CALICO RESOURCES USA CORP.
GRASSY MOUNTAIN MINE PROJECT

MALHEUR COUNTY, OREGON

CONDITIONAL USE APPLICATION

January 2019

Applicant's Representative: Nancy J. Wolverson
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503-796-2893

MALHEUR COUNTY PLANNING DEPARTMENT

CONDITIONAL USE PERMIT APPLICATION
For Non-Farm Dwelling
In the EFU, ERU or EFFU Zones

A conditional use is an activity which is basically similar to the uses permitted in a zone but which may not be entirely compatible with the permitted uses. An application for a non-farm dwelling requires review to ensure that the proposed dwelling complies with non-resource dwelling criteria and may be made compatible with the permitted uses in the zone or other adjacent permitted uses which may be adversely affected.

1. **APPLICANT:**

Name: Calico Resources USA Corp. Phone: 775-623-3600

Address: 665 Anderson St City: Winnemucca State: NV Zip: 89445

DEED HOLDER OF THE SUBJECT PROPERTY:

Name: Calico Resources USA Corp. Phone: Same as above.

Address: Same as above. City: _____ State: _____ Zip: _____

CONTRACT PURCHASER OR LESSEE OF THE SUBJECT PROPERTY:

Name: N/A Phone: _____

Address: _____ City: _____ State: _____ Zip: _____

2. **SPECIFIC DIRECTIONS TO SUBJECT PROPERTY:**

South on Russel Road, Cow Hollow Road, Twin Springs Road to Patent Parcel.

3. **SPECIFIC DESCRIPTION OF PROPERTY:**

T 22S **R** 44E **Sec(s).** N/A

ASSESSOR'S MAP NO.(S) 22S44E

TAX LOT NO.(S): 101

COMPUTER REFERENCE NO.(S): _____

SIZE OF PARENT PARCEL: 62 acres

4. **GENERAL DESCRIPTION OF PROPERTY:**

Current Use: Open Range; Mineral Exploration

Topography: Sloping, with mounded rock outcroppings

Does it front as a public road? ☒ **Yes** ☐ **No**

Name of road: Twin Springs Road

- **Attach a letter from the appropriate road district or State Highway Division**

Does it front a private road? ☐ **Yes** ☒ **No**

Name of road: _____

What buildings are on the property? N/A

Does the property have water rights attached to it? ☒ **Yes** ☐ **No**

- **Attach a letter from the appropriate irrigation district addressing water rights**

Means of water supply: Well

Means of sewage disposal: Septic drainfield

Is the parcel located within a rural fire protection district? ☐ **Yes** ☒ **No**

- **Attach a letter from the appropriate fire protection district regarding the availability of fire protection for the parcel**

What other improvements are on the property? _____

5. **Cite the section in the land use and development ordinance under which you are applying for a conditional use permit:** See attached narrative.

6. **GENERAL DESCRIPTION OF ADJOINING PROPERTY:**
Identify any buildings or structures on the adjacent property and give their approximate distance from your property lines:
N/A

Identify the current uses of adjacent property: Open range BLM land.

7. **PROVIDE PLOT PLAN (See attached example)**

NON-FARM DWELLING CRITERIA

8. **Effect on nearby resource lands standard:** The dwelling or activities associated with the dwelling will not force a significant change in, or significantly increase the cost of accepted farming or forest practices on nearby lands devoted to farm use:

a. **Describe farm practices (not just the use) on surrounding lands devoted to farm or forest use:** N/A

b. **Explain why the proposed use (non-farm dwelling) will not force a significant change in those practices:** N/A

c. **A lot or parcel, or portion of a lot or parcel, being unsuitable for one farm use does not mean it is unsuitable for all farm uses. Explain how the proposed site for the dwelling is unsuitable for all farm uses:**

N/A

9. **The "materially alter the stability" standard:** The dwelling and/or partition will not materially alter the overall stability of the overall land use pattern of the area.

Explanation: Generally, the intent of the "materially alter" standard is to consider the cumulative impact of possible now non-farm dwellings and parcel, and new non-farm dwellings on existing lots and parcels in the area, and, if the application involves the creation of a new parcel for a non-farm dwelling, to also consider whether or not creation of the new parcel will lead to the creation of other non-farm parcels to the detriment of agricultural practices in the area.

a. Identify and attach a map of the study area that includes at least 2,000 acres. Lands zoned for rural residential or other urban or non-farm use may not be included in the study area.

If a study area of less than 2,000 acres is selected, attach findings of fact supported by substantial evidence, explaining why the selected area is representative of the land use pattern surrounding the subject parcel and why it is adequate to conduct the required "cumulative impact analysis".

b. List the broad types of farm uses (i.e. irrigated or non-irrigated crops, pasture, range, etc.) within the study area.

N/A

c. List the number of existing dwellings within the study area. (Mark location of existing dwellings on the study area map)

Primary Farm Dwellings _____ Accessory Farm Dwellings _____

Non-Farm Dwellings: _____ Hardship Dwellings: _____

d. List the number of potential dwellings within the study area:

1. Potential Farm Dwellings _____

2. Potential Non-Farm Dwellings _____

3. Potential "Lot of Record" Dwellings _____

10. On those parcels where you conclude no potential dwelling(s) will be sited, describe why?

N/A

11. Describe what the study area looks like now and what the study area will look like if all potential development occurs.

N/A

12. Does the approval of potential non-farm and "lot of record" dwellings, together with existing non-farm dwellings within the study area, materially alter the stability of the overall land use pattern of the area? The stability of the land use pattern will be materially altered if the cumulative effect of the existing and potential non-farm dwellings will make it more difficult for the existing farms in the area to continue operation due to diminished opportunities to expand, the diminished opportunity to purchase or lease farmland such that the area will be destabilized and diminished opportunity to acquire water rights.

N/A

13. Describe dwelling development trends in the study area since 1993:

N/A

FEE: **A non-refundable fee, as specified in the most recent "Malheur County Code, Section 1-6-5, must accompany this application. Make all checks payable to the Malheur County Planning Department.**

I (We), CARLO BUFFONE

(print name in full)

am (are) the applicant(s) and hereby certify that the statements and information contained herein are, in all respects, true, complete and correct to the best of my (our) knowledge and belief.

Signed: C. B

PROPERTY OWNER OR AUTHORIZED AGENT MUST ALSO SIGN:

C. B

Property Owner

Date:

BEFORE THE COUNTY COMMISSION AND COUNTY COURT FOR MALHEUR COUNTY, OREGON

An Application for a Conditional Use Permit and Sage Grouse Rule Permit pursuant to OAR 660-023-0115 to establish an underground gold mine on property identified as tax lot 101 of Malheur County Assessor's Map 22S 44E.	**APPLICANT'S STATEMENT IN SUPPORT OF APPLICATION**

I. INTRODUCTION

This application (the "Application") is respectfully submitted by Calico Resources USA Corp. ("Calico") for an underground gold and silver mine on private land zoned for Exclusive Range Use ("ERU"). The project is known as the "Grassy Mountain Gold Project" (the "Project") and will be located approximately 22 miles south of Vale on an approximately 62-acre parcel (the "Patent Parcel") and surrounding land administered by the Bureau of Land Management ("BLM").[1] The Patent Parcel is coterminous with Calico's patented mining claims and is the subject of this Application. It is entirely surrounded by federal land managed by the BLM. The Patent Parcel location is shown on the map below:

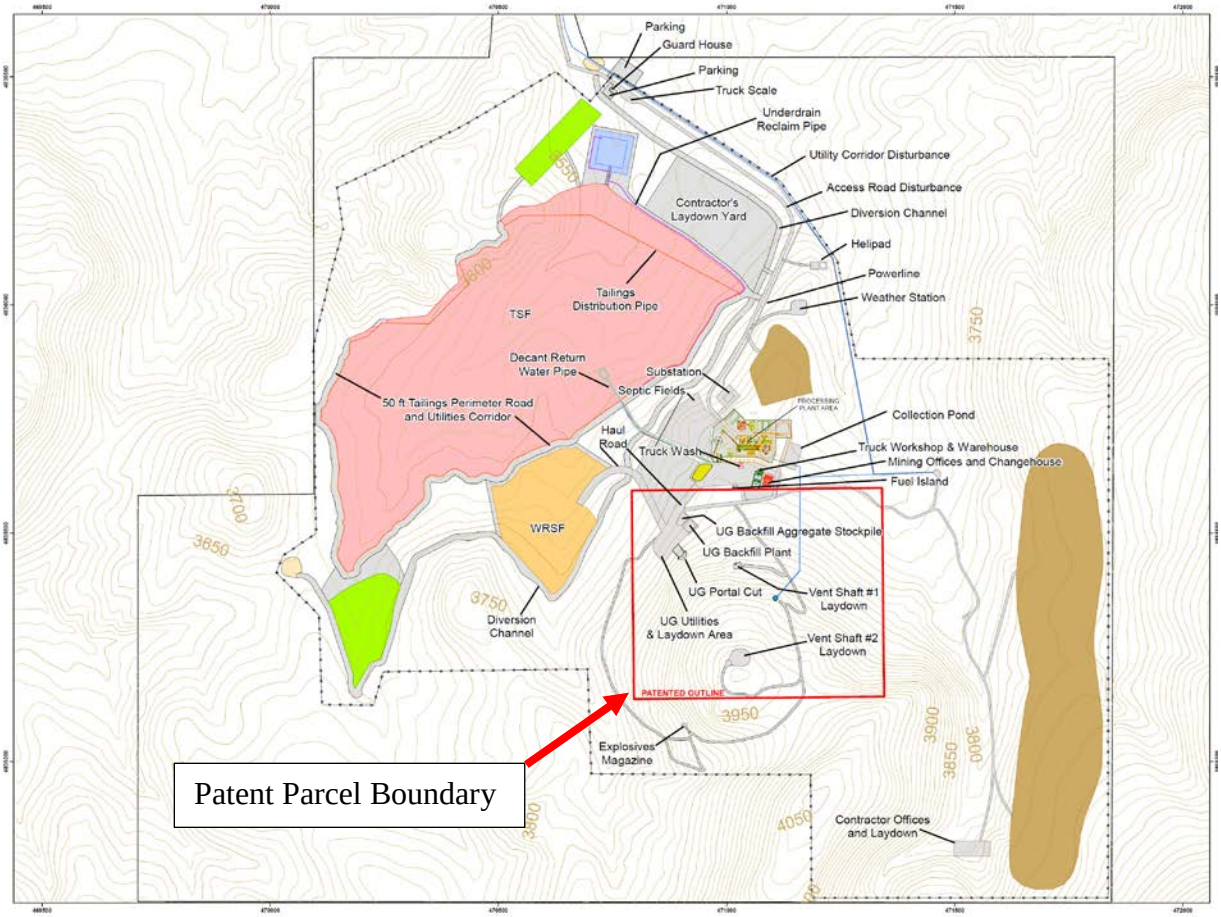
[1] For purposes of this application narrative, the term "Patent Parcel" refers to the private land subject to this Application, the term "Project Area" refers the geographic extent of the entirety of the Project, and the word "Project" refers to the entirety of the mine and processing operation.

Figure 1 - Overview Map

A. Project Description

The Project will involve several elements: the mine site itself and its entry portal, which are located on the Patent Parcel; a processing facility; a tailings storage facility; a waste rock storage facility; borrow pits for production of backfill rock; and various support and administrative buildings. The entire Project Area will be fenced. Of these facilities, only the mine portal and related elements will be located on the Patent Parcel surface (the mine itself will be located beneath the Patent Parcel). A concept site plan showing the entirety of the Project is below. Note that the Patent Parcel subject to this Application is outlined in red.

Figure 2 - Site Plan

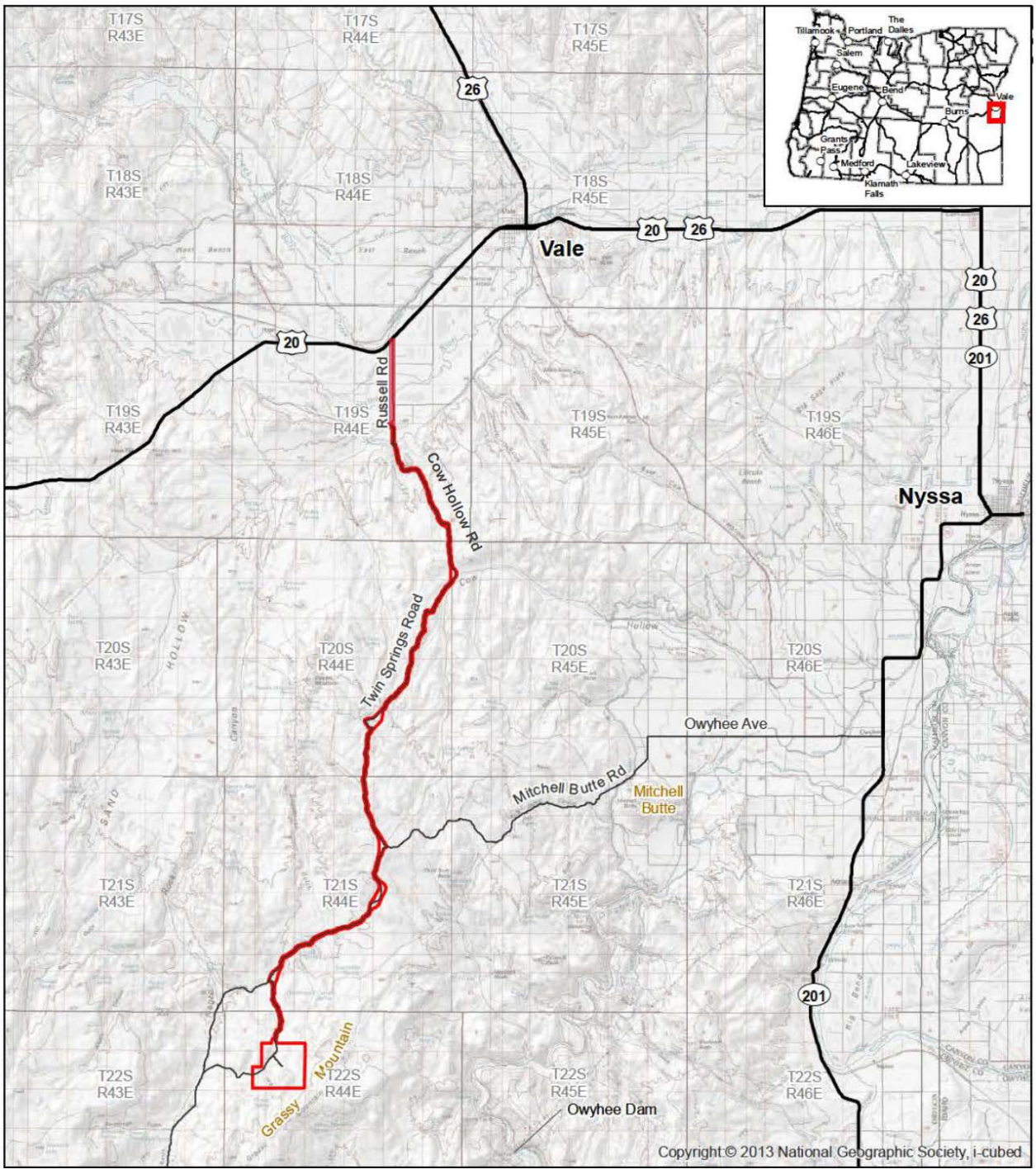


As demonstrated on the above site plan, development on the Patent Parcel will primarily involve construction of a mine portal near the northwest corner, improved gravel surface roadways that will allow access to the mine portal/decline, ventilation shafts, and laydown/storage areas.

B. Road Access

The Project will be accessed via "Russel Road," "Cow Hollow Road" and "Twin Springs Road," as shown in the following figure:

Figure 3 - Primary Project Access Route



Russell Road is a county road that is used as part of the main access route from the City of Vale. It extends approximately four miles to connect US 20 to Cow Hollow Road. Approximately two miles of Russell Road is paved, after which it becomes

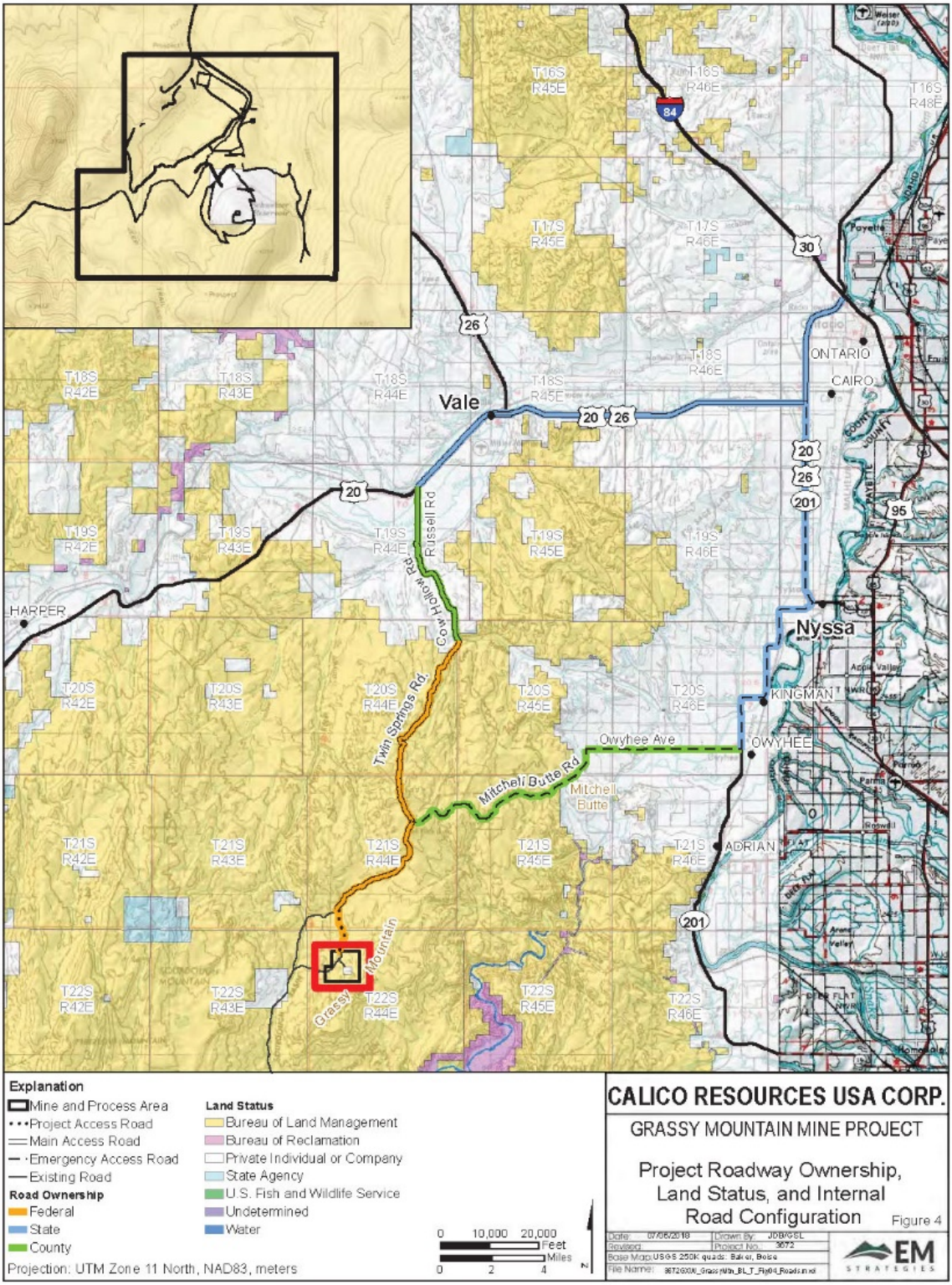
gravel as it extends south. The paved section passes through irrigated farmland and dispersed farmsteads.

The Oregon Department of Transportation ("ODOT") and the County's Transportation System Plan (1998) (the "TSP") classify Russell Road as a Minor Collector. The four-mile segment is managed and maintained by the County's Road Department. Russell Road consists of an approximately 22-foot wide improvement within a 60-foot wide right-of-way. The County does not propose any improvements to Russell Road in its current capital improvement program.

Cow Hollow Road connects Russell Road to Twin Springs Road via a four-mile section of unpaved (gravel) road. Cow Hollow Road is designated as a county local street by the County's TSP and is maintained by the BLM. It passes through undeveloped land, most of which is privately owned, continues past the intersection with Twin Springs Road, and eventually connects into the road network around the town of Owyhee to the east.

Twin Springs Road is the last section of the main access road, and is also designated as a local street by the TSP. The section of Twin Springs Road that is part of the proposed Project will provide a connection between Cow Hollow Road and the Mine and Process Area. Twin Springs Road is unpaved (gravel) and passes through BLM land. The BLM manages and maintains Twin Springs Road.

Figure 4 - Road Ownership in the Project Area



The unpaved portion of the county road system that provides access to the Project will be improved according to County road standards, as determined by the County Roadmaster, and as roughly proportional to the impacts of the Project. All roadway improvements will be provided at Calico's expense. Calico will coordinate with the County Roadmaster to obtain any necessary permits for improvement of the County roadways.

C. Surface and Subsurface Drainages

The Project Area is rolling hill terrain that drains toward, and into, Negro Rock Canyon, which is located to the northwest of the Project Area. The highest surface elevation is about 4,800 feet above mean sea level ("AMSL") along the west flank of Grassy Mountain. Elevation of the Project Area decreases to the north (about 3,250 AMSL at Negro Rock Canyon). The Patent Parcel and Project Area do not feature any permanent or consistently periodic surface drainages. There are no jurisdictional waters within the Project Area. Negro Rock Canyon contains an intermittent drainage that only flows in response to snowmelt or heavy precipitation.

On the Patent Parcel, subsurface water is located within an aquifer generally located below 3,000 feet AMSL, approximately 500-800 feet below the mine surface.

II. RESOURCE DESCRIPTION AND PROJECT PLAN

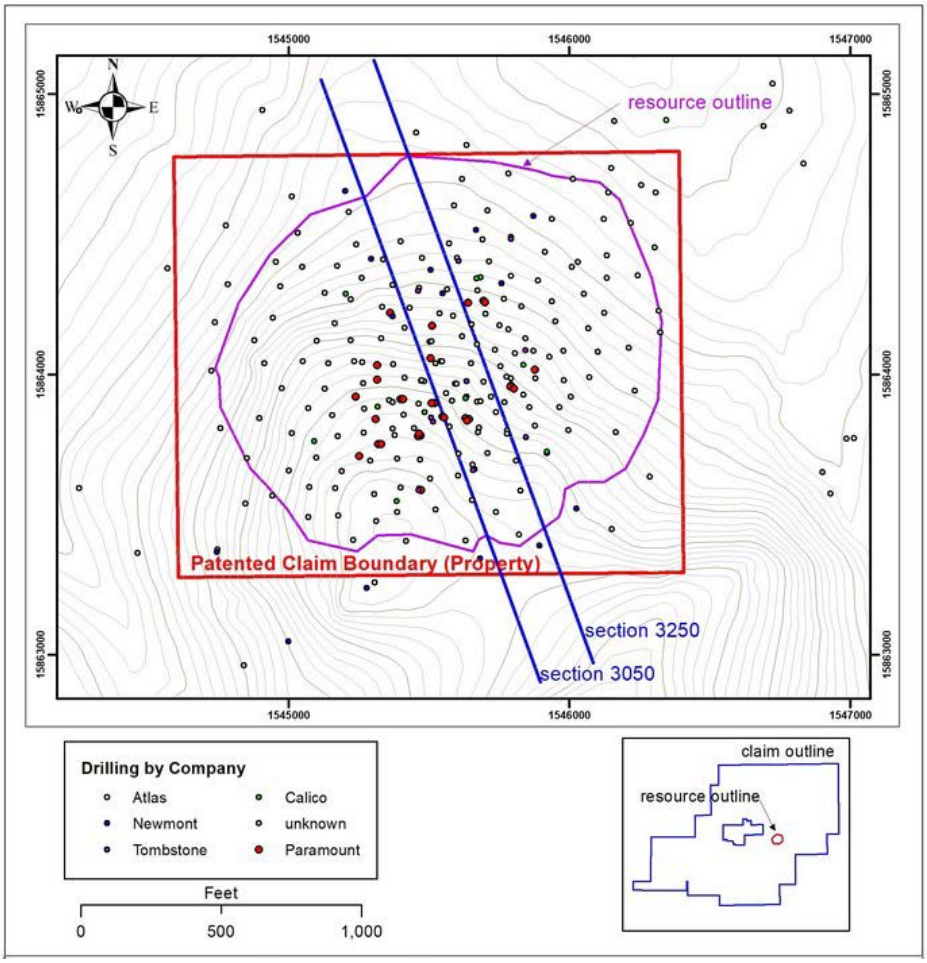
The entire Grassy Mountain project area is comprised of approximately 981 acres, of which 919 acres are public land administered by the BLM and approximately 62 acres of which constitute the Patent Parcel. The Patent Parcel surrounds a loose rock outcropping approximately 22 miles south-southwest of Vale.

Both gold and silver were discovered in the Project Area by two independent geologists in 1986, who staked and patented the claim area that became the Patent Parcel. Calico became the Project owner in 2011 after the claim was transacted a number of times. Low gold and silver prices and high production costs have prevented mining on the site until it became economically feasible over the last half-decade, as mining techniques developed and the price of gold and silver increased.

A. Resource Description

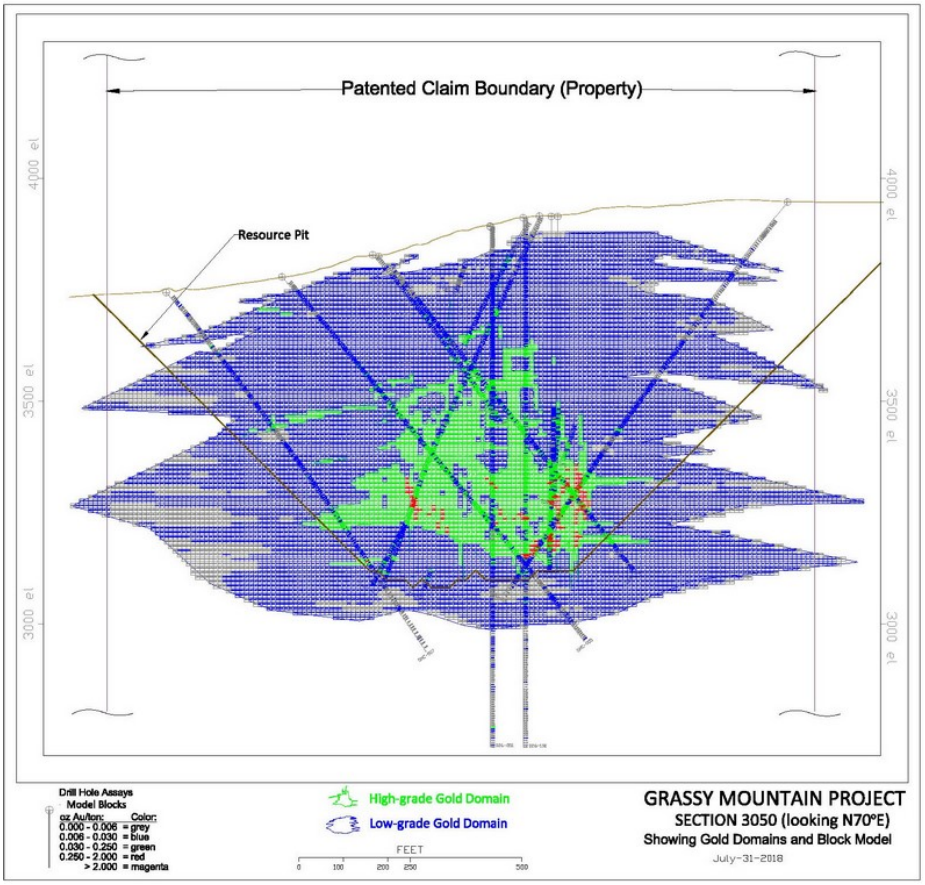
The gold and silver resources at Grassy Mountain are not exposed on the surface, but are located roughly 500–700 feet below the surface of the Patent Parcel. **Figure 5**, below, provides a plan-view of the deposit as its outline would appear on the surface.

Figure 5 - Location of Grassy Mountain Gold and Silver Resource



The Figures 6 and 7, below, provide an isometric view of the gold resource.

Figure 6. Cross-Section View of Grassy Mountain Mineral Resources

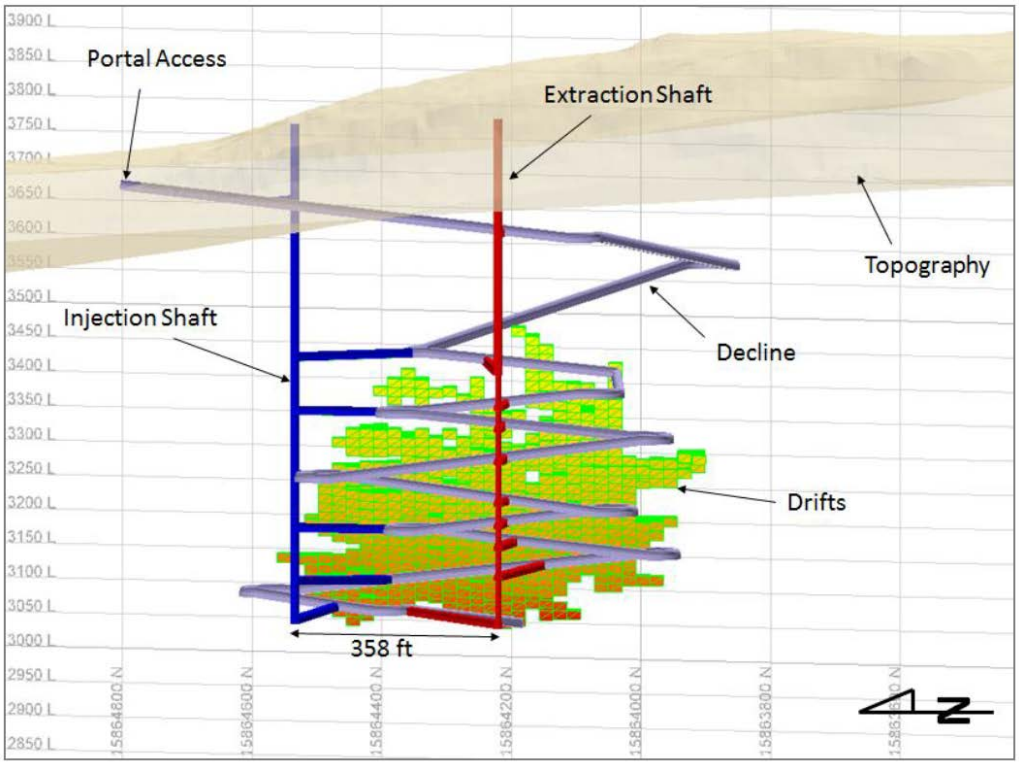


Based on Calico's July, 2018 Preliminary Feasibility Study and Technical Report (the "PFS Report") (**Exhibit 1**), the deposits include approximately 362,000 oz of gold and 516,000 oz of silver, based on proven plus probable reserves. PFS Report at 5.

B. Mining and Processing Methods

Initial surface access to the mineralized zone, which lies at a depth between 500 and 700 feet from the surface, will be via a portal (mine entrance) and decline (underground ramp). This portal will start in the northwest corner of the Patent Parcel and proceed on a downward gradient in a generally south-southeast direction. Once mine development reaches the initial mining levels, ventilation shafts will be installed. The following figure provides an isometric view of how the mine will be constructed.

Figure 7 – Mine Access and Decline Plan



The mine is designed to produce 1,300 to 1,400 tons of raw ore per day. In general, the ore body will be mined out from the bottom to the top using a combination of explosives and mechanical mining techniques. As mining proceeds, the mine decline and drifts will be back-filled with waste rock extracted early in the mine development and aggregate mined from pits located on federal land, adjacent to the Patent Parcel.

The raw ore will be removed from the mine drifts by trucks and sent through a staged mineral recovery (i.e. processing) plant. The ore will first be crushed and placed into a centrifugal gravity concentrator to separate gold and silver. Afterwards, the resulting tails will be sent through an enclosed carbon-in-leach ("CIL") process. During this process, the ore will be deposited into agitated tanks where leaching reagents (sodium cyanide), lime to adjust the pH, and oxygen are added. The resulting chemical reaction dissolves (leaches) the precious metals and allows them to go into solution (dissolve into the slurry flow). These tanks are situated on bermed concrete floors, which are designed to contain 110 percent of each tank's maximum storage capacity in order to avoid contamination if an accidental spill were to occur.

The next step in the CIL process involves the addition of activated carbon to the gold solution. The activated carbon is added to the last tank, and moved counter-current to the slurry flow. Activated carbon has the ability to recover gold and silver from solution by adsorbing it onto carbon particles. The gold- and silver-loaded carbon is transferred from the first leach tank to the carbon handling area for further treatment. The leached tailings slurry from the final leach tank will be transferred to a cyanide destruction circuit, which will destroy the cyanide before the tailings are deposited in a storage containment facility. None of the cyanide processes are conducted outside of slurry tanks or other enclosed systems.

The remaining tailings and process water are then pumped to an engineered tailings storage facility ("TSF") for final disposal. The TSF will be an approximately 102-acre impoundment, which will be located entirely on federal land. The TSF will include an underdrain system comprised of perforated pipe being set in a coarse development rock drainage blanket. This will be constructed above a compacted natural fill on a synthetic impoundment liner. Seepage will be limited due to the permeability of the tailings. Process water will settle through the tailings, into the drainage system, and recovered and reused in the CIL process.

C. Surface Alterations of the Patent Parcel

As the bulk of the processing, tailings management, and stockpiling activities will occur outside of the Patent Parcel, Calico proposes few surface alterations on the Patent Parcel. Surface alterations will primarily include the mine portal, associated utility and laydown areas, and backfill aggregate plant and stockpiling areas. Ventilation shafts, utility lines, and associated laydown areas are also proposed. A high-definition site plan showing these facilities is enclosed as **Exhibit 2**.

D. Reclamation

The State of Oregon requires that a reclamation plan be developed for any new mining project and for expansions of existing operations (OAR 632-037-0070). A preliminary reclamation plan (the "Rec. Plan") is part of a preliminary Plan of Operation and is enclosed as **Exhibit 3**.[2] For the Patent Parcel, the principal reclamation will be the plugging of the portal and vent shafts. Surface facilities, such as tanks wells and power lines will be removed. Reclaimed surfaces will be

[2] Note that some materials include earlier draft site plans that may conflict with the one in the PFS Report and attached hereto. Any conflicts between site plans in the supporting materials should be resolved in favor of the Site Plan enclosed herein as **Exhibit 2**.

re-vegetated to control runoff, reduce erosion, provide forage for wildlife and livestock, and reduce visual impacts. During reclamation, growth media suitable for revegetation will be spread over the disturbed areas of the Project—including the TSF—to a depth of 12-24 inches. Rec. Plan 15. Suitable growth media will be salvaged and stockpiled during the development of the facilities, during construction of the waste rock storage areas and the TSF, and construction of other Project facilities. Rec. Plan 9. After the growth media is spread, it will be graded to resemble natural contours and seed will be applied during the spring. Rec. Plan 9. Seeded species will include sagebrush, wheatgrass, and squirreltail. Rec. Plan 16.

The proposed Project will be active for approximately 14 years, which includes two years of construction and pre-production, ten years of mining and processing, and three years of closure and reclamation. Ground water may be monitored for up to seven years after that, extending to some 20 years from the beginning of the Project. The same land uses of mineral exploration and development, livestock grazing, wildlife habitat, and dispersed recreation, and all other uses permitted by the ERU zone will remain following mine closure.

E. Operational Timeframe

The proposed Project will be active for approximately 14 years, which includes two years of construction and pre-production, ten years of mining and processing, and three years of closure and reclamation. Three years of closure and reclamation are estimated with several years beyond anticipated for ground water monitoring. This schedule may be modified based on the rate of mining and future commodities prices.

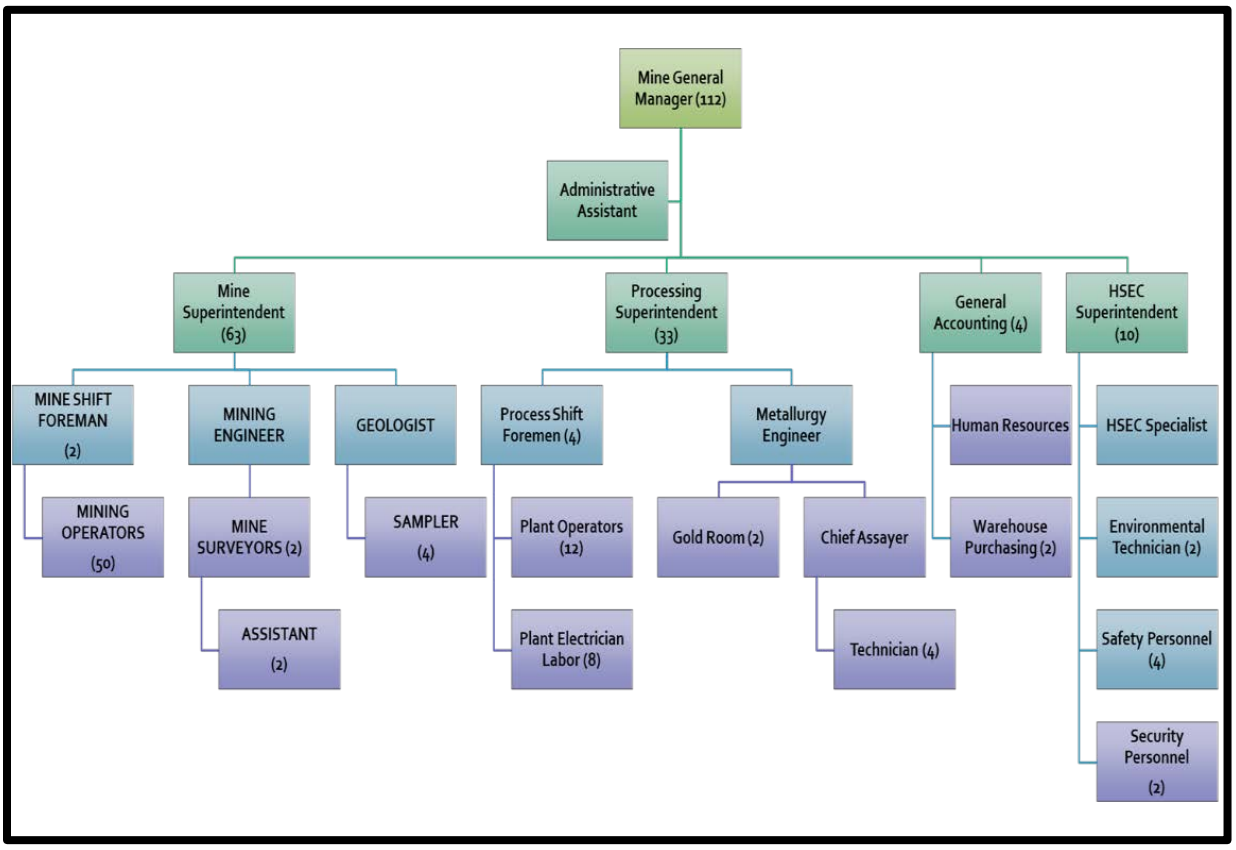
Construction is anticipated to begin in 2020, meaning that active construction, mining, and reclamation activities will continue through at least 2034.

F. Mine Staffing

During its 10-year processing duration, the Project is anticipated to employ up to 110 employees at its peak, which comprises approximately 63 mine workers, 35 plant operations and maintenance workers, and 12-15 administrative staff. The Project will provide employment opportunities through 2034 or longer, depending on economic conditions. PFS Report 209, Rec. Plan 15.

Calico intends to source jobs from the local community, primarily including the Malheur County and Treasure Valley areas, to supply the expertise reinforcing the site's experience level. In previous projects, Calico has gained substantial expertise in creating and maintaining partnerships with local community colleges and vocational schools whereby "mining expertise" is developed through "partnership curriculums." For this project, partnerships are likely to be made with Treasure Valley Community College in Ontario, Eastern Oregon University in LaGrande, and the College of Western Idaho in Boise, in order to provide workforce training. Mine employees will be provided a daily bus shuttle option from Vale to limit the number of personal vehicles travelling to the site.

Figure 8 - Mine Organization Chart



G. Construction Staffing

Construction will be performed by contractors over a one- to two-year period. The peak number of construction workers is estimated to be approximately 150.

III. REGULATORY STRUCTURE AND PROCEDURAL REQUIREMENTS

Mining operations on BLM land are subject to approval under the Federal Land Policy and Management Act ("FLPMA") and state and federal environmental statutes. Overall approval of the mine on both federal and County land is the responsibility of the Oregon Department of Geology and Mineral Industries ("DOGAMI") through its Chemical Process Mining permitting process, set forth in OAR Chapter 632, Division 37 (the "Consolidated Permit"). Other state environmental laws apply on federal land through that process.

FLPMA accords land planning responsibilities for federal land under the jurisdiction of the Department of Interior to BLM. Therefore, only the project elements proposed on the Patent Parcel are within the scope of this Application.

Mining activities on non-federal lands, including the Patent Parcel, are subject to Oregon land use laws, the Malheur County Comprehensive Plan (the "Plan"), and the Malheur County Code ("the MCC"). Pursuant to MCC 6-3A-3, "mining of aggregate and other mineral resources or other subsurface resources" is a Conditional Use in the ERU zone, meaning that a Conditional Use permit ("CUP") will be required.[3]

In addition to this proposed CUP, OAR 660-023-0115, the state "Sage Grouse Rule" (or "SGR"), applies to the Application, although it is not incorporated into the MCC. The Application includes findings of fact supported by substantial evidence demonstrating that the Project can satisfy the SGR.

Decisions on a CUP are made after a hearing before the Planning Commission. MCC 6-6-6. Appeals of a Planning Commission decision are conducted before the County Court. No procedures are set forth in MCC for considering a permit issued under the SGR (OAR 660-023-0115). However, by providing that approvals under that rule are to be issued by a county, the rule apparently requires a final decision by the governing body of a county; in this case, the County Court. MCC 6-9-11

[3] The MCC provides that permits to mine for *aggregate* resources may issue only if the Patent Parcel is "included on an inventory in the Malheur County Comprehensive Plan." MCC 6-4-7 (**Exhibit 4**); *see also* ORS 215.298(2). This "inventory" refers to the County's inventory of significant Goal 5 mineral and aggregate resources. *Beaver State Sand and Gravel, Inc. v. Douglas County*, 43 Or LUBA 140, 170–75 (2002), *aff'd*, 187 Or App 241, 247–53 (2003). However, this Application is for a mine for a *mineral* resource and not an aggregate resource; therefore, inclusion on the County's inventory of significant Goal 5 resources is not required.

requires that "where other provisions of the Malheur County ordinances specify procedures with greater opportunity for public notice and comment, those procedures shall apply." In light of the above, the Applicant requests an initial hearing before the Planning Commission with a recommendation to the County Court on the CUP and SGR permit. The County Court should then hold an on-the-record hearing on the Application,[4] after which it may either approve, approve with conditions, or deny the Application.

IV. CONDITIONAL USE PERMIT

6-6-7: General Criteria to Evaluate Suitability:

In considering the suitability of proposed conditional uses, the planning commission shall base its decision upon the following criteria:

A. Comprehensive Plan Goals: Comprehensive plan goals and policies, as applicable.

RESPONSE: The Patent Parcel is zoned for Exclusive Range Use, which is a sub-designation of the County's Goal 3 "Agricultural Lands." As the Project will create a substantial number of jobs in Malheur County, Goal 9 "Economy," also applies. Goals 11 and 12 apply because the project will generate a small increase in traffic and will require service by public utilities. Finally, a number of miscellaneous policies may apply. Please note that Statewide Planning Goal 5 does not apply because the Property is not listed by the County as a Goal 5 resource. However, Calico addresses Goal 5 of the Comprehensive Plan without conceding that it applies.

Goal 1: Citizen Involvement

Goal: To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the Planning Process.

9. All planning activities will be publicized to make residents aware of upcoming decisions that may affect them.

[4] The County Court is required to hold its hearings on-the-record unless the applicant or Opposing Party shows good cause. MCC 6-9-4.D.

RESPONSE: Pursuant to the County's administrative requirements in the MCC and ORS 197.763, the County shall provide adequate notice of this Application. Therefore, the County can find that the Project is consistent with this policy.

11. Copies of the comprehensive plan and all other planning documents will be available to all residents.

RESPONSE: A copy of the Application and official record in this matter shall be made available for the public at County offices and can be accessed upon request. Therefore, the County can find that the Project is consistent with this policy.

Goal 3: Agricultural Lands

Goal: To preserve and maintain the agricultural land in the county for agricultural purposes.

1. Public and private land classified by the Natural Resources Conservation Service (formerly U.S. Department of Agriculture Soil Conservation Service) as being in Capability Classes I through VI, as well as High Value Farmland as defined by applicable Oregon Revised Statutes and Oregon Administrative Rules and any other lands determined to be necessary and required for farm use, are considered to be agricultural lands.

RESPONSE: The Patent Parcel has not been classified by the U.S. NRCS as having Type I through Type VI soils. In fact, the NRCS has not characterized the soil types on Project Area or in the vicinity. While the County considers the Patent Parcel to be suitable for range use, it is barren and unirrigated; therefore, no additional protections from non-farm uses are warranted on the Patent Parcel.

2. High Value Farmlands (ORS and OAR designated) shall be given the greatest protection. Lands classified by the Natural Resources Conservation Service, as Capability Classes I through VI shall be afforded the next highest protection with Class I having the highest protection and Class VI the least.

RESPONSE: The Patent Parcel has not been classified by the U.S. NRCS as having Type I through Type VI soils. While the Patent Parcel has been considered to be suitable for range use, it is barren and unirrigated; therefore, no additional protection from non-farm uses are warranted on the Patent Parcel.

Note that a site-specific soil study was conducted in 1989 and 1991. It characterized the soils on the Patent Parcel to be "Farmell-Rock outcrop complex, 8 to 30 percent slopes" and "Farmell-Chardoton very cobbly soil, 15 to 30 percent slopes." (*See* excerpt of Mine Plan of Operations, Volume I of III dated August 2017 at 22-23 enclosed herein as **Exhibit 5**.) Even without slopes and substantial gravel and rock inclusions—which the Patent Parcel soils have in abundance—these soils have an unirrigated rating of VI or VII, and both soil types are mild to moderately alkaline. **Exhibit 6**. The following photos of the soils and terrain on the Patent Parcel illustrate the rockiness of the soils and its unsuitability for cultivation.

6. The county will review and consult with the irrigation and drainage districts on land use decisions to assure they will not negatively impact the integrity or operation of water for irrigation or drainage purposes.

RESPONSE: This policy is for the County to implement and is not directly applicable to the Application. The Patent Parcel is unirrigated and process water will be provided by wells pursuant to water rights issued by the Oregon Water Resources Department.[5] Therefore, the County can find that the Project will have no impact on water distribution or drainage district resources in the County.

7. In addition to county code and the State of Oregon's land use laws and administrative rules for non-farm dwellings, it is the policy of Malheur County that there be no net loss of farmlands listed on the High Value Farmlands Soils list or soils classified as types I-III by the Natural Resources Conservation Service.

RESPONSE: As explained above, the Patent Parcel is not composed of soil classes I-III; therefore, this policy does not apply.

8. Normal farming and ranching activities will be allowed to exist and continue without interference from non-farm users of the land.

RESPONSE: There are no surrounding or nearby farming or year-round ranching activities adjacent to the Patent Parcel. The Access Road within the area of active farming will be within an existing County right-of-way. To the extent that surrounding open range is used for seasonal ranching in the vicinity of the Project Area, interference between livestock and mining activities will be prevented by fencing that will enclose the entire Project Area. For the above reasons, the County can find that the Project is consistent with this policy.

Goal 5: Open Space, Scenic and Historic Areas, and Natural Resources

Goal: To conserve open space and protect natural and scenic resources.

<u>Mineral and Aggregate Resources</u>

[5] Water quantity considerations are the sole purview of the Oregon Water Resources Department and the County may not consider water quantity in deciding whether to approve the application. *Ashland Drilling, Inc. v Jackson County*, 168 Or App 624, 643 (2000).

1. The county will continue to study mineral and aggregate sites throughout the county to determine the precise location, quality and quantity of these resources.

RESPONSE: This policy is a mandate for the County to determine the location, quality, and quantity of mineral resources. For this reason, the above policy does not apply to the Application. However, even if it did, the County can find that this Application is consistent with this policy because it precisely identifies the location, quality, and quantity of the gold and silver resources proposed for mining.

2. The county will establish land use regulations that protect mineral and aggregate resources from incompatible uses.

RESPONSE: This policy is a planning mandate for the County, and does not apply to the Application. As the surrounding property is entirely under the jurisdiction of the BLM, Calico does not request re-zoning of surrounding lands to protect the Patent Parcel from incompatible uses.

3. The county will cooperate with other government agencies in the enforcement of mining regulations.

RESPONSE: This policy is a coordination mandate for the County and does not apply to the Application. However, Calico notes that the County has been and will continue to cooperate with BLM, DOGAMI, DEQ, and ODFW as necessary for this and all other permitting actions necessary for the Project, including for determination of any mitigation necessary under the SGR and completion of the Consolidated Permit.

Fish and Wildlife Habitat

2. The county will consider the impacts of proposed development on fish and wildlife habitats when making land use decisions.

RESPONSE: The requirement that the County "consider" the Project's impacts on fish and wildlife habitats does not require a specific showing in the application and does not require affirmative actions or decisions from the County, and therefore does not apply directly to the Application. The Commission can find that the County's consideration of land use impacts on fish and wildlife habitats is implemented through the MCC.

However, Calico has conducted a complete Wildlife Resources Baseline Report (the "Wildlife Report"), which is enclosed in this Application as **Exhibit 7**. Even if this policy does apply, the County can find that activities on the Patent Parcel will not cause any detrimental or permanent harm to fish and wildlife. Thus, the County can find, in the alternative, that the Project is consistent with this Policy.

3. The Oregon Department of Fish and Wildlife's "Fish and Wildlife Habitat Protection Plan" will be recognized as a guideline for planning decisions.

RESPONSE: While the above policy may recognize the "Fish and Wildlife Habitat Protection Plan" ("FHWPP") as a "guideline," it does not by its own terms impose the provisions of that plan as applicable criteria. The Commission can find that this policy does not apply.

However, if the Commission concludes that it should examine the Project guided by the FHWPP, that review would demonstrate that the Project is consistent with this policy. The objective of the FWHPP (now titled the "Fish and Wildlife Habitat Mitigation Policy" or the "Habitat Policy") is to "mitigate impacts to fish and wildlife caused by land and water development actions." OAR 635-415-0000. Under the Policy, development applications are reviewed by ODFW for potential impacts, then ODFW makes recommendations for mitigating impacts, if any. OAR 635-415-0015. Because Calico's Project will be reviewed by ODFW under the Policy, the Project can be considered consistent with the FHWPP. This is particularly true because Calico's Wildlife Report identified no endangered or threatened species or sage grouse within the Patent Parcel.

The Wildlife Report (**Exhibit 7**) is based on a Wildlife Study Area ("WSA") that includes the Access Corridor and Permit Area, and either a 0.5 mile or two mile buffer, depending on the species. Species which were surveyed within a two-mile buffer include greater sage-grouse, golden eagle, nesting raptors, and general observations of special status (i.e. endangered or threatened) and non-special status species. Surveys were conducted in 2014, 2017, and 2018. Wildlife Report 8. Habitat was categorized in accordance with the ODFW Fish and Wildlife Habitat Mitigation Policy. Wildlife Report 8. No endangered or threatened species, or sage grouse or sage grouse leks were observed within the WSA or are identified in official records. Some species identified as "Sensitive" by the BLM are present in the study area. Wildlife Report 16–19.

<u>Water Resources</u>

3. The county will continue to consult the County Sanitarian in land use decisions.

RESPONSE: This policy establishes an affirmative duty on the County and not the Applicant; therefore, the County can find that it does not apply. To the extent that the County finds otherwise, it can find that this policy can be met by notifying the County Sanitarian of the Project upon this Application being deemed complete.

4. The county will notify and consult with appropriate state agencies during review of development proposals that might affect surface or groundwater quality.

RESPONSE: This policy establishes an affirmative duty on the County and not the Applicant; therefore, the County can find that it does not apply. To the extent that the County finds otherwise, it can find that this policy can be met by notifying appropriate state agencies of the Project upon this Application being deemed complete.

Goal 9: Economy

Goal: To diversify and improve the economy of Malheur County.

4. County land use regulations and land use decisions will encourage the continuation and expansion of existing industry and promote the development of new industry in Malheur County whenever possible.

RESPONSE: The Commission can find that the Application satisfies this policy by providing over 100 new jobs and creates a new, large-scale gold and silver mining industry in the County.

5. The county may not arbitrarily prohibit, deter, delay or increase the cost of appropriate development, but shall enhance economic development and opportunity for the benefit of county citizens.

RESPONSE: The Commission can find that prompt review and approval of the Application furthers this Policy.

7. In implementing land use regulations and making land use decisions, the county will strive to achieve the following:

a. Develop available natural resources.
b. Create employment opportunities.
c. Expand and maintain existing industry.
d. Diversify agricultural products and the economic base.
e. Broaden the tax base.

RESPONSE: As explained above, the Project will create a substantial positive economic impact in Malheur County by:

- Developing the County's gold and silver reserves;
- Adding an estimated 110 new full-time jobs for no less than seven years;
- Adding a substantial number of construction jobs (estimated to be at least 150) for at least a year after work begins;
- Providing good family-wage jobs through 2034.
- Broadening the County's tax base by substantially increasing the value of the patent parcel, which is subject to County property taxation;
- Building on the County's mining heritage; and
- Creating a new chemical mining industry in the County.

For the above reasons, the County can find that the project furthers sub-policies a-c and e. The Project does not relate to sub-policy d because it is not an agricultural use, although the County can find that by creating a new type of mining use in the County, it will diversify the County's economic base.

Goal 11: Public Facilities and Services

Goal: To plan and develop a timely, orderly, and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

<u>Fire and Police Protection</u>

2. The county will require all major development projects to have an adequate fire protection plan.

RESPONSE: The Project will proceed under the following Fire Protection Plan, outlined in the PFS Report at 193:

"Water for fire protection will be distributed from the fire water tank located at the base of Grassy Mountain via a network of piping and will be maintained under a constant pressure with a jockey pump. The piping will be looped and sectionalized to minimize loss of fire protection during maintenance. Where located outside buildings, fire water piping will be buried below the ground surface to eliminate the potential of pipes freezing.

Yard hydrants will be limited to the fuel storage tank area. Wall hydrants will be used in lieu of yard hydrants, and these will be located on the outside walls of the buildings in cabinets that will be heated during winter months.

Fire protection within buildings will include standpipe systems, sprinkler systems, and portable fire extinguishers. Standpipe systems will be provided in all structures that exceed 46 feet in height, as well as where required by building code, local authorities, or the insurance underwriter.

Sprinklers will be provided at the following locations or to protect the following items:

- Truck workshop;
- Assay laboratory;
- Over hydraulic or lube packs that contain more than 120 gallons of fluid;
- Lube-storage rooms;
- Any conveyor belts that are within tunnels or other enclosed spaces which would be hazardous to fight fires manually;
- Transformers (excluding the substation); and
- Warehouse."

Although there are no standards within the MCC that define an "adequate" fire protection plan, the County can find that that the proposed fire protection plan provides for adequate fire protection because it includes a complete standpipe system with adequate pressure to address fire hazards on the Property. For this reason, the County can find that the Project is consistent with this policy.

Water and Sewage

1. The county, in considering land use proposals, will ensure that the physical characteristics of the land that affect sewage disposal, water supply, and water quality are carefully considered.

RESPONSE: Water supply is anticipated to come from two sources: (1) wells drilled near SPR 02 about three miles north of the proposed mine site and (2) the SPR 01 well between the plant and the borrow source. Two wells will be drilled in the area of SPR 02, and water from these wells will be pumped along the main access road through a pipeline to the mine site. The majority of water will come from the SPR 02 area. SPR 01 is expected to be low producing and will primarily be used as a backup well. Storage tanks will be placed at both the SPR 01 and SPR 02 locations to allow for temporary storage as needed, as shown on the enclosed site plan.

The siting and design of the Project sewage system will follow all State (DEQ) and County requirements for construction and permitting. Based on the Site Evaluation Report (Malheur County Environmental Health Department), Calico will design the required acceptable wastewater treatment system. The onsite sewage system will accept only domestic wastewater or a waste stream from the water treatment plan (no mine processing or related waste). Processing will occur 24 hours per day, 7 days per week. The final site will meet system setback requirements and be based on the Site Evaluation Report.

Goal 12: Transportation

Goal: To provide and encourage a safe, convenient, and economic transportation system.

20. Developers creating a demand for improvement of unimproved county or public use road rights-of-way will be responsible for those improvements. After the improvements have been made, the developer may petition the County Court to accept such roads, upon meeting county standards, into the county road maintenance program.

RESPONSE: As explained above, the improved road corridor will be 40 feet wide, which includes a 24-foot wide road travel width (12 feet on either side of the road centerline), four-foot wide shoulders on each side of the road, minimum one-foot wide ditches on each side of the road, and appropriate cut and fill. The Access Road Area totals approximately 876 acres.

All necessary road improvements will be constructed and/or paid for by Calico. This includes improvement of Russel Road within County Jurisdiction. Russel Road and Cow Hollow Road are County Roads with 60 feet of public right-of-way (**Exhibit 8**). All improvements to roadways within County jurisdiction will remain after mining is complete, unless the County requires otherwise.

The main access road to Grassy Mountain will utilize existing private and BLM roads to the Patent Parcel, with BLM maintenance throughout. The primary roadway is approximately 17 miles long and will need to be upgraded to include some straightening and widening in sections. This BLM-maintained access road will remain under the jurisdiction of the BLM following closure of the Project. The improved roads on BLM land will either remain or be reclaimed after mining has been completed, according to BLM requirements. Roads constructed for the Project within the Project Area will be reclaimed in accordance with the final approved reclamation plan to be included in the DOGAMI Consolidated Permit.

For these reasons, the County can find that the Project is consistent with this policy.

B. Specific Plans: Specific plan recommendations.

RESPONSE: There are no specific plans applicable to the Patent Parcel. This policy does not apply.

C. Developments And Viewpoints: Existing development and viewpoints of property owners in the surrounding area.

RESPONSE: There is no adjacent or nearby development around the Patent Parcel. All abutting land is under federal ownership and under the jurisdiction of the BLM. Therefore, the County can find that the Project will neither impact existing development nor the viewpoints of property owners, and in so doing, can find that the Project is consistent with this policy.

D. Services And Utilities: Availability of services and utilities.

RESPONSE: Initial power for the Project will be provided by diesel power generators. These generators are anticipated to be used during the first 1.5 years of construction and initial mining. During the construction period, Idaho Power will

install a new power line along the access roads to the Project Area based on a power purchase agreement with Calico.

The new Idaho Power service will include a 23-mile distribution circuit (power line), a new 69/34.5 kV to 14 MV transformer, and a new 34.5-kV 167-amp regulator. The line will connect at the Hope Substation near Vale, Oregon and run to the mine site along the main BLM access roads. The mine substation will be located on adjacent BLM land. The power distribution from the powerhouse will be provided by overhead power lines.

Underground power distribution will serve the underground facilities, which will supply power to electrical equipment used to develop the main decline and portable fans. This system will include a 480 V transformer placed near the entrance to the portal during the initial stages of decline construction. Once development has advanced far enough that carrying power at 480 V becomes too inefficient, a main underground power line will be installed along the rib of the decline to carry 4.16 kV and connected to the transformer, which will be moved underground. Upon completion of the decline to 3224 feet AMSL elevation, and the initiation of production-mining activities, a second underground transformer will be installed for use in the lower areas of the mine. Line power will also be carried up the hill to the two ventilation shafts to supply power to the ventilation fans.

At completion of mining, the main BLM access road power line will be controlled by the power company, which may either maintain it or remove it. The Project power supply equipment and all associated lines within the Project Area will be removed and reclaimed.

E. Effect: The effect of the proposed use on the stability of the community's social and economic characteristics.

RESPONSE: The Project will have beneficial effects on Malheur County's social and economic characteristics. Currently, Malheur County has the lowest median income of all Oregon Counties.[6] The most common jobs in the County are in the following industries: "Agriculture, Forestry, Fishing, and Hunting" (15.1%),

[6] Mark Graves, "Which Oregon County has the Highest Median Income," The Oregonian (March 13, 2018), available at https://www.oregonlive.com/pacific-northwestnews/index.ssf/2018/03/which_oregon_county_has_the_hi.html.

"Healthcare and Social Services" and "Manufacturing" (10.5%), "Accommodation and Food Service," (10.2%), and "Retail Trade" (10.1%).[7] While the unemployment rate in the County is low, many of the County's largest industries are relatively low-paying and offer comparatively few benefits as compared to more urban counties in Oregon.

The Project will be active for approximately 14 years, which includes one year of construction, ten years of mining and processing, and three years of closure and reclamation. Several years beyond that date may be anticipated for ground water monitoring. The Project will provide three classes of jobs available to local residents: construction, operation, and post-closure/reclamation jobs. The Project is anticipated to create approximately 150 construction jobs, approximately 110 operational jobs, and numerous closure/reclamation jobs. Operational and post-closure/reclamation jobs are anticipated to pay a (median/average) of $79,518, which is significantly higher than the median wage for the County.[8]

Through its intended partnerships with local community colleges and training opportunities, Calicos hopes the Project will provide a base of expertise in the County that can be levered for future mining projects in Malheur County and will provide employees with technical skills that can be applied to different industries.

The project will provide significant road improvements to County and BLM roadways, which will benefit the County both during and after mining operations are concluded.

The Project Area is separated from the nearest home, a small farm on the Owyhee River, by five miles and numerous hills and ridges. It is 10 miles from the nearest populated farming area, outside of Owyhee, and 22 miles from the nearest population center (Vale). Therefore, no residences in the County will be impacted by noise, dust, or other externalities. Moreover, as demonstrated by the enclosed trip generation estimate, the Project will not generate enough daily vehicle trips to warrant a full Transportation Impact Analysis ("TIA") as required by MCC 6-5-3 (**Exhibit 9**), and therefore, the Project will have a negligible impact on the County's transportation system.

[7] American Community Survey 2016 dataset. Date USA, https://datausa.io/profile/geo/malheur-county-or/#economy (retrieved on September 29, 2018).
[8] According to the U.S. Census Bureau, the median household income in Malheur County was $34,720 in 2016. https://www.census.gov/quickfacts/fact/table/malheurcountyoregon/AFN120212

For the above reasons, the County can find that the Project will substantially benefit the County's social and economic characteristics.

F. Fish and Wildlife: It does not interfere with traditional fish and wildlife use of habitats determined critical or sensitive in the fish and wildlife habitat protection plan for Malheur County. (Ord. 86, 12-7-1993)

RESPONSE: As demonstrated by the Wildlife Report (**Exhibit 7**), there are no identified critical or sensitive habitats within Patent Parcel or the Project area, generally.

G. General Criteria:
1. Increasing setbacks of structures to reduce possibilities of overshadowing adjoining property, noise, odor or night lighting nuisances.

RESPONSE: There are no adjacent structures, people or operations within five linear miles that will be affected by the Project's noise, odor or night-lighting. Therefore, the County can find that this criterion is met.

2. Landscaping improvements for the visual benefit of the subject site and for the improved appearance of the neighborhood and county.

RESPONSE: There are no private structure within five miles of the Project and therefore landscaping improvements will only be benefit the personnel that work at the site. However, as landscaping is not necessary for any business purpose and because it would have to be reclaimed after mining operations have concluded, Calico does not propose any landscaping on the Patent Parcel. For these reasons, the County can find that this criterion is met.

3. Location and size of driveway access points and right of way widening and improvement for present and future traffic circulation consistent with the adopted county road standards or the standards of the appropriate road district and the access management standards of the Malheur County transportation system plan.

RESPONSE: No new access points or rights-of-way on County Roads are proposed. The internal circulation system proposed for the Patent Parcel is completely isolated from the Malheur County transportation system by approximately 17 miles of BLM roads. For these reasons, the County can find that this criterion is met.

4. Visual screening of outdoor waste and storage areas.

RESPONSE: Visual screening is intended to protect the public from views of unsightly or messy work areas. However, there are no structures or populated activities within several miles in any direction from the Patent Parcel, except those associated with the Project. For this reason, the County can find that the project does not need to screen outdoor waste or storage areas.

5. Control and focusing of outdoor lighting to avoid glare being directed beyond property limits.

RESPONSE: Outdoor lighting will be used to safely and efficiently conduct the mining operations on the Project. There are no occupied structures or dwellings within several miles of the Project, except those associated with the mining operation. For this reason, the County can find that specific lighting requirements need not be applied to the Project.

6. Special criteria listed below, as applicable.

RESPONSE: The special criteria applicable to the Project are located in subsection H, which is addressed below. As demonstrated therein, the County can find that all special criteria are satisfied.

H. Allowance of Certain Uses: A use allowed under section 6-3A-3 of this title shall be approved only where it is found that the use will not:

1. Force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; or

RESPONSE: There are no farming activities, grazing activities, or forests on the Patent Parcel. Although range uses are present on surrounding BLM land, such lands are not subject to County jurisdiction, and the County can find that this standard does not apply to farm or forest practices on BLM lands.

Regardless, range uses on BLM land will only be curtailed within the Project Area and after the mine has been reclaimed, the entire Project Area will be available for range use. Given the size of the surrounding BLM open range area compared with the size of the 62-acre Patent Parcel, the County can find that the Project will not force a significant change on farm or forest uses on surrounding lands.

2. Significantly increase the cost of accepted farm or forest practices on surrounding lands devoted to farm or forest use.

RESPONSE: The County can find that the Project will not significantly increase the cost of accepted farm of forest practices for the same reasons that it will not force a significant change on those practices.

6-6-8: Specific Criteria to Evaluate Suitability:

In addition to the general criteria above, the specific criteria listed below and the standards for the zone in which the conditional use is to be established shall govern the following conditional uses.

6-6-8-4: Mineral, Aggregate or Geothermal Resource Exploration, Mining and Processing:

A. Submitted plans and specifications shall contain sufficient information to allow the planning commission to set standards pertaining to:

1. Noise, dust, traffic and visual screening.

RESPONSE: Project construction will create a substantial amount of noise and minor dust due to blasting for the mine portal, noise from construction machinery, and dust created by both. However, the nearest population center, Vale, is approximately 22 miles to the north, and the nearest cultivated farm land, outside of Owhyee, is approximately 10 miles to the east. A single small farm is located approximately five miles away, on the other side of Grassy Mountain. These substantial distances will prevent nuisances to occupied properties cause by noise and dust. These distances also provide sufficient visual screening from surrounding private properties.

Figure 9 - Nearest Developed Areas

After construction is completed (approximately one year), all blasting and drilling activities will take place underground, substantially limiting or eliminating blasting noise and dust emissions from the project. Noise generated from the project during operational phases will include trucks and vehicles using the haul road and mechanical sounds issued from the processing plant.

Throughout the project, dust suppression will be provided with water spray or palliatives during all construction and operations, and disturbed areas will be seeded with an interim seed mix to minimize fugitive dust emissions from surfaces without vegetation, including all stockpiled soil. Dust suppression will be conducted according to a Fugitive Dust Control Plan required by the Oregon Department of Environmental Quality ("DEQ"). See Rec. Plan 7.

For the above reasons, the County can find that no additional conditions are required to limit noise and dust.

After construction is completed, vehicle trips will consist of employee transportation, approximately three to five material and chemical trucks per week, approximately one refuse truck per day, and approximately one armored product truck per week. As demonstrated by the enclosed trip generation estimate (**Exhibit 9**), the Project will not generate enough daily vehicle trips to warrant a full TIA as required by MCC 6-5-3. Nevertheless, the Project will include a shuttle service to reduce the number of single-occupancy vehicle trips coming into the Project Area. For these reasons, County can find that no additional conditions related to traffic generation are warranted.

2. Setbacks from property lines.

RESPONSE: Setback requirements in the ERU zone are as set forth in MCC 6-3A-6, as follows:

> "A. Setbacks: No building or sight obscuring fence, other than a fence or facility associated with irrigation activities, shall be located closer than forty feet (40') from a street or road right of way line and fifteen feet (15') from any other property line. No sight obscuring fence exceeding three feet (3') in height shall be placed within the forty foot (40') street setback, also within this setback shrubbery other than trees shall be maintained at heights not exceeding three feet (3'). Dwellings and inhabitable structures, including associated sewage disposal facilities and removal of vegetation, shall be prohibited within one hundred feet (100') of rivers, streams, lakes, reservoirs and other wetlands, unless topographic features make such setback unnecessary to protect riparian habitat."

The Property is several miles away from the nearest County road right-of-way. The only structure proposed to be built on the Patent Parcel is the mine portal, which will be located more than 15 feet from the boundaries of the Patent Parcel.

For the above reasons, the County can find that the Project satisfies County setback requirements and no additional setback conditions need to be imposed on the Project.

3. Location of vehicular access points.

RESPONSE: The final access point to the Project Area and Patent Parcel are located on BLM land. No changes to existing county road access points are

proposed. Therefore, the County can find that no additional conditions related to vehicle access points need to be imposed.

4. Fencing needs.

RESPONSE: The entire Project Area will be fenced as described in the Rec. Plan:

> "A perimeter fence, approximately 22,358 feet in length, will be constructed around the Project facilities to prevent access by livestock, wildlife, and the public (Figure 3). In general, three-strand barbed wire fences will be constructed in accordance with BLM fencing standards per BLM Handbook 1741-1. The area within the perimeter fence is approximately 540 acres. Within the perimeter fence in areas where a higher level of security is needed, chain-link fences will be erected. Gates or cattle guards will be installed along roadways within the Project Area, as appropriate. The perimeter fence will be monitored on a regular basis and repairs made as needed."

No fencing of the Patent Parcel is proposed within the Project Area fence. Given that Calico proposes a complete perimeter fence around the Project Area, the County can find that no additional fencing of the Patent Parcel is necessary.

5. Prevention of the collection and stagnation of water at all stages of the operation.

RESPONSE: Some water impoundment will be necessary in the TSF in order to manage mine tailings. Calico recommends that the County apply the Best Management Practices for Reclaiming Surface Mines in Washington and Oregon (DOGAMI 1997) and the requirements of the forthcoming Tailings Facility and Ancillary Facilities Design Report to ensure that surface water impoundments are correctly managed.

Best Management Practices (BMPs) will be used to limit erosion and reduce sediment in precipitation runoff from Project facilities and disturbed areas during construction, operations, and initial stages of reclamation. BMPs may include, but are not limited to, diversion and routing of storm water using accepted engineering practices, such as diversion ditches, and the placement of erosion control devices, such as sediment traps, and rock and gravel cover.

Surface water diversion channels and ditches will be constructed as necessary around surface facilities and waste rock storage areas to control storm water run-on to these sites. Surface water control ditches and sediment retention ponds will be constructed in accordance with BMPs as outlined in the Best Management Practices for Reclaiming Surface Mines in Washington and Oregon (DOGAMI 1997) and in the Tailings Facility and Ancillary Facilities Design Report (refer to the DOGAMI Consolidated Permit Application). Sediment ponds and diversion ditches are sized to contain a 100-year, 24-hour precipitation event. Run-on diversion channels and ditches will remain as permanent features after final reclamation and mine closure.

See Rec. Plan at 8.

For these reasons, the County can find that the Best Management Practices for Reclaiming Surface Mines in Washington and Oregon (DOGAMI 1997) and the requirements of the forthcoming Tailings Facility and Ancillary Facilities Design Report are sufficient to provide adequate standards for preventing stagnant water.

6. Rehabilitation of the land upon termination of the operation.

RESPONSE: The Rec. Plan includes a preliminary mine reclamation plan which is summarized in Section II.D of this Application and attached hereto as **Exhibit 3**. A final reclamation plan is required to be submitted and approved by DOGAMI prior to issuance of the Consolidated Permit. The primary alteration on the Patent Parcel will be the mine portal, which will be plugged, regraded, and revegetated during the reclamation period.[9] Rec. Plan 17. Vent shafts will be plugged and onsite haul roads will also be regraded and revegetated. Revegetation of any denuded areas on the Patent Parcel will be conducted as generally described in the Rec. Plan at pages 20–25.

For these reasons, the County can find that the Application includes a plan for rehabilitation of the Patent Parcel upon termination, and that the Patent Parcel will be adequately rehabilitated after mine reclamation is completed.

B. In zones where processing is permitted, it shall be located no closer than two hundred feet (200') from residential or commercial uses.

[9] Note that the mine portal structure may remain, but it will be plugged and the landing at the portal entrance will be regraded to reduce its visual impact.

RESPONSE: There are no residential or commercial uses within 200 feet of the Patent Parcel or the broader Project boundary. This standard is met.

C. Equipment and access roads shall be constructed, maintained and operated in such a manner as to eliminate, as far as is practicable, noise, vibration or dust that is injurious or substantially annoying to livestock being raised in the vicinity.

RESPONSE: Before beginning construction, Calico will be required to obtain DEQ approval of a Fugitive Dust Control Plan that will provide for water or palliative application of haul roads and other disturbed areas, chemical dust suppressant application (such as magnesium chloride) where appropriate, and other dust control measures as per accepted and reasonable industry practice. Also, disturbed areas will be seeded with an interim seed mix to minimize fugitive dust emissions from surfaces without vegetation, where appropriate. Rec. Plan 7.

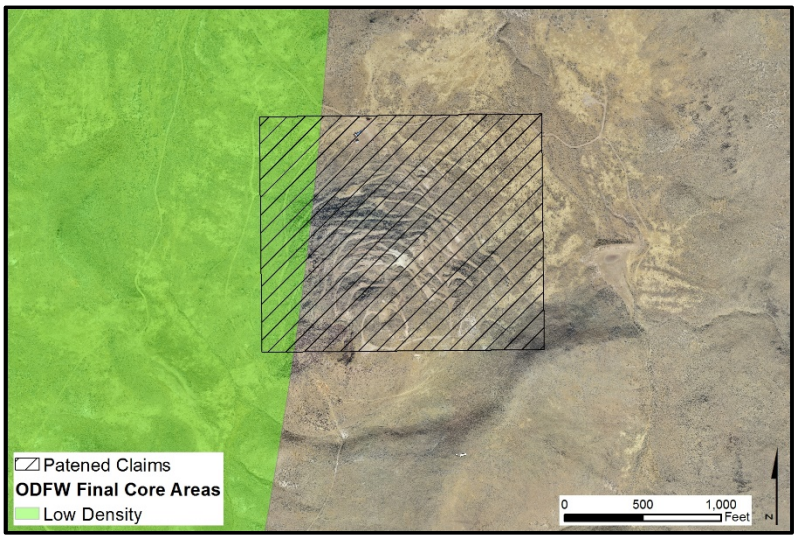
The Project will create a minimal amount of traffic outside of the Project Area boundary, as explained above and in Calico's Trip Generation Estimate. **Exhibit 9**. Movement of ore and tailings within the project site will be conducted by trucks moving between the mine portal and the processing plant; this haul road is located far within the Project Area boundary and therefore, dust emissions from the use of this road are not expected to cross the Project Area boundary.

For the above reasons, the County can find that this criterion is met.

V. SAGE GROUSE RULE PERMIT

The Sage Grouse Rule ("SGR") applies to "large scale developments," which include mining uses. The SGR imposes requirements for avoidance, minimization, and mitigation depending on the identified habitat type. The habitat types are "core area," "low density," and "general habitat," ranked in descending order of priority. Most of the Patent Parcel is designated as "general habitat," with some "low density" located to the west, as demonstrated on the ODFW map below.

Figure 10. ODFW Greater Sage Grouse Habitat Map



Calico commissioned a consulting firm, EM Strategies, to characterize the wildlife resources within and around the Patent Parcel and broader Project area. **Exhibit 7**. As explained above, the Wildlife Report is based on a WSA that includes the Access Corridor and Permit Area, and either a 0.5 mile or two mile buffer, depending on the species. Greater sage grouse habitat was surveyed within a two-mile buffer area and categorized in accordance with the ODFW Fish and Wildlife Habitat Mitigation Policy. Wildlife Report 9. No sage grouse or sage grouse leks were observed within the WSA or are identified in official records. Wildlife Report 32. The Wildlife Report's finding are excerpted below:

> "Greater sage-grouse brood-rearing surveys were conducted on June 25, 2013, and July 25, 2013. No sign of use of the Two-Mile Buffer WSA by greater sage-grouse was detected. No birds were encountered, nor were any feathers, tracks, or scat found. No greater sage-grouse or their sign were encountered during any other field

surveys. Scat of this species can persist for many months and even years; therefore, the lack of such sign is indicative of little or no use of the Two-Mile Buffer WSA by this species in recent years."

***

"Winter use surveys were conducted on December 20, 2013, and January 14 and 15, 2014; the latter were done under ideal conditions, clear days with a covering of snow on the ground. No sign of use of the survey area by greater sage-grouse was detected. No birds were encountered, nor were any feathers, tracks, or scat found.

***

"No known greater sage-grouse leks are known to exist within the Two-Mile Buffer WSA (Milburn 2014). No sign of this species was found during any surveys prior to the April lekking season; therefore, there were no areas of potential concentration to be checked for leks. Listening for drumming males during the hour before and after sunset (on April 10 and April 28, 2014) yielded no detections of greater sage-grouse or their leks."

Wildlife Report 31-32.

The low-density habitat area is described by the Wildlife Report as follows:

"Based on actual habitat type and condition, however, little or none of this area constitutes high quality sage-grouse habitat. The vegetation community is poor-quality big sagebrush shrub-steppe with an understory of exotic grasses."

Criteria. As the SGR development criteria are more restrictive in "low density" areas than in "general habitat," the following addresses the criteria for development in "low density" areas only.[10] The SGR requires a tiered

[10] The criteria for allowing a large-scale development on "general habitat" are set forth in OAR 660-023-0115(11), as follows:
"(a) A county may approve a large-scale development on significant sage-grouse habitat in general habitat upon requiring:
(A) General Habitat Consultation. Minimizing impacts from development actions in general habitat shall include consultation between the development proponent and ODFW that considers

conservation approach, in a descending order of priority. First, impacts to Sage Grouse Habitat should be avoided, if possible. If impacts cannot be avoided, they should be minimized. ODFW can require mitigation of any remaining impacts.

- **Avoidance**. A major development located in a "low density" habitat area must first try to avoid disturbance of the habitat, as OAR 660-023-0115(10)(a)(A) provides below:

Before proceeding with large-scale development activity that impacts a low density area, the proponent must demonstrate that reasonable alternatives have been considered and that the activity or other action cannot avoid impacts within a low density area.

RESPONSE: The Project resource has only been identified on the patented mining claim, which is coterminous with the Patent Parcel boundaries. Therefore, the County can find that there is no other appropriate or feasible location for the Project.

If the proposed large-scale development can occur in another location that avoids both direct and indirect impacts within a low density area, then the proposal must not be allowed unless it can satisfy the following criteria:

(i) It is not technically or financially feasible to locate the proposed large-scale development outside of a low density area based on accepted engineering practices, regulatory standards, proximity to necessary infrastructure or some combination thereof; <u>or</u>

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and results in recommendations on how to best locate, construct or operate the development action so as to avoid or minimize direct and indirect impacts on significant sage-grouse habitat within the area of general habitat. A county shall attach ODFW recommendations as a condition of approval; and
(B) Compensatory Mitigation. Required consistent with the provisions of paragraph (9)(a)(D) above."

As these criteria only require consultation with ODFW and that the Project comply with relevant ODFW minimization and mitigation requirements, and because the County can find that the Project meets the conflicting use requirements for "low-density habitat" as explained herein, which includes consultation with ODFW, the County can find that it need not specifically address the "general habitat" criteria.

RESPONSE: The Project resource has only been identified on the patented mining claim, which is coterminous with the Patent Parcel boundaries. Therefore, the County can find that there is no other appropriate or feasible location for the Project.

(ii) The proposed large-scale development is dependent on geographic or other physical feature(s) found in low density habitat areas that are less common at other locations, or it is a linear use that must cross significant sage-grouse habitat in order to achieve a reasonably direct route.

RESPONSE: As the Project satisfies (i), above, (ii) is inapplicable. However, to the extent that the County finds that it does apply, it can find that the Project is dependent on the geographic and physical features containing the mineral resource, which is certainly less common at other locations.

- **Minimization**. As the Project cannot avoid low density habitat, we proceed to the next step, which OAR 660-023-0115(10)(a)(B) provides as follows:

If the proposed use cannot be sited by avoiding a low density area altogether, including direct and indirect impacts, it shall be located to minimize the amount of such habitat directly or indirectly disturbed, and to minimize fragmentation of the low density area(s) in question by locating the development adjacent to existing development and at the edge of the low density area when possible. Uses should minimize impacts through micro-siting, limitations on the timing of construction or use, or both, and methods of construction.

RESPONSE: As explained above, the Project cannot avoid the low density area because it is geologically dependent on the proposed location. Within the patent parcel, the Project will be primarily located underground, with the only above-ground improvements being the entry portal for the underground improvements and gravel stockpiling, and improved existing circulation roads. The Project design minimizes to the extent practicable the uses with the low-density habitat.

- **Mitigation**. If impacts to the habitat are unavoidable, compensatory mitigation will be required:

To the extent that a proposed large-scale development will have direct or indirect impacts on a core area after application of the avoidance and minimization standards and criteria, above, the permit must be conditioned to

fully offset the direct and indirect impacts of the development to any core area. The required compensatory mitigation must comply with OAR chapter 635, division 140. OAR 660-023-0115(10)(a)(C); (9)(a)(D).

RESPONSE: ODFW will review the Application and determine what mitigation requirements, if any, should be imposed.

- **Findings for Approval.** Once the above analysis is completed, the County may approve the "conflicting use" (i.e. the mine) as follows:

(b) A county may approve a conflicting use as identified at subsection (7)(b) above upon either:

(A) Receiving confirmation from ODFW that the proposed conflicting use does not pose a threat to significant sage- grouse habitat or the way sage-grouse use that habitat; or

(B) Conditioning the approval based on ODFW recommendations, including minimization techniques and Compensatory mitigation, if necessary, to resolve threats to significant sage-grouse habitat. OAR 660-023-0115(9)(b).

RESPONSE: As part of the DOGAMI Consolidated Permit process, ODFW will be completing a review of the impact of the Project on sage grouse within the entire Project Area. Construction and mining will not begin until the DOGAMI Consolidated Permit is issued. To avoid unnecessary duplication of ODFW's review process, the Applicant requests that the County impose a condition requiring compensatory mitigation for threats to significant sage grouse habitat within the Patent Parcel, as follows:

> "The Applicant shall comply with ODFW minimization and compensatory mitigation requirements, if any, for threats to significant sage-grouse habitat on the Patent Parcel."

With this condition, the County may approve a conflicting use on the Patent Parcel.

VI. CONCLUSION

For the above reasons, the County can find that the Project meets or exceeds all applicable criteria and should approve this Application on that basis.

VI. EXHIBITS

1. PFS Report (the complete report is available at www.paramountnevada.com)
2. Site Plan
3. Preliminary Reclamation Plan
4. Malheur County Comprehensive Plan
5. Excerpt of Mine Plan of Operations
6. NRCS Survey
7. Wildlife Report
8. Assessor's Map
9. Transportation Impact Analysis

MINE DEVELOPMENT ASSOCIATES
MINE ENGINEERING SERVICES

Report Date: July 9, 2018
Effective Date: May 21, 2018

PRELIMINARY FEASIBILITY STUDY AND TECHNICAL REPORT FOR THE GRASSY MOUNTAIN GOLD AND SILVER PROJECT, MALHEUR COUNTY, OREGON, USA

Submitted to:
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1.0 SUMMARY

Mine Development Associates ("MDA") has prepared this technical report on the Grassy Mountain gold and silver project in Malheur County, Oregon, at the request of Paramount Gold Nevada Corp. ("Paramount"), which is listed on the NYSE American stock exchange (NYSE: PZG). The technical report presents the results of a Preliminary Feasibility Study ("PFS") and includes the first estimate of mineral reserves for the project. Paramount is a reporting issuer in the provinces of Ontario, British Columbia, and Alberta, Canada. Consequently, this report has been prepared in accordance with the disclosure and reporting requirements set forth in the Canadian Securities Administrators' National Instrument 43-101 ("NI 43-101"), Companion Policy 43-101CP, and Form 43-101F1, as well as with the Canadian Institute of Mining, Metallurgy and Petroleum's "CIM Definition Standards - For Mineral Resources and Reserves, Definitions and Guidelines" ("CIM Standards") adopted by the CIM Council on May 10, 2014.

Paramount controls the Grassy Mountain project through its 100% wholly-owned subsidiary Calico Resources USA Corp. ("Calico"), which was formerly a wholly-owned subsidiary of Calico Resources Corp. ("Calico BC"). Paramount acquired Calico BC in July of 2016 by issuing shares in Paramount to the shareholders of Calico BC, and Paramount and Calico BC were subsequently amalgamated.

1.1 Property Description and Ownership

The Grassy Mountain property encompasses approximately 9,300 acres in Malheur County, Oregon about 70 miles west of Boise, Idaho. The geographic center of the property is located at 43.674° N latitude and 117.362° W longitude, and the principal zone of mineralization is located in Section 8 of Township 22 South ("T22S"), Range 44 East ("R44E"), Willamette Meridian. The property consists of 427 unpatented lode claims, nine unpatented mill site claims, six unpatented association placer claims, three patented claims, and two land leases. Annual property holding costs total $107,970.

Calico, a wholly owned subsidiary of Paramount, owns and controls 100% of the mineral tenure of the unpatented mining claims, patented mining claims, Fee lands, and mining leases that comprise the Grassy Mountain property, including all existing exploration and water rights pertaining to the Grassy Mountain project, pursuant to the "Deed and Assignment of Mining Properties" between Seabridge Gold Inc., Seabridge Gold Corporation ("Seabridge") and Calico dated February 05, 2013.

Seabridge retains a 10% Net Profits Interest ("NPI") in the Grassy Mountain project pursuant to the "Deed of Royalties" between Calico and Seabridge dated February 05, 2013. Pursuant to that deed, Seabridge may elect to cause Calico to purchase the 10% NPI for $10M (CAD) within 30 days

following the day that Calico has delivered to Seabridge a Feasibility Study on the Grassy Mountain project. A 1.5% royalty on the gross proceeds of the production of minerals from the patented and unpatented claims and a surrounding ½ mile area of interest is held by Sherry & Yates.

The Bishop I and Bishop II Mining Leases, as amended with Bishop et al. ("Bishop") and expiring September 11, 2019, require Annual Minimum royalty payments by Calico, or its assigns, of $30,000 USD (Bishop I) and $3,000 USD (Bishop II). All minimum royalty payments are recoverable against future production royalty payments; records to date indicate that there are accumulated credits of $760,000 and $76,000 that would apply to the Bishop I and Bishop II Leases, respectively. The Bishop I lease includes Fee lands and unpatented placer claims, while the Bishop II lease includes Fee lands. Bishop retains a 6.0% Net Smelter Return ("NSR") royalty based on a gold price above $800 USD per ounce. If ore minerals other than gold are produced, they would be subject to an additional 4.0% NSR royalty. A provision in the Bishop I lease agreement provides for payments to Bishop of $50 for each drill hole on Fee land, $100 for each acre of disturbed Fee land, and $300 for each acre disturbed and lost for Bishop's use.

1.2 Exploration and Mining History

Portions of the Grassy Mountain property were first staked in 1984. After acquiring the property in 1986, Altas Precious Metals ("Atlas") discovered and defined the Grassy Mountain gold-silver deposit, as well as the Crabgrass deposit 1.5 miles to the southwest, through predominantly reverse-circulation rotary ("RC") drilling. Atlas commissioned a 1990 historical feasibility study for an envisioned open-pit heap-leach and milling operation and began to consider underground-mining scenarios, but declining gold prices and the perception of an unfavorable permitting environment discouraged Atlas from developing the project. The property was optioned to Newmont Exploration Ltd ("Newmont") in 1992. Newmont drilled 15 holes in 1994 and completed an in-house economic and mining-method evaluation that was completed in 1995. Newmont determined that the project did not meet corporate objectives and returned the property to Atlas in 1996.

The property was optioned to Tombstone Exploration Company Ltd ("Tombstone") in 1998. Tombstone drilled six holes and returned the property to Atlas in 1998. Seabridge Gold ("Seabridge") completed an acquisition of the Grassy Mountain property from Atlas in 2003. Seabridge did not conduct exploration of the property, and in 2012 Calico Resources Corp. ("Calico") acquired the property. Calico drilled 17 holes before Calico was acquired by Paramount Gold Nevada Corp ("Paramount") in 2016. There has been no historical mineral production from the Grassy Mountain gold-silver deposit.

1.3 Geology and Mineralization

The Grassy Mountain low-sulfidation epithermal hot-spring gold-silver deposit was formed concurrent with fluvio-lacustrine deposition of the Grassy Mountain Formation in the mid-Miocene-age Lake Owyhee volcanic field. Sedimentary units of the Grassy Mountain Formation, which are the host rocks of the deposit, include interbedded conglomerate, sandstone, siltstone, tuffaceous siltstone, and mudstone, as well as several silica sinter deposits. Surface exposures and drilling indicate the host rocks are generally flat-lying to gently arched.

The deposit has extents of 1,900 feet along a N60°E to N70°E axis, as much as 2,700 feet in a northwest-southeast direction, and as much as 1,240 feet vertically. A central higher-grade core with gold grades generally in excess of ~0.03 oz Au/ton coincides with the axis of the Grassy fault, and it is surrounded by a broad envelope of lower-grade mineralization. The central higher-grade core is almost 1,000 feet long along the N60°E to N70°E axis, by 450 feet in width and 450 feet in vertical extent.

Three distinct and overlapping types of gold-silver mineralization are recognized within the central core of the deposit: gold-bearing, chalcedonic quartz ± adularia veins; disseminated mineralization in silicified siltstone and arkose; and gold and silver in bodies of "clay matrix breccia".
Colliform-banded veins tend to carry the highest grades (>0.5 oz Au/ton), in some cases with electrum along the vein margins or within microscopic voids. Some veins carry very little grade or are barren. Vein widths generally range from 1/16 to ~2.0 inches, and vein frequency can average one vein per foot in places, but any individual vein is unlikely to have lateral or vertical extents of significance.

High gold grades are also present in silicified siltstone and arkose with no visible veins. In these cases, gold and silver are inferred to be very finely disseminated in a stratiform manner in the silicified rock. Fine-grained pyrite is commonly disseminated in the silicified siltstone and sandstone where oxidation has not occurred.

Gold-silver mineralized clay matrix breccias are mainly of clast-supported types. Fragments consist of sub-rounded to sub-angular, sand- to boulder-sized clasts of silicified and/or veined arkose and siltstone, with minor amounts of clay and iron-oxide minerals between the clasts. Their true thickness and exact orientations are poorly understood because their margins are commonly irregular-to-gradational, as opposed to planar. The clay matrix breccia mineralization may be more prevalent in the lower portion of the higher-grade core of the deposit, and individual bodies of this material are interpreted to extend at near-vertical angles up and down into the surrounding, low-grade envelope.

1.4 Metallurgical Testing and Mineral Processing

The most recent metallurgical testing was completed in 2017 as part of this PFS. This included tests using nine different composites based on representative lithologies and grade ranges. The results demonstrate that the Grassy Mountain mineralization is free-milling and can be processed with gravity concentration followed by conventional cyanide leaching of the gravity tails. Results from the 2017 test program are consistent with historical testing. A conservative interpretation of the results estimates a gravity recovery of 8.6% of the gold. Carbon-in-leach ("CIL") has been selected for this project for the processing of the gravity tails and is estimated to achieve a gold recovery of 84.9%, for an overall combined gold recovery of 93.5%.

Comminution testing from 2017 showed the samples to be classified as hard. The crusher work index determined from these tests, 21.2 kWh/ton, was used to select primary, secondary, and tertiary crushers. From historical testing, a Bond ball-mill work index of 19.0 kWh/ton (75^{th} percentile value of available data) was used to select the ball mill, along with a feed size of 80% passing 0.39" and the product size of 80% passing 100 mesh.

1.5 Mineral Resource Estimate

The Grassy Mountain gold and silver mineral resources were modeled and estimated by:

- evaluating the drill data statistically;
- separately interpreting gold and silver mineral domains on a set of 070°-looking cross sections spaced at 50-foot intervals, and using these sections to code the drill-hole database;
- rectifying the cross-sectional mineral-domain interpretations on level plans spaced at 10-foot vertical intervals, and using these level plans to code the resource block model;
- analyzing the modeled mineralization spatially and statistically to aid in the establishment of estimation and classification parameters; and
- interpolating grades into the block model, using the coding of the level-plan gold and silver mineral domains to constrain the estimations.

The Grassy Mountain resources have been estimated to reflect potential open-pit extraction and milling, as well as potential underground mining of material lying outside of the resource pit shell. To define the open-pit resources, a pit optimization was run using the parameters summarized in Table 1.1, and a gold-equivalent cutoff grade of 0.012 oz Au/ton was applied to all material withing the pit shell.

Table 1.1 Pit Optimization Parameters

Mining Cost	$	2.00	$/ton
Processing Cost	$	13.00	$/ton processed
Tons per Day		5,000	tons-per-day processed
G&A per Ton	$	2.22	$/ton processed
Au Price	$	1,500	$/oz
Ag Price	$	20	$/oz
Au Recovery		80%	
Ag Recovery		60%	
Au Refining Cost	$	5.00	$/oz produced
Ag Refining Cost	$	0.50	$/oz produced

Underground resources were estimated by applying a a gold-equivalent cutoff grade of 0.060 oz/ton to blocks lying immediately outside of the optimized pit. Table 1.2 lists the parameters used to calculate the underground cutoff grade.

Table 1.2 Parameters Used to Determine Underground Resource Cutoff Grade

Mining Cost	$	50.00	$/ton
Processing Cost	$	25.00	$/ton processed
Tons per Day		5,000	tons-per-day processed
G&A per Ton	$	8.00	$/ton processed
Au Price	$	1,500	$/oz
Ag Price	$	20	$/oz
AuEq Recovery		90%	
Refining Cost	$	5.00	$/oz produced

The gold equivalent grade ("oz AuEq/ton") of each model block was calculated by dividing the silver grade by 100 and adding it to the gold grade. The silver-to-gold equivalency factor of 100 was derived from the metal prices and recoveries in Table 1.1.

The total Grassy Mountain project gold and silver resources, which are dominated by the in-pit resources, are presented in Table 1.3. The resources are inclusive of the project mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

Table 1.3 Grassy Mountain Gold and Silver Resources

Classification	Tons	oz Au/ton	oz Au	oz Ag/ton	oz Ag
Measured	17,933,000	0.020	363,000	0.079	1,409,000
Indicated	12,886,000	0.054	695,000	0.146	1,882,000
Measured + Indicated	30,819,000	0.034	1,058,000	0.107	3,291,000
Inferred	1,055,000	0.040	42,000	0.119	125,000

1. *Mineral Resources are comprised of all model blocks at a 0.012 oz AuEq/ton cutoff that lie within an optimized pit, plus blocks at a 0.060 oz AuEq/ton cutoff that lie outside of the optimized pit.*
2. *The mineral resources are inclusive of the project mineral reserves.*
3. *Mineral resources that are not mineral reserves do not have demonstrated economic viability.*
4. *The Effective Date of the Grassy Mountain resource estimate is May 1, 2018.*
5. *Rounding may result in apparent discrepancies between tons, grade, and contained metal content.*

1.6 Mineral Reserves

Modifying factors were applied to the Measured and Indicated mineral resources presented in Table 1.3 to estimate the Proven and Probable mineral reserves for the Grassy Mountain project. The estimated Proven and Probable mineral reserves (Table 1.4) contain 1.72 million tons at an average grade of 0.210 oz Au/ton and 0.30 oz Ag/ton, for 362,00 contained ounces of gold and 516,000 contained ounces of silver. Mineral reserves are included in the estimated Measured and Indicated mineral resources. The Effective Date of the estimated mineral reserves is May 1, 2018.

Table 1.4 Mineral Reserve Statement

Classification	Tons (Million)	Gold Grade oz Au/ton	Silver Grade oz Ag/ton	Contained Metal (oz Au)	Contained Metal (oz Ag)
Proven	0.23	0.191	0.27	43,000	62,000
Probable	1.49	0.214	0.30	319,000	454,000
Proven + Probable	1.72	0.210	0.30	362,000	516,000

1. *Mineral reserves have an Effective Date of May 1, 2018.*
2. *Mineral reserves are reported using the 2014 CIM Definition Standards.*
3. *Mineral reserves are reported inside stope designs assuming drift-and-fill mining methods, and an economic gold cutoff grade of 0.103 oz Au per ton. The economic cutoff grade estimate utilizes a gold price of $1,275/oz, mining costs of $80/ton processed, surface rehandle costs of $0.16/ton processed, process costs of $30/ton processed, general and administrative costs of $11.11/ton processed, and refining costs of $5/oz Au recovered. Metallurgical recovery is 94.5% for gold. Mining recovery is 95% and mining dilution is assumed to be 10.5%. Mineralization that was either not classified or was assigned to Inferred mineral resources was set to waste. A 1.5% NSR royalty is payable. The reserves reference point is the PFS mill crusher.*
4. *Mineral reserves are included in Measured and Indicated resources; tonnage and contained metal have been rounded to reflect the accuracy of the estimate. Apparent discrepancies are due to rounding.*

1.7 Mining Methods

Extraction of the estimated mineral reserves is planned via a proposed underground mine that will be accessed via one decline and a system of internal ramps. Two shafts are planned for ventilation and secondary egress. The planned mining method is drift-and-fill with diesel-powered mining equipment. Cemented rock fill and uncemented rock fill will be used for backfill.

The mine design is based on a production rate of 1,300 to 1,400 tons per day over four days per week, with two shifts per day, to provide sufficient material to feed the 750 tons per day to the mill on a seven day per week basis. The nominal development size is 15 feet wide by 15 feet high for the main decline, 13 feet wide by 13 feet high for horizontal access to production areas, and the production headings will be 20 feet wide x 13 feet high. Ground support was designed to maintain a safe operation.

1.8 Recovery Methods

The Grassy Mountain gold-silver mineralization is considered to be amenable to a combination of gravity concentration and cyanide leaching. A 750 ton per day process plant has been designed to recover and concentrate gold and silver. The plant will be a conventional CIL type and is designed to operate with two shifts per day, 365 days per year, with an overall plant availability of 91.3%. The process plant will produce gold doré bars to be sold to gold refiners.

The plant feed will pass through a jaw crusher as the primary stage and cone crushers for secondary and tertiary size reduction, and then will be ground by a ball mill in a closed circuit with hydro-cyclones. A centrifugal gravity concentrator will collect gravity-recoverable gold from the cyclone underflow and discharge it to an intensive-leach reactor for recovery. The hydro-cyclone overflow with P_{80} of 100 mesh will flow to a CIL recovery circuit via a pre-aeration reactor.

Gold and silver leached in the CIL circuit will be recovered on carbon and eluted in a pressurized Zadra-style elution circuit, then precipitated by electrowinning and smelted in a refining furnace to pour doré bars.

Cyanide in the tailings will be destroyed in an SO_2/air circuit. Detoxified tails will be pumped to a tailings storage facility for final deposition and recovery of decant water. Process water recovered from the decant water will be re-used for grinding and plant utility water.

1.9 Infrastructure

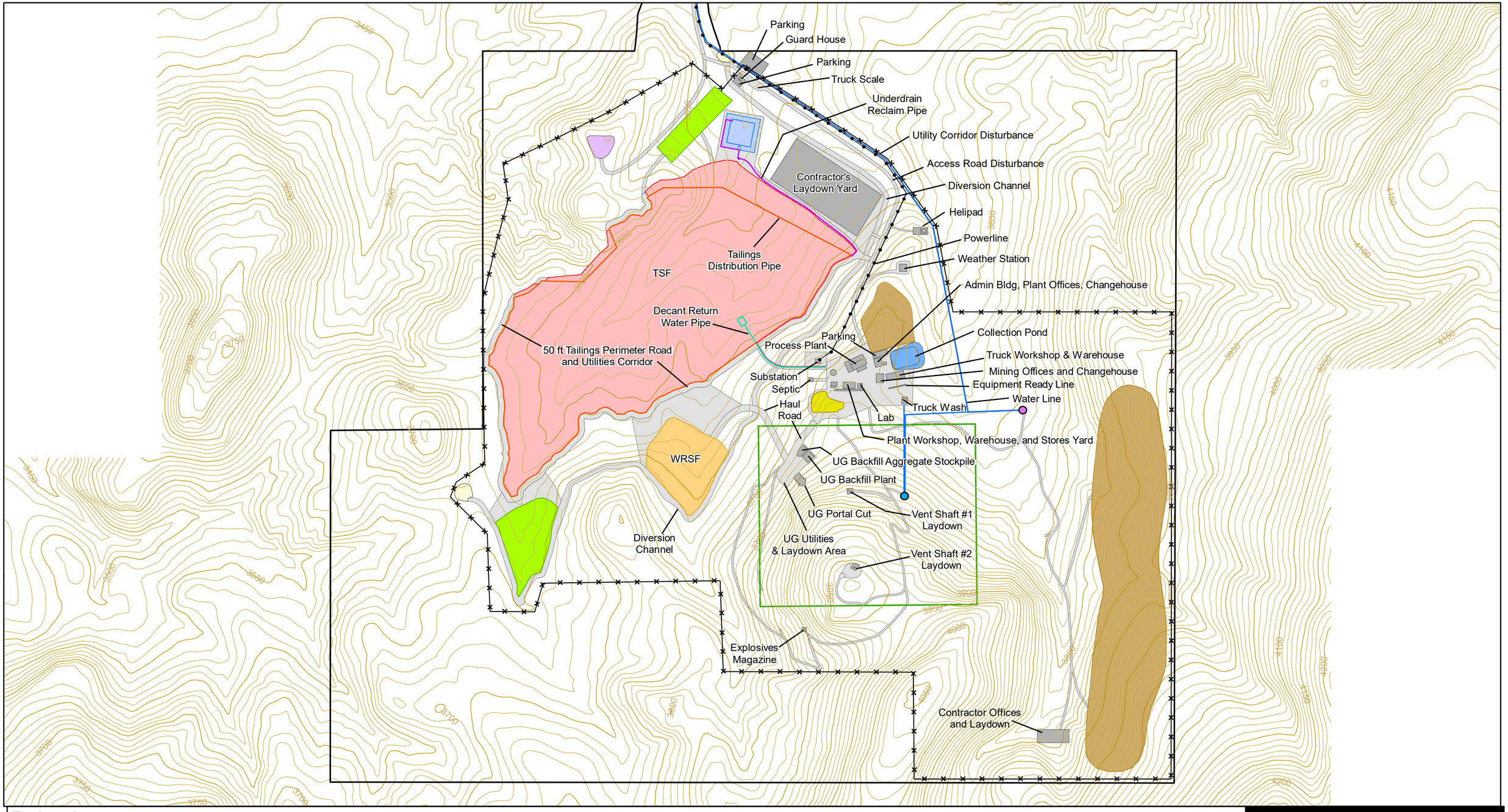
Provisions for infrastructure include: 17 miles of main access road, security fencing, water supply and distribution piping, fuel handling facilities, communications, buildings, explosives storage and handling, borrow source, electrical power supply and distribution, and a tailings storage facility. The general arrangement of the project surface facilities is shown in Figure 1.1.

1.9.1 Tailings Storage Facility

Tailings produced during mineral processing will be conveyed and disposed of in a tailing storage facility ("TSF") west of the mill site. The TSF is fully-lined and provides sufficient storage capacity to contain all tailings produced during the PFS mine production life.

The TSF consists of a dual containment lining system, water recovery, collection, return systems, and storm-water controls. Preliminary design by Golder Assoicates Inc. ("Golder") includes construction of the TSF in stages. Each stage increases the storage capacity of the facility by increasing dam embankment heights and expanding the impoundment basin.

Using data provided to, and additional data collected by, Golder, the TSF is designed to be zero-discharge facility during normal and upset conditions and remain geotechnically stable during the design seismic event.


Parking
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Access Road Disturbance
Contractor's
Laydown Yard
Diversion Channel
Helipad
Powerline
Weather Station
Admin Bldg, Plant Offices, Changehouse
Tailings
Distribution Pipe
TSF
Decant Return
Water Pipe
50 ft Tailings Perimeter Road
and Utilities Corridor
Parking
Process Plant
Collection Pond
Truck Workshop & Warehouse
Mining Offices and Changehouse
Substation
Septic
Equipment Ready Line
Water Line
Haul
Road
Truck Wash
Lab
Plant Workshop, Warehouse, and Stores Yard
WRSF
UG Backfill Aggregate Stockpile
UG Backfill Plant
UG Portal Cut
Vent Shaft #1
Laydown
Diversion
Channel
UG Utilities
& Laydown Area
Vent Shaft #2
Laydown
Explosives
Magazine
Contractor Offices
and Laydown
Explanation
Project Area
Patented Outline
Tailings Storage Facility
Waste Rock Storage Facility
Topsoil Storage
ROM Stockpile
Reclaim Pond
Collection Pond
Sediment Basin
Potential Borrow Pit Area
Landfill
Facility
Disturbance Area
Facility/Road
Fence Line
Powerline
Water Line
Decant Return Water Pipe
Tailings Distribution Pipe
Underdrain Reclaim Pipe
Water Production Well
Water Tank
Contours (10-ft contour interval)
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2.0 INTRODUCTION AND TERMS OF REFERENCE

Mine Development Associates ("MDA") has prepared this technical report on the Grassy Mountain gold and silver project, located in Malheur County, Oregon, at the request of Paramount Gold Nevada Corp. ("Paramount"), a company based in Winnemucca, Nevada, USA, and listed on the NYSE American (NYSE: PZG). Paramount controls the Grassy Mountain project through its 100% wholly-owned subsidiary Calico Resources USA Corp. ("Calico"), which was formerly a wholly-owned subsidiary of Calico Resources Corp. ("Calico BC"). Paramount acquired Calico BC in July 2016 by issuing shares in Paramount to the shareholders of Calico BC, and Paramount and Calico BC were subsequently amalgamated. For this report, "Paramount" refers to both Paramount and Calico, unless specifically stated otherwise.

Paramount is a reporting issuer in the provinces of Ontario, British Columbia, and Alberta, Canada. Consequently, this report has been prepared in accordance with the disclosure and reporting requirements set forth in the Canadian Securities Administrators' National Instrument 43-101 ("NI 43-101"), Companion Policy 43-101CP, and Form 43-101F1, as well as with the Canadian Institute of Mining, Metallurgy and Petroleum's "CIM Definition Standards - For Mineral Resources and Reserves, Definitions and Guidelines" ("CIM Standards") adopted by the CIM Council on May 10, 2014.

2.1 Project Scope and Terms of Reference

The purpose of this report is to provide a technical summary of the Grassy Mountain gold and silver project in support of a Preliminary Feasibility Study ("PFS") and first estimate of mineral reserves that are based on an updated mineral resource estimate that includes Paramount's 2016 - 2017 drill data. The most recent previous estimate of mineral resources at Grassy Mountain was made in 2015 by Metal Consultants Inc. (Wilson et al., 2015a; 2015b).

The mineral resources that are the subject of this technical report were estimated and classified under the supervision of Michael M. Gustin, Ph.D., C.P.G., and Senior Geologist for MDA. The mineral reserves were estimated and classified by Boris Caro, Aus.I.M.M., an independent mining engineering consultant and associate of Ausenco, a multi-national mining engineering consultancy firm. The mineral resources and reserves reported herein are estimated in accordance with the standards and requirements stipulated in NI 43-101.

The scope of this study included a review of pertinent technical reports and data provided to the authors by Paramount relative to the general setting, geology, project history, exploration activities and results, methodology, quality assurance, interpretations, drilling programs, and metallurgy. This work culminated in the estimation of mineral resources and reserves.

Table 2.1 lists the authors of this report, all of which are qualified persons, as well as the sections of the report for which they are responsible and the date of their most recent site inspection, where applicable.

Table 2.1 Qualified Persons, Dates of Most Recent Site Visits, and Report Responsibilities

Company	Author	Professional Designation	Date of Most Recent Site Visit	QP Responsibilities by Report Section
Mine Development Associates	Tom Dyer	P.E.	8/18/2016	1.9, 1.11, 1.12, 1.13, 16.10, 18, 19, 21, 22, 25.7, 25.9, 25.10, 25.11
	Michael Gustin	C.P.G.	6/1/2017	1.1, 1.2, 1.3, 1.5, 1.10, 1.14, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 20, 23, 24, 25.1, 25.2, 25.3, 25.8, 26.1, 27, 28, 29
Ausenco	David Baldwin	P.Eng.	6/8/2018	18.2.4 thru 18.2.9; 18.3.3; 25.7
	Tommaso Roberto Raponi	P. Eng.	n/a	1.4, 1.8, 13, 17, 25.4, 25.6, 26.2.1, 26.2.2
	Boris Caro	Aus.I.M.M.	n/a	1.6, 1.7, 15, 16 (except 16.10), 21.1.1, 21.2.1, 25.5, 26.2.4
Golder Associates Inc.	Chris MacMahon	P.E.	8/18/2016	1.91,18.4, 25.6, 25.11.1.2, 25.11.2.3, 26.2.3

Mr. Gustin, Mr. Dyer, Mr. Baldwin, Mr. Raponi, Mr. Caro, and Mr. MacMahon are qualified persons under NI 43-101 and have no affiliations with Paramount except that of independent consultant/client relationships.

In addition to the site inspections shown in Table 2.1, Mr. Gustin also accompanied Mr. Dyer and Mr. MacMahon on their August 18, 2016 visit to the project site, which was led by senior technical staff of Paramount. This joint site visit provided a general overview of the Grassy Mountain deposit area, including access to the project, potential surface infrastructure locations, and the site of the proposed portal for the underground mine access to the project. Pertinent geological aspects of the project were also discussed. Mr. Baldwin's site visit on June 8, 2018 was conducted similarly. These site visits also included additional time at Paramount's core storage and field office facilities in Vale, Oregon, which was used to further review technical aspects of the project and inspect representative drill core.

Mr. Gustin completed additional site inspections on November 17, 2016 and June 1, 2017. These site visits included traverses across the Grassy Mountain deposit area, inspection of numerous exposures of altered rock units that host the gold-silver mineralization, and the monitoring of active reverse-circulation and diamond-core drill sites, including the collection and on-site handling of drill samples. Additional days of each of these visits were spent at Paramount's Vale field office inspecting drill core in detail, reviewing all project procedures related to the active drilling programs, and generally communicating with the technical staff about the geology and mineralization of the Grassy Mountain deposit.

Karen Moffitt, an engineer and geotechnical expert, and two associates also participated in the August 18, 2016 site visit. Golder Associates Inc. ("Golder") field and engineering staff, under the direction of

Ms. Moffitt, visited the site several additional times between September 2016 and March 2018 to facilitate the geotechnical field investigations.

Additional site visits were also conducted by MDA Senior Geologist Mr. Paul Tietz, C.P.G., and MDA Senior Associate Geologist Mr. Steven Weiss, Ph.D., C.P.G. Both Mr. Tietz and Mr. Weiss are qualified persons under NI 43-101 and have no affiliations with Paramount except that of independent consultant/client relationship. Mr. Tietz visited the project office and drill core logging facility in Vale, Oregon, for three days in December 2016. Drill core, project data, and logging procedures were reviewed with Paramount's project manager, Mr. Michael McGinnis. Mr. Tietz visited the project office again in January, February, and March 2017 for a total of 18 days, two of which were spent at the Grassy Mountain project reviewing the site geology and surface exposures of hydrothermally altered rocks that host the deposit. During the remainder of this time, Mr. Tietz undertook further review of drill core and assisted Paramount's technical team in the construction of a cross-sectional geological model of the Grassy Mountain gold deposit.

Mr. Weiss visited the project area for 12 days in March 2017. Five days were spent reviewing the geology of the deposit area as well as other areas of hydrothermally altered rocks on the property in detail as part of an effort to develop and evaluate exploration drilling targets. Mr. Weiss spent seven days at the project office and core facility in Vale, Oregon reviewing drill core and cuttings, maps, surface and down-hole geochemical data, and cross-sections for areas adjacent to the Grassy Mountain deposit as well as outlying prospects within the property.

Although Mr. Tietz and Mr. Weiss are not co-authors of this report, their on-site activities contributed to the Data Verification summarized in Section 12.0 of this report.

The authors have relied almost entirely on data and information derived from work done by Paramount and its predecessor operators of the Grassy Mountain project, as well as other sources of information as cited. The authors have reviewed much of the available data, completed multiple site visits, and have made judgments about the general reliability of the underlying data. Where deemed either inadequate or unreliable, the data were either eliminated from use or procedures were modified to account for lack of confidence in that specific information. The authors have made such independent investigations as deemed necessary in the professional judgment of the authors to be able to reasonably present the conclusions discussed herein.

The Effective Date of this technical report is May 21, 2018. The estimated mineral resources have an Effective Date of May 1, 2018. The estimated mineral reserves have an Effective Date of May 1, 2018.

2.2 Frequently Used Acronyms, Abbreviations, Definitions, and Units of Measure

In this report, measurements are generally reported in Imperial units. Where information was originally reported in metric units, MDA has made the conversions as shown below, except in cases where legal, laboratory, or metallurgical measures and results were originally specified or reported in metric units, and their conversion would result in substantive rounding errors or changes to precision.

Currency, units of measure, and conversion factors used in this report include:

Linear Measure		
1 centimeter	= 0.3937 inch	
1 meter	= 3.2808 feet	= 1.0936 yard
1 kilometer	= 0.6214 mile	
Area Measure		
1 hectare	= 2.471 acres	= 0.0039 square mile
Capacity Measure (liquid)		
1 liter	= 0.2642 US gallons	
Weight		
1 tonne	= 1.1023 short tons	= 2,205 pounds
1 kilogram	= 2.205 pounds	

Currency Unless otherwise indicated, all references to dollars ($) in this report refer to currency of the United States.

Frequently used acronyms and abbreviations

AA	atomic absorption spectrometry
Ag	silver
Amp	amperes
Au	gold
CAD	Canadian dollars
cm	centimeters
core	diamond core-drilling method
^{o}C	degrees centigrade
d	day
°F	degrees Fahrenheit
ft	foot or feet
ft/d	feet per day
ft^3/min	cubic foot per minute
ft^3/sec	cubic feet per second
gal	gallons (US)
GIS	geographic information system
g/t	grams per tonne
gpm	gallons per minute
ha	hectares
hp	horse power
hr	hour
ICP	inductively coupled plasma analytical method
in	inch or inches

inches wg	air pressure in inches water gauge
kg	kilograms
km	kilometers
kV	kilovolts
kVA	kilovolt-ampere
kW	kilowatts
kWh	kilowatt-hour
l	liter
lab	laboratory
lb	pounds
lb/ft^3	pounds per cubic foot
LOM	life of mine
µm	micron
m	meters
Ma	million years old
mi	mile or miles
min	minutes
mm	millimeters
MV	megavolts
MVA	megavolt amp
MW	megawatts
MWh	megawatt-hour
NSR	net smelter return
oz	ounce
oz Au/ton	ounces of gold per short ton
P_{80}	particle-size distribution of 80% ≤ the nominal dimension
Pcf	pounds per cubic feet
ppm	parts per million
ppb	parts per billion
QA/QC	quality assurance and quality control
RC	reverse-circulation drilling method
ROM	run of mine
RQD	rock-quality designation
sec	seconds
st	Imperial short ton
t	metric tonne or tonnes
T or ton	Imperial short ton (2,000 pounds)
µg	microgram
USD	United States dollars
y	years
yd^3	cubic yard

3.0 RELIANCE ON OTHER EXPERTS

The authors did not conduct any investigations of the environmental, permitting, or social-economic issues associated with the Grassy Mountain project, and the authors are not experts with respect to these issues, or with respect to legal matters, such as the assessment of the legal validity of mining claims, private lands, mineral rights, and property agreements in the United States. The authors have fully relied on Paramount to provide complete information concerning the legal status of Paramount and related companies, as well as current legal title, material terms of all agreements, material environmental and permitting information, and tax matters that pertain to the Grassy Mountain project.

Section 4.0 in its entirety is based on information provided by Paramount. A Mineral Status Report prepared for Paramount by mining attorney Thomas P. Erwin of Erwin, Thompson & Faillers LLP, and dated September 26, 2017, described the property and title aspects of the project. Mr. Richard Delong of EM Strategies, Inc., an environmental consulting firm contracted by Paramount, prepared Sections 4.3 and 4.4, as well as Section 20, on environmental studies, permitting, and social and community impacts. Mr. DeLong has particular expertise in environmental compliance and permitting of mining projects in the western United States.

Mr. Dyer relied on Paramount to provide guidance on the application of taxes in economic analyses (Section 22.0).

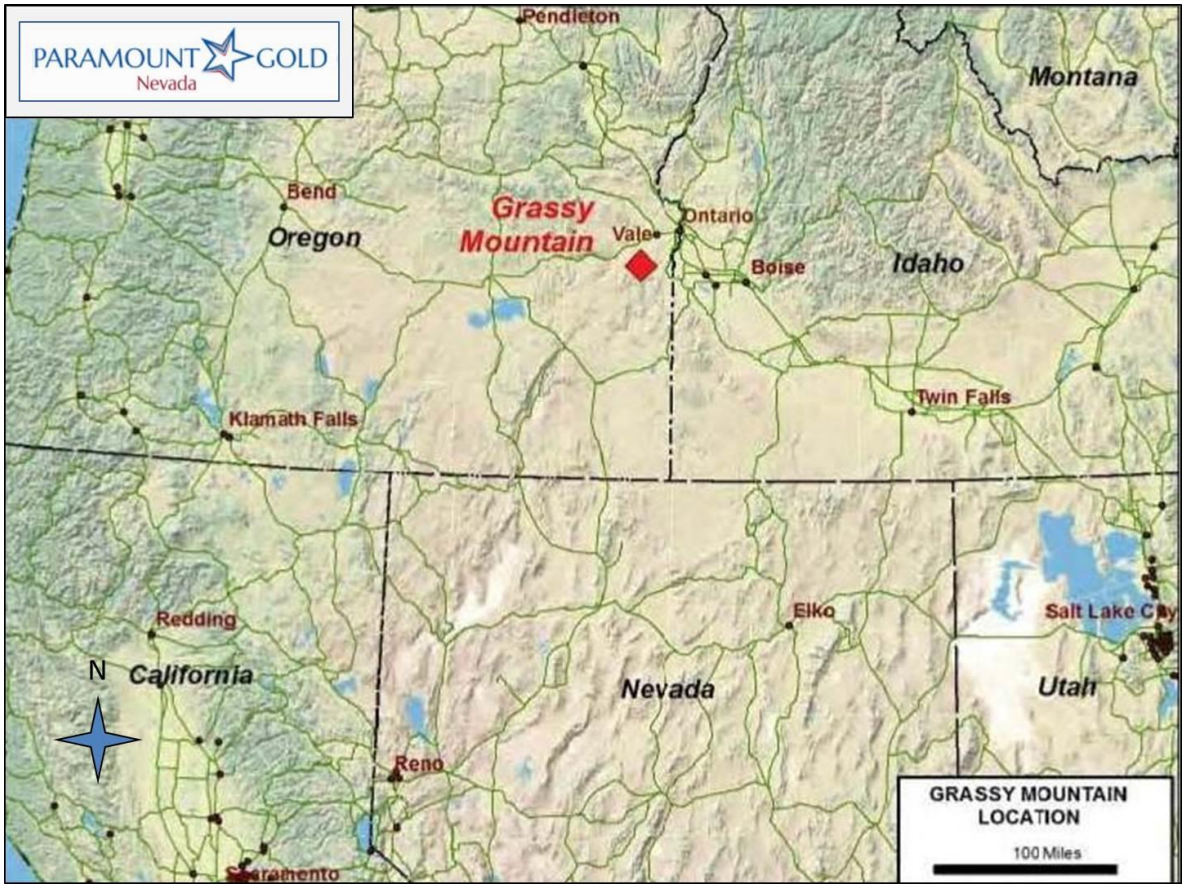
4.0 PROPERTY DESCRIPTION AND LOCATION

Mr. Gustin is not an expert in land, legal, environmental, and permitting matters. This Section 4.0 is based on information provided to MDA by Paramount. Mr. Thomas P. Erwin of Erwin, Thompson & Faillers, LLP prepared a Mineral Status Report for Paramount, dated September 26, 2017. This report described the property and title aspects of the project. MDA presents this information to fulfill reporting requirements of NI 43-101 and Mr. Gustin expresses no opinion regarding the legal or environmental status of the Grassy Mountain project.

4.1 Location

The Grassy Mountain property is situated near the western edge of the Snake River Plain in eastern Oregon, 20 miles south of the town of Vale, Oregon and about 70 miles west of Boise, Idaho (Figure 4.1). The property encompasses approximately 9,300 acres, all located within surveyed townships in Malheur County. The geographic center of the property is located at 43.674° N latitude and 117.362° W longitude, and the principal zone of mineralization is located in Section 8 of Township 22 South ("T22S"), Range 44 East ("R44E"), Willamette Meridian.

Figure 4.1 Location of the Grassy Mountain Project



4.2 Land Area and Mineral Title

The Grassy Mountain property consists of 427 unpatented lode claims, nine unpatented mill site claims, six unpatented association placer claims, three patented claims, and two land leases covering portions of Sections 11 through 15 and 24 of T22S, R43E; portions of Sections 3 through 10 and 16 through 20, T22S, R44E; Sections 31 through 34, T21S, R44E; and Section 36, T21S, R43E, as shown in Figure 4.2. Patented claims were individually surveyed at the time of location. Unpatented claim and Fee land boundaries were established initially by GPS handheld units and in 2011 by onsite survey work. Claim information is summarized in Appendix A.

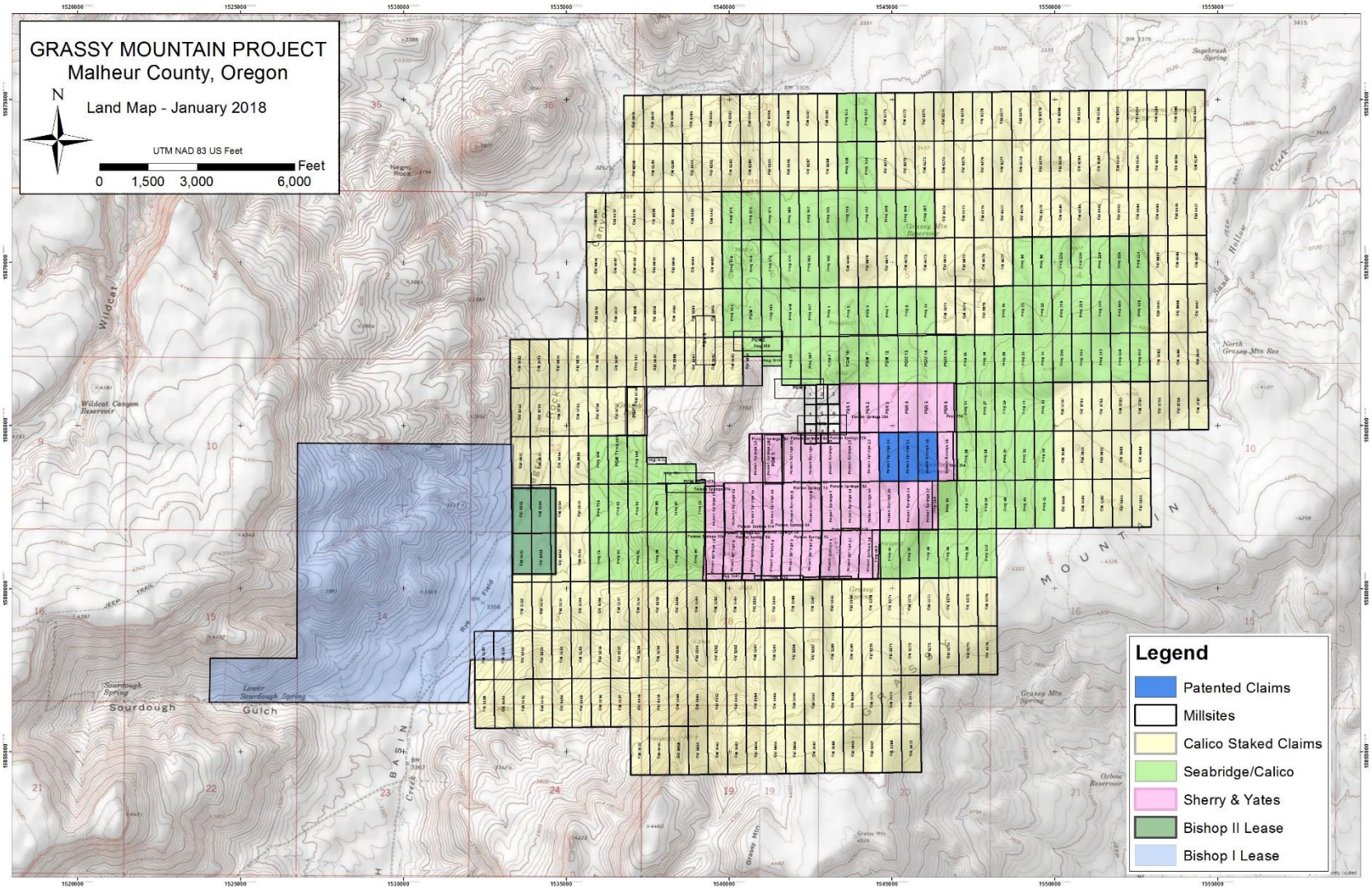
Unpatented claims are subject to annual US Bureau of Land Management ("BLM") fees of $155 per claim. The unpatented annual claim fees have been paid through September 1, 2018. Patented claims are subject to annual property taxes of $102.44 per year. Taxes for 2017/2018 were paid on November 3, 2017.

Calico, a wholly owned subsidiary of Paramount, owns and controls 100% of the mineral tenure of the unpatented mining claims, patented mining claims, Fee lands, and mining leases that comprise the Grassy Mountain property. Calico acquired all right, title and interest in the property, including all existing exploration and water rights pertaining to the Grassy Mountain project, pursuant to the "Deed and Assignment of Mining Properties" between Seabridge Gold Inc., Seabridge Gold Corporation and Calico dated February 05, 2013.

Ownership of unpatented mining claims is in the name of the holder (locator), subject to the paramount title of the United States of America, under the administration of the U.S. Bureau of Land Management ("BLM"). Under the Mining Law of 1872, which governs the location of unpatented mining claims on Federal lands, the locator has the right to explore, develop, and mine minerals on unpatented mining claims without payments of production royalties to the U.S. government, subject to the surface management regulation of the BLM.

Paramount controls 100% of the surface rights to the patented and leased lands that comprise the Grassy Mountain project, with the exception the Bishop II leased lands. The surface rights controlled by Paramount are subject to applicable Federal and State environmental regulations and the agreements outlined in Section 4.3.

Figure 4.2 Grassy Mountain Property Map
(from Paramount Gold Nevada, 2018)



4.3 Agreements and Encumbrances

Paramount's 100% ownership of the Grassy Mountain project is subject to the underlying agreements and royalties summarized in the following subsections.

4.3.1 Seabridge Gold Corporation ("Seabridge")

Seabridge retains a 10% Net Profits Interest ("NPI") in the Grassy Mountain project pursuant to the "Deed of Royalties" between Calico and Seabridge dated February 05, 2013. Pursuant to the "Deed of Royalties", within 30 days following the day that Calico has delivered to Seabridge a Feasibility Study on the Grassy Mountain project, Seabridge may elect to cause Calico to purchase the 10% NPI for $10M (CAD).

4.3.2 Sherry & Yates Inc. ("Sherry & Yates")

4.3.2.1 2004 Lease and Agreement

On February 14, 2018, Calico exercised their Option to Purchase, whereby Sherry & Yates agreed to sell to Calico all right, title and interest in the three patented and 37 unpatented mining claims. The 2004 Lease and Agreement with Sherry & Yates was terminated.

4.3.2.2 2018 Mining Deed

Sherry & Yates have closed the purchase and sale of the three patented and 37 unpatented mining claims under terms of the 2004 Lease and Agreement. Sherry & Yates retains a 1.5% royalty of the gross proceeds for the production of minerals from the patented and unpatented claims and the surrounding ½ mile area of interest (Sherry & Yates Property). Royalty payments are due 30 days following the end of the calendar quarter in which Calico realizes gross proceeds and the royalty will run with the Sherry & Yates Property. The royalty is not subject to advance-royalty payments made prior to Calico's exercise of their Option to Purchase. The royalty attributed to Sherry & Yates has decreased from 6% to 1.5%.

4.3.3 1989 Bishop I & Bishop II Leases

The Bishop I and Bishop II Mining Leases, as amended, with Bishop et al. ("Bishop"), dated September 11, 1989, include the following terms:

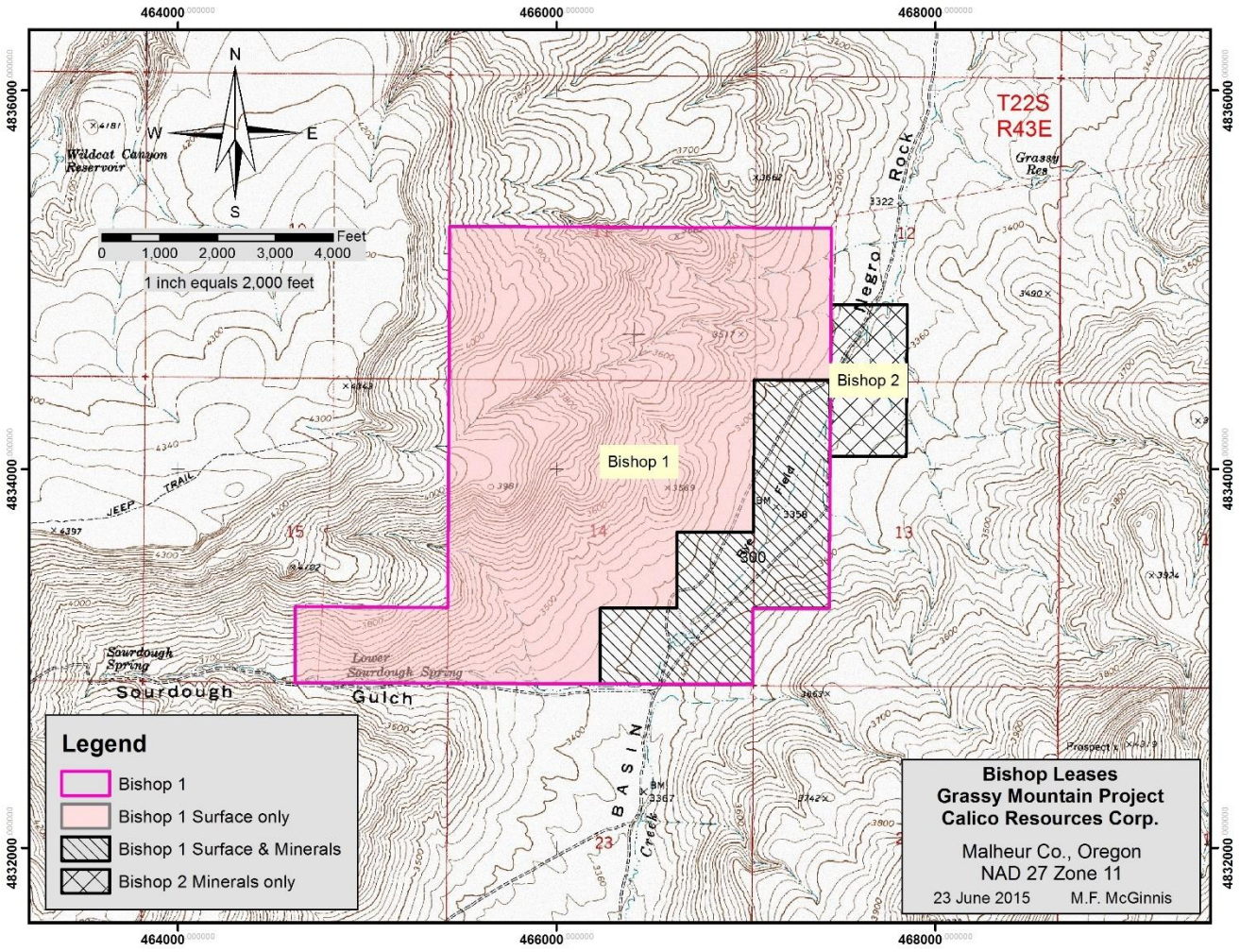
- The Terms shall be 10 years, as amended in 2009, expiring September 11, 2019;
- Annual Minimum royalty payments of $30,000 USD (Bishop I) and $3,000 USD (Bishop II) must be paid by Calico, or its assigns, to keep the Mining Lease and Agreement in good standing. All minimum royalty payments are recoverable against future production royalty payments;
- Bishop retains a 6.0% Net Smelter Return ("NSR") royalty based on a gold price above $800 USD per ounce. If ore minerals other than gold are produced, they would be subject to an additional 4% NSR royalty; and

- A provision in the Bishop I lease agreement provides for payments to be made by the lessee to Bishop as follows: $50 for each drill hole on Fee land; $100 for each acre of disturbed Fee land; and $300 for each acre disturbed and lost for Bishop's use.

Minimum royalty payments made to date indicate that there are accumulated credits of $760,000 and $76,000 that would apply to the Bishop I and Bishop II Leases, respectively.

The Bishop I lease includes Fee lands and unpatented placer claims, while the Bishop II lease includes Fee lands. The surface and mineral rights relating to the Bishop I and II leases are shown in Figure 4.3, and the Bishop I unpatented claims are included in Appendix A.

Figure 4.3 Surface and Mineral Rights of the Bishop I and Bishop II Leases



4.3.4 Total Annual Property Holding Costs

Annual property holding costs total $107,970, as summarized in Table 4.1.

Table 4.1 Grassy Mountain Annual Land Holding Costs

Payment Type	Yearly Cost
BLM Claim Fees – Calico unpatented claims	$ 61,845
BLM Claim Fees – Former Sherry & Yates unpatented claims	$ 4,960
BLM Claim Fees – Bishop placer claims	$ 5,735
Malheur County Claim Recording Fees	$ 2,328
Patented Claims Property Taxes	$ 102
Lease Payments -- Bishop I and II	$ 33,000
Total Annual Cost	**$ 107,970**

4.4 Environmental Liabilities

Except for the exploration surface disturbance and network of wells that will need to be reclaimed, there are no known environmental liabilities associated with the Grassy Mountain project. All exploration drill holes that are not part of the current approved monitor well program have been plugged according to Oregon regulations. Surface disturbance that has not been reclaimed will be used for future development activities and access. The groundwater monitoring wells remain in use for ongoing exploration activities and permit acquisition activities associated with the mine development process. The disturbance is bonded as described below in Section 4.5 of this report.

4.5 Environmental Permitting

There is a valid existing exploration permit with DOGAMI and the BLM. A bond in the amount of $146,200 is associated with the exploration permit. An existing Notice with the BLM for 2.78 acres of surface disturbance and a monitor well has an associated bond in the amount of $25,315. An application for "Extension of Time for a Water Right Permit" was filed with the Oregon Water Resources Department. Paramount has until October 1, 2028 to complete the water system and apply water to beneficial use. The company must submit progress reports on October 1 of 2022 and 2027. The permit allows a maximum pumping rate of 2.0 cubic feet per second (895 gallons per minute).

Permits needed for the type and scope of mining at Grassy Mountain outlined in the PFS of this technical report will involve a number of Federal, State, and local regulatory authorities. The project will require the following major environmental permits to construct, operate, and close: 1) a Plan of Operations from the BLM; 2) a DOGAMI Consolidated Permit for Mining Operations; 3) an Oregon Department of Environmental Quality ("ODEQ") Chemical Mining Permit; 4) Water rights from the Oregon Department of Water Resources; 5) an Air Quality Operating Permit ("AQOP") with the ODEQ; and 6) a Conditional Use Permit from Malheur County. Other applicable State of Oregon and federal permits may include, but are not limited to, the following:

- Fill and Removal Permit(s) (ORS 196.600 and 196.800);

- Permits to appropriate groundwater or surface water, or to store water in an impoundment (ORS 537.130, ORS 537.400, and ORS 540.350);
- Water Pollution Control Facility (ORS 468.740);
- Storm Water Pollution Prevention Plan (EPA);
- Air Quality Permits (ORS 468.310);
- Solid Waste Disposal Permit (ORS 459.205);
- Permit to Clear Right of Way (ORS 477.685);
- Permit for Placing Explosives (ORS 509.140);
- Hazardous Waste Storage Permit (ORS 466.005);
- Land Use Permit (OAR Chapter 632, Division 001); and
- Any other state permits, if applicable and required under Division 37

Further information on environmental studies, permitting, and social and community impacts is discussed in Section 20.0.

4.6 Water Rights

Paramount holds a water right granted by the Oregon Water Resources Department to Calico Resources USA Corp. The water right was issued on April 5, 1990 through State of Oregon Water Rights Application G-11847 and Permit G-10994. Use is limited to not more than 2.0 cubic feet per second (897.6 gallons per minute) measured at the well.

On December 26, 2012, the Oregon Water Resources Department, Water Rights Services Division, granted Final Order Extension of Time for Permit Number G-10994. This extension gave Calico Resources USA Corp. until October 1, 2028 to fully develop and apply water to beneficial use. If the water right has not been developed and proven by the deadline, the State will begin cancellation proceedings.

4.7 Summary Statement

Mr. Gustin is not aware of any significant factors and risks not discussed in this report that may affect access, title, or the right or ability to perform work on the property, although Mr. Gustin is not an expert with respect to such matters.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Access to Property, Physiography and Sufficiency of Surface Rights

Access to the Grassy Mountain project area is provided by Twin Springs Road, a partially maintained unpaved road that originates at US Highway 20 approximately four miles west of the city of Vale, Oregon. The center of the project area may be reached from the Twin Springs Road via 2.5 miles of secondary unpaved roads. Winter and wet weather conditions occasionally limit access to the property, although on-site travel is generally possible year-round.

The project area is located in the plateau region of eastern Oregon. Terrain at the project area is mainly open steppe with mesas, broad valleys, and gently rolling hills to steeper uplands. Elevations range from 3,330 to 4,300 feet above mean sea level. Vegetation consists of sagebrush, weeds, and desert grasses tolerant of semi-arid conditions.

The surface rights as described in Section 4 are sufficient for the mining and exploration activities proposed in this report.

5.2 Climate

The climate can be described as the semi-arid, continental interior type, with average annual precipitation of about 9.25 inches, roughly half of which falls as snow between November and March. Local weather data indicate a mean annual temperature of 52° F, with daily temperatures ranging from an extreme low of -20°F in the winter to extreme highs of 100°F and higher in the summer. Monthly average temperature and precipitation data for Vale, Oregon are shown in Table 5.1.

Table 5.1 Monthly Average Climate Data for Vale, Oregon

Period of Record Monthly Climate Summary

Period of Record : 01/01/1893 to 07/31/2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	36.2	43.9	55.5	65.4	74.5	82.8	93.3	90.8	79.7	66.2	48.9	37.8	64.6
Average Min. Temperature (F)	18.7	23.7	29.5	35.1	42.8	49.6	55.6	52.6	43.2	33.7	26.1	20.5	35.9
Average Total Precipitation (in.)	1.17	0.85	0.83	0.72	1.01	0.80	0.26	0.30	0.45	0.68	0.99	1.19	9.25
Average Total SnowFall (in.)	6.2	1.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	4.2	14.0
Average Snow Depth (in.)	1	1	0	0	0	0	0	0	0	0	0	1	0

Percent of possible observations for period of record.
Max. Temp.: 95.2% Min. Temp.: 95.1% Precipitation: 96% Snowfall: 92.1% Snow Depth: 90%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

It is expected that seasonal road maintenance will be sufficient to provide access to the site for all personnel and any deliveries related to the mine site. Mining and exploration activities can be conducted year-round.

5.3 Local Resources and Infrastructure

As of the Effective Date of this report, several monitoring wells and unpaved access and drilling roads are the only available infrastructure at the Grassy Mountain property. A regional, 500-kV electrical transmission line runs through the southern part of the property, about 2.5 miles south of the proposed mine site. Project power requirements and other infrastructure details are discussed in Section 18.0

Water to support current exploration activity is available from on-site wells. Long-term water needs for mining and processing are forecasted to be approximately. Paramount has already developed capacities of more than 200 gpm from multiple wells near the mill and mine sites. Project water requirements and sources are described in more detail in Section 18.0.

Logistical support is available in Vale, Nyssa, and Ontario, Oregon, all of which are located within 20 miles of the project site. Mining personnel, equipment, fuel, supplies, and engineering and telecommunications services for operations at the Grassy Mountain property are expected to be available from Malheur County, Oregon and the adjacent greater Boise area in neighboring southern Idaho.

6.0 HISTORY

The information summarized in this section of the report has been extracted and modified from Wilson et al. (2015a), which was drawn from Hulse et al. (2012), with additional information derived from multiple sources, as cited. A concise early history of the discovery of the Grassy Mountain deposit and other events to September 1988 was reported by Kelly (1988). Mr. Gustin has reviewed this information and believes this summary accurately depicts the history of the Grassy Mountain project.

Portions of the present Grassy Mountain property were first staked by two independent geologists, Dick Sherry and Skip Yates, in 1984. Atlas Precious Metals ("Atlas") acquired the Grassy Mountain property from Sherry and Yates in 1986. Between 1986 and 1991, Atlas conducted detailed mapping and sampling at the property and drilled a total of 227,397 feet in 400 drill holes. Shallow, apparently stratiform gold mineralization was delineated at the main Grassy Mountain deposit and 1.5 miles to the southwest at the Crabgrass prospect. Atlas identified exploration targets at the Grassy Mountain project based on soil anomalies, conducted further soil and float sampling on several prospects, expanded the original claim block, and collected extensive geologic, mine engineering, civil engineering, and environmental baseline data. The baseline data were compiled to support a 1990 historical feasibility study for an envisioned open-pit heap-leach and milling operation. Atlas then began to consider underground-mining scenarios, but declining gold prices and the perception of an unfavorable permitting environment discouraged Atlas from developing the project, and the property was optioned to Newmont Exploration Ltd ("Newmont") in 1992.

Newmont leased the Grassy Mountain property from Atlas in September 1992 for US$30 million. Newmont geologists mapped the property and completed geochemical sampling. Several ground and airborne geophysical surveys were also conducted. In late 1994, Newmont drilled 15 holes and completed an in-house mineral resource estimate that became the basis for an in-house economic and mining-method evaluation that was completed in 1995. Newmont determined that the project did not meet corporate objectives and returned the property to Atlas in September 1996.

In January 1998, Atlas granted Tombstone Exploration Company Ltd ("Tombstone") the option to purchase 100% of the property. Tombstone executed the option agreement and conducted an exploration program which included six holes for a total of 8,071 feet. Lack of venture capital forced Tombstone to return the property to Atlas in May 1998.

In February 2000, Seabridge Gold ("Seabridge") entered an option agreement with Atlas to acquire a 100% interest in the Grassy Mountain property. Seabridge completed its acquisition of the Grassy Mountain property in April 2003.

Seabridge did not carry out exploration at the Grassy Mountain property and in April of 2011, signed an option agreement granting Calico Resources Corp. the sole and exclusive right and option to earn a 100% interest in the project. The acquisition of the Grassy Mountain property by Calico was completed in 2012. In 2011 and 2012, Calico carried out geologic mapping and sampling, and drilled a total of 13,634 feet in 17 holes. Calico also commissioned a geophysical survey to assist in their exploration efforts at the Grassy Mountain property.

In 2016, Paramount acquired Calico by issuing 7,171,209 common shares to Calico shareholders, whereby Calico stockholders had the right to receive 0.07 of a share of common stock of Paramount for every common share of Calico.

6.1 1986 – 1996 Exploration History

Historical exploration conducted by previous operators includes exploration programs carried out by Atlas, Newmont, Tombstone, and Calico.

6.1.1 Atlas 1986 - 1992

Atlas carried out geologic mapping of the property and recognized soil geochemistry as an important exploration tool at Grassy Mountain. Most Atlas exploration targets were initially identified by claim-corner soil sampling on 600-foot by 1,500-foot spacings. Atlas conducted further soil and float sampling on several anomalies and identified a genetic link between gold mineralization and silicification. Of the 400 drill holes completed by Atlas at the Grassy Mountain property, 196 were RC holes drilled on 75- to 100-foot centers within what became the Grassy Mountain resource area. The remaining holes were drilled at prospects away from the main Grassy Mountain resource area.

In addition to the Grassy Mountain deposit, Atlas delineated another gold prospect called Crabgrass, which is located approximately 1.5 miles southwest of the Grassy Mountain deposit. Atlas drilled 87 RC holes at Crabgrass and defined three separate near-surface mineralized zones.

6.1.2 Newmont 1992 - 1996

Newmont carried out extensive and locally detailed geologic mapping, and both soil and rock-chip sampling. In 1993, Newmont geologists mapped 40 square miles at a scale of 1:6,000 and collected approximately 2,600 soil samples on a 400-foot by 200-foot grid. Newmont began soil sampling on a 400-foot by 200-foot grid, hoping to identify anomalies missed by the Atlas sampling. During 1993 and 1994, Newmont collected more than 400 rock-chip samples and conducted several geophysical surveys. These included a ground-based gravity survey along existing roads, airborne magnetic and radiometric surveys over the entire property, and ground based gradient array (IP/resistivity) surveys over the main deposit and several of the satellite prospects. Ground magnetic surveys were conducted over certain areas. Newmont geologists re-logged the remaining Atlas drill core during this period, and eventually the Atlas RC drill chips as well.

In 1994, Newmont first drilled 11 inclined diamond-core holes designed to intersect and define the geometry of potential high-grade gold zones in the main Grassy Mountain deposit. These were followed with one wedge core hole off of their initial core hole, two holes pre-collared by RC and completed with core, and one additional core hole.

Newmont's 15 holes were all angled and totaled 15,009.5 feet. This drilling defined what Newmont thought could be several gold zones in excess of 0.1 oz Au/ton within an area of the Grassy Mountain deposit measuring approximately 600 feet long by 350 feet wide by 250 feet thick. Mineralization was constrained to the northeast by a single hole which failed to encounter high-grade gold. Newmont considered the western extent of the main high-grade zone effectively closed off after encountering only

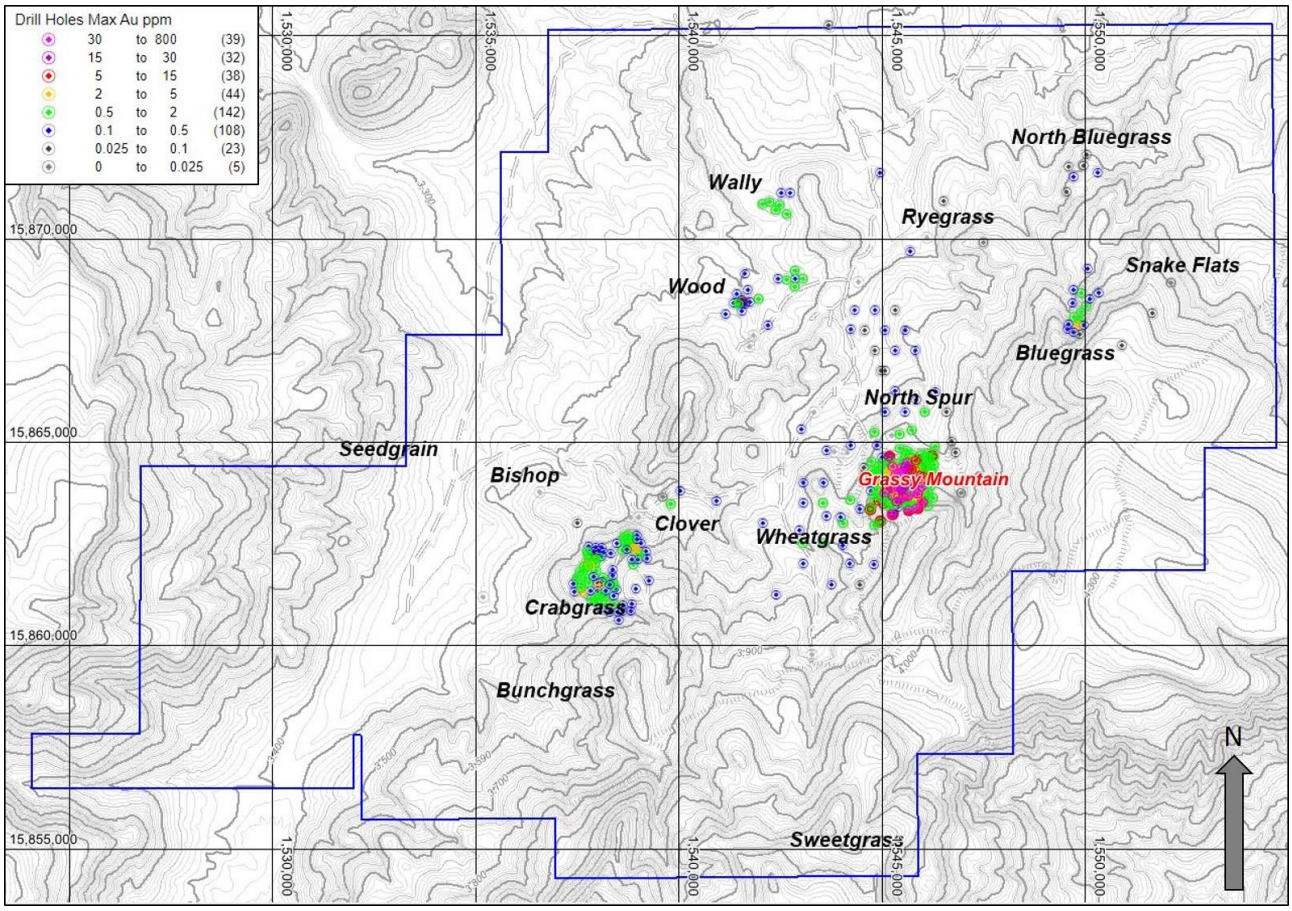
low-grade gold (0.012 to 0.019 oz Au/ton) and local barren quartz-chalcedony veins. Based on the core drilling and mapping and sampling of surface exposures, Newmont geologists concluded that high gold grades at the Grassy Mountain deposit were controlled by narrow, steeply south-dipping quartz-chalcedony veins and clay matrix breccias that would need to be properly represented during grade modeling and resource estimation.

During 1995 and 1996, Newmont's activities were focused on estimating mineral resources at the main Grassy Mountain deposit. No new exploration work was done during this period.

6.2 1996 Historical Exploration at Outlying Target Areas

By 1996, Atlas and Newmont had identified and named several mineralized and potentially mineralized target areas peripheral to the main Grassy Mountain gold deposit based primarily on rock-chip, float, and soil-sample data. These outlying targets, several of which were drilled to varying degrees, are shown in Figure 6.1 and summarized in the following subsections to provide perspective regarding the historical exploration activities that have been conducted on the property, and to provide context for historical exploration done by Calico in 2011 and 2012.

Figure 6.1 Outlying Target Area Map
(data from Paramount, 2016)



Blue lines are limits of Paramount's claims; UTM NAD83 US Feet, Zone 11 projection; contour interval is 10 feet. 5,000ft grid lines for scale. Dots are drill hole collars through 2012 colored by maximum gold assays.

6.2.1 Wheatgrass

This target area is approximately 1,500 feet southwest of the Grassy Mountain deposit area (Figure 6.1) and was the site of the first drilling on the property. It has been hypothesized that Wheatgrass may be a lateral continuation of mineralization extending from the main Grassy Mountain deposit that is displaced by down-to-the-west faults. A number of RC drill holes have tested this area with some narrow, low-grade intersections being encountered. Most of the historical holes are vertical and widely spaced.

6.2.2 North Spur

North Spur is 2,000 feet to the north-northeast of the main Grassy Mountain deposit (Figure 6.1). Resistant ledges of silicified sandstone indicate hydrothermal fluids flowed through the North Spur area. Three widely spaced vertical RC holes south of the silicified ledges have intervals with grades as high as the 0.015 to 0.058 oz Au/ton range. About 500 feet to the north, a fence of three vertical RC holes is located approximately at the northern margin of the most strongly silicified outcrops. These holes penetrated intervals with generally low grades, but they are sporadically mineralized. Review of RC chips and logs from these holes indicates that gold grades decrease down hole as the sandstone intervals transition to more clay-rich units with depth. All of these holes were drilled vertically and did not adequately test for steeply dipping mineralized structures.

6.2.3 Crabgrass

The three mineralized areas that comprise the Crabgrass prospect (Figure 6.1) appear to be stratiform and contained within the flat-lying to gently east-dipping sandstones above the clay-rich units, but all the historical holes are vertical and RC. Significant low-grade gold mineralization was encountered in numerous holes, which formed the basis for a historical resource estimate, as discussed in Section 6.4.

6.2.4 Bluegrass and North Bluegrass

These targets are located 1.2 miles and 1.6 miles northeast of the Grassy Mountain deposit, respectively (Figure 6.1). Sixteen RC holes were drilled in the area to follow up on rock-chip and float-chip samples with elevated gold contents. The best hole intersected 65 feet averaging 0.035 oz Au/ton beginning at 140 feet down the hole.

6.2.5 Snake Flats

This area is 2.25 miles to the northeast of the Grassy Mountain deposit (Figure 6.1). The target was identified by mapping float of silicified arkose and sinter boulders. A large mercury, arsenic, and antimony soil anomaly extends down-slope for approximately 3,500 feet to the northeast. This is the most aerially extensive surface geochemical anomaly at the project other than at Wheatgrass. Samples from the altered boulders contained up to 0.03 oz Au/ton; the source area for these boulders appears to be somewhere beneath post-mineral basalt in the area. Three RC holes were drilled through about 100 feet of the post-mineral basalt before intersecting unaltered sandstone and siltstone. Additional work is necessary to define a drill target.

6.2.6 Wood

The Wood target is 1.2 miles northwest of the main deposit area (Figure 6.1). Wood was identified by surface rock and soil sampling, followed by surface trenching. Rock-chip samples that were taken from a small outcrop of weakly silicified volcanic rocks returned assays of as much as 0.007 to 0.009 oz Au/ton. Fifteen shallow RC drill holes were completed in the area, with the best intercept being 30 feet averaging 0.073 oz Au/ton beginning at 30 feet down the hole.

6.2.7 Wally

The Wally target is 1.5 miles north-northwest of the Grassy Mountain deposit (Figure 6.1) and has been referred to as the "Big Wally" target in some historical documents. Soil samples in the Wally area defined overlapping arsenic, mercury, antimony, and gold anomalies that straddle a north-northwest-trending fault shown on the district geology map. The best drill hole intercept in this target was 90 feet of 0.025 oz Au/ton, beginning 100 feet down the hole.

6.2.8 Ryegrass

The Ryegrass target is located 1.2 miles north of the Grassy Mountain deposit (Figure 6.1). This area was identified by mapping silicified zones. Follow-up rock-chip sampling of the outcrops returned values of 20 to 25 ppb gold and 900 to 1,000 ppb mercury.

6.2.9 Clover

This target is one mile west of the main deposit (Figure 6.1) and is identified as an area of weakly silicified arkose adjacent to a northeast-trending fault. Rock-chip sampling identified an outcrop containing 25 ppb gold.

6.2.10 Bunchgrass

Bunchgrass is an area of modestly elevated mercury, arsenic, and antimony in soil samples located 0.5 miles south of Crabgrass (Figure 6.1). Wilson et al. (2015a) reported that the target area is approximately 750 feet wide.

6.2.11 Sweetgrass

Sweetgrass is located approximately 1.75 miles southwest of the Grassy Mountain deposit (Figure 6.1). Sampling of a large float boulder of siliceous sinter returned 1,030 ppb Au. Although additional sampling in the area did not return any significant values, more work is warranted to determine the source of this siliceous sinter boulder.

6.3 1998 – 2016 Exploration

6.3.1 Tombstone 1998

Prior to finalizing their agreement with Atlas, Tombstone reviewed data from previous work at the property and commissioned an economic study of alternative development scenarios. Tombstone drilled 10 RC holes, six of which were completed with diamond core ("core") tails, for a total of 8,071 feet. Tombstone relied heavily on Newmont's gradient array surveys to define their drilling targets.

6.3.2 Seabridge 2000 - 2010

Seabridge acquired the property in 2000 and subsequently optioned the property to Calico in early 2011. Paramount represents that Seabridge did not conduct exploration activities at Grassy Mountain.

6.3.3 Calico 2011 - 2016

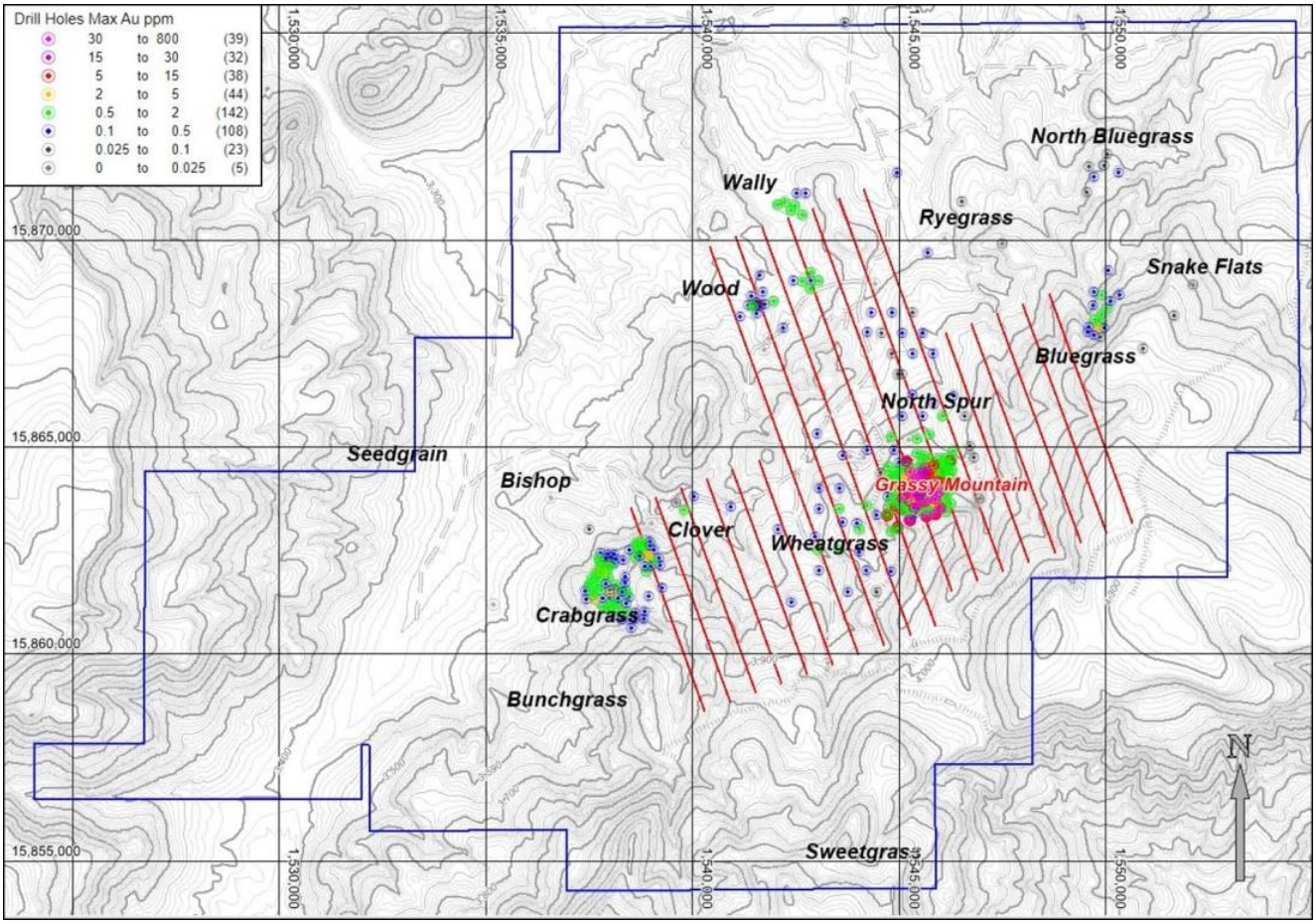
Calico geologists conducted geologic mapping and compiled the Atlas and Newmont geology and surface sample data into property-wide and deposit area maps using conventional GIS procedures. During 2011 and 2012 a total of 13,634 feet were drilled in 14 RC and three core holes. Thirteen of these holes were drilled in the Grassy mountain deposit area and four were drilled in outlying targets.

In 2012, Calico commissioned a 25.1 line-mile controlled-source audio-frequency magnetotelluric ("CSAMT") survey conducted by Zonge Geosciences Inc. ("Zonge"). The survey lines were oriented N20°W (Figure 6.2) and arranged to cross the trend of known mineralization. The CSAMT survey was done under the supervision of consulting geophysicist J.L. Wright, of Wright Geophysics in Spring Creek, Nevada. Mr. Wright documented the survey methods and parameters, analyzed the processed data provided by Zonge, and made geologic and exploration interpretations in a 2012 report to Calico that included 18 inverted resistivity sections and interpretive overlays in PDF format, as well as ArcGIS and MapInfo electronic data files. (Wright, 2012).

An important result of the CSAMT survey was the recognition of a zone of high resistivity that encompassed the main Grassy Mountain gold deposit (Figure 6.3). This was attributed to the zone of extensively silicified rocks that host the main Grassy Mountain gold deposit. The high-resistivity response was visible in sectional and plan views of the resistivity inversion; an example is shown in Figure 6.3.

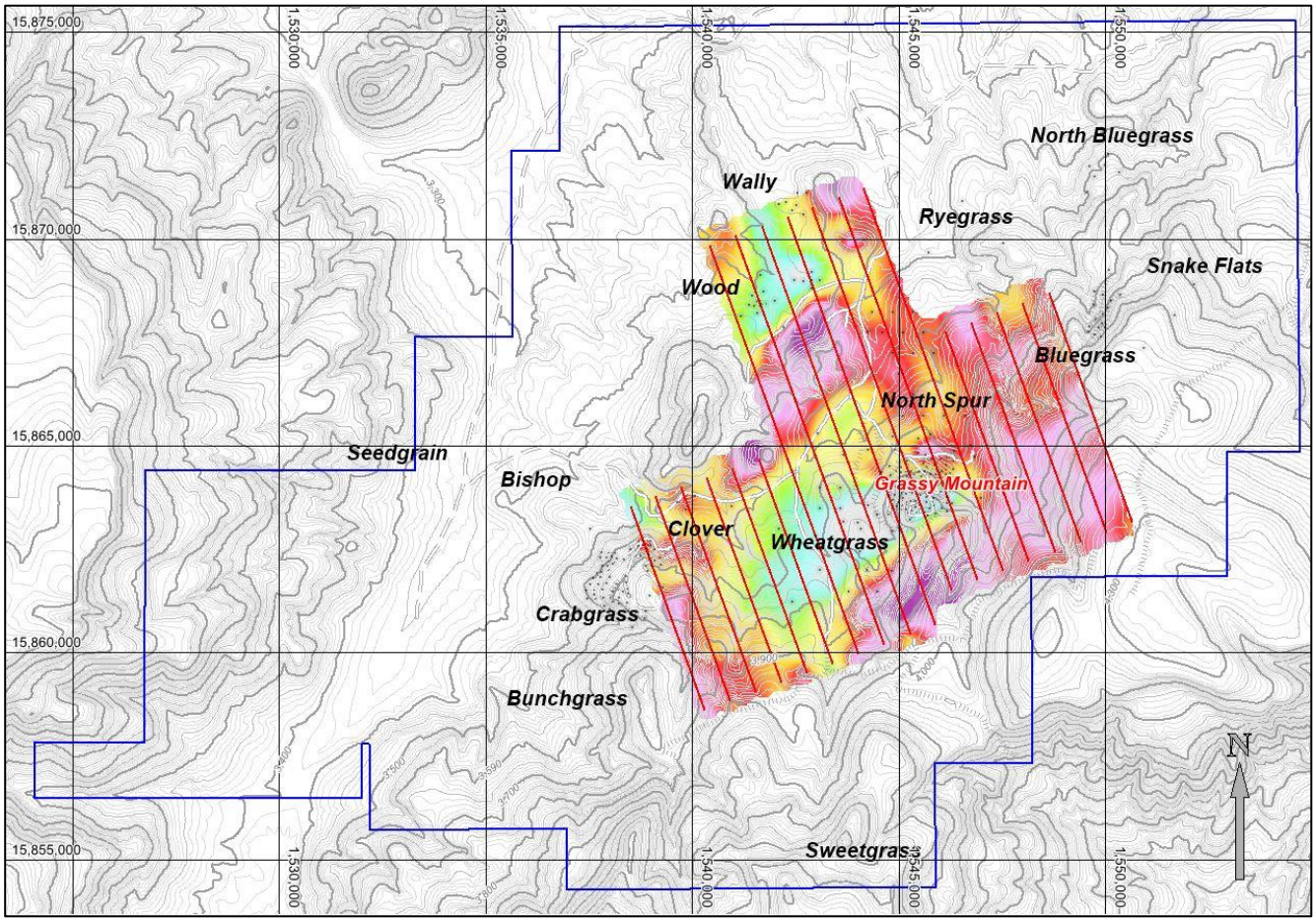
In July 2016, Calico and the Grassy Mountain property were acquired by Paramount. Work carried out by Paramount, the current operator of the project, is summarized in Section 10.2.

Figure 6.2 Map of 2012 CSAMT Lines
(from Wright, 2012)



Red lines show CSAMT lines. Blue lines are limits of Paramount's claims; UTM NAD83 US Feet, Zone 11 projection; contour interval is 10 feet. 5,000ft grid lines for scale. Dots are drill hole collars through 2012 by maximum Au assays, same as in Figure 6.1.

Figure 6.3 CSAMT Inversion: Resistivity at 328 to 656 Feet Below Surface



Blue lines are limits of Paramount's claims; UTM NAD83 US Feet, Zone 11 projection; contour interval is 10 feet. 5,000ft grid lines for scale. Grey dots are drill hole collars through 2012.

6.4 Historical Mineral Resource Estimates

6.4.1 1990 – 1997

A variety of historical resource and reserve estimates for the Grassy Mountain gold deposit were completed on behalf of previous owners and issuers from 1990 through 1997. These historical estimates (Table 6.1 and Table 6.2) were summarized in the 2011 Technical Report prepared by Resource Modeling Inc. (Lechner, 2011), and are described in detail in various internal reports prepared by Atlas, Newmont, and their contractors. In addition, Wilson et al. (2015a) provided a summary of historical estimated resources for the Crabgrass prospect (Table 6.3). All of the estimates presented below in Table 6.1, Table 6.2, and Table 6.3 are relevant only for the historical context of exploration work done during this period and are not to be relied upon. Paramount is not treating these estimates as current mineral resources and Mr. Gustin has not done sufficient work to classify these estimates as current mineral resources. These historical estimates are superseded by the current mineral resources described in Section 14.0.

Table 6.1 1990 – 1997 Historical Open Pit Estimates, Grassy Mountain Deposit
(from Lechner, 2011)

Open Pit Type 'Resources'						
Year	Source of Estimate	Au Cutoff (opt)	Tons Above Cutoff	Mean Au (opt)	Contained Au (oz)	Comments
1990	PAH	0.020	17,200,000	0.061	1,053,100	"Geologic Resource" - global block model tabulation, 1990 Kilborn "feasibility study"
1991	PAH	0.020	15,900,000	0.062	996,000	"Open pit Reserve" - used in 1990 Kilborn "feasibility study"
1993	Newmont	0.010	25,400,000	0.032	803,000	Manual polygonal "Resource"
1993	Newmont	0.020	13,600,000	0.045	617,091	Global recovery "Resource"
1993	Newmont	0.020	14,900,000	0.061	900,010	Global recovery "Resource"
1994	Newmont	0.020	20,300,000	0.039	783,000	"Geologic Resource" - DDH only, conservative vein distribution, normal mean
1994	Newmont	0.020	20,300,000	0.059	1,194,000	"Geologic Resource" - DDH only, optimistic vein distribution, lognormal mean
1994	Newmont	0.020	18,000,000	0.04	721,000	"Open pit Resource" - DDH only, conservative vein distribution, normal mean
1994	Newmont	0.020	18,000,000	0.063	1,126,000	"Open pit Resource" - DDH only, optimistic vein distribution, lognormal mean
1997	PAH	0.020	17,252,000	0.052	899,000	"Measured" and "Indicated" Mineral Resource

Table 6.2 1990 – 1997 Historical Underground Estimates, Grassy Mountain Deposit
(from Lechner, 2011)

Underground Type 'Resources'						
Year	Source of Estimate	Au Cutoff (opt)	Tons Above Cutoff	Mean Au (opt)	Contained Au (oz)	Comments
1990	Atlas	0.500	90,210	1.550	139,765	Manual polygonal underground estimate
1991	Dynatec	0.500	131,632	1.130	148,774	Diluted underground "Reserve"
1993	TWC	0.500	62,943	1.660	104,774	Undiluted underground "Reserve"
1993	PAH	0.100	1,562,000	0.256	414,600	Kilborn "prefeasibility study" for Newmont-diluted "Reserve "
1993	Newmont	0.200	1,400,000	0.156	204,000	"Underground Resource" - DDH only, conservative vein distribution, normal mean
1994	Newmont	0.200	1,400,000	0.350	458,000	"Underground Resource" - DDH only, conservative vein distribution, lognormal mean

Mr. Gustin has not done sufficient work to classify the historical estimates above as current mineral resources or mineral reserves and Paramount is not treating the historical estimates as current mineral resources or mineral reserves. These estimates are relevant only for historical context and are not to be relied upon. These historical estimates use categories of resources that are not in accordance with CIM Standards and Definitions and are superseded by the current mineral resources described in Section 14.0.

Table 6.3 Summary of Historical Estimates for the Crabgrass Deposit

(from Wilson et al. 2015a)

Open Pit Type "Resources"						
Year	**Source of Estimate**	**Au Cutoff (opt)**	**Tons Above Cutoff**	**Mean Au (opt)**	**Contained Au (oz)**	**Comments**
1990	Atlas Interoffice Correspondence	0.010	1,694,832	0.023	38,385	Manual Polygonal “Resource"
1990	Atlas Interoffice Correspondence	0.020	621,583	0.039	24,473	Manual Polygonal “Resource"

Mr. Gustin has not done sufficient work to classify the historical estimates above as current mineral resources and Paramount is not treating the historical estimates as current mineral resources. These estimates are relevant only for historical context and are not to be relied upon. These historical estimates use categories of resources that are not in accordance with CIM Standards and Definitions and are superseded by the current mineral resources described in Section 14.0.

All of the above historical resource and reserve estimates pre-date and are not in accordance with NI 43-101, have not been independently verified by Mr. Gustin and are mentioned here for historical completeness to provide perspective regarding the range of estimates produced using different data, methods, and assumptions. These historical resources and reserves are superseded by the current mineral resources and reserves described in Section 14.0 and Section 15.0 of this report. The mineral resource categories applied to the 1990 through 1997 historical resource estimates are not in accordance with 2014 CIM standards, they are not current, they are considered relevant only for the purposes of historical perspective and completeness, and they are not reliable. Mr. Gustin has not done sufficient work to classify the historical resources as current resources, and Paramount is not treating the historical estimates as current mineral resources.

6.4.2 2007 - 2015

Several historical estimates of mineral resources were completed from 2007 through 2015 by Seabridge (Lechner, 2007) and Calico (Lechner, 2011; Hulse et al., 2012; Brown et al., 2012; Wilson et al., 2015a; 2015b) as summarized in Table 6.4. These historical estimates are relevant only for the purposes of historical perspective and s the historical 2007-2015 estimates as current mineral resources.

6.5 Historical Production

There has been no historical production at the Grassy Mountain project as of the Effective Date of this report.

Table 6.4 Summary of 2007 – 2015 Historical Grassy Mountain Resources

Year	Source	Cutoff (oz Au/ton)	Tons	Grade (oz Au/ton)	Au oz	Resource Class	Comments
2007	*1*	0.0149	24,084,400	0.042	1,006,000	Ind + Inf	$600/oz gold pit shell
2007	*1*	0.0998	2,030,457	0.168	342,000	Ind + Inf	$600/oz gold pit shell
2011	*2*	0.0160	22,464,002	0.044	985,000	Ind + Inf	$600/oz gold pit shell
2012a	*3*	0.0100	58,648,000	0.022	1,576,900	Ind + Inf	$1,255/oz gold price, open pit
2012a	*3*	0.0600	3,855,900	0.155	598,700	Ind + Inf	$1,255/oz gold price, underground
2012b	*4*	0.0120	53,377,000	0.028	1,670,200	M + Ind + Inf	$1,255/oz gold price, open pit
2012b	*4*	0.0790	2,701,875	0.276	744,300	M + Ind + Inf	$1,255/oz gold price, underground
2015a	*5*	0.0550	4,289,000	0.142	607,000	M + Ind	$1,300/oz gold price, underground
2015b	*6*	0.0650	3,245,500	0.155	503,700	M + Ind	$1,300/oz gold price, underground
2015b	*6*	0.0050	65,668,700	0.018	1,150,500	M + Ind + Inf	$800/oz gold pit shell, excluding underground

M = Measured; Ind = Indicated; and Inf = Inferred

1 Lechner (2007)
2 Lechner (2011)
3 Hulse et al. (2012, March 29)
4 Brown et al. (2012, Nov 29)
5 Wilson et al. (2015, February PEA)
6 Wilson et al. (2015, July Amended PEA)

Mr. Gustin has not done sufficient work to classify the historical estimates above as current mineral resources and Paramount is not treating the historical estimates as current mineral resources. These estimates are relevant only for historical context and are not to be relied upon. It is not known if these historical estimates use categories of resources that are in accordance with CIM Standards and Definitions, and these estimations are superseded by the current mineral resources described in Section 14.0.

7.0 GEOLOGIC SETTING AND MINERALIZATION

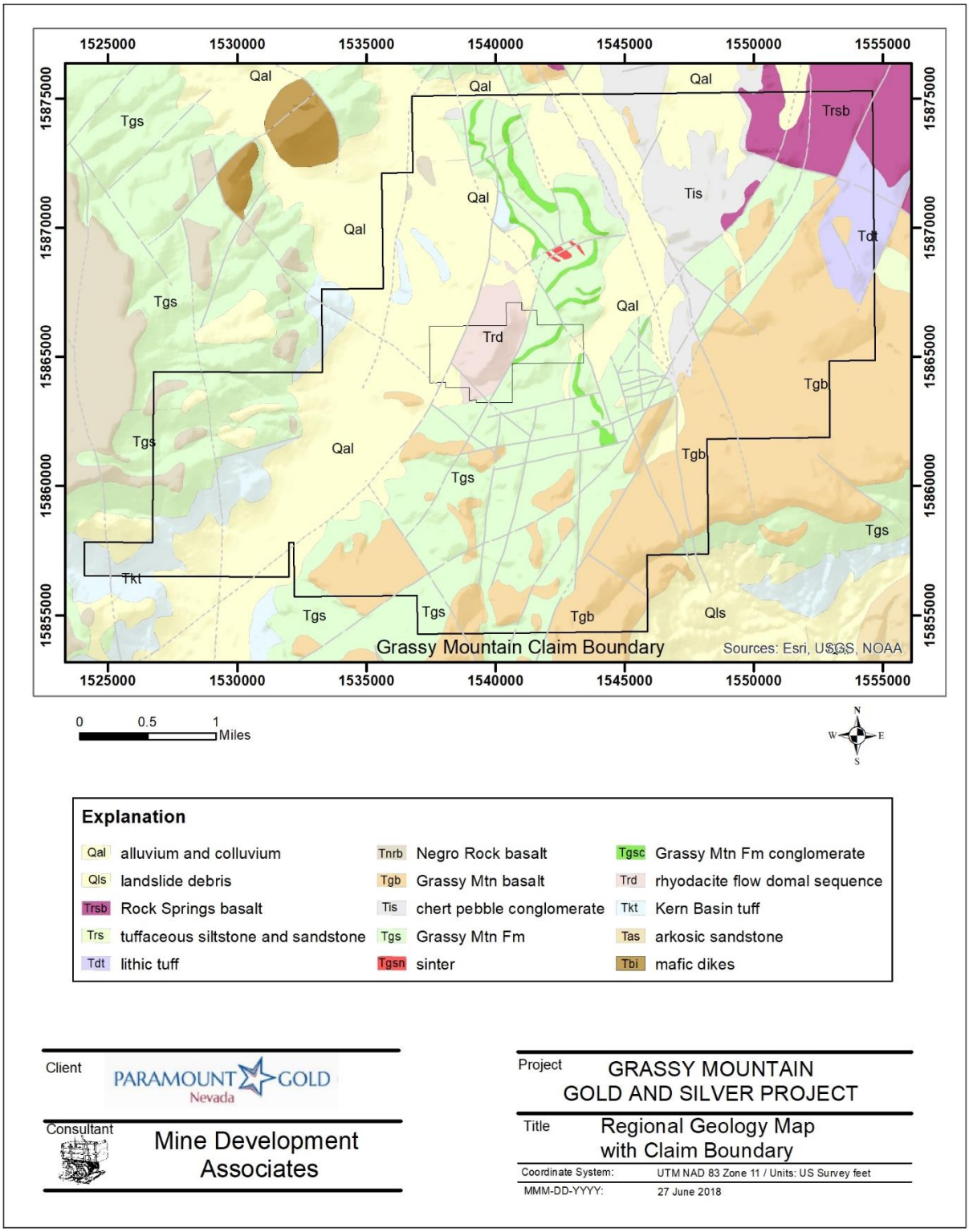
The information presented in this section of the report is derived from multiple sources, as cited. Mr. Gustin has reviewed this information and believes this summary accurately represents the Grassy Mountain project geology and mineralization as it is presently understood.

7.1 Regional Geologic Setting

The Grassy Mountain gold-silver deposit is the largest of 12 recognized epithermal hot-spring precious-metal deposits of the Lake Owyhee volcanic field. The Lake Owyhee volcanic field is located at the intersection of three tectonic provinces: the buried North American cratonic margin, the northern Basin and Range, and the Snake River Plain. During mid-Miocene time, large-volume peralkaline and subalkaline caldera volcanism occurred throughout the region in response to large silicic magma chambers emplaced in the shallow crust (Rytuba and McKee, 1984). The Lake Owyhee volcanic field includes several ash-flow sheets and rhyolite tuff cones that were erupted between 15.5 to 15 Ma (Rytuba and Vander Meulen, 1991). The district geology surrounding the Grassy Mountain gold deposit is shown in Figure 7.1.

At about 15 Ma, subsidence of the Lake Owyhee volcanic field triggered a change in volcanic eruption styles, resulting in small-volume basaltic and rhyolite deposits of limited extent. Volcanism during the middle to late Miocene was characterized by the eruption of small-volume metaluminous high-silica rhyolite domes and flows, as well as small-volume basalt flows and mafic vent complexes in north- and northwest-trending Basin and Range-type fracture zones and ring structures related to resurgent calderas. Regional subsidence involved the development of extensive grabens and facilitated the formation of through-going fluvial systems and large lacustrine basins. Large volumes of fluvial sediments, sourced in part from the exhumed Idaho Batholith to the east and southeast, were deposited contemporaneous with volcanism and hot spring activity during the waning stages of volcanic field development (Cummings, 1991). The resulting regional stratigraphic section is a thick sequence of mid-Miocene volcanic rocks and coeval to Pliocene-age lacustrine, volcaniclastic, and fluvial sedimentary rocks. The oldest units encountered are the flow-on-flow Blackjack and Owyhee Basalts (14.3 to 13.6 Ma). These basalts are overlain by arkosic sandstone, tuffaceous sandstone, and conglomerates of the Deer Butte Formation.

Figure 7.1 Grassy Mountain Regional Geology
(modified from Calico, 2017)



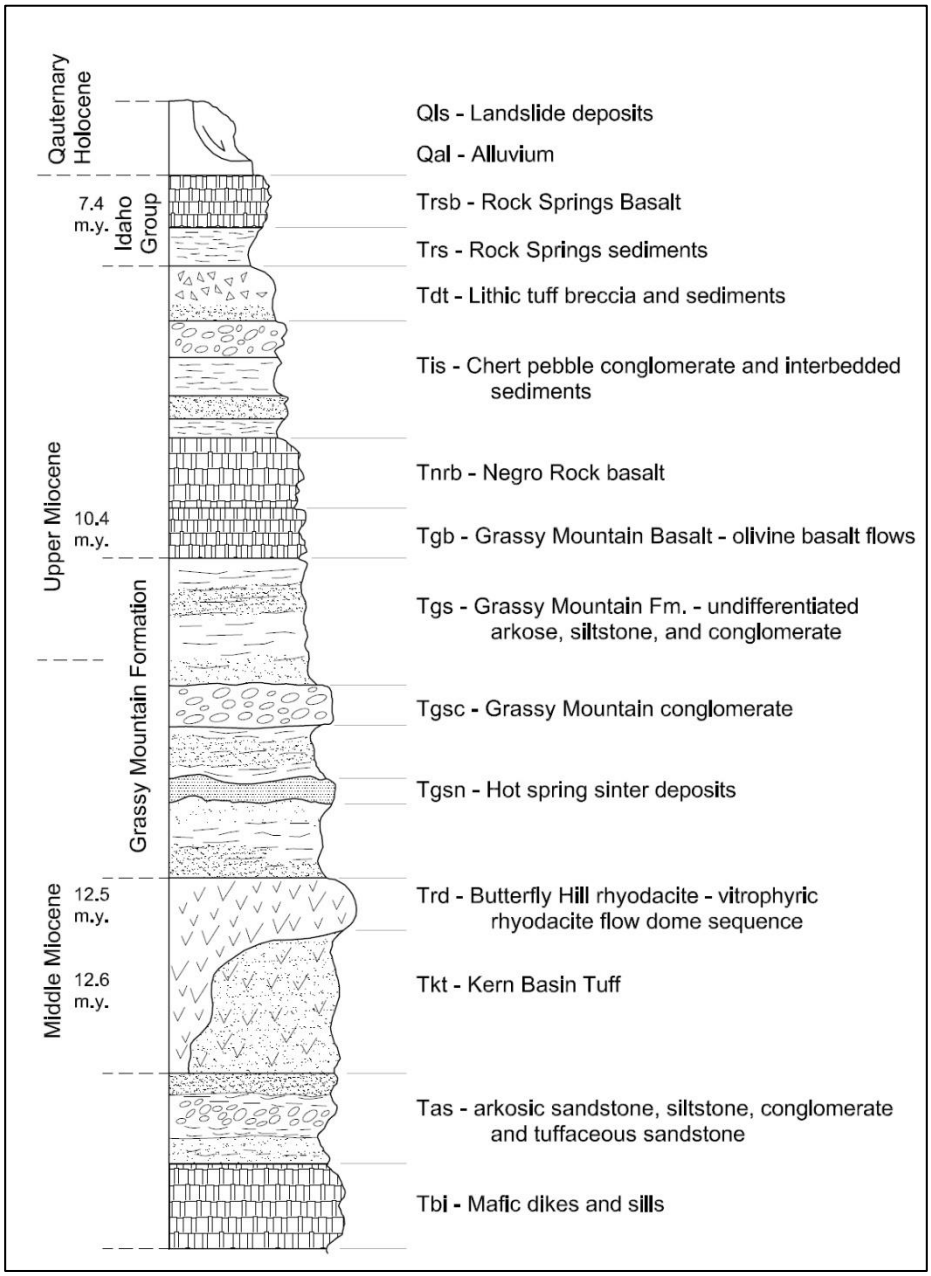
7.2 Local and Property Geology

Bedrock outcrops in the vicinity of the Grassy Mountain property are typically composed of olivine basalt flows and siltstones, sandstones, and conglomerates of the Miocene Grassy Mountain Formation. These rocks are locally covered with relatively thin, unconsolidated alluvial and colluvial deposits. Erosion-resistant basalt flows cap local topographic highs, including Grassy Mountain proper, which is a prominent northeast-elongate ridge that forms a topographic crest about one mile southeast of the Grassy Mountain gold-silver deposit (Figure 7.1). Arkosic sandstones have been encountered at the surface and at depth, but individual beds or sequences have not been correlated across the project area, in part due to lateral sedimentary facies changes and structural offsets. Surface exposures and drill-defined stratigraphy at the Grassy Mountain deposit area reveal complex facies that were produced during the waning stages of volcanism of the Lake Owyhee volcanic field (Lechner, 2011) and development of the coeval Ore-Ida graben.

Figure 7.2 shows the local stratigraphic column in the vicinity of Grassy Mountain. The basal unit is the Kern Basin Tuff, a sequence of pumiceous crystal tuff, which in part displays cross beds and local surge structures, and non-welded to densely welded rhyolite ash-flow tuff. Clast size, thickness of individual ash units, and bedding structures suggest a source in the Grassy Mountain area (Cummings, 1991). The Kern Basin Tuff ranges in thickness from 300 feet on the south bluffs of Grassy Mountain to at least 1,500 feet in a drill hole beneath the Grassy Mountain gold-silver deposit.

A small local flow-dome of approximately 12.5 Ma and known as the Butterfly Hill rhyodacite overlies the Kern Basin Tuff (Figure 7.2). However, in most of the project area the Kern Basin Tuff is overlain by a series of fluvial, lacustrine, and tuffaceous sediments which are assigned to the Miocene Grassy Mountain Formation (Cummings, 1991). These sedimentary units include granitic-clast conglomerate, arkosic sandstone, fine-grained sandstone, siltstone, tuffaceous siltstone, and mudstone (Figure 7.2). The sedimentary units of the Grassy Mountain Formation reportedly range from 300 to over 1,000 feet in thickness, and they comprise the host rocks of the mineral resources at the Grassy Mountain project. Several siliceous “terraces” and silica sinter deposits are interbedded with silicified units of the Grassy Mountain Formation. Terrace construction was apparently episodic and intermittently inundated by fluvial and lacustrine sediments and ash, resulting in an interbedded sequence of siltstone, tuffaceous siltstone, sandstone, conglomerate, and sinter-terrace deposits. Load casts, flame textures, convolute laminations, and other soft-sediment deformation textures are common in both the sinter beds and other sedimentary units (Siems, 1990). The amount and size of the sinter clasts in the sedimentary rocks reflect relative proximity to a terrace. Proximal deposits are angular, inhomogeneous, clast-supported breccias of sandstone, siltstone, and sinter with indistinct clast boundaries in a sulfidic mud-textured matrix.

Figure 7.2 Stratigraphic Column for the Grassy Mountain Area



Note: unit "Tis" with interbedded chert-pebble conglomerate occurs beneath the Grassy Mountain basalt.

According to Lechner (2007), the sedimentary units of the Grassy Mountain Formation are unconformably overlain by 50 to 100 feet of black-chert pebble conglomerate interbedded with unconsolidated siltstone. This unit is recessive, and it is overlain by flows of olivine basalt assigned to the Grassy Mountain basalt, and, in the northwestern part of the property, by the basalt of Negro Rock (Figure 7.2). These mafic lavas are overlain by lacustrine and fluvial siltstone, sandstone, and conglomerate, which are successively overlain by the Rock Springs lacustrine deposits and basalt lavas that together make up the late-Miocene Idaho Group.

7.3 Deposit Area Geology

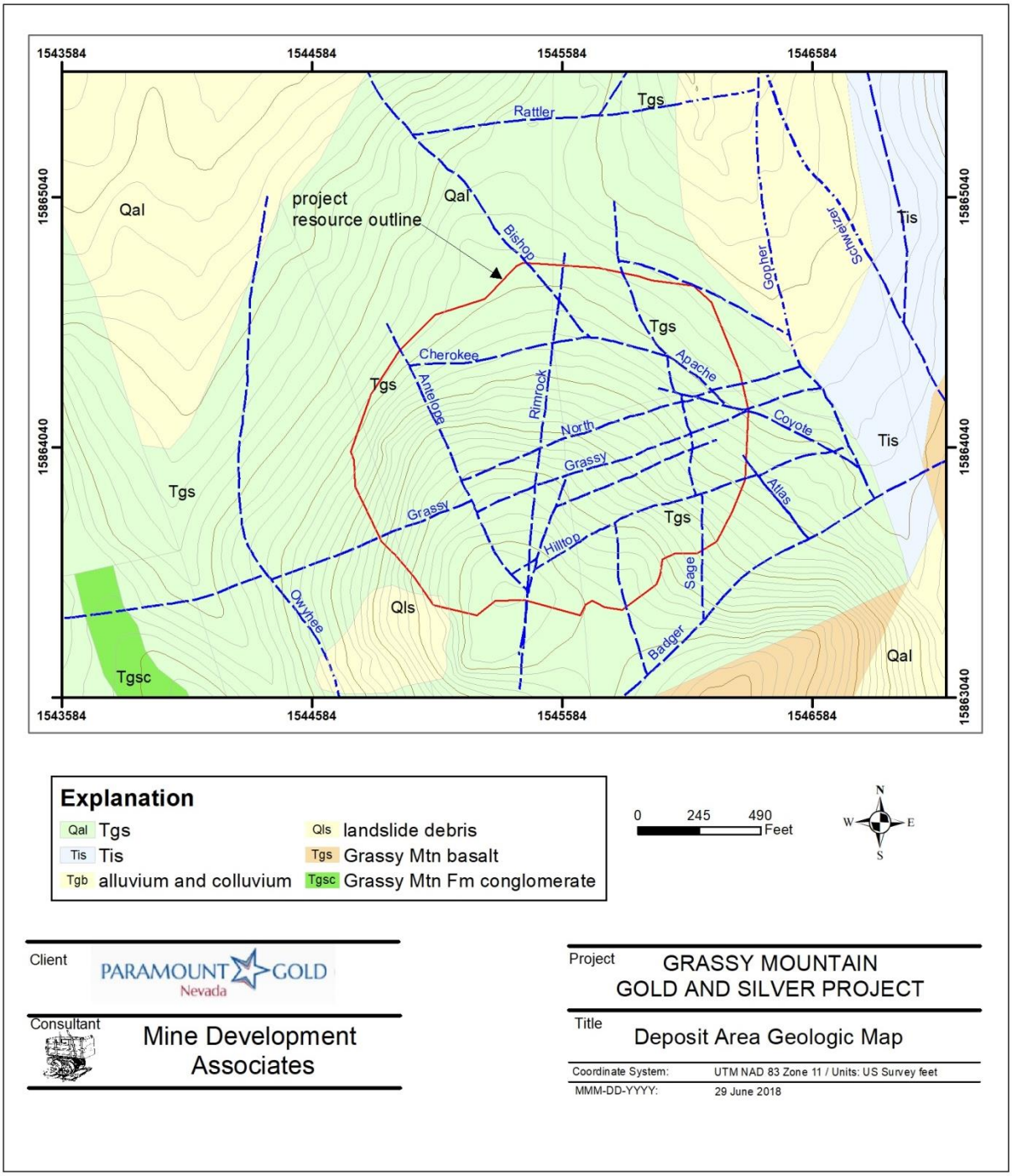
The Grassy Mountain deposit area geology is shown in Figure 7.3. The deposit is centered beneath a prominent, 150-foot high, silicified and iron-stained hilltop that consists of hydrothermally altered arkose and interbedded conglomerate of the Grassy Mountain Formation. Bedding is horizontal at the hilltop and dips at 10° to 25° to the north-northeast on the northern and eastern flanks. The bedding steepens to 30° to 40° on the west side of the hill due to drag folding in the footwall of the N20°W-striking Antelope fault. The southwest slope is covered by landslide debris of silicified arkose.

Several horizons of laminated silica, from a few inches to several feet in thickness, crop out southwest and north of the deposit area and are interbedded within the arkose, siltstone, and conglomerate of the Grassy Mountain Formation. These have been interpreted as beds of silica sinter (Figure 7.2), due in part to the presence of fossil reeds, petrified wood, and other fossil plant debris. Drilling within the Grassy Mountain deposit has penetrated through more numerous and much thicker sinter horizons, indicating the sinter was deposited from hydrothermal fluids venting at the paleo-surface within the accumulating fluvial sedimentary sequence.

Drilling has also shown that in the subsurface of the deposit area the arkosic sandstones and conglomerates are interbedded with numerous intervals of siltstone and mudstone, much of which is thinly laminated. Beds with clay-altered ash to lapilli-sized tephra are common, and there are abundant layers rich in organic carbon ± carbonized plant debris. The laminated siltstone and mudstone intervals reflect a predominantly lacustrine setting that was the site of frequent episodic influxes of fluvial sand- to cobble-sized material.

The gold-silver deposit is situated within a zone of complex extensional block faulting and rotation. Faults at Grassy Mountain are dominated by N30°W to N10°E striking normal faults developed during Basin and Range extension and are inferred to have post-mineral displacement. On the east side of the deposit, these faults are inferred to have down-to-the east movement based on interpreted offsets of a prominent white sinter bed in drill holes, as well as drilled intersections of fault gouge. A set of orthogonal, N70°E-striking high-angle faults of minor displacement are inferred to link the graben faults. One of these, the Grassy fault, has vertical offset of only 10 to 40 feet or less, but it coincides with the axis of the high-grade core of the deposit (see Section 7.4).

Figure 7.3 Deposit Area Geologic Map
(modified from Calico, 2017; blue lines are faults)



Client PARAMOUNT GOLD Nevada

Consultant Mine Development Associates

Project GRASSY MOUNTAIN GOLD AND SILVER PROJECT

Title Deposit Area Geologic Map

Coordinate System: UTM NAD 83 Zone 11 / Units: US Survey feet

MMM-DD-YYYY: 29 June 2018

7.4 Alteration and Mineralization

Hydrothermal activity and gold mineralization occurred during the accumulation of the Grassy Mountain Formation, and they were coeval with active sedimentation. The water-saturated, unconsolidated sediments therefore required silicic ± potassic alteration to develop sufficient competency to allow for the creation of fractures and structurally-induced open space.

Silicification is the principal hydrothermal alteration type associated with gold-silver mineralization at the Grassy Mountain deposit. It takes the form of silica sinter, pervasive silica flooding, and as cross-cutting chalcedonic veins, veinlets, and stockworks. The silicification is inferred to be largely controlled by hot-spring vents active during accumulation of the Grassy Mountain Formation. The 300-foot deep main sinter is underlain by a zone of strong silicification with silica flooding and chalcedonic quartz veins.

Small amounts of fine-grained pyrite are present in silicified rocks that have not undergone later oxidation. In some parts of the deposit, particularly within arkose and sandy conglomerate units, silicification can be accompanied by potassic alteration in the form of adularia flooding. Orthoclase, present primarily in sand-size grains and in granitic clasts, is unaffected by potassic alteration, and plagioclase is replaced by adularia. The adularia is extremely fine-grained and is identified microscopically or by cobaltinitrite staining. Silicic and potassic alteration zones are surrounded by barren, unaltered, clay-rich (20-40% montmorillonite), tuffaceous siltstone and arkose with minor diagenetic pyrite.

The Grassy Mountain gold-silver deposit is located largely within the silicic and potassic alteration, zones, beginning approximately 200 feet below the surface. The deposit has extents of 1,900 feet along a N60°E to N70°E axis, as much as 2,700 feet in a northwest-southeast direction, and as much as 1,240 feet vertically. The surface expression of the mineralization is indicated by weak to moderately strong silicification and iron-staining, accompanied by scattered, 1/8- to 1.0-inch wide creamy to light-gray chalcedonic veins that filled joints.

The deposit is comprised of a central higher-grade core with gold grades of $\geq$~0.03 oz Au/ton that is surrounded by a broad envelope of lower-grade mineralization. The central higher-grade core is almost 1,000 feet long on the N60°E to N70°E axis, by 450 feet in width and 450 feet in vertical extent, all of which is above the Kern Basin Tuff and below a distinctive sinter unit. Representative cross sections through the deposit are shown in Section 14.7 (see Figure 14.1 through Figure 14.4).

Central Higher-Grade Core Zone

Three distinct and overlapping types of gold-silver mineralization are recognized within the central core of the deposit. These are gold-bearing chalcedonic quartz ± adularia veins, disseminated mineralization in silicified siltstone and arkose, and gold and silver in bodies of clay matrix breccia.

Zones of high-grade mineralization are defined by the presence of chalcedonic quartz ± adularia veins. Mineralized quartz ± adularia vein types include single, banded, colliform, brecciated and calcite-pseudomorphed veins. The colliform veins tend to carry the highest grades (>0.5 oz Au/ton), with visible gold up to 0.02 inches associated with argentite. Veins with relict bladed calcite texture also

contain higher gold grades than the banded and single vein types. The gold mostly occurs as electrum along the vein margins or within microscopic voids. Some veins carry very little grade or are barren. At least some of the higher-grade zones of veins are thought to strike approximately N70°E.

Vein widths range from 1/16 to ~2.0 inches. Individually, such narrow veins are unlikely to have lateral or vertical extents of significance, but vein frequency can average one vein per foot in places. Vein swarms have strike lengths of 400 to 700 feet and vertical extents of 100 to 250 feet at elevations of 3,150 to 3,400 feet. Individual veins are too narrow to trace or correlate from hole to hole.

A steep southerly dip (70-85°) of the veins is inferred from vein intersection angles with drill core axes and bedding. Veins are mostly perpendicular to bedding, which generally dips 10-25° NNE within the deposit. Vein intersection angles of 10-25° to the core axis were mostly recorded in core holes GMC-001 to GMC-008 angled at -50° at S20°E, compared with 25° to 50° intersection angles in holes GMC-009 to GMC-011 angled -50° at N20°W. The N70°E strike of the veins is supported by: 1) surface mapping, 2) vein orientation perpendicular to bedding, 3) grade-thickness contouring, and 4) the overall trend in mineralization with grades in excess of ~0.03 oz Au/ton.

The veins cross-cut the silicified sediments and have extremely sharp grade boundaries with the sediments. Vein frequency diminishes abruptly below an elevation of ~3,000 at the west-southwest limit of the higher-grade core to ~3,100 feet at the east-northeastern limit, and very few high-grade veins have been encountered above the higher-grade core of the deposit.

Within the higher-grade core, high gold grades are also present in silicified siltstone and arkose with no visible veins. In these cases, gold and silver are inferred to be very finely disseminated in a stratiform manner in the silicified rock. Fine-grained pyrite is commonly disseminated in the silicified siltstone and sandstone where oxidation has not occurred. Contacts between siltstone and arkose beds seem to be more favorable and carry higher gold grades. In places, beds of tuff and tuffaceous siltstone appear to be particularly favorable host for higher-grade mineralization that lacks associated veins.

The third style of gold-silver mineralization has been referred to by the Newmont and later operators as "clay matrix breccia", bodies of which may be more prevalent in the lower portion of the higher-grade core of the deposit and are interpreted to extend at near-vertical angles up and down into the surrounding, low-grade envelope. Clay matrix breccias are mainly of clast-supported types and contain sub-rounded to sub-angular, sand- to boulder-sized clasts of silicified and/or veined arkose and siltstone with minor amounts of clay and iron-oxide minerals between the clasts. In drill core, clay matrix breccia intervals are intersected over lengths of as much as several tens of feet, but their true thickness and exact orientations are poorly understood, in part because their margins are commonly irregular-to-gradational and not planar, except where structural fabrics related to fault movement are evident. In some cases, it is difficult to discern where clay matrix breccias end and similar fault-related breccias begin; it is possible the two are in some cases genetically related.

Clay matrix breccias cut, and are therefore paragenetically later than, the silicification and veins. One interpretation is the clay matrix breccias formed by explosive releases of over-pressured water vapor, through faults and fractures during boiling in the waning stages of the hydrothermal activity.

Lower-Grade Envelope

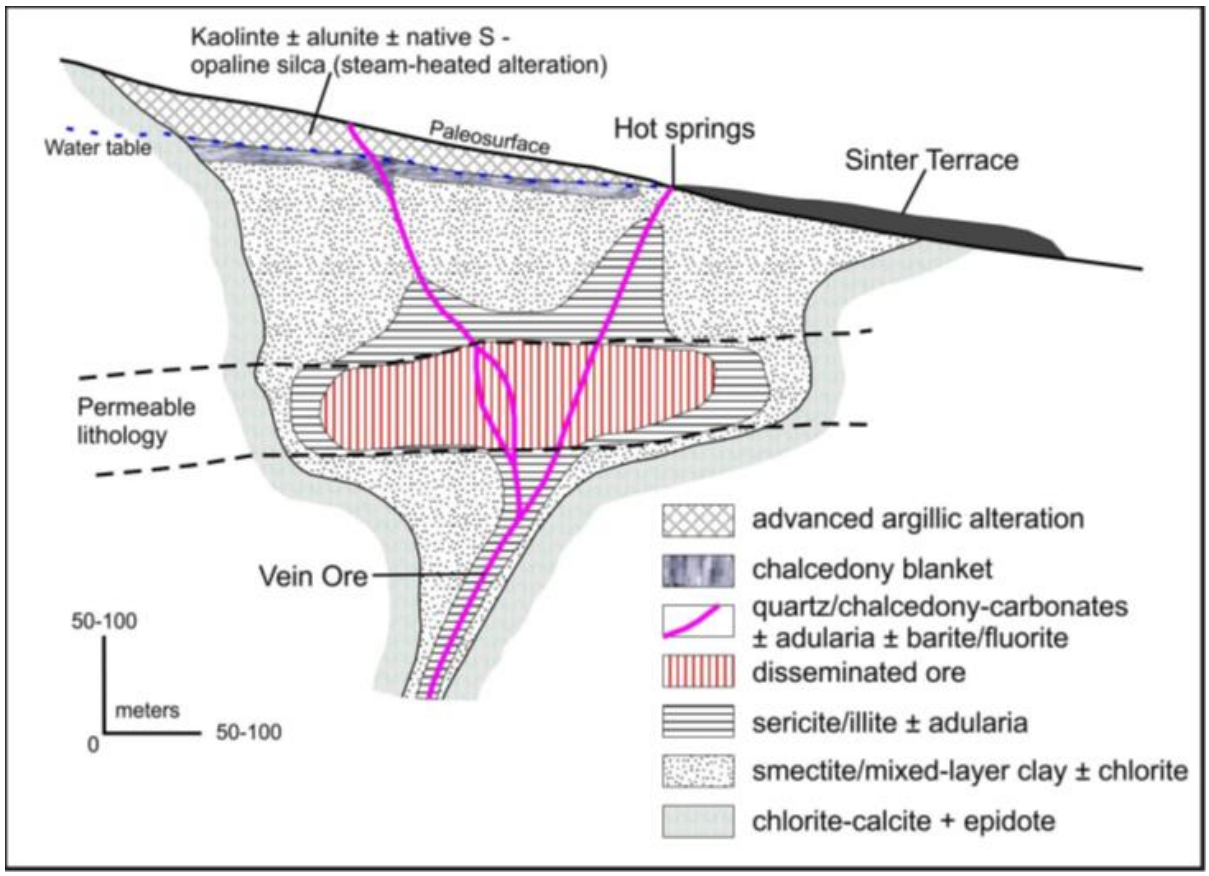
Lower-grade mineralization envelopes the higher-grade core and, further from the core, extends outwards as stratiform, mineralized lenses parallel to bedding (Figure 14.1 and Figure 14.2). There are very few visible chalcedonic veins; the gold and silver are inferred to be disseminated within the silicified arkose and siltstone units. Contacts between arkose, siltstone, and sinter appear to have been preferentially mineralized, and beds of tuff and tuffaceous siltstone also were favorable sites for mineralization. Low-grade mineralization is also present in numerous intervals of silica sinter, but not all sinter intervals are mineralized. Sinter-hosted mineralization may be disseminated, or within fractures where the sinter has been structurally disrupted.

8.0 DEPOSIT TYPES

The geological setting, hydrothermal alteration, styles of gold-silver mineralization, and close spatial and timing association with silica sinter deposition, indicate that Grassy Mountain is an example of the hot-springs subtype of low-sulfidation, epithermal precious-metals deposits. The Grassy Mountain deposit is characterized by stacked sinter terraces that demonstrate hydrothermal fluids vented at the paleosurface concurrent with lacustrine and intermittent fluvial sedimentation. At a depth of 300 feet, the main sinter at Grassy Mountain is underlain by a zone of intense silicification, within which is located the core of the deposit that is the focus of this report.

A conceptual, schematic section (Figure 8.1) shows a low-sulfidation epithermal system and its variable form with increasing depth, and the typical alteration zonation, including the distribution of sinter, a blanket of steam-heated advanced argillic alteration, and water-table silicification (Buchanan, 1981; Sillitoe, 1993). In the case of Grassy Mountain, the broader lower-grade mineralization extends up to and overlaps multiple, stacked deposits of sinter, reflecting near-surface epithermal mineralization as the sedimentary sequence accumulated.

Figure 8.1 Conceptual Hot-Springs Epithermal Deposit Model
(modified from Buchanan, 1981)



15.0 MINERAL RESERVE ESTIMATES

15.1 Introduction

Mineral reserves were estimated under the supervision of Mr. Boris Caro and classified in order of increasing confidence into Probable and Proven categories to be in accordance with the "CIM Definition Standards - For Mineral Resources and Mineral Reserves" (2014) and therefore Canadian National Instrument 43-101. Mr. Caro is independent of Paramount and has no affiliations with Paramount except that of independent consultant/client relationship.

CIM mineral reserve definitions are given below, with CIM's explanatory material shown in italics:

Mineral Reserve

Mineral Reserves are sub-divided in order of increasing confidence into Probable Mineral Reserves and Proven Mineral Reserves. A Probable Mineral Reserve has a lower level of confidence than a Proven Mineral Reserve.

A Mineral Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.

The reference point at which Mineral Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

The public disclosure of a Mineral Reserve must be demonstrated by a Pre-Feasibility Study or Feasibility Study.

Mineral Reserves are those parts of Mineral Resources which, after the application of all mining factors, result in an estimated tonnage and grade which, in the opinion of the Qualified Person(s) making the estimates, is the basis of an economically viable project after taking account of all relevant Modifying Factors. Mineral Reserves are inclusive of diluting material that will be mined in conjunction with the Mineral Reserves and delivered to the treatment plant or equivalent facility. The term 'Mineral Reserve' need not necessarily signify that extraction facilities are in place or operative or that all governmental approvals have been received. It does signify that there are reasonable expectations of such approvals.

'Reference point' refers to the mining or process point at which the Qualified Person prepares a Mineral Reserve. For example, most metal deposits disclose mineral reserves with a "mill feed" reference point. In these cases, reserves are reported as mined ore delivered to the plant and do not include reductions attributed to anticipated plant losses.

In contrast, coal reserves have traditionally been reported as tonnes of "clean coal". In this coal example, reserves are reported as a "saleable product" reference point and include reductions for plant yield (recovery). The Qualified Person must clearly state the 'reference point' used in the Mineral Reserve estimate.

Probable Mineral Reserve

A Probable Mineral Reserve is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve.

The Qualified Person(s) may elect, to convert Measured Mineral Resources to Probable Mineral Reserves if the confidence in the Modifying Factors is lower than that applied to a Proven Mineral Reserve. Probable Mineral Reserve estimates must be demonstrated to be economic, at the time of reporting, by at least a Pre-Feasibility Study.

Proven Mineral Reserve

A Proven Mineral Reserve is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors.

Application of the Proven Mineral Reserve category implies that the Qualified Person has the highest degree of confidence in the estimate with the consequent expectation in the minds of the readers of the report. The term should be restricted to that part of the deposit where production planning is taking place and for which any variation in the estimate would not significantly affect the potential economic viability of the deposit. Proven Mineral Reserve estimates must be demonstrated to be economic, at the time of reporting, by at least a Pre-Feasibility Study. Within the CIM Definition standards the term Proved Mineral Reserve is an equivalent term to a Proven Mineral Reserve.

Modifying Factors

Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.

The mineral reserves estimated for the Grassy Mountain project are shown in Table 15.1 and are included in the estimated Measured and Indicated mineral resources presented in Table 14.12. The Effective Date of the estimated mineral reserves is May 1, 2018.

Table 15.1 Mineral Reserve Statement

Classification	Tons (Million)	Gold Grade oz Au/ton	Silver Grade oz Ag/ton	Contained Metal (oz Au)	Contained Metal (oz Ag)
Proven	0.23	0.191	0.27	43,000	62,000
Probable	1.49	0.214	0.30	319,000	454,000
Proven + Probable	1.72	0.210	0.30	362,000	516,000

Notes:

5. *Mineral reserves have an Effective Date of May 1, 2018. The Qualified Person for the estimate is Mr. Boris Caro.*
6. *Mineral reserves are reported using the 2014 CIM Definition Standards.*
7. *Mineral reserves are reported inside stope designs assuming drift-and-fill mining methods, and an economic gold cutoff grade of 0.103 oz Au per ton. The economic cutoff grade estimate utilizes a gold price of $1,275/oz, mining costs of $80/ton processed, surface rehandle costs of $0.16/ton processed, process costs of $30/ton processed, general and administrative costs of $11.11/ton processed, and refining costs of $5/oz Au recovered. Metallurgical recovery is 94.5% for gold. Mining recovery is 95% and mining dilution is assumed to be 10.5%. Mineralization that was either not classified or was assigned to Inferred mineral resources was set to waste. A 1.5% NSR royalty is payable. The reserves reference point is the PFS mill crusher.*
8. *Mineral reserves are included in Measured and Indicated resources; tonnage and contained metal have been rounded to reflect the accuracy of the estimate. Apparent discrepancies are due to rounding.*

15.2 Economic Cutoff Grade Calculation

The economic cutoff grade ("COG") used for stope design is based on initial economic parameters shown in Table 15.2. The calculated gold COG is 0.103 oz Au/ton. Silver was not included in the COG calculation due to its relatively small contribution to total economic value. However, revenue for silver is included in the financial model, and therefore silver grade and silver contained metal are reported in the estimated mineral reserves.

Table 15.2 Mineral Reserve Cutoff Grade Input Parameters

Description	Quantity	Units
UG Mining Costs	$ 80.00	$/ton Processed
Surface Rehandle	$ 0.16	$/ton Processed
Process Costs	$ 30.00	$/ton Processed
G&A Costs	$ 11.11	$/ton Processed
Total Operating Costs	$ 121.27	$/ton Processed
Refining Cost	$ 5.00	$/oz Au Recovered
NSR Royalty	1.5	%
Gold Metal Recovery	94.5	%
Gold Selling Price	$ 1,275	$/oz Au
Reserve Cutoff Grade	**0.103**	**oz Au/ton**

The economic COG was used in the stope optimization to identify the Measured and Indicated blocks above GOG available for consideration to be converted to mineral reserves. The mineral resource COG's (Section 14.8) were applied to internal dilution for Measured and Indicated resources that are below the economic COG.

15.3 Mineral Reserve Estimation

The mineral reserves were confined by the design of mineable stope shapes centered on Measured and Indicated blocks with grades greater than the economic COG. For stope optimization, the Stope Optimiser module from Deswik™ software was used. The shapes were developed using 20-foot by 20-foot horizontal and 13-foot high stope-block sizes. Each stope block was queried against the resource block model to determine the tonnages and grades within the stope shapes. Stopes with an average gold grade above the COG were selected to be included in the mine plan and mineral reserves estimate. Some isolated stopes above COG were eliminated from consideration because the development to extract them would cost more than the economic return.

Stope shapes include estimated planned dilution and exclude resource loss where the geometry and grade do not warrant inclusion. The mineral reserve estimate also includes allowances for unplanned dilution (see discussion in Section 15.4).

Development designs were generated concurrently for each stope shape with the purpose of minimizing development in waste. Figure 15.1 shows a typical level design. These designs were done on main levels every 39 feet. The amount of waste development required for the sub-levels (13 feet above and below the main levels) was interpreted based on the required waste development for the main levels.

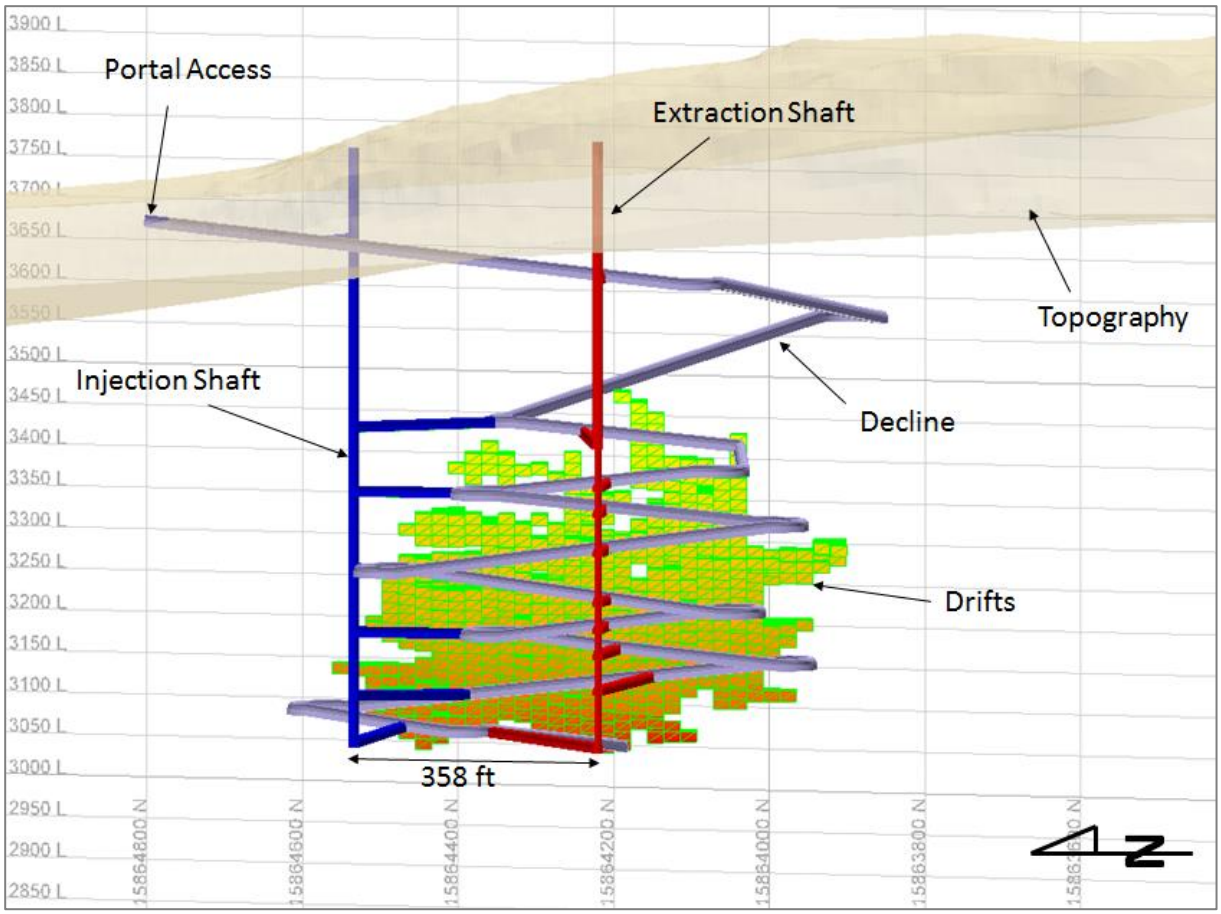
16.0 MINING METHODS

This section was prepared under the supervision of Mr. Boris Caro, an associate of Ausenco. Mr. Caro has reviewed the information used to prepare this section and believes it accurately represents the parameters and procedures used for the proposed PFS mine design.

16.1 Introduction

The Grassy Mountain mine will be accessed via one decline and a system of internal ramps. Two shafts are included in the design to be used for ventilation and secondary egress as shown in the isometric view in Figure 16.1. The planned mining method is drift-and-fill ("D&F"). CRF and rock fill ("RF") will be used for backfill. The planned proportions will be 46% CRF and 54% RF.

Figure 16.1 Isometric View



According with the analysis conducted by Ausenco, the majority of the ground conditions of the Grassy Mountain deposit are classified as being of fair to poor rock quality, and the rock mass rating ("RMR") is typically less than 49. Ground support was designed to maintain a safe operation for these ground conditions.

The mine design was based on a production rate of 1,300 to 1,400 tons per day using four days on and three days off shifts, with two shifts per day, to provide 24-hour coverage during the four operating days during full operation. This will provide sufficient material to feed the 750 tons per day to the mill on a seven day per week basis. The underground production schedule is discussed in Section 16.10 of this report. The nominal development size is 15 feet wide by 15 feet high for the main decline and 13 feet wide by 13 feet high for horizontal access to production areas. Production heading size will be 20 feet wide x 13 feet high. This heading size will allow the miners and associated diesel mining equipment access and flexibility to maximize production from the mine as well as minimize waste haulage from the development headings. The mining cycle involves drilling, blasting, and mucking for the development and production access. The final part of the mining cycle is to backfill the stopes.

The key challenges in attainment of planned production levels and costs are anticipated to be the development of sufficient drift areas, and the interaction between the mining and the backfilling activities. The mine production schedule was created taking into consideration these challenges and two main production sectors were considered for adding more flexibility to the mining operations.

16.2 Geotechnical Analysis and Recommendations

16.2.1 Structural Domains

Rock structures were not assessed because there is no oriented drill-core data currently available for the project. However, observations of the core suggest that there is little systematic structure, except for the very steep features often sub-parallel to core axis that are likely oriented similarly to the interpreted northwest-southeast striking structural set that is associated with mineralization. The remaining structure is typically very small scale, irregular, and generally related to micro-defects within the rock mass.

16.2.2 Golder Geotechnical Appraisal

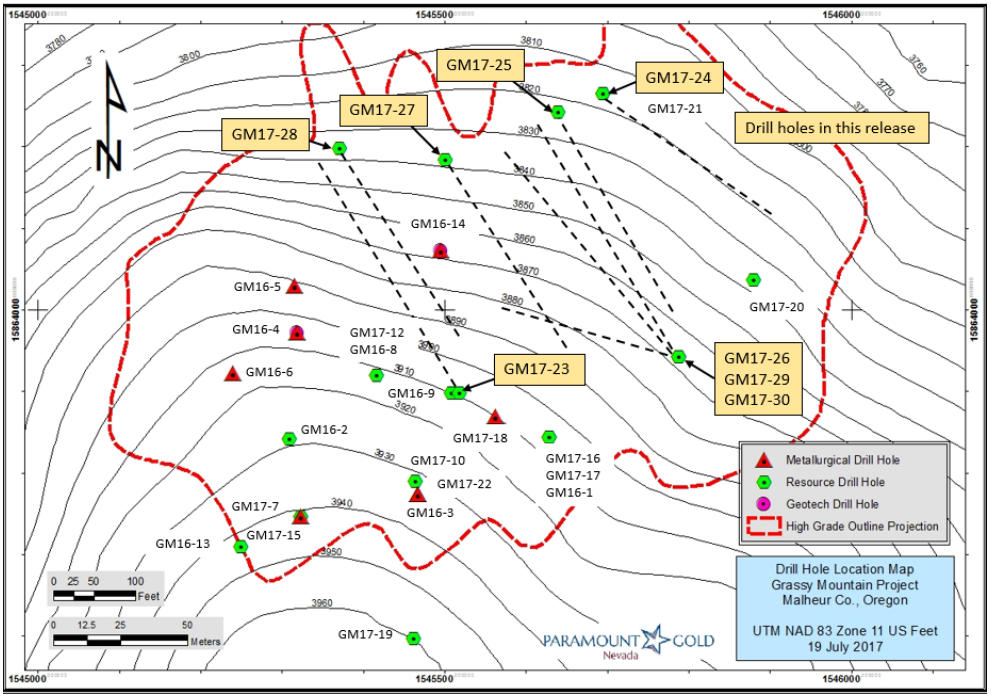
A geotechnical appraisal of the proposed underground mine area was carried out by Golder during 2016-2017 (Golder Associates Inc., 2018). Geotechnical data are available from three different drilling campaigns that were completed prior to the 2016-2017 drill campaign (Table 16.1). Calico, Newmont, and Atlas carried out RQD measurements. Additional geotechnical data from the Newmont and Calico drilling were reviewed, but not used directly in Golder´s 2016-2017 evaluation, due to uncertain reliability and consistency in the data.

Table 16.1 Geotechnical Drill Hole Investigations

Company	Year	Number of Geotechnical Drill Holes	Information Considered	Other Geotechnical Information
Calico	2011	2	RQD	None
Newmont	1992	13	RQD, core photographs in splits	Recovery, fracture, frequency, joint condition rating, hardness, rock strength, underground rock mass ratings (URMR)
Atlas	1986-1992	6	RQD	Recovery, weathering, breakage, hardness, bedding, joints
Paramount	2016-2017	27	RMR	RQD, fractures, ISRM strength rating, weathering index, joint condition rating (JRC)

The 2016-2017 drilling campaign included 27 core holes of HQ3-diameter (2 3/8-inch diameter) drilled using a triple-tube core barrel to maximize core recovery. Two holes were logged in detail for geotechnical characterization by Golder personnel at the drill rig. The other 2016-2017 holes were logged by Paramount personnel according to Golder's instructions and procedures. Figure 16.2 shows the locations of the two Paramount geotechnical hole collar locations within an approximate 0.075 oz Au/ton cutoff boundary.

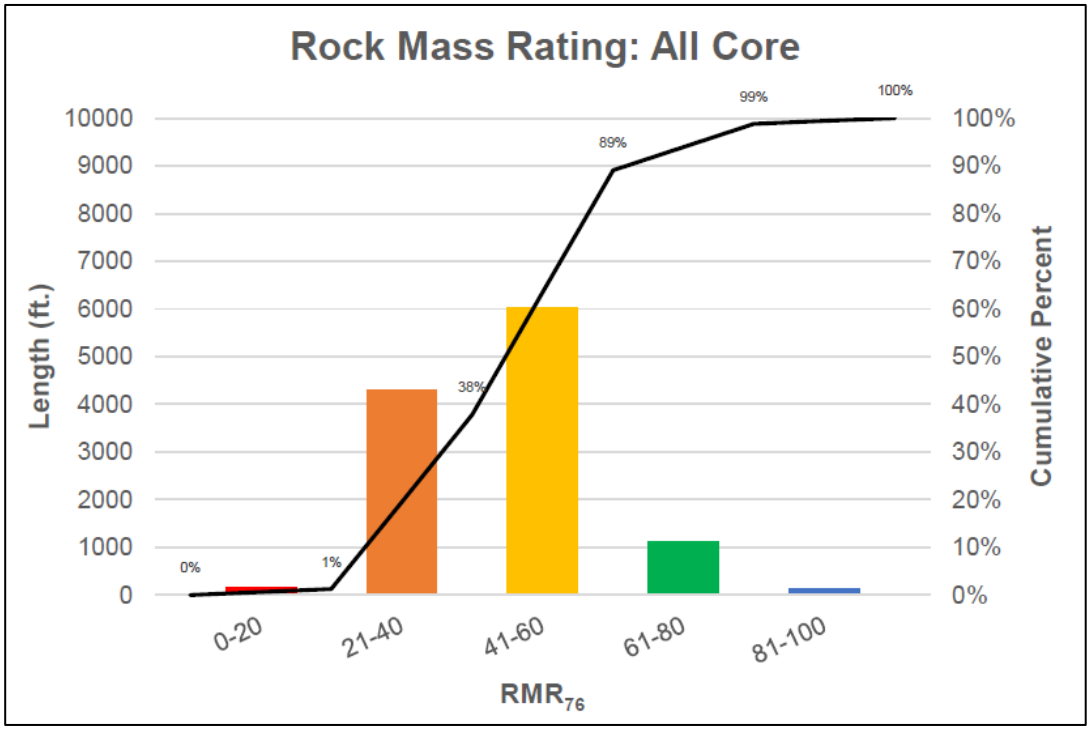
Figure 16.2 Drill Holes Collar Locations (2016 - 2017)



(from Paramount Gold Nevada; 10-foot contour interval.)

Golder utilized the Paramount and Golder geotechnical log data to characterize the orebody and surrounding rock mass based on a calculation of rock mass ratings ("RMR") from the logged data. Figure 16.3 presents the RMR histogram for all core that was geotechnically logged from the 2016-2017 drill campaign. The historical data was not evaluated with the 2016-2017 campaign because the historical logging of RQD data is not comparable with the RMR logging during the 2016-2017 campaign.

Figure 16.3 Golder Rock Mass Rating, All 2016-2017 Core
(from Golder, 2018)



The Golder review of the 2016-2017 drill core indicated the presence of a significant number of zones of broken rock fragments within what Golder termed "a matrix of soil" and referred to as "Soil Matrix Breccia". These zones are more correctly referred to as "clay matrix breccia" as described in detail in Sections 7.4 and 14.3. The clay matrix breccia is readily observed in core in split tubes immediately after drilling, but it is also clearly identifiable after the core has been boxed and somewhat disturbed.

The geological and geotechnical data did not identify any trends or patterns that would allow the delineation of rock quality domains for mine design, with the exception of very poor-quality rock encountered in and around the interpreted subvertical structures. However, very poor-quality rock is not limited to the vicinity of the structures, it is also frequently observed between structures. Therefore, this degree of variability will require a selective mining method that can quickly respond to changing ground conditions.

Golder concluded that, in the absence of spatial patterns in rock quality, three categories of rock quality should be used for PFS level design and cost estimating purposes. Table 16.2 shows the three rock quality categories applied to the design of the Grassy Mountain underground mine workings.

Table 16.2 Rock Quality Categories, Modified from Golder 2017

Rock Quality Category	Description	Approximate Expected Percent of Excavations(a)
Type I	Moderately fractured rock	20%
Type II	Poor quality, highly fractured rock	40%
Type III	Clay matrix breccia and other very poor-quality rock (clay, broken rock and rubble in core boxes)	40% (15% clay matrix breccia, 25% other poor-quality rock)

Note: based on percent encountered within 2016-2017 drill holes.

16.2.3 Ausenco 2017 Geotechnical Work

In 2017, Ausenco's geotechnical group in Santiago, Chile conducted a review of all the available geotechnical information provided by Paramount, including core logs, core photographs, and the work completed by Golder that is summarized above. The main objectives of Ausenco's work were to select a mining method and develop support recommendations for underground openings. While Golder's work was takenen into consideration by Ausenco, Mr. Caro, Ausenco's qualified person, is responsible for the underground mine designs and the geotechnical conclusions and recommendations presented in this PFS.

16.2.3.1 Rock Mass Fabric Domains

The geotechnical holes drilled in the 2016-2017 campaign were not oriented and there was no televiewer information available. Therefore, no rock mass fabric domains have been recognized and they could not be explicitly modeled.

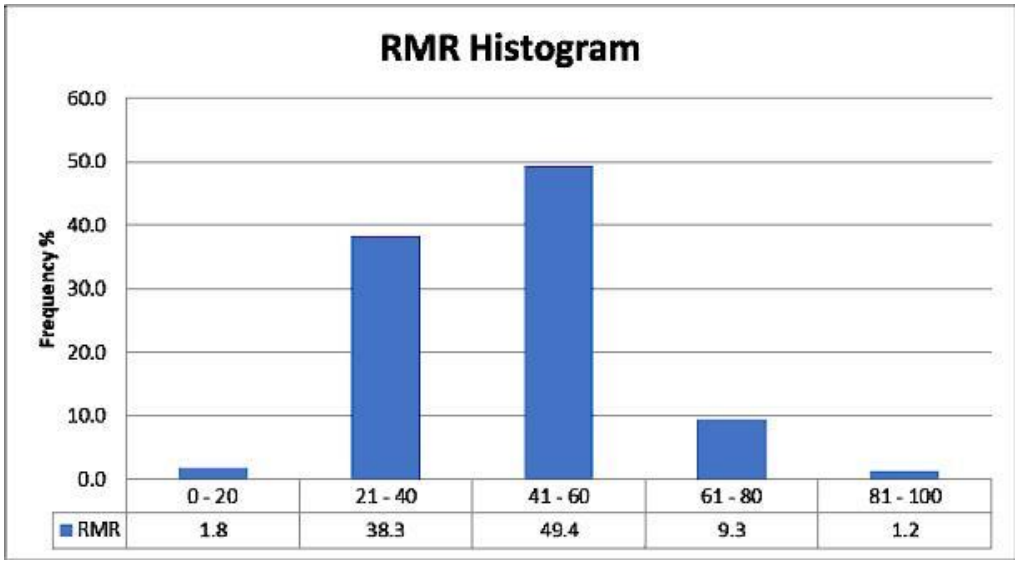
16.2.3.2 Structural Model 3D

For the geotechnical analysis, the orientations of the primary structural zones that are believed to have influenced precious metal distributions in the Grassy Mountain deposit were used to estimate the 3D structural model. For the purposes of this modeling, Ausenco assumed that the major structures are vertical and persist for distances of 100 to 200 feet.

16.2.3.3 Geotechnical Characterization

A statistical analysis was performed by Ausenco on the geotechnical data derived from the core logging of Paramount and Golder. This analysis was performed on each hole as well as the 27 drill holes in aggregate. The RMR results are shown in Figure 16.4.

Figure 16.4 RMR Histogram from 27 Drill Holes



Based on the RMR statistics and Ausenco's interpretation and correlation of the RMR data with the geological database, the Grassy Mountain deposit was assigned to three classes of rocks according to geotechnical quality:

- Class 1: Rocks of Poor geotechnical quality according to RMR; approximately 40% of the deposit.
- Class 2: Rocks of Regular geotechnical quality according to RMR; approximately 50% of the deposit.
- Class 3: Rocks of Good geotechnical quality according to RMR; approximately 10% of the deposit.

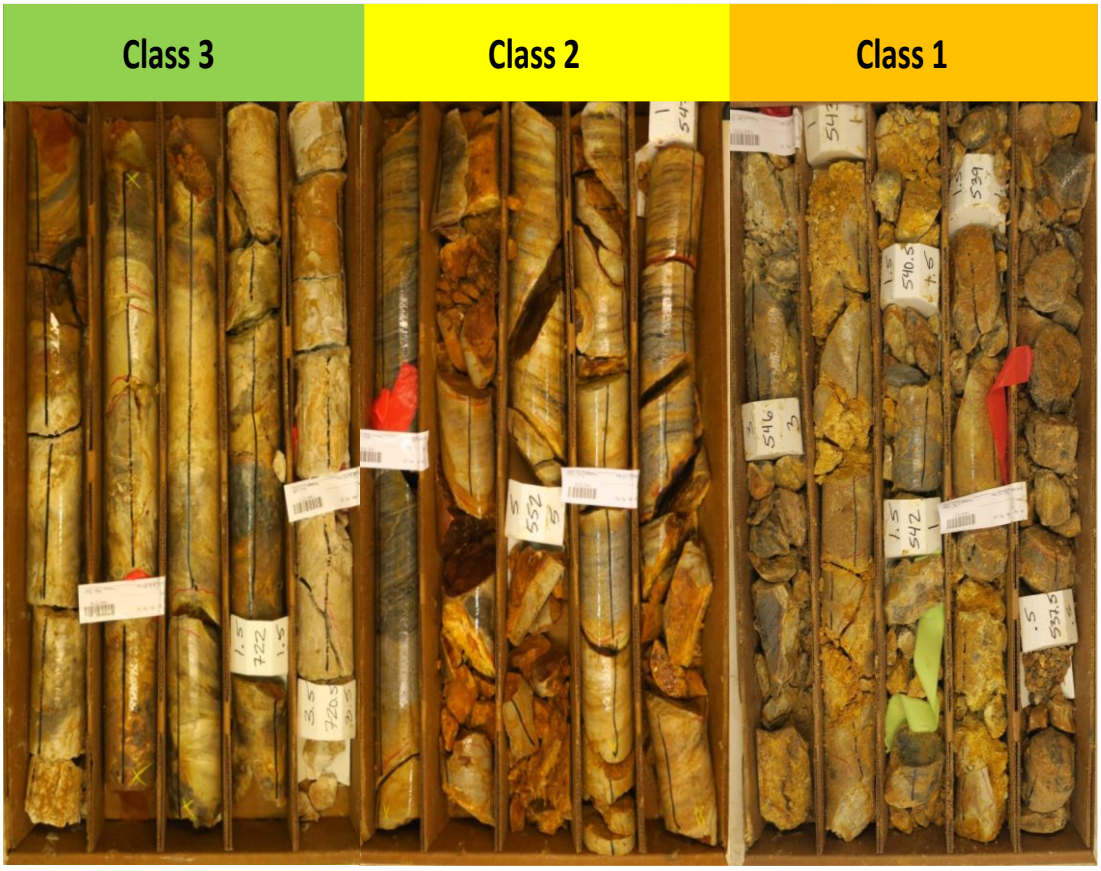
Table 16.3 shows the cumulative frequency values from Figure 16.4 with the classes of rocks assigned by Ausenco.

Table 16.3 Ausenco Rock Quality Categories

Rock Quality (RMR)		Frequency (%)	Rock Class	Deposit (%)
0 - 20	Very Poor	1.8	-	-
20 - 40	Poor	38.3	Class 1	40
40 - 60	Fair	49.4	Class 2	50
60 - 80	Good	9.3	Class 3	10
80 - 100	Very Good	1.2	-	-

The rock qualities of Very Poor and Very Good are not representative of the deposit due to the low frequencies measured, so they were omitted from the three classes of rock assigned. Examples of the three classes are shown in Figure 16.5.

Figure 16.5 Examples of Three Geotechnical Rock Classes



16.2.3.4 Intact Rock Properties Review and Rock Mass Strength

No final results of testing of the intact rock properties or rock mass strength was available for the completion of this PFS, although some testwork was undertaken. This preliminary information was used to check some numerical analyses, but the work will need to be completed as part of additional geotechnical studies required for a Feasibility Study.

16.2.4 Summary of Geotechnical Analysis and Evaluation for Underground Mining

Mr. Caro believes the available geotechnical data are adequate for designing the mine openings associated with the estimation of the Grassy Mountain mineral reserves at a PFS level, but further geotechnical work will be required to complete a Feasibility Study. Risks associated with the current level of geotechnical analysis are discussed in Section 25.11.1, and recommendations for additional work are presented in Section 26.2.4.

While the rock quality is variable, and the deposit is mineable based on the chosen mining method, care will need to be taken during the execution of the mining plan. The selected mining method and underground support recommendations are specified in Sections 16.4 and 16.5.

16.3 Hydrogeology Analysis

This section is based on work completed by SPF Water Engineering of Boise, Idaho ("SPF") as part of the overall PFS. This summary, and the included references, are taken from Clark et al., 2018.

Groundwater flow, expressed as a potentiometric surface, appears to follow topography, from areas of higher to lower surface elevation. The groundwater flow direction is predominantly to the northwest and more or less continuous in the vicinity of the Grassy Mountain deposit.

The horizontal hydraulic gradient is relatively high and somewhat uniform in higher relief areas, reflecting the steep topography, recharge areas, and predominantly low permeability of subsurface deposits. The gradient is lower in areas coinciding with flatter topography and groundwater discharge.

Despite the local variations in groundwater flow and aquifer properties, the apparent, aggregate aquifer system on a more regional scale appears to be relatively consistent. Local discontinuities resulting from fault and/or fracture zones, lithologic facies changes, or some combination of these influences are expressed as local compartmentalization and variations in the groundwater elevation. This concept is supported by groundwater-level monitoring performed on a seasonal basis for a period of several years, suggesting relatively stable trends over time. Aquifer pumping tests also support the general concept of localized zones of higher versus lower permeability. This trend is based on well yields during short-duration pumping (i.e., over a period of a few days) that typically cannot support sustained pumping rates more a few tens of gallons per minute, combined with apparent negative boundary conditions (i.e., associated with lower-permeable deposits and/or faults that limit groundwater flow).

Assignment of discrete aquifers is typically based on several criteria, with the designation being somewhat subjective and relative as a function of scale:

- Physical separation of higher-permeable deposits (aquifers) and lower-permeable deposits (aquitards);
- Hydraulic communication (i.e., similar groundwater elevation trends); and
- Similar lithology, water quality, and geochemical characteristics.

The concept of a single aquifer system has been supported by previous investigations (JMM, 1991; ABC, 1992; SPF, 2016). The overall hydraulic connectivity based on historical and recent water-level

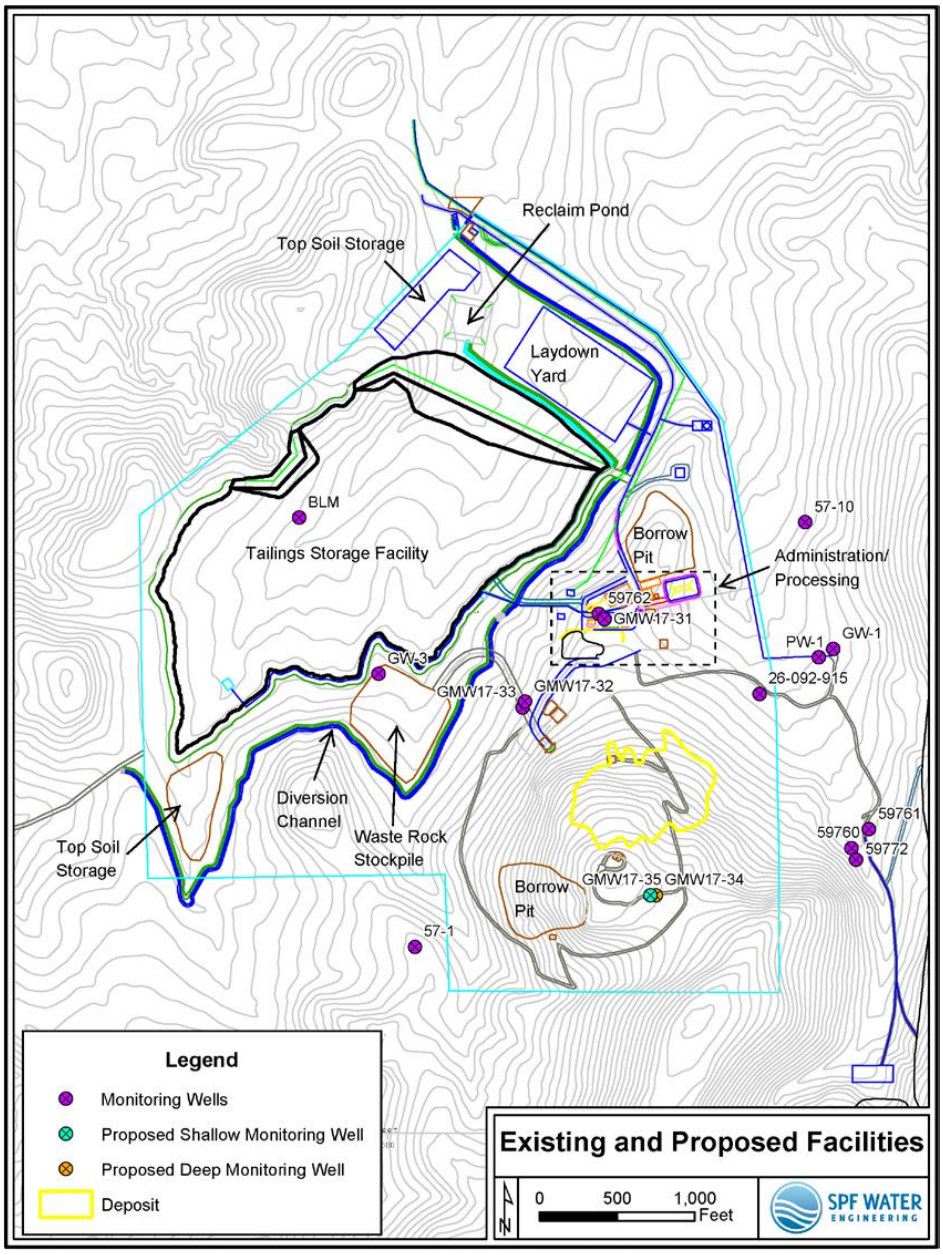
and water-quality data has supported a single, heterogeneous, and complex shallow aquifer system. This system contains discrete water-bearing zones that are laterally discontinuous, exhibited by regions with lower permeability (i.e., clay and siltstone, competent bedrock, and silicified deposits) and structural barriers to groundwater flow (SPF, 2016).

The presence of a deeper, regional aquifer has been contemplated based on the measured groundwater elevation over time in well 59762 (approximately 3,100 feet above mean sea level), compared to wells with groundwater elevations of 3,200 feet or higher (SPF, 2016). Well 59762 was completed to approximately 700 feet below ground surface, deeper than other wells installed in the deposit vicinity (Figure 16.6). In terms of elevation, however, other hydraulically down-gradient wells are actually screened over a comparable or lower elevation (i.e., GW-4, PW-4, Prod-1, and GW-6), but exhibit higher groundwater elevations. Since well 59762 was installed, one additional deep well (GMW-17-32) was installed down-gradient from the deposit in 2017, and several deep vibrating wire piezometers ("VWP"s) have been installed directly within the Grassy Mountain deposit (SPF 2017). Those installations have similar, deeper groundwater elevation trends to well 59762 (i.e., 3,000 to 3,100 feet above mean sea level range), supporting the concept of a deeper zone within the aquifer system. The current VWP installations, combined with deep wells, indicate that the potential exists to encounter groundwater within the deposit area both above and below the target dewatering elevation of approximately 3,100 feet, with lower static groundwater elevations found in water-bearing zones at depths of more than approximately 500 feet below ground surface.

The overall direction of groundwater flow and hydraulic gradients are similar for shallow and deeper well completions and are suggestive of a strong topographic influence. The geochemistry of shallow versus deep wells is similar, without a clear distinction based strictly on vertical or depth trends. Therefore, the concept of various zones (shallow and deep hydraulic expression) within the regional aquifer appears to be supported with the available data.

Theoretical groundwater inflow rates into the Grassy Mountain deposit area are on the order of 20 gpm to 100 gpm for sustained pumping, and 250 to 500 gpm for short-duration pumping and reflect the wide span of aquifer parameters and model assumptions utilized for predictive analyses. Actual inflow rates of several tens to a few hundred gpm are anticipated based on median aquifer parameters and model assumptions. However, based on drilling observations within the deposit, and aquifer testing performed outside the deposit area to date, the higher-end range of potential inflow rates associated with higher hydraulic conductivity are unlikely to be encountered during mining activities and, if encountered, the associated high dewatering rates would be anticipated for relatively short durations (i.e., likely on the order of days or weeks). Due to the proposed underground mining approach, the entire groundwater table will not be intercepted at once. Rather, the exposure to groundwater is anticipated to be restricted to subsurface workings that encounter groundwater, if present, such that inflow can be managed or mitigated as the conditions vary.

Figure 16.6 Water Well Locations in Relation to Proposed Infrastructure



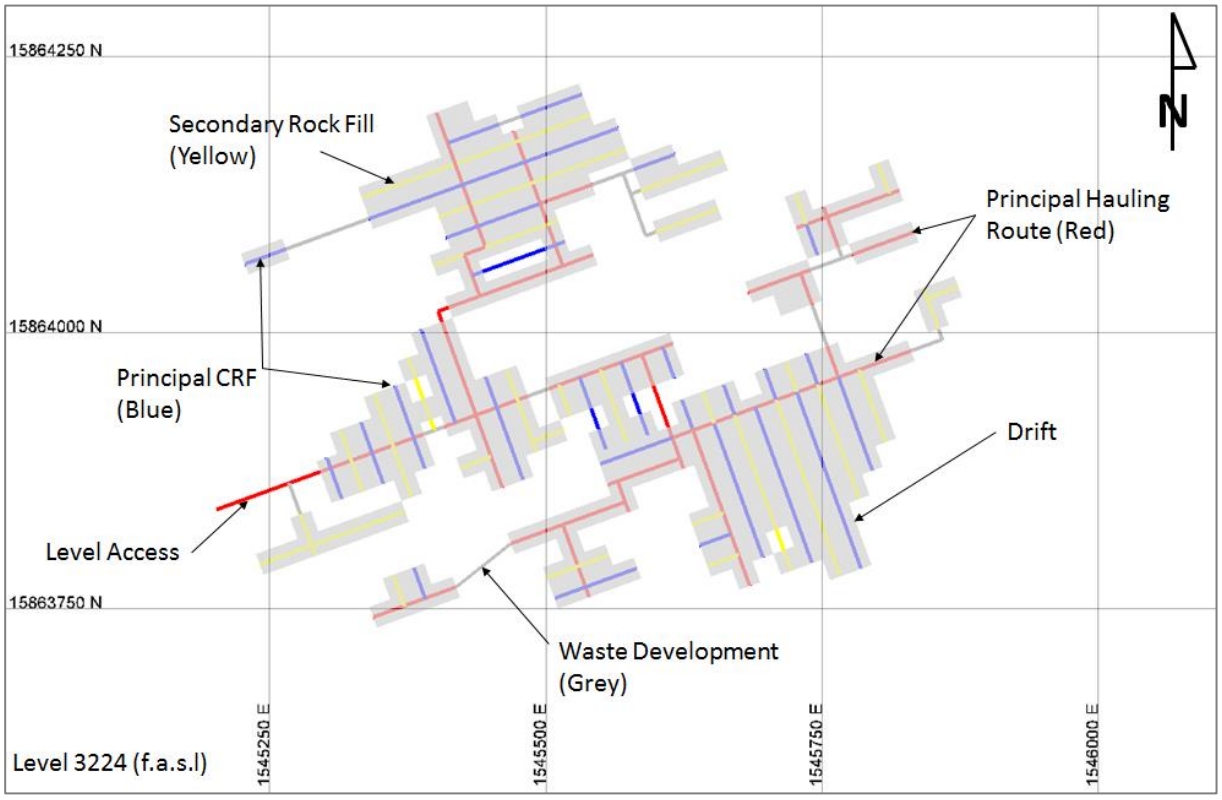
The lower range of inflow rates represents longer-term predicted dewatering as steady-state conditions are approached and reflects lower overall permeability of the aquifer system over a greater area (and likely within the deposit). The higher inflow rates reflect shorter-duration flow rates resulting from dewatering of zones with higher permeability that appear to be laterally discontinuous throughout the area based on borehole drilling and aquifer testing. Based on borehole drilling and aquifer testing performed to date in the vicinity of the orebody, higher permeability areas are thought to more likely be encountered away from the silicified orebody, such as to the north of the deposit and in basin areas. These would be areas characterized by greater amounts of relatively unaltered sedimentary rocks as compared to silicified and/or competent bedrock. Direct testing of aquifer properties within the Grassy

Mountain deposit has not been performed to date as verification, but extensive anecdotal evidence from mineral exploration drilling supports the concept of low permeability within the near vicinity of the deposit.

16.4 Mining Methods

The D&F mining method was selected using the methodology proposed by Nicholas (1981), where the geometry and the geotechnical conditions of the deposit are assessed. The D&F method is highly flexible and can achieve high recovery rates in deposits with complex and flat-dipping geometries, as is the case at the Grassy Mountain deposit. Figure 16.7 shows the typical D&F layout proposed for the deposit at the 3224 level.

Figure 16.7 Proposed Drift and Fill Design for the 3224 Level



The maximum D&F dimensions were defined to ensure underground stability, based on the geotechnical conditioned discussed in Section 16.2. These dimensions were estimated using the methodology proposed by Mathews (1981), which considers the hydraulic ratio of the drift and the geology and geotechnical conditions of the deposit.

16.5 Mine Design

The Grassy Mountain orebody will be accessed using a 15 x 15 ft main decline, developed from a portal on surface. The decline will provide the connection to all services. The design intent is to have the decline located as close as possible to the mineralization in order to reduce transportation costs, but

sufficiently removed from mining activities to ensure that the decline is geotechnically stable for the planned life-of-mine ("LOM").

A summary of the mine design criteria is shown in Table 16.4.

Table 16.4 Underground Mine Design Criteria

Development Heading Parameters - Horizontal/Incline/Decline	Width (ft)	Height (ft)	Diameter (ft)	Length (ft)	Maximum Gradient (%)
Decline	15	15		varies	12
Level access	13	13		varies	15
Stope	20	13		varies	
Center-line radius of curvature - internal ramps				32.8	
Raise boring			13.12		
Conventional Shaft			19.68		

16.5.1 Access

The main access portal will be located on surface close to the process plant infrastructure. Figure 16.8 shows the location and configuration of the main portal access. Figure 18.1 shows the portal in relation to other facility locations on the mine site.

The main decline ramp will be approximately 100 feet in stand-off distance from the orebody. This distance will allow sufficient space between the decline ramp and the orebody for the excavation of cross levels and access to drift levels. The decline ramp will have dimensions of 15 feet in width by 15 feet in height, and it will be developed with a maximum 12% gradient. This gradient is commonly used in modern underground mines and is within the operating limits of the haul trucks that will be used. Figure 16.9 shows the planned design for the main access portal.

Figure 16.8 Location of Main Portal Access

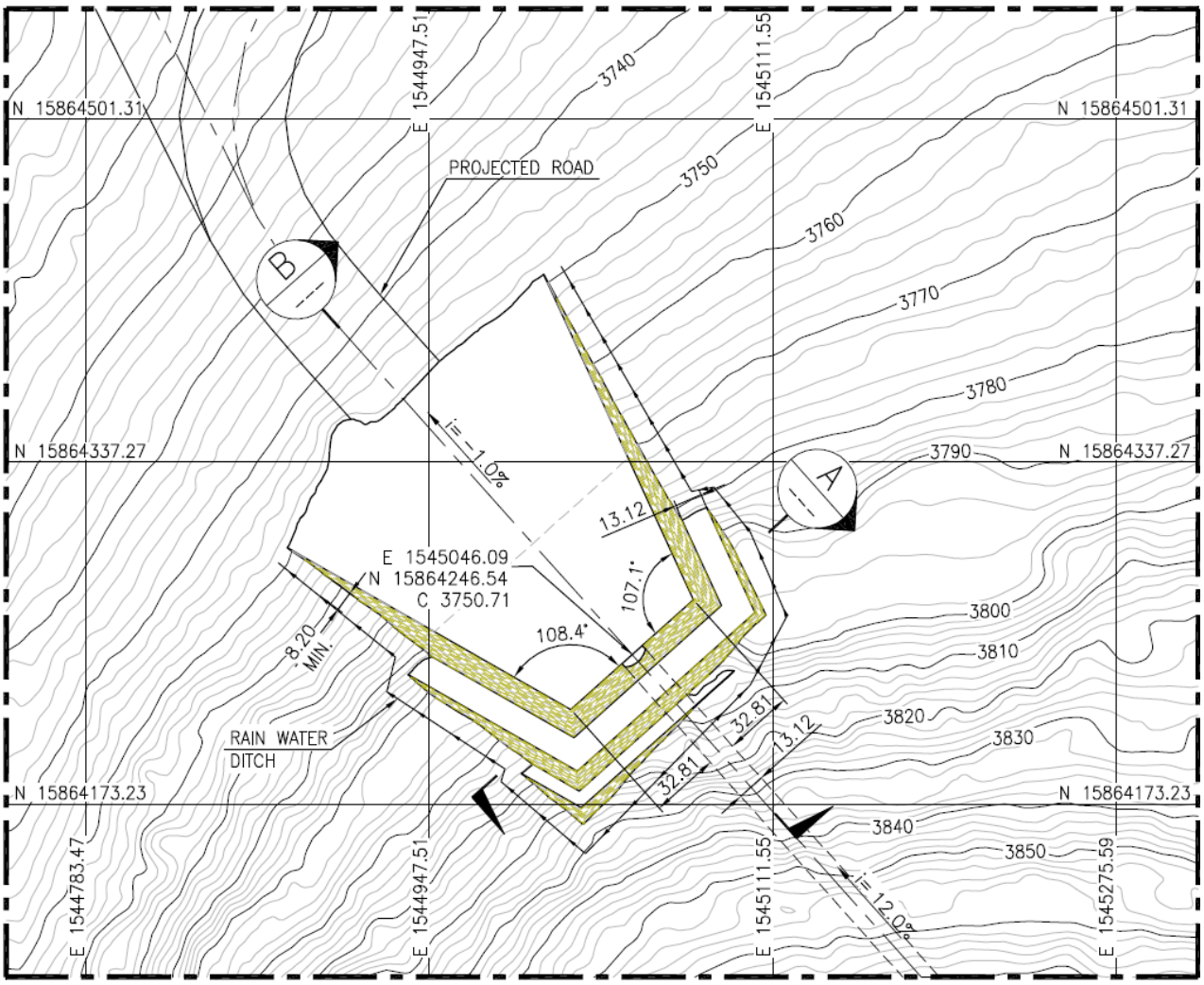
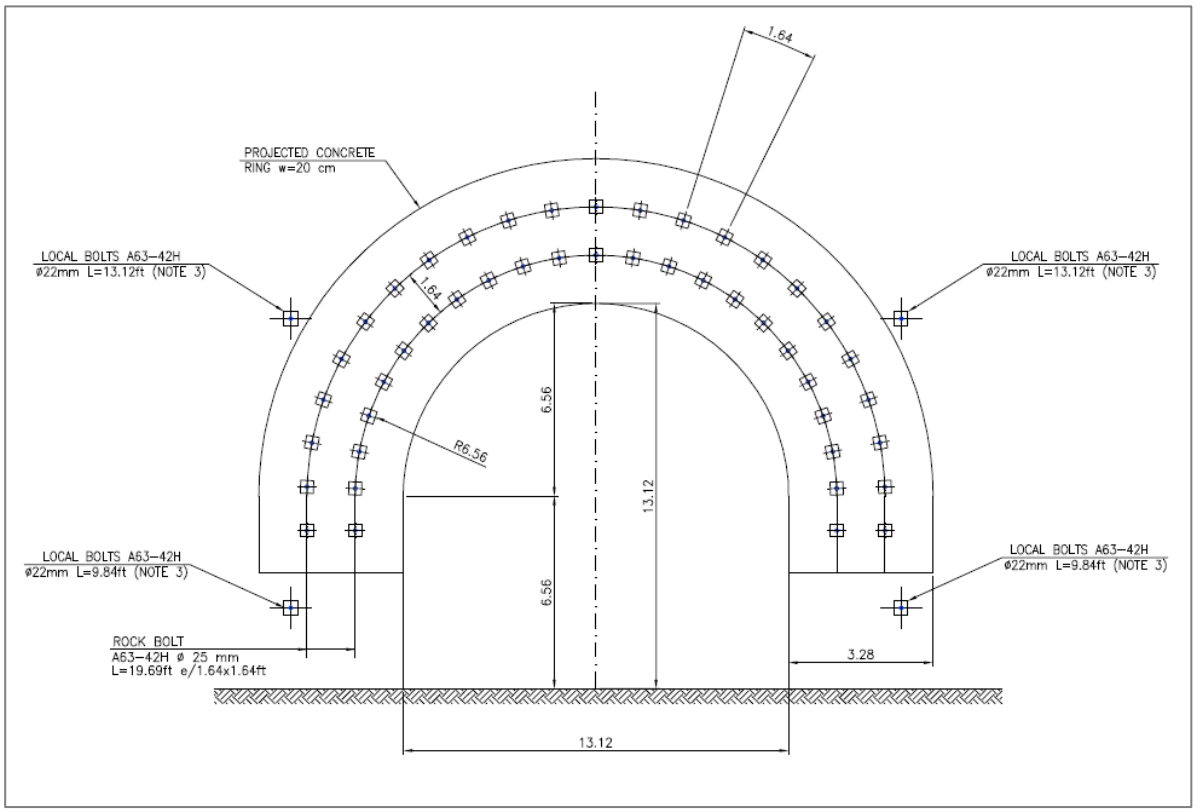


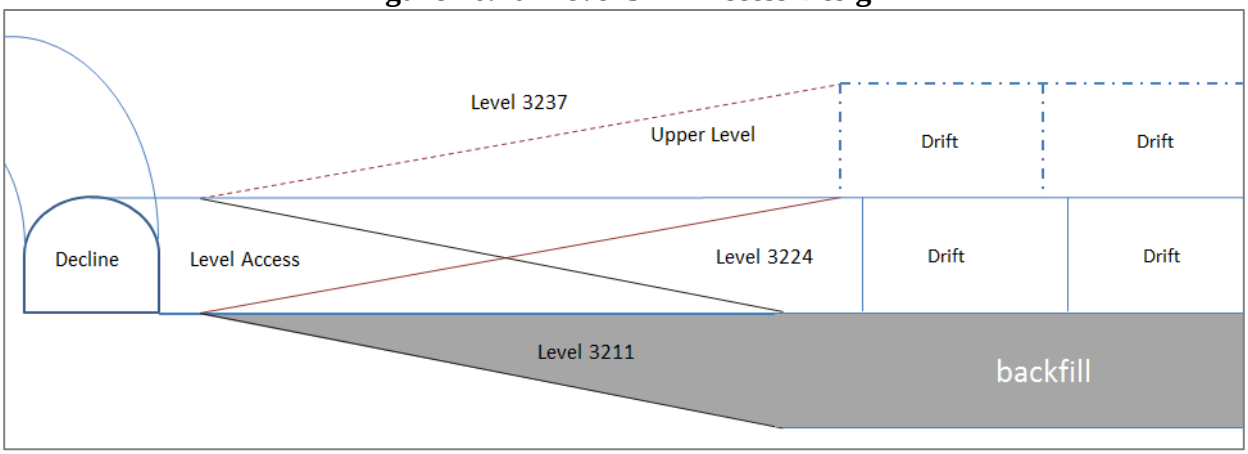
Figure 16.9 Main Portal Design



16.5.2 Level Access Design

Each level will be mined from the decline ramp via a "level access" excavation. This excavation has been designed to be 13 feet wide and 13 feet high to provide clearance for the trucks that will be used to haul material from the levels mined. Each level access will connect with three production levels. Figure 16.10 shows the schematic level access and development for the 3224 level.

Figure 16.10 Level 3224 Access Design



16.6 Mining Services

16.6.1 Mine Ventilation

The ventilation network was designed to comply with U.S ventilation standards for underground mines [Code of Federal Regulations / Title 30. Underground metal and nonmetal mines. Washington, DC: U.S. Government Printing Office, Office of the Federal Register]. Regulatory concentrations for gases are specified by the 1973 American Conference of Industrial Hygienists ("ACGIH") threshold limit values ("TLV"s) [71 Fed. Reg. 3 28924 (2006)]. For diesel particular matter ("DPM"), a permissible exposure limit ("PEL") of 160 $\mu g/m^3$ total carbon is specified in the U.S. diesel rule for metal/nonmetal mines [71 Fed. Reg. 28924 (2006)].

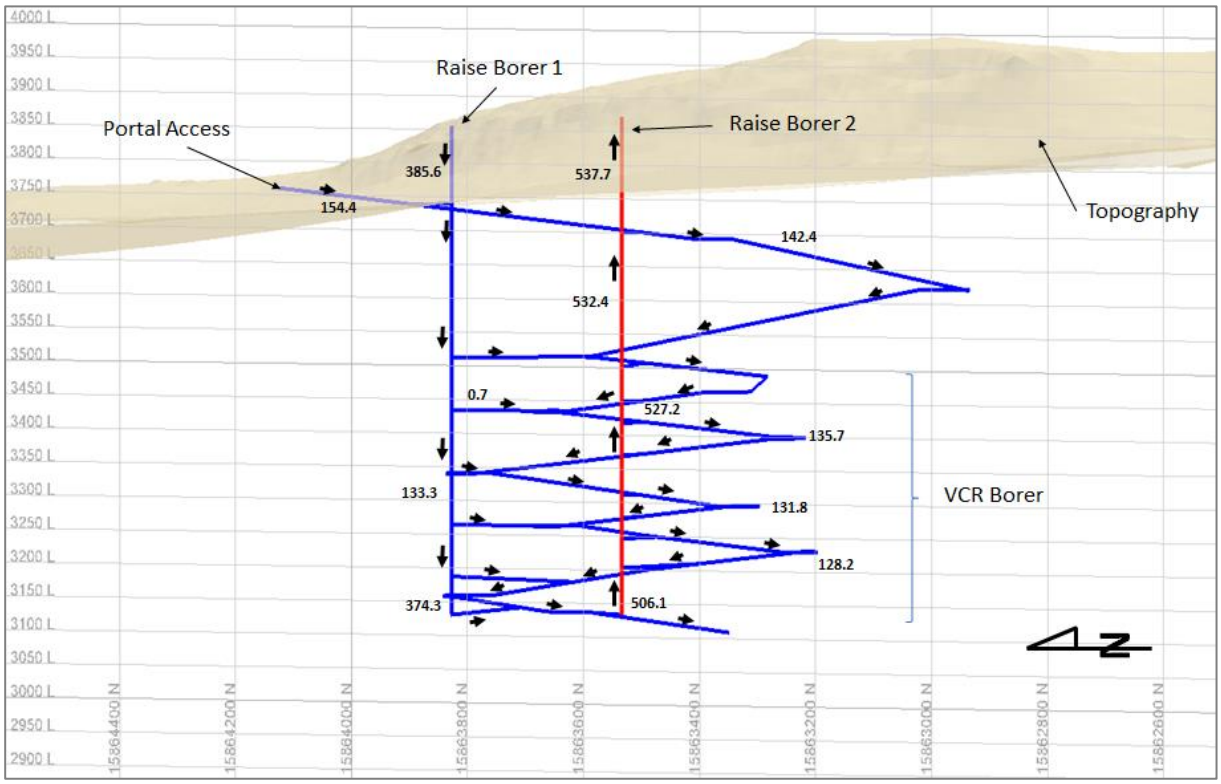
Mine Safety and Health Administration ("MSHA") sets an airflow requirement for the dilution of gas emissions, and an additional airflow requirement for dilution of DPM. These values are published with the list of approved engines on MSHA's internet website. Airflow of 54,000 ft^3/min was selected as a minimum reference for the ventilation design in order to meet the MSHA ventilation standards.

Required airflows were determined at multiple stages during the mine life, using equipment numbers and utilization rates, specific engine types and exhaust output, and the number of personnel expected to be working underground. The designed ventilation system includes the following parameters:

- Required air flow of 540,000 ft^3/min;
- Fan total pressure ("FTP") of 7 inches Hg; and
- Air density of 0.071 lb/ft^3

The planned ventilation will use a push/pull system and will require extraction fans on surface. An extraction vent raise, with dimensions of 19.7 feet x 19.7 feet and 367 feet in length, will connect the lowest level of the mine (3,123-foot level) with the 3,490 level. A raise borer vent raise of 18.58 feet in diameter and 373 feet in length will connect the 3,490 level with the surface (3,863 level), thereby forcing the air flow into the main extraction circuit. Figure 16.11 shows the main components of the proposed ventilation network with inflow and exhaust air-flow directions.

Figure 16.11 Ventilation Network



16.6.2 Underground Water Supply

Water will be needed for underground production drilling and bolting, as well as for diamond drilling. The required LOM water supply has been estimated based on the mine-equipment requirements as summarized in Table 16.5.

Table 16.5 Estimated LOM Water Requirement

Equipment	Maximum	Water Pump (gal/min)	Operational Factors	Water required (gal/min)
Jumbo DD321	2	26.4	70%	37.0
Bolter DS311	1	8.7	70%	6.1
Diamond Drill	1	20	70%	14.0
				gal/min
			Total Required	57.1
			Factor	20%
			Total with factor	68.5

16.6.3 Dewatering

Dewatering is planned to a target elevation of approximately 3,100 feet, from approximately 500 to 700 feet beneath the surface, as per the expected hydrologic conditions (Section 16.3). The active mining area is projected to be about 600 feet by 900 feet in aerial extent.

Dewatering assumptions include:

- Estimated steady-state, bulk-dewatering rates on the order of 20 gpm, with the potential to intercept up to 500 gpm on a short-duration basis (i.e., days to weeks); anticipated based on the PFS-level assessment (Section 16.3).
    - The low-end estimate reflects lower permeability, in the range of 0.003 ft/d, anticipated directly within the deposit area. Due to the expression of individual faults or fault zones, the actual permeability may be more or less. Ausenco is not aware of direct testing of hydraulic conductivity or transmissivity based on aquifer pumping tests within the deposit area to date to confirm this estimate. However, the results of pumping tests performed around the perimeter of the deposit support an aggregate lower hydraulic conductivity within this magnitude due to limited yields and negative boundary conditions.
    - The high-end estimate reflects higher hydraulic conductivity that may be more representative of basin conditions and short-duration inflows into the deposit area that could potentially be intercepted during the mining activities. The anticipated hydraulic conductivity may be on the order of $1x10^{-4}$ cm/s (0.3 ft/d). This condition may arise from contributions from local zones of higher permeability that are effectively dewatered early in the mining process. As the cone of depression or radius of influence extends from the theoretical pumping well(s), the overall aquifer properties are expected to produce less water over time due to overall lower permeability effects.
- The conceptual model for groundwater flow at Grassy Mountain provided the basis for the dewatering estimates. The current model suggests a single aquifer system as a function of scale, supported by the relatively uniform, shallow and deep potentiometric surface and correlation with groundwater elevation and depth. On a local scale, heterogeneity effects are apparent, attributed to local variations in hydraulic properties, facies changes, and/or the occurrence of faults/fault zones.
- Dewatering was simulated by placing theoretical wells along the deposit perimeter and assigning uniform pumping rates to achieve dewatering to the 3,100-foot elevation. Four wells were simulated at five-gpm each, for 20-gpm total pumping requirements under steady-state conditions, resulting in a pumping-level elevation of approximately 2,950 feet to 3,050 feet.
- The dewatering evaluation also examined potential groundwater inflow rates using a combination of steady-state and transient analytical methods.
    - A groundwater flow rate of approximately 20 gpm was predicted in the steady-state analytical model. This value was consistent with the numerical model results based on an assumed, uniform hydraulic conductivity of 0.003 ft/d. The model was sensitive to changes in hydraulic conductivity by half an order in magnitude, with corresponding increases in estimated dewatering by one order in magnitude. For example, assignment

of hydraulic conductivity of 0.3 ft/d resulted in an estimated dewatering rate of approximately 500 gpm. This model assumes steady-state conditions. However, based on drilling observations within the deposit and aquifer testing performed outside the deposit area to date, these higher hydraulic conductivity zones are unlikely to be encountered during mining activities. If encountered, the associated high dewatering rates would be anticipated for relatively short durations, likely on the order of days or weeks.

  - The transient analytical method was used to estimate the predicted dewatering rate of approximately 250 gpm to 600 gpm, assuming a single pumping well scenario, placed at the center of the deposit. The theoretical drawdown effects at the perimeter of the deposit were evaluated after one year of continuous pumping to produce 600 feet of drawdown (assuming an initial groundwater elevation of 3,700 feet for up-gradient conditions and an assumed dewatering elevation of 3,100 feet). The higher flow rate range is consistent with anticipated short-duration inflow amounts over the span of days to weeks.

- The dewatering estimates reflect inherent uncertainty, both in the available datasets and necessary simplifying assumptions for representing a complex system. However, these results are considered appropriate for PFS-level mine planning.
- The construction of special stations for dewatering is a planned part of the mine development. These stations will have dimensions of 32.8 feet in length by 13 feet in height, by 13 feet in width, with a slope of 12%.

16.6.4 Electrical Distribution

An underground 480 V transformer will be placed near the entrance to the portal at the start of mining. This will supply power to electrical equipment used to develop the main decline and to portable fans. A main power line will be installed along the rib of the decline to carry 1.4 kV when development has advanced far enough that carrying power at 480 volts becomes too inefficient. This line will be connected to a transformer that will be moved underground. Line power will also be extended to the locations of the two ventilation shafts to supply power to the ventilation fans.

Upon completion of the decline to the 3224 level, and commencement of mine production activities, a second underground transformer will be purchased for use in the lower areas of the mine.

16.6.5 Mine Communications

Inside the mine, a leaky-feeder VHF radio system will be used as the primary means of communication. The system will allow for communications between the underground mine and surface operations.

16.6.6 Refuge Station

Two emergency refuge stations are considered to be necessary in case of fire or rockfalls that would block access and prevent full evacuation of personnel. These refuges will allow the staff to remain safe in the underground mine for 48 hours. The refuges are mobile, each can accommodate up to 20 people within the protected chamber, and they will be arranged so that they are always no more than 650 feet

from the areas where the mine operation personnel are located. Figure 16.12 shows an example of a refuge station.

Figure 16.12 Typical Mobile Refuge Station

16.6.7 Maintenance Facilities

Stations will be developed for maintenance of underground equipment without the equipment having to return to surface. Two maintenance stations will be constructed during the LOM measuring 32.8 feet wide, 49.8 feet long, and 13 feet high and will be equipped with tools appropriate for minor repairs and maintenance only.

The underground maintenance stations will be located close to the decline ramp on the 3510 and 3237 levels. Figure 16.13 shows the planned configuration of the maintenance stations.

16.7.6 Backfill

The backfill method has been selected according to the geological and geotechnical conditions of the deposit, as well as the selected D&F mining method. The main objectives of the backfill are to provide stability to the drifts and to control dilution associated with the ore extraction. CRF and RF will be used in the primary and secondary drifts, respectively.

To the extent possible, the waste rock from underground operations will be used for CRF and rock from the borrow pit will be used for RF. A plant to produce the CRF will be built as part of the project infrastructure (see Section 18.0).

16.7.6.1 Cemented Rock Fill

CRF will be used to backfill primary drifts allowing for reasonable recovery of secondary drifts. The CRF will have the following properties:

- Cement: 5.0%;
- Water / Cement (ratio): 0.8 to 1.2;
- Waste Rock: 70% – 98% (rock with good geotechnical rating); and
- Granulometry size: -6 inches.

It is assumed that the cement will properly encapsulate any potentially acid-generating material. Thus, the mine waste will be used as available. This will reduce the mine waste storage to zero over the LOM. When mine waste is not available, rock from the borrow pit on the east side of the project will be utilized for CRF.

The CRF plant will be located near the portal. Haul trucks will be used to haul the CRF down the decline and into the locations to be used. LHDs will have special "jamming plates" attached to the bucket so that the CRF can be jammed as tight as possible. Control of the CRF slump properties will be an important factor to its successful use. The CRF will need to be thin enough for trucks to handle in the transporting and dumping of the material, but stiff enough to allow the LHDs to pack the material into position. The slump properties will be adjusted based on locations and experience.

It is assumed that the curing time for the CRF will be approximately 28 days. Following curing, the secondary drift can be filled with RF using LHDs. Recommendation for additional work is discussed in Section 26.2.4.

16.7.6.2 Rock Fill

The RF will be used in the secondary drifts according to the design and mine plan. It will act as an unconfined filling adjacent to the primary drifts which will have been previously filled with CRF. Basalt material from the borrow pit on the east side of the project will be used. For the purposes of the PFS, this basaltic rock is assumed to be free of sulfides and therefore not acid generating.

RF material will be hauled at the run-of-mine ("ROM") size. The transport and disposal of RF into the drifts will use mine trucks that will place the material at unloading points inside the mine, where it will subsequently be loaded and transported to the drifts using LHDs. The LHDs will push the material into place as tight as possible using the loader bucket.

16.8 Mine Equipment

Mine operations will be based on the usage of mobile mining equipment suitable for underground mines. The estimate of the fleet size was based on equipment running-time requirements to achieve the mine production plan. The estimate of the running time for the mine equipment was conducted through the usage of mine-operating factors. Mine-operating factors are summarized in Table 16.10.

Table 16.10 Mine Equipment Operating Factors

Underground Mining Equipment	Availability (%)	Utilization (%)	Operational Efficiency (%)
Drilling Development Jumbo (Jumbo DD21-40)	85	70	70
Bolter (Sandvik DS311)	85	70	70
LHD 5.2 yd^3 (LH410)	85	70	80
Front-end Loader (JCB 456ZX)	85	70	75
Low Profile Truck (AD30)	85	70	75
Telehandler (JCB 540-170)	85	80	80
Bulldozer (Cat D6T)	70	70	80
Motor Grader (Paus PG5HA)	70	70	80
Fuel Truck	75	70	80
Service Truck	75	70	70
Diamond Drilling (Hydracore Gopher)	70	70	70

During the first year of usage, the utilization is restricted to the range between 50% and 60% for all the equipment due to the limited mining fronts. The productivities of development drill and LHD are 222 ft/hr and 114 ton/hr, respectively. The truck productivity varies from 15 to 153 ton/hr depending the haul distance. The shortest haul distance is only 1,640 ft and the longest is more than 12,000 ft.

The maximum permanent underground mine equipment required for the LOM are summarized in Table 16.11.

Table 16.11 Mine Equipment Requirements

Underground Mining Equipment	Quantity
Drilling Development Jumbo (Jumbo DD21-40)	2
Bolter (Sandvik DS311)	1
LHD 5.2 yd^3 (LH410)	4
Front-end Loader (JCB 456ZX)	1
Low Profile Truck (AD30)	3
Emulsion Loader	1
Telehandler (JCB 540-170)	2
Bulldozer (Cat D6T)	1
Motor Grader (Paus PG5HA)	1
Fuel Truck	1
Service Truck	1
Diamond Drilling (Hydracore Gopher)	1

During very limited peak times, the maximum requirement of Low Profile Trucks will be five, however, only three trucks are considered as permanent fleet and additional trucks will be provided by a local contractor spordically. The total hours, average hours and maximum hours per month are displayed in Table 16.12.

Table 16.12 Mine Equipment Hours

Underground Mining Equipment	Total Operating Hours	Average Hour per Month	Maximum Hours per Month
Drilling Development Jumbo (Jumbo DD21-40)	27,936	274	406
Bolter (Sandvik DS311)	17,677	173	259
LHD 5.2 yd^3 (LH410)	26,189	257	369
Front-end Loader (JCB 456ZX)	14,022	163	185
Low Profile Truck (AD30)	68,159	667	1,165
Telehandler (JCB 540-170)	45,977	451	686
Bulldozer (Cat D6T)	21,470	210	230
Motor Grader (Paus PG5HA)	21,538	211	233
Fuel Truck	22,715	223	227
Service Truck	15,584	153	162
Diamond Drilling (Hydracore Gopher)	21,429	210	227

Some relevant quantities used for the mine fleet and mining operating cost estimates are provided in Table 16.13.

Table 16.13 Relevant Mining Quantities

Underground Mining Equipment	Unit	Total	Average per Month
Horizontal Drilling	ft	22,341,670	221,205
Emulsion	lb	6,507,246	64,428
Diesel	Gallons	1,968,798	19,493
Power	kWh	34,413,307	340,726

16.9 Mine Personnel

Personnel requirements for the LOM are summarized in Table 16.14. The table includes staff for mine management, operation, maintenance and technical services.

The peak mine personnel required will be 63 workers. The shift system for administrative personnel is planned to be 5 days on and 2 days off, at 10 hours per day. Production-related mining personnel (operators, fitters, electricians, and assistants) will work a shift system of 4 days on and 3 days off in two teams. Each team will provide 12 hours per day coverage so that the mine can operate for a 24 hour per day, 4 days per week. Some personnel may work additional overtime through weekends for care-and-maintenance requirements, as needed.

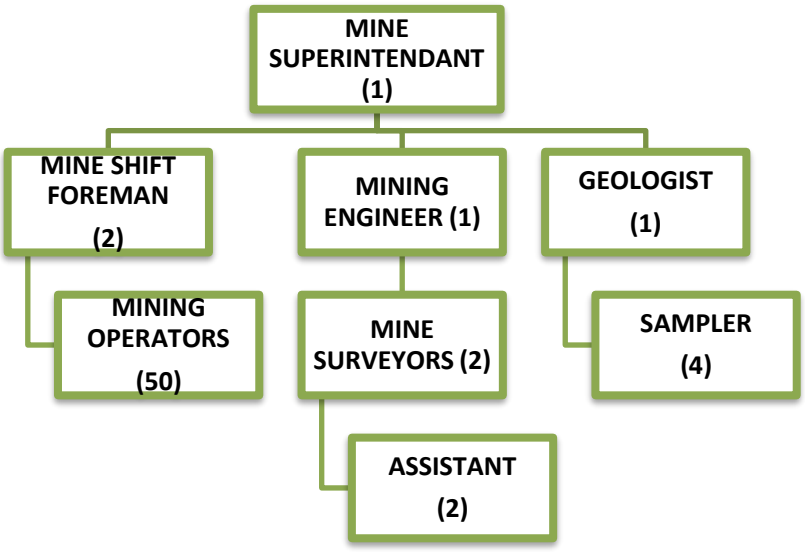
The operating calendar is based on 360 operating days per year.

Table 16.14 Mine Manpower

Role	Role per Shift	Shift	Schedule (days on/off)	N° of Employees
Mine Superintendent	1	1	5/2	1
Planning Engineer	1	2	5/2	1
Geologist	1	2	4/3	1
Mine Shift Foreman	1	2	4/3	2
Surveyor	1	2	5/2	2
Assistant Surveyor	1	2	5/2	2
Sampler	2	2	5/2	4
Mine Operations Manpower				
Maintenance	4/5	2	4/3	11
Drilling	2	2	4/3	4
Bolter	1	2	4/3	2
LHD	4	2	4/3	8
Front end Loader	1	2	4/3	2
Truck	3	2	4/3	6
Ancillary Equipment	4	2	4/3	8
Diamond Drilling	1	2	4/3	2
Assistance	3/4	2	4/3	7
Total Mining Labor	**32**			**63**

The planned mine organization chart is shown in Figure 16.19.

Figure 16.19 Mine Organization Chart



16.10 Mine Production Schedule

MDA used the Proven and Probable mineral reserves defined by Ausenco to create a mine production schedule using MineSched™ (version 9.1), which allows for the scheduling of both underground development and production. The primary inputs used to develop the schedule include:

- The resource block model with defined material types;
- Development centerlines drawn in the direction of mining;
- Solids representing the stopes or production areas to be mined;
- Locations defining stockpiles, processing plant, and waste dumps;
- Material movement definition;
- Mining sequence among developments and production areas;
- Development and production rates by location; and
- Definition of the periods to be used.

The naming convention for material types considered either ore or waste. Ore was assigned to four categories based on grade: high-grade ("HG"), medium-grade ("MG"), low-grade ("LG"), and sub-grade. Sub-grade is material that is below the mining economic COG, but above the resource COG. The basic assumption is that a stope that is economic to be mined will be processed in its entirety. Thus, if internal waste in an economic stope is classified as Measured or Indicated mineral resources, these resources will be converted to Proven or Probable mineral reserves, respectively, and will contribute to the revenue stream.

Waste is comprised of: (*i*) material classified as Measured or Indicated mineral resources that is below both the mining COG and the resource COG; or (*ii*) material classified as Inferred mineral resources. Waste is considered to be internal dilution within a stope, which would be mined and sent to the process plant. All waste material is considered to have zero grade and therefore does not contribute to the revenue steam.

The development centerlines were provided by Ausenco. Some adjustments were made to the centerlines for proper linkage and mining direction. The level development provided by Ausenco included development in ore, development in waste, and centerlines for the stopes on the main levels. The centerlines were not used in MineSched™ because the production was represented using the stope solids.

The mining solids were provided by Ausenco and were used as provided to define mining locations. Other locations included stockpiles, the mill, and a single waste dump. Three stockpiles were used for LG, MG, and HG material so that higher-grade material can be fed to the mill prior to lower-grade material. All mill material was scheduled to report to the stockpile before being fed into the mill.

Waste development in each sublevel was estimated using the ratio of waste development footage per ore ton, calculated from the main level. Material movement allowed for all of the waste to be sent directly

to the waste dump, which includes development tonnages mined. Material mined from the stopes will be routed to the stockpile and then rehandled into the plant.

The mining sequence was defined to make sure that there was sufficient underground development completed for a level prior to mining stopes on that level. Ausenco designed the stope solids using "stope blocks" with dimensions of 20 feet by 20 feet, by 13 feet in height. An advance rate of 15 feet per day was assumed, which would yield 290 tons per day in a single cut. It was anticipated that two stopes could be mined during the day on some levels where sufficient stoping areas would be available. Based on the number of headings, a maximum production of 290 tons per day would be possible with a single heading, or 580 tons per day for two headings on a level.

The PFS contemplates mining of primary and secondary stopes. This will require completion of the primary stope to allow placement and curing of the CRF before the secondary stope can be mined. Ausenco specified that there should be a 28-day delay between primary and secondary stopes to allow for curing time. Detailing the sequence between primary and secondary stopes will be completed as part of short-term mine planning. MDA reviewed each main level to determine a production rate based on the sequence of primary and secondary stopes. This was done by assigning a sequence number for each stope block and then reviewing the difference in the sequence number between the primary and secondary stopes.

The difference between the primary and secondary stopes, together with the production rate, defined a maximum productivity that could be accomplished for secondary stoping based on the delay for the primary stopes to be back-filled. MDA determined the maximum tons per day for each main level (Table 16.15) and these values were also used for the sublevels below and above the main levels.

Table 16.18 Stockpile Balance

	Units	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Added	K Tons	220	282	282	283	282	279	113	18	-
	oz Au/ton	-	-	-	-	-	-	-	-	-
	K ozs Au	44	74	57	51	54	59	19	4	-
	oz Ag/ton	-	-	-	-	-	-	-	-	-
	K ozs Ag	55	79	80	74	84	96	43	5	-
Removed	K Tons	217	274	274	275	274	274	154	18	-
	oz Au/ton	-	-	-	-	-	-	-	-	-
	K ozs Au	44	73	56	51	54	59	21	4	-
	oz Ag/ton	-	-	-	-	-	-	-	-	-
	K ozs Ag	55	77	79	73	81	94	53	5	-
Balance	K Tons	3	12	20	28	36	42	-	-	-
	oz Au/ton	0.067	0.071	0.073	0.072	0.071	0.075	-	-	-
	K ozs Au	0	1	1	2	3	3	-	-	-
	oz Ag/ton	2.752	3.382	3.184	3.120	3.693	3.546	-	-	-
	K ozs Ag	1	3	5	6	10	11	-	-	-

Table 16.19 Development Schedule

Development Type	Units	Pre-Prod -2	Pre-Prod -1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Total
Main Decline	K Feet	1.3	4.4	1.5	-	-	-	-	-	-	-	-	7.3
Vent Drift	K Feet	0.1	1.1	1.5	-	-	-	-	-	-	-	-	2.6
Level Access	K Feet	-	-	0.5	0.4	0.2	0.4	0.4	0.4	0.5	0.5	-	3.2
Level Development Waste	K Feet	-	-	2.1	1.5	1.0	1.4	2.1	3.0	2.1	0.3	-	13.4
Level Development Ore	K Feet	-	0.1	11.9	0.3	-	-	-	-	-	-	-	12.2
Vent Shaft	K Feet	-	1.0	0.5	-	-	-	-	-	-	-	-	1.5
Total Development	K Feet	1.4	6.6	18.0	2.2	1.1	1.7	2.4	3.3	2.7	0.8	-	40.2

Figure 16.20 and Figure 16.21 show the proposed yearly production schedule in terms of tons and gold and silver ounces for the LOM.

Figure 16.20 Mine Production Schedule

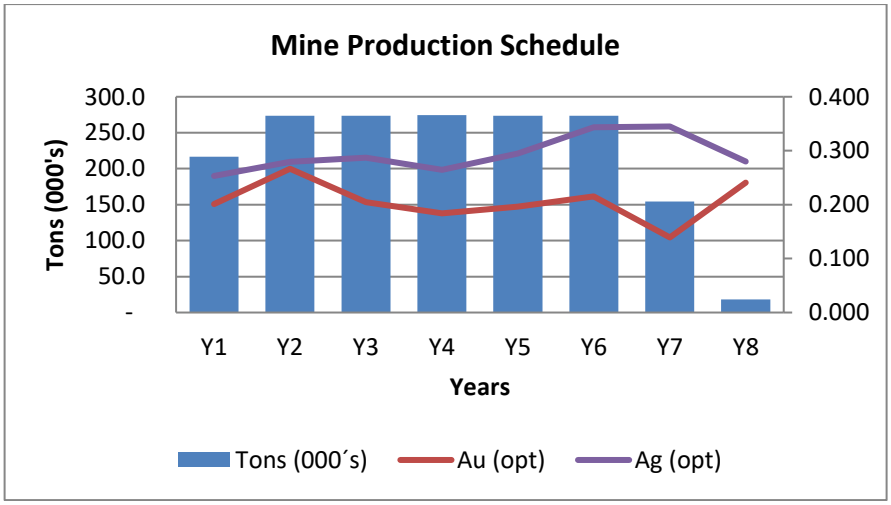
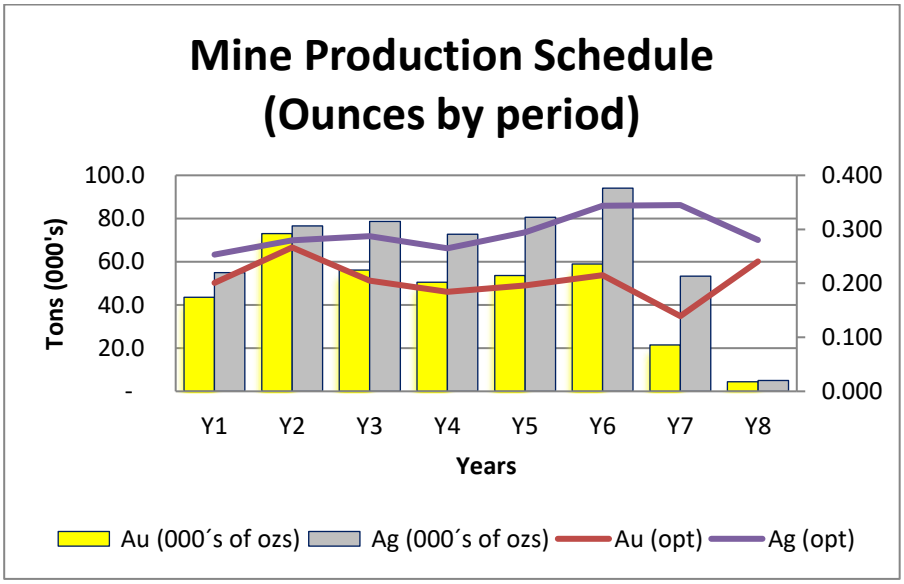


Figure 16.21 Mine Production Schedule (Ounces by Period)



18.0 PROJECT INFRASTRUCTURE

18.1 Project General Arrangement

The project general arrangement, which was developed by MDA with assistance from Ausenco and Golder, is shown in Figure 18.1.

18.2 Site Facilities

This summary of the proposed site facilities was prepared by MDA and Ausenco.

18.2.1 Access Roads

The main access road to Grassy Mountain will utilize an existing BLM road to the site. This road is approximately 17 miles long and will need to be upgraded to include some straightening and widening in portions. An engineering firm in Ontario, Oregon completed preliminary designs for the road alignment and provided general road profiles. Approximately 50 culverts of 18 inches in diameter will be required to allow drainage under the roadway. Once the road is built to subgrade level, approximately 120,000 tons of ¾-inch gravel will be used to surface the road to a depth of six inches.

Costs for the road construction were estimated by a local contractor that would utilize a portable crusher to provide the gravel to be used. An aggregate source located on private property has been identified, although other public sources may also be available. The cost of upgrades to the main access road is estimated to be $3.302 million and is included in the initial capital estimate.

18.2.2 Security and Fencing

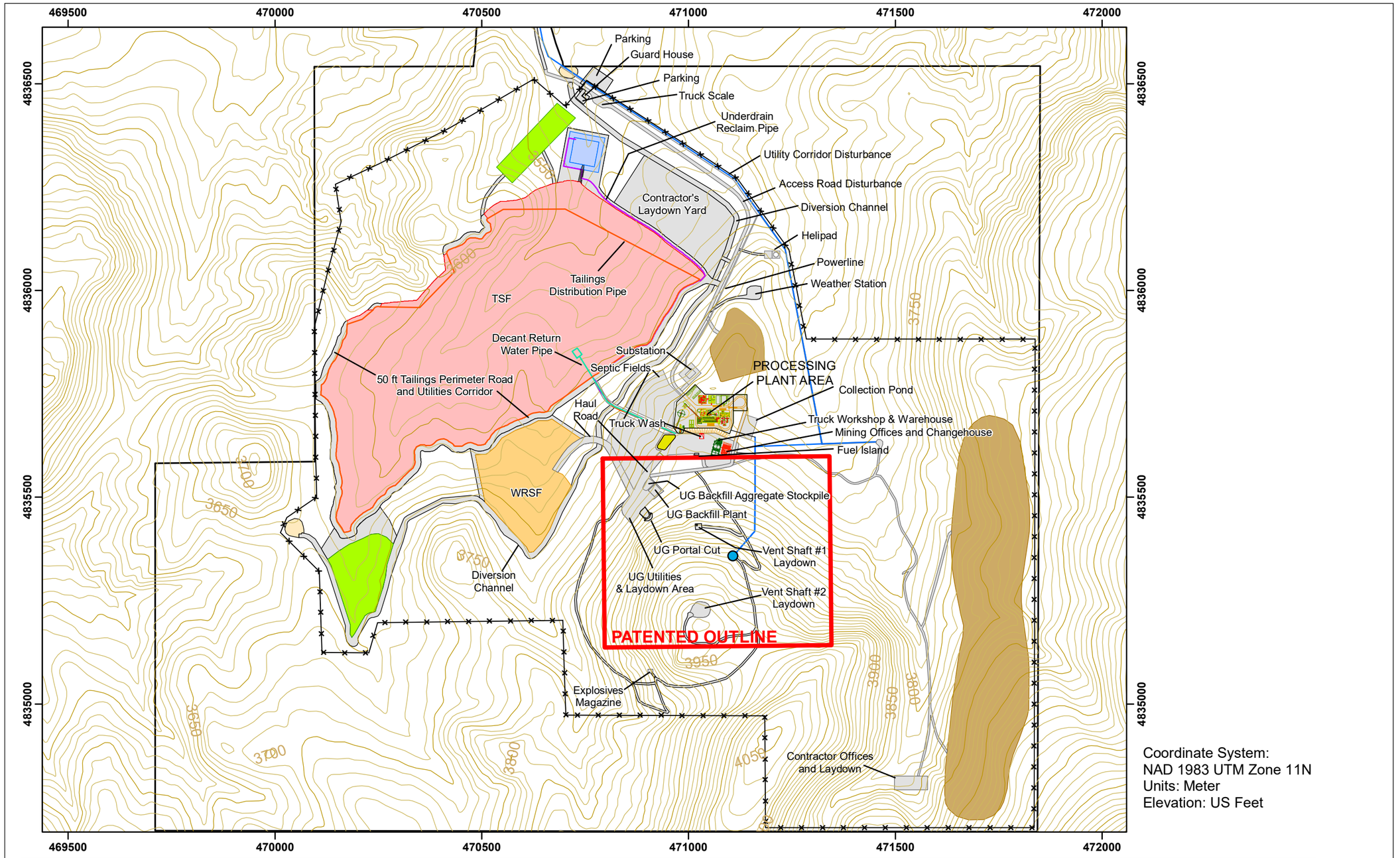
Security fencing will be installed around the entire mine site, including the borrow source area. The total length of the perimeter fence is estimated to be 22,350 feet. There will be a main gate where the main access road enters the site, and a second gate will be placed at the southern end of the property. The main gate will include a parking area and a guard shack. The southern access gate is anticipated to remain locked with access only allowed as needed.

18.2.3 Water Supply and Distribution

Water supply is anticipated to come from two sources: 1) SPR 01 well between the plant and the borrow source; and 2) additional wells drilled near SPR 02 about three miles north of the proposed mine site. SPR 01 is expected to be low producing and will primarily be used as a backup well.

Two wells will be drilled in the area of SPR 02, and water from these wells will be pumped along the main access road through a pipeline to the mine site. The majority of water will come from the SPR 02 area.

Storage tanks will be placed at both the SPR 01 and SPR 02 locations to allow for temporary storage as needed.



Coordinate System:
NAD 1983 UTM Zone 11N
Units: Meter
Elevation: US Feet

Explanation

- Project Area
- Patented Outline
- Tailings Storage Facility
- Waste Rock Storage Facility
- Topsoil Storage
- Reclaim Pond
- Sediment Basin
- Potential Borrow Pit Area
- ROM Stockpile
- Disturbance Area
- Fence Line
- Powerline
- Water Line
- Decant Return Water Pipe
- Tailings Distribution Pipe
- Underdrain Reclaim Pipe
- Water Tank
- Contours (10-ft contour interval)

Meters: 0 — 235 — 470

N

[redacted]

CALICO RESOURCE USA CORP

GRASSY MOUNTAIN PROJECT

Site Plan

01/04/2019

Updated_SiteLayout.mxd

18.2.4 Fire Protection

Water for fire protection will be distributed from the fire water tank located at the base of Grassy Mountain via a network of piping and will be maintained under a constant pressure with a jockey pump. The piping will be looped and sectionalized to minimize loss of fire protection during maintenance. Where located outside buildings, fire water piping will be buried below the ground surface to eliminate the potential of pipes freezing.

Yard hydrants will be limited to the fuel storage tank area. Wall hydrants will be used in lieu of yard hydrants, and these will be located on the outside walls of the buildings in cabinets that will be heated during winter months.

Fire protection within buildings will include standpipe systems, sprinkler systems, and portable fire extinguishers. Standpipe systems will be provided in all structures that exceed 46 feet in height, as well as where required by building code, local authorities, or the insurance underwriter.

Sprinklers will be provided at the following locations or to protect the following items:

- Truck workshop;
- Assay laboratory;
- Over hydraulic or lube packs that contain more than 120 gallons of fluid;
- Lube-storage rooms;
- Any conveyor belts that are within tunnels or other enclosed spaces which would be hazardous to fight fires manually;
- Transformers; and
- Warehouse.

18.2.5 Fuel Supply, Storage, and Distribution

A single double-walled steel tank will be used for diesel storage. There will be one 8,200-gallon tank for mobile mining equipment. The fuel will be used by both underground and surface mobile equipment. The surface equipment will primarily be fuelled at a fuel island near the storage tanks. The underground-mining equipment includes a fuel truck that will be used to fuel underground equipment as required. This fuel truck may be used to fuel surface equipment as needed.

The locations of the fuel tanks and fuel island are shown in Figure 18.1.

A small portable tank will be maintained for unleaded gasoline as required for light vehicles and other small equipment (e.g., portable pumps). This tank will be stored in a location away from fire hazards and will be placed within a lined berm area as required by local regulations. Light vehicles that return off-site overnight will be fuelled in other locations, thereby reducing the storage requirements for gasoline on site.

18.2.6 Compressed Air Supply

High-pressure compressed air will be provided by two duty screw compressors, one standby screw compressor, and a duty-plant air receiver. There will be two high-pressure air uses: instrument air and plant air. The instrument air will be dried and then stored in a dedicated air receiver. The plant air will be fed straight from the plant air receiver without a drying step.

Low-pressure air for pre-aeration tank air requirements will be provided by two duty and one standby centrifugal blowers.

18.2.7 Communications

On-site communications will comprise inter-connected mobile and fixed systems, including a land-line telephone network, portable two-way radios, and internet. Access for internet and corporate network connection will be made via satellite connections.

Underground communication with the surface will be via a leaky-feeder system as described in Section 16.6.5.

18.2.8 Transportation

Main transportation of personnel and supplies will be via the main access road. No provisions have been made at this time for the transport of employees, as they will be required to drive out or car pool at their own expense.

18.2.9 Buildings

A total of nine buildings are planned to be constructed at the site to support mining, processing, and administrative activities. The locations of these buildings are shown in Figure 18.1.

Administration Building

The administration building will be a double-width Atco trailer of approximately 3,600 ft^2. It will contain the mine general manager's office, as well as accounting and human resources offices.

Plant Office and Changehouse

The plant office building and changehouse will constructed as a single-level modular wood-frame building of approximately 2,900 ft^2. It will contain the plant offices and change rooms for the process plant staff and labor force. These facilities will be complete with showers, basins, toilets, lockers, and overhead laundry baskets.

Plant Maintenance and Warehouse

The process-plant maintenance and warehouse building will be a pre-engineered steel-frame and metal-clad building of approximately 1,075 ft^2. This building will be used to perform maintenance for process equipment, as well as for the storage of equipment spare parts.

Mine Office

The mine office and changehouse will be constructed as a single-level modular wood-frame building of approximately 4,300 ft^2. This building will include Engineering and Geology offices as well as mine-operations offices. The building will also have showers, basins, toilets, lockers, and overhead laundry baskets. The building will also include first-aid facilities, along with safety-training areas to be used for site-wide training.

Truck Workshop and Warehouse

The truck workshop and warehouse building will be a pre-engineered steel-frame and metal-clad building with an area of 7,100 ft^2 and will be positioned adjacent to the mine-office building. This area will be divided into two sections, one for warehousing spare parts and tool storage and the other for a maintenance workshop. An overhead crane will be included in this building, above the maintenance workshop.

Vehicle Wash-Bay Facility

The vehicle wash-bay facility will be an open-air, 50- by 50-foot concrete slab with a fluid-collection sump and will be located adjacent to the truck workshop and warehouse. Wash water will be collected in the sump where settling will occur prior to the water being recirculated back to the wash system. An oil-water separation system will be included in the facility to recover hydrocarbons prior to re-use of the wash water. The recovered hydrocarbons will be collected and shipped offsite for disposal in accordance with applicable environmental regulations.

Laboratory

The laboratory will be constructed as a single-level modular wood-frame building of approximately 1,850 ft^2 situated adjacent to the process building. The laboratory building will house all laboratory equipment for assaying, metallurgical, and environmental requirements. Dust-collection equipment will be located external to the laboratory building.

Gold Room

The gold room will be a pre-engineered steel-frame and metal-clad building of approximately 1,850 ft^2. This building will be used to pour doré gold, which will be shipped off site for refining.

Reagent Storage and Handling

Reagents will be stored and handled in a pre-engineered, open-air building consisting of a roof and top-panel walls. This building will have an area of approximately 3,500 ft^2 and will be located near the process-plant building.

18.2.10 Explosives Storage and Handling

Explosives-storage facilities will be constructed at the southwest side of the Grassy Mountain project (Figure 18.1). This location uses the hill as a natural barrier between the explosives-storage facility and other infrastructure. The storage facilities will consist of leased powder magazines as per vendor quotation. Dirt berms will be places around the magazines for additional security.

Explosives will be delivered to site by vendors using the main access. Explosives will be delivered to the working face using stainless-steel totes on flatbed trucks.

18.2.11 Borrow Source

A borrow pit will be located on the east side of the property where there are basalts that are believed to be suitable for both construction and mine-backfill material, and a small borrow pit north of the processing area is planned for additional construction material. The borrow mining would be done by a contractor, and some of the material may be crushed for use as RF and CRF as needed. A small contractor laydown-yard is also planned near the main borrow source area.

18.3 Electrical Power Supply and Distribution

MDA estimated the costs for electrical-power distribution to site based on vendor quotations. MDA also estimated the costs for electrical distribution for the underground-mining operations, while Ausenco estimated the cost of power distribution for the remainder of the site, including the mill.

MDA performed a trade-off study to determine the most economical option to supply power to the site: line power brought in to supply electricity from the grid, or power generation using natural-gas-fired generators. The analysis determined that the long-term cost of power generation on site would be approximately $0.221 per kWh compared to a cost of about $0.065 per kWh for line power. The total capital cost of installing line power is slightly over $7 million. Power-generation equipment was assumed to be leased and was included in the unit cost for power. Based on MDA's evaluation, the installation of line power is the preferred option and will have a payback period of approximately 2.2 years.

For the PFS, it was assumed that power supply would initially be from diesel power generators located on site. This would be used for slightly over a year during construction and initial mining of the decline. During the construction period a new power line would be constructed along the main access road to site.

18.3.1 On-Site Power Generation

Quotations for portable power generation, including the leasing of generation equipment, were obtained from vendors. Once construction of the primary power lines has been completed, the generators would remain on site for backup in case of power outages. Power generation is estimated based on monthly rates and fuel, as the rate per kWh will vary depending on power consumption. The cost of on-site generation is estimated to be around $0.53 per kWh when mining starts, and it reduces to about $0.48 per kWh during the main development of the mine.

18.3.2 Line Power

A quotation was obtained for the construction of line power to deliver approximately 5.3 MW of power to site, including a 23-mile distribution circuit, a new 69/34.5 kV to 14 MV transformer, and a new 34.5-kV 167-amp regulator. The power line would be constructed from the Hope Substation near Vale, Oregon to the mine site along the main access road. The line-power operating cost is estimated at $0.0632 per kWh.

18.3.3 Site Power Distribution

The plant power distribution from the powerhouse will be via overhead powerlines. The distribution voltage to the local electrical rooms will be 4.16 kV. There will be a combination control-room and motor-control-center room. This room will be pre-fabricated and loaded with electrical equipment prior to delivery to site. The power distribution from the electrical rooms will be 480 V.

The total connected load for the process plant is expected to be 4.9MW, with an average power draw of 3.3 MW.

18.3.4 Underground Mine Power Distribution

At the start of mining an underground 480 V transformer will be placed near the entrance to the portal. This will supply power to electrical equipment used to develop the main decline and portable fans. Once development has advanced far enough that carrying power at 480 V becomes too inefficient, a main power line will be installed along the rib of the decline to carry 4.16 kV and connected to the transformer which will be moved underground.

Upon completion of the decline to the 3224 level, and the initiation of production-mining activities, a second underground transformer will be purchased for use in the lower areas of the mine.

Line power will also be carried up the hill to the location of the two ventilation shafts to supply power to the ventilation fans.

18.4 Tailings Storage Facility

Golder caution to readers: In this Item, all descriptions and estimates related to the locations and designs of the tailings storage facility are forward-looking information. There are many material factors that could cause actual results to differ materially from the designs, forecasts, or projections set out in

this Item. Some of the material factors include differences from the assumptions regarding the following: facility locations, permitting, production rate, processing methods, water recovery and usage, and construction methods. The material factors or assumptions that were applied in drawing the conclusions, forecasts and projections set forth in this Item are summarized in this report. Any significant differences from these factors or assumptions will have material impacts on the locations and designs of facilities as set forth in this report.

Golder completed a trade-off study for two TSF locations to provide Paramount with sufficient information to select a preferred location (Conway et al. 2016). Option 1 is located in the valley east of the mine portal, and it was the preferred TSF location presented in the Amended Preliminary Economic Assessment (PEA) for the project, prepared by Metal Mining Consultants Inc. on July 9, 2015. Option 2 is located in the broad valley west of the mine portal. Conceptual designs were completed for each option using the same design criteria and key design components. The advantages and disadvantages for each option were presented and discussed in the detail in the trade-off study. Based on a review of the existing topography beneath the facility, the elevation of the facility, the construction material requirements, and the assumed risks associated with each option, Option 2 was selected as the preferred alternative. All discussions of the TSF within this PFS report are in reference to Option 2.

The proposed TSF will cover approximately 110 acres and will be located in the broad valley immediately west of the Grassy Mountain mine portal and process facilities (Figure 18.1, prepared by MDA). The TSF will fill the valley and require embankments on the north and west sides to impound the tailings. The main embankments will cross the natural drainage on the north side of the TSF, and small secondary embankments will be constructed across saddles along the western ridge.

The embankments will be constructed in stages with soil and/or rock materials generated from on-site borrow sources using downstream construction methods. The embankments will have a maximum overall upstream slope of 3H:1V, with a downstream slope of 2.5H:1V. The TSF will be a 100% geomembrane-lined facility with a continuous, composite engineered lining system extending across the impoundment basin and the upstream slope of each stage.

The embankments are designed to be geotechnically stable during the design seismic event. For this preliminary design, Golder performed a site-specific seismic and faulting hazard assessment to estimate peak ground motions resulting from various seismic events. The design seismic event will vary based on the dam hazard classification required by the regulatory agencies during the consolidated permitting process. For this preliminary design, Golder utilized a design earthquake with a return period of 2,475 years for closure conditions. This exceeds the requirements for a Low Hazard Dam Classification.

The composite lining system within the impoundment basin will consist of (from bottom to top) a six-inch to 12-inch thick, prepared subgrade, a 300-mil thick, enhanced geosynthetic clay liner (“GCL”), 80-mil HDPE geomembrane liner, an 18-inch thick drainage layer, and a six-inch thick filter layer. An underdrain collection system consisting of perforated piping will be located within the drainage layer to promote drainage of the tailings. The upstream slope of the embankments will utilize the same composite lining system, but without the overlying piping, drainage and filter layers.

A reclaim pond, located north of the TSF, will capture all process solution collected in the underdrain collection system. The lining system for the reclaim pond will consist of (from bottom to top): a

prepared-in-place subgrade, 60-mil HDPE secondary geomembrane liner, HDPE geonet, and 80-mil HDPE geomembrane primary liner. The geonet located between the two geomembranes will serve as the leakage collection and recovery system ("LCRS").

The supernatant pool will be maintained away from the embankments on the eastern side of the facility by controlled deposition of tailings from spigots installed around the perimeter of the facility. Water separating from the tailings solids after deposition will be managed with two independent return-water systems. One will manage flows collected in the Reclaim Pond from the underdrain collection systems and the other will manage water collected in the supernatant pool. The supernatant pool will be managed with a pump installed either on the eastern edge of the facility or on a floating barge within the pool. Water from both systems will be returned to the mill for use in the process circuit. At all times, process fluid pipelines will be located above secondary containment that consists of either geomembrane liners or concrete containment structures.

The TSF has been designed as a zero-discharge facility capable of storing the 500-year, 24-hour storm event and an allowance for wave run-up due to wind action. Permanent and temporary stormwater diversions will collect and divert a majority of the stormwater runoff around the facility to a natural drainage on the north side of the TSF.

At an average deposition rate of 680 dry short tons per day, an assumed settled density of 70 pounds per cubic foot ("pcf") and a total capacity of 3.2 million tons, the facility will have an approximate design life of 12.9 years. However, for the PFS mine production, only 1.76 million tons are planned to be delivered to the TSF. Therefore, only Stages 1, 2, and a portion of 3 will be required for the 7.25-year PFS mine life. Details of the PFS-level TSF design are presented in MacMahon et al. (2018).

18.5 Mining-Related Facilities

18.5.1 Cemented Rock Fill Plant

As discussed in Section 16.7.6.1, about 46% of the stopes mined will be backfilled with CRF. A CRF-MS07-1BN4 Eagle 7000 Rockfill plant was quoted by Simem Underground Solutions. The capital costs include:

- $836,807 for the basic CRF plant; and
- $119,500 for optional upgrades, including a winterization package and aggregate bins.

18.5.2 Waste-Rock Management Facility

The mined waste rock will ultimately be used as CRF material. This PFS assumes that the cement will lock in and neutralize potential acid generation when backfilled into the stopes; further work will be necessary to confirm this assumption.

During operation, a stockpile of waste rock will be managed on the surface to be used as CRF as needed. Due to the potential sulfides in the waste rock material, the temporary waste rock management facility ("WRMF") is assumed to be a lined facility. The composite lining system will consist of (from bottom to top) a six-inch to 12-inch thick, prepared subgrade, a 300-mil thick enhanced GCL, 80-mil HDPE

geomembrane liner, and an 18-inch thick drainage layer. A collection system consisting of perforated piping will be installed within the drainage layer to collect any water coming in contact with the waste rock. The location of the WRMF, adjacent to the TSF, will allow the lining system to tie into the TSF lining system to provide continuous containment (see Figure 18.1). The WRMF collection pipe will gravity drain towards the TSF where it will be installed within the TSF drainage layer and ultimately outlet at the Reclaim Pond. The WRMF collection pipe will remain isolated from the TSF underdrain collection system so the water can be handled separately, if necessary.

All of the material from the WRMF will be used through the life of the mine. So, in final reclamation, the WRMF will have been removed.

18.5.3 Borrow Pit

The borrow pit will be on the east side of the project (Figure 18.1). Basalt material will be mined from the borrow pit for use in construction, backfill, and reclamation. The construction use will include ROM material for fill and TSF-embankment construction, as required. Backfill uses include both BF and CRF material for backfilling of underground stopes. The reclamation use will include capping material where required.

Borrow material will be generated using contract mining. Material for CRF will be crushed to minus 6-inches. During initial construction where more material is needed, the borrow mining will utilize larger equipment, while smaller equipment will be used during production when the amount of material required is reduced.

MDA estimated the initial ROM material cost to be $1.89 per ton. With the smaller equipment the cost will increase to $3.90/ton, with an estimated cost of $6.69/ton for crushed material sent to the CRF plant. This estimate was done using first principle costs and a 30% increase to assume the contractor. The contractor is expected to be on site about 6 to 9 months out of the year. Mobilization costs of $50,000 per year were included in the unit cost estimate.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

EM Strategies, Inc., a permit-acquisition strategy and government-relations consulting firm, provided the following information on environmental considerations, permitting, and social or community impacts.

As of the Effective Date of this report, Paramount's wholly-owned subsidiary, Calico Resources USA Corp. ("Calico"), is in the process of acquiring the necessary local, state, and federal permits for the development of an underground-mining and mill-processing operation in southeastern Oregon.

20.1 Introduction

The permitting activities by Calico for the Grassy Mountain mine began in 2012 with engagement with the State of Oregon and the collection of baseline data. The baseline-data collection is ongoing. In addition, Calico submitted an updated Plan of Operations ("Plan") to the BLM in September 2017. The BLM has determined that additional information is necessary in order to find that the Plan is complete (see Section 20.3.2). The Plan outlines approximately 265 acres of proposed surface disturbance as summarized in Table 20.1.

Table 20.1 Proposed Surface Disturbance for the Grassy Mountain Mine

Component	Public Acres	Private Acres	Total Acres
Portal Area	0.0	3.3	3.3
Waste Rock Storage Area	7.5	0.0	7.5
Tailings Storage Facility (TSF)	101.2	0.0	101.2
Process/Administration Area[1]	15.0	2.5	17.5
Laydown/Yard Areas	17.2	0.0	17.2
Roads	13.5	1.8	15.3
Water Tank and Road	0.0	0.5	0.5
Water Wells and Water Pipeline[2]	11.8	0.8	12.6
Fence[3]	15.4	0.0	15.4
Borrow Areas	44.7	3.0	47.7
Diversion Ditches and Sediment Basins	8.6	0.0	8.6
Growth Media Stockpiles	8.3	0.0	8.3
Landfill	0.7	0.0	0.7
Exploration[4]	5	5	10
Total	**248.9**	**16.9**	**265.8**

[1]This includes the mill, refining plant, administrative building, parking lot, security building, mining contractor yard, reagent storage, assay laboratory, and substation.
[2]Includes the water supply pipeline at 16,164 feet with a 30-foot construction disturbance width and well locations each at 0.25 acres.
[3]Includes the perimeter fence at 22,358 feet with a 30-foot construction disturbance width.
[4]The actual location of the exploration activities within the Project Area is currently unknown and is assumed to be on all public lands.

The project includes the following activities and facilities:

- One underground mine;
- One waste-rock storage area;
- One carbon-in-leach processing plant;
- Three borrow-pit areas;
- One TSF;
- Ore stockpile;
- One reclaim pond;
- A water-supply well field and pipeline, associated water-delivery pipelines, and power;
- A power substation and distribution system;
- Access and haul roads;
- Ancillary facilities that include haul, secondary, and exploration roads; truck workshop, warehouse, storm-water diversions, sediment-control basins, reagent and fuel storage, storage and laydown yards, explosives magazines, freshwater storage, monitoring wells, meteorological station, administration/security building, borrow areas, growth-media stockpiles, landfill, and solid and hazardous-waste management facilities; and
- Reclamation and closure, including the potential development of an E Cell for the TSF.

20.2 Permitting History

Permitting activities for the Grassy Mountain project have spanned 30 years. During the late 1980s, Atlas collected a wealth of geologic, mine engineering, civil engineering, and environmental baseline data to support an historical feasibility study that was completed in 1990. During 2012 to 2016, Calico began the permitting process for an underground-mining operation at Grassy Mountain. Since the acquisition of Calico by Paramount in 2016, the permitting process has continued with the Oregon Department of Geology and Mineral Industries ("DOGAMI"), Malheur County, and the BLM.

20.3 Project Permits

The project will require the following major environmental permits to construct, operate, and close: 1) a Plan from the BLM; 2) a DOGAMI Consolidated Permit for Mining Operations; 3) an Oregon Department of Environmental Quality ("ODEQ") Chemical Mining Permit; 4) water rights from the Oregon Department of Water Resources ("ODWR"); 5) an Air Quality Operating Permit ("AQOP") with the ODEQ; and 6) a Special Use Permit from Malheur County.

20.3.1 State of Oregon Permit Processing

Calico entered into a Memorandum of Understanding for Cost Recovery ("MOU") with the DOGAMI on November 3, 2014. The MOU provides a mechanism whereby Calico, as the project proponent, agrees to reimburse DOGAMI and other primary state agencies for their involvement in processing

permit applications for the Grassy Mountain project. In addition, DOGAMI has hired a consulting firm to provide expertise that is not available from the staff of the various agencies that are involved with the permitting process. The key components of the Calico permitting program with the State of Oregon are as follows:

- Environmental baseline studies for all resource categories described in Oregon's Chapter 632, Division 37 Chemical Process Mining Rules;
- Meeting all requirements of Division 37 Rules that include, but are not limited to: 1) preparation of a Consolidated Permit Application; 2) obtaining all necessary federal, state, and local permits and authorizations; and 3) satisfying any potentially applicable NEPA requirements; and
- Implementing a proactive community involvement and consultation process including: 1) local-hire preference; 2) local contracting and purchasing where practicable; and 3) mine-worker job training to provide an experienced workforce.

A key authorization permit that will be needed is the permit for Chemical Processing Mining, as required under Chapter 632, Division 37, 1991 Oregon Laws (§632-037-0005). The Consolidated Permit also requires approval by ODEQ under Division 43, Chemical Mining Rules (OAR 430-043-000), which address other environmental stipulations. "Chemical Process Mining" means a mining and processing operation for metal-bearing ores that uses chemicals to dissolve metals from ore. The Calico processing facility will employ cyanide in the metallurgical process. The Division 37 Rules provide a well-defined regulatory pathway with definitive permitting requirements and timelines.

Calico has filed multiple Notices of Intent ("NOI"s) under Division 37, which initiate the state permitting process and baseline-data collection. The reason for the multiple NOIs is that the scope of the operation, as well as the configuration of the Project Area, have changed through the project history. Each change requires the submittal of a new NOI and a re-initiation of the permitting process. In addition, the initial NOI filing was done to initiate the agency Division 37 permit process and provide for public notice that the project is proceeding into the permitting phase. As part of initiating the public notification, an interagency Technical Review Team ("TRT") has been organized to provide interdisciplinary review of technical permitting issues for Oregon's Consolidated Permitting Process. This TRT has convened numerous times and accepted the NOIs.

In addition, DOGAMI administrators and the TRT have reviewed and approved the *Calico Resources Environmental Baseline Work Plans Grassy Mountain Mine Project,* which was filed on May 17, 2017. In July 2017, a "Notice of Prospective Applicant's Readiness to Collect Baseline Data" was issued to Calico by DOGAMI. The environmental baseline program is currently being implemented by Calico, and this program is expected to be completed by the fourth quarter of 2018. Baseline studies of air quality, grazing, recreation, and visual resources have already been completed and accepted by the TRT. This information is supplemental to an earlier database developed by Atlas and Newmont.

With the TRT approval of the work plans, Calico is now authorized to prepare the Division 37 Consolidated Permit Application for the Grassy Mountain Gold mine. However, the application cannot be submitted until all the baseline study reports have been accepted by the TRT. The application

preparation is being initiated concurrent with completion of the baseline studies. This single application, as required under Oregon Laws, will include the following elements:

- General information;
- Existing environmental baseline data;
- Operating plan;
- Reclamation and closure plan; and
- Alternatives analysis.

Upon completion of the Consolidated Permit Application, a completeness review will be conducted by the TRT, and a Notice to Proceed with the preparation of draft permits will be issued by DOGAMI. This notice will also involve a directive by DOGAMI to use the third-party contractor to prepare an Environmental Evaluation ("EE"), which is to be issued at least 60 days prior to the issuance of any draft permits. This EE is not a federal NEPA requirement, it is a State of Oregon requirement that includes: 1) impact analysis; 2) cumulative-impact analysis, and 3) alternatives analysis (OAR 632-037-0085).

Concurrent with this assessment, DOGAMI will also use the contractor to prepare a Socioeconomic Analysis. This analysis will identify major and reasonably foreseeable socioeconomic impacts on individuals and communities located in the vicinity of the proposed mine. In particular, the analysis will describe impacts on population, economics, infrastructure, and fiscal structure (OAR 632-037-0090).

This process for permit review and approval will also involve a consolidated public hearing on all draft permits, as well as the draft operating permit. Other applicable state and federal permits may include, but are not limited to the following:

- Permits to appropriate groundwater or surface water, or to store water in an impoundment (ORS 537.130, ORS 537.400, and ORS 540.350);
- Water Pollution Control Facility (ORS 468B.050);
- Storm Water Pollution Prevention Plan (EPA);
- Air Quality Permits (ORS 468A.040);
- Solid Waste Disposal Permit (ORS 459.205);
- Permit for Placing Explosives (ORS 509.140);
- Hazardous Waste Storage Permit (OAR 340-102-0010);
- Land Use Permit (OAR Chapter 632, Division 001); and
- Any other State of Oregon permits, if applicable and required under Division 37

The State of Oregon has retained a project manager to oversee the permitting program and lead the review team. A Project Coordinating Committee ("PCC") was also formed for the purpose of sharing information, further coordinating the federal, state, and local permitting requirements, optimizing communication, facilitating the regulatory process, and avoiding duplicative effort. The PCC has

convened formally and conducted a series of public meetings in the cities of Ontario and Bend, Oregon. These meetings were attended by agencies, public officials, project supporters, and non-governmental organizations ("NGO"s).

Division 37 mandates DOGAMI to manage and facilitate the regulatory permitting process. It requires that a series of public meetings are held, to be coordinated by DOGAMI or its contractor. The PCC is charged with gathering comments from the public regarding the specifics of the project. DOGAMI acts as the facilitating state agency and state clearinghouse for the mine-permitting process. It is the applicant's responsibility to secure other needed state permits, such as air-pollution control, storm-water pollution prevention plan, and land-use permits as may be required. However, the Division 37 process is designed to promote a consolidated permitting pathway.

DOGAMI coordinates with the other agencies to avoid duplication on the part of the applicants and related agency requests. DOGAMI is also responsible for reviewing mine-operating plans and issuing reclamation permits. It establishes reclamation-bond amounts for the project, working closely with Calico. As part of DOGAMI's permitting process, it also requires the preparation of detailed environmental baseline-data collection work plans that direct the inventorying of the various existing natural and human resources that may be impacted by the project. These include air quality, surface and groundwater quality and hydrology, vegetation, fisheries, wildlife, socioeconomic, historical/cultural, and other resource categories.

The basic information for a Division 37 Consolidated Permit Application involves:

- Determining existing environmental baseline conditions;
- Providing an operating plan (mine plan and reclamation/closure plan);
- Providing an alternatives analysis;
- Providing an environmental evaluation;
- Providing a socio-economic impact analysis;
- Developing a plan to minimize pollution and erosion;
- Protecting fish and wildlife during operations and closure (fish and wildlife standards);
- Providing a water balance;
- Establishing financial-assurance requirements; and
- Inclusion of all other state, federal, and local permit applications required under Division 37.

DOGAMI officials have indicated that the Division 37 timeline for this requirement can be expected to be about one year from the date that a "complete application" (as deemed complete by DOGAMI) is submitted for the regulatory process to be concluded, and a permit issued.

20.3.2 BLM Plan of Operations and Federal Processing

At this time, it is not contemplated that the Grassy Mountain project will require either a federal National Pollutant Discharge Elimination System Permit ("NPDES") from the U.S. Environmental

Protection Agency ("EPA") or U.S. Army Corps of Engineers 404 Dredge and Fill Permit. The Grassy Mountain project does not involve a discharge to Waters of the U.S., nor does it involve construction in wetlands or placement of dredge tailings or fill material into waters of the U.S. However, the project will require a Plan of Operation approval from the BLM.

The Plan Application is submitted to the BLM for any surface disturbance in excess of five acres. The Plan Application describes the operational procedures for the construction, operation, and closure of the project. As required by the BLM, the Plan Application includes a waste-rock management plan, quality-assurance plan, a storm-water plan, a spill-prevention plan, reclamation plan, a monitoring plan, and an interim-management plan. In addition, a reclamation report with a Reclamation Cost Estimate ("RCE") for the closure of the project is required. The content of the Plan Application is based on the mine-plan design and the data gathered as part of the environmental baseline studies. The Plan Application includes all mine and processing design information and mining methods. The BLM determines the completeness of the Plan Application, and a completeness letter is submitted to the proponent. The RCE is reviewed and the bond is determined prior to the BLM issuing a decision record on the Plan Application.

Submittal of the Plan Application took place in September 2017. The BLM has requested additional details, which are expected to be provided to the BLM by the fourth quarter of 2018. However, several key baseline reports still need to be completed for inclusion in the Plan Application. These reports have yet to be, or are just being, reviewed by the relevant agencies. The BLM will likely need to complete their review of the baseline reports in the Plan Application and approve the final version of these reports.

20.3.3 National Environmental Policy Act ("NEPA")

The NEPA process is triggered by a federal action, and, as is the case with the Grassy Mountain project, the BLM issuance of a completeness letter for the Plan will be the trigger for the federal action. The NEPA review process is completed by either an Environmental Assessment ("EA") or an Environmental Impact Statement ("EIS"). The BLM has stated that the NEPA review process for this project will be an EIS.

The EIS process is conducted in accordance with NEPA regulations (40 CFR 1500 et. seq.), BLM guidelines for implementing the NEPA in BLM Handbook H-1790-1 (updated January 2008), and BLM Washington Office Bulletin 94-310. The intent of the EIS is to assess the direct, indirect, residual, and cumulative effects of the project and to determine the significance of those effects. Scoping is conducted by the BLM and includes a determination of the environmental resources to be analyzed in the EIS, as well as the degree of analysis for each environmental resource. The scope of the cumulative analysis is also addressed during the scoping process. Following scoping and baseline information collection, the Draft EIS is prepared for the BLM by a third-party contractor. When the BLM determines the Draft EIS is complete, it would then be submitted to the public for review. Comments received from the public would be incorporated into a Final EIS, which would in turn be reviewed by the BLM and the public prior to the BLM issuing a record of decision ("ROD"). Under an EIS there can be significant impacts. The project proponent pays for the third-party contractor to prepare the EIS, and also pays recovery costs to the BLM for any work on the project by BLM specialists.

The BLM is requiring the preparation of an EIS to comply with the NEPA for the Grassy Mountain project. Under the 2018 Secretarial Order 3355, the EIS must be completed in 365 days (from the NOI publication in the Federal Register to the signing of the ROD) and must be less than 150 pages in length, unless a Department of Interior wavier is obtained, which then allows for 300 pages.

20.4 Environmental Study Results and Known Issues

As previously discussed, the deposit and property have been known for over 30 years. However, there have been long periods of non-operation. There are no known, ongoing environmental issues with any of the regulatory agencies. Calico has been conducting baseline-data collection for six years for environmental studies required to support the Plan Application and the state and federal permitting process. Results indicate limited biological and cultural issues, air-quality impacts appear to be within State of Oregon standards, traffic and noise issues are present but at low levels, and socioeconomic impacts are positive.

20.5 Waste Disposal, Monitoring, Water Management

Waste-rock characterization tests have been conducted. Results indicate that the waste rock and mineralized rock are generally reactive, acid generating, and have the potential to leach metals. As a result, waste-rock and tailings management are expected to be key issues in the permitting of the mining operation.

20.6 Social and Community Issues

Social and community impacts have been, and are being, considered and evaluated for the various Plan amendments performed for the project in accordance with the NEPA and other federal laws, as well as the State of Oregon Socioeconomic Analysis. Potentially affected Native American tribes, tribal organizations, and/or individuals are consulted during the preparation of all Plan amendments to advise on the proposed projects that may have an effect on cultural sites, resources, and traditional activities.

The most recent planning by Malheur County, Oregon, is consulted during the preparation of Plan amendments. Potential community impacts to existing population and demographics, income, employment, economy, public finance, housing, community facilities, and community services are evaluated for potential impacts as part of the State of Oregon and the NEPA process.

There are no known social or community issues that would have a material impact on the project's ability to extract mineral resources. Identified socioeconomic issues (employment, payroll, services and supply purchases, and state and local tax payments) are anticipated to be positive.

20.7 Mine Closure

A closure plan has not yet been completed and there are no current estimates for the reclamation bond. Closure costs are estimated in Section 21.3.1. The anticipated closure scenario would include plugging the mine portal, while for the tailings closure the approach would consist of fluid management through evaporation, covering the tailings with an operational layer of waste rock or approved closure material, a synthetic liner and growth media, and then revegetation. The process of managing the solutions from

the tailings drain-down would require multiple years. Residual tailings drainage would likely be managed with evaporation ponds/cells. The waste-rock dump would be moved to the tailings facility, although no waste rock is envisioned to exist at the end of mining operations in this PFS. Other facilities would be regraded, covered with growth media, and revegetated. The closure scenario for the tailings would likely result in conditions that require long-term management of the evaporation ponds/cells and associated ancillary facilities at the site, which will require a financial instrument to cover those cost into the future.

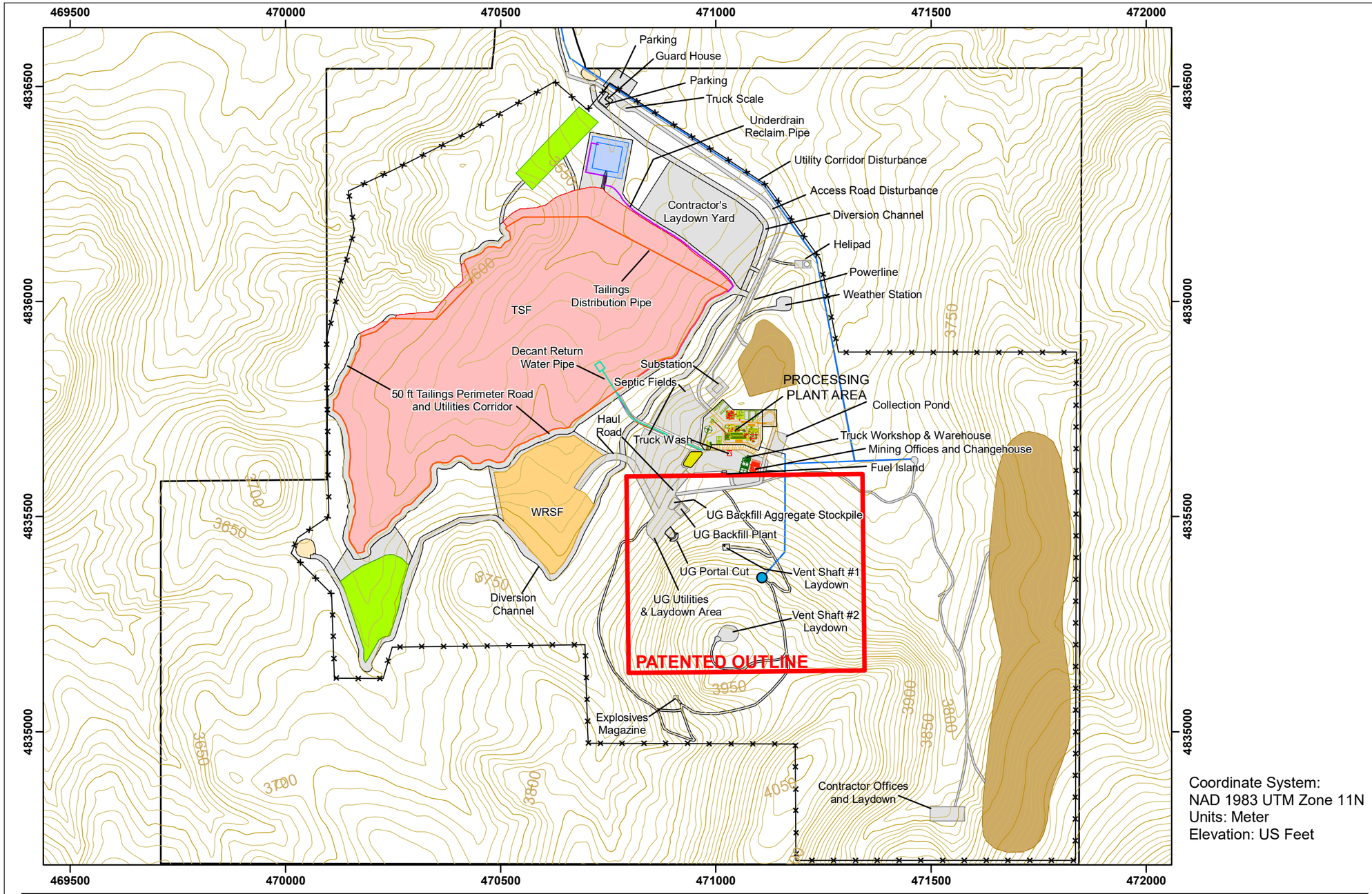
20.8 Environmental and Permitting Risks and Opportunities

As with almost all mining projects, there are inherent risks and opportunities related to the final outcome of the project. Most of the risks related to environmental and permitting are based on the uncertainty of the permitting program and the timing to obtain all necessary permits and authorizations. Other environmental and permitting risks can involve new regulations, tightening of standards for air or water quality, and legal challenges.

Subsequent high-level engineering studies and environmental baseline studies are required to further define these risks and identify opportunities, as will be conducted at the feasibility level. To facilitate project permitting and development for the PFS and permitting programs, and to design a sustainable project and reduce environmental risks, Calico has adopted the following environmental principles for the project:

- Protect local surface and groundwater quality and quantity by applying best mining practices ("BMP"s) and water treatment, as necessary;
- Confirm the presence of potential threatened and endangered or sensitive amphibians, wildlife, or plant species at the site;
- Effectively manage all related mine waste, including lining the tailings storage facility, waste-rock underground as backfill, and segregation and selective handling of waste rock as necessary;
- Reduce the carbon footprint for the project by processing the gold concentrate on site;
- Conduct environmental monitoring to ensure compliance with all applicable state, federal, and local laws, regulations, and ordinances;
- Transport all fuel to the mining operation according to accepted transport and spill prevention and response procedures developed specifically for the project;
- Integrate pro-active wildlife habitat mitigation and enhancement proposals with an environmentally responsible reclamation and closure plan;
- Provide adequate financial assurance for implementing an effective reclamation and closure plan to ensure long-term protection and rehabilitation of the mine site; and
- Implement a responsible community and statewide public affairs program to further open communications, maximize local job opportunities and involvement, and meet environmental justice requirements for the project.

Collectively, these objectives or environmental principles will guide project development. They will also serve to reduce risk and enhance related project opportunities.



Explanation

- Project Area
- Patented Outline
- Tailings Storage Facility
- Waste Rock Storage Facility
- Topsoil Storage
- Reclaim Pond
- Sediment Basin
- Potential Borrow Pit Area
- ROM Stockpile
- Disturbance Area
- Fence Line
- Powerline
- Water Line
- Decant Return Water Pipe
- Tailings Distribution Pipe
- Underdrain Reclaim Pipe
- Water Tank
- Contours (10-ft contour interval)

Meters

0 235 470

N

MINE DEVELOPMENT ASSOCIATES

CALICO RESOURCE USA CORP

GRASSY MOUNTAIN PROJECT

Site Plan

01/04/2019

Updated_SiteLayout.mxd

MEMORANDUM

DATE: October 23, 2018

TO: Calico Resources USA Corp.

FROM: Richard F. DeLong

SUBJECT: Summary of Operational Environmental Protection Measures and Closure and Reclamation Plans, Grassy Mountain Project, Malheur County, Oregon

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The following summary is based on the current status of the project. Additional studies are in progress and any new data will be incorporated into the final mine design, environmental measures, closure and reclamation. Also included below in a summary of the overall project.

1 INTRODUCTION

The Project is located in Malheur County, Oregon, approximately 22 miles south-southwest of Vale (see Location Map figure below) and consists of two areas: the Mine and Process Area and the Access Road Area (Permit Area) (See Permit Area Map figure below). The Access Road extends north from the Mine and Process Area to the Malheur County Road named Twin Springs Road.

The Mine and Process Area is located on three patented lode mining claims and unpatented lode mining claims that cover an estimated 886 acres. These patented and unpatented lode mining claims are part of a larger land position that includes 419 unpatented lode mining claims and nine mill site claims on lands administered by the Bureau of Land Management (BLM). All proposed mining would occur on the patented claim area, which consists of approximately 62 acres in the center of the Mine and Process area, with some mine facilities on unpatented claims. The Mine and Process Area is in all or portions of Sections 5 through 8, Township 22 South, Range 44 East (T22S, R44E) (Willamette Meridian).

The Access Road Area is located on public land administered by the BLM, and private land controlled by others. A portion of the Access Road Area is a Malheur County Road named Twin Springs Road. The Access Road Area extends north from the Mine and Process Area to Russell Road, a paved Malheur County Road. The Access Road Area is in portions of Section 5, T22S, R44E, Sections 3, 10, 11, 14, 15, 21 through 23, 28, 29, and 32, T21S, R44E, Sections 1, 12 through 14, 23, 26, 27, and 34, T20S, R44E, Sections 6 and 7, T20S, R45E, and Sections 22, 23, 26, 35, and 36, T19S, R44E (Willamette Meridian). The final engineering of the road will be consistent throughout, and within the Permit Area. The Access Road Area also includes a buffer on either side of the proposed road width for the collection of environmental baseline data. The road corridor will be up to 40 feet wide. The Access Road Area totals approximately 876 acres.

Calico, a wholly owned subsidiary of Paramount, owns and controls 100 percent of the mineral tenure of the unpatented mining claims, patented mining claims, Fee lands, and mining leases that comprise the Grassy Mountain property. Calico acquired all right, title and interest in the property,

including all existing exploration and water rights pertaining to the Grassy Mountain project, pursuant to the "Deed and Assignment of Mining Properties" between Seabridge Gold Inc., Seabridge Gold Corporation and Calico dated February 05, 2013.

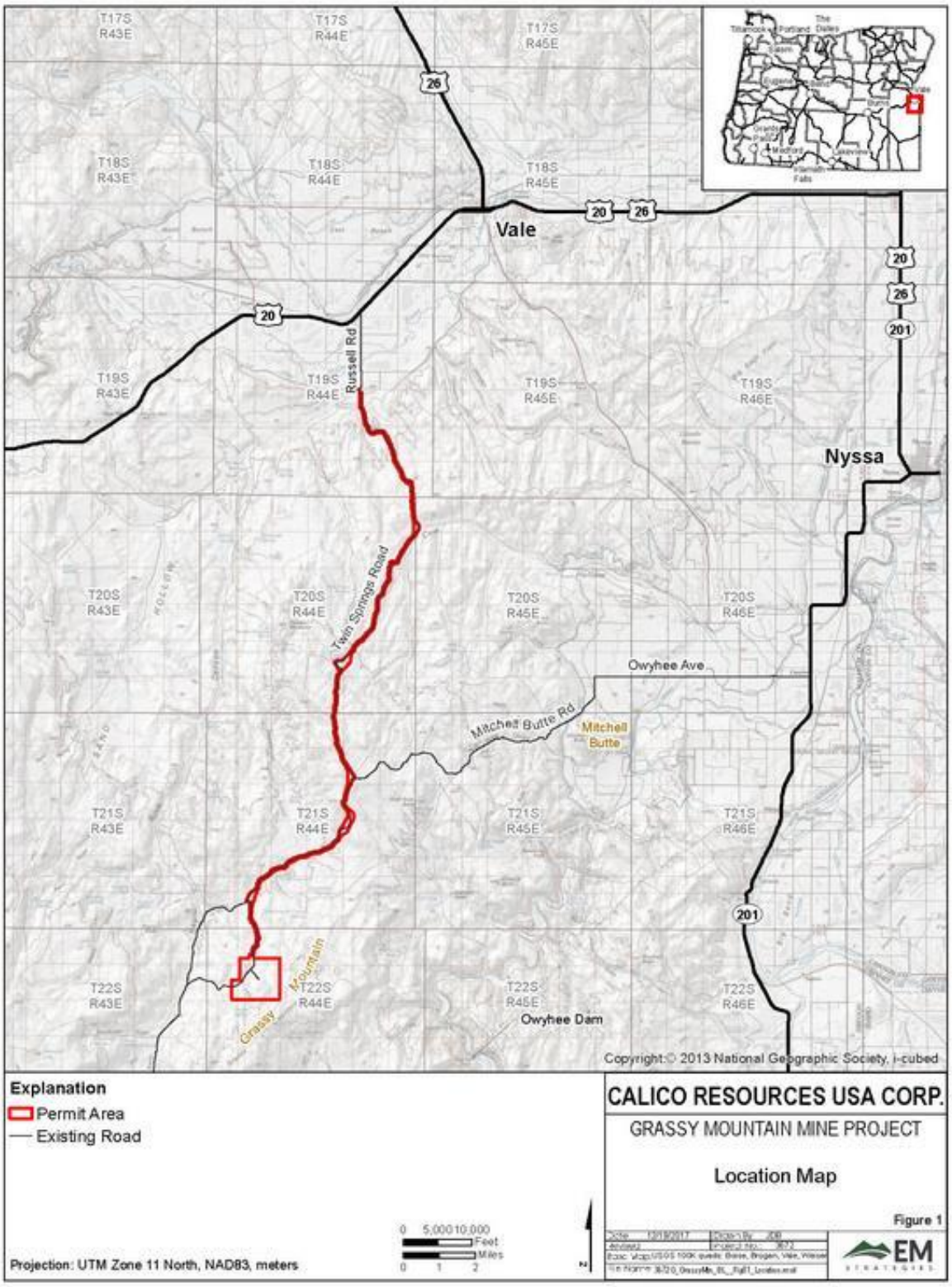
2 OPERATING PLAN OVERVIEW

Calico Resources USA Corp. (Calico) proposes to construct, operate, reclaim, and close an underground mining and precious metal milling operation known as the Grassy Mountain Mine (Project).

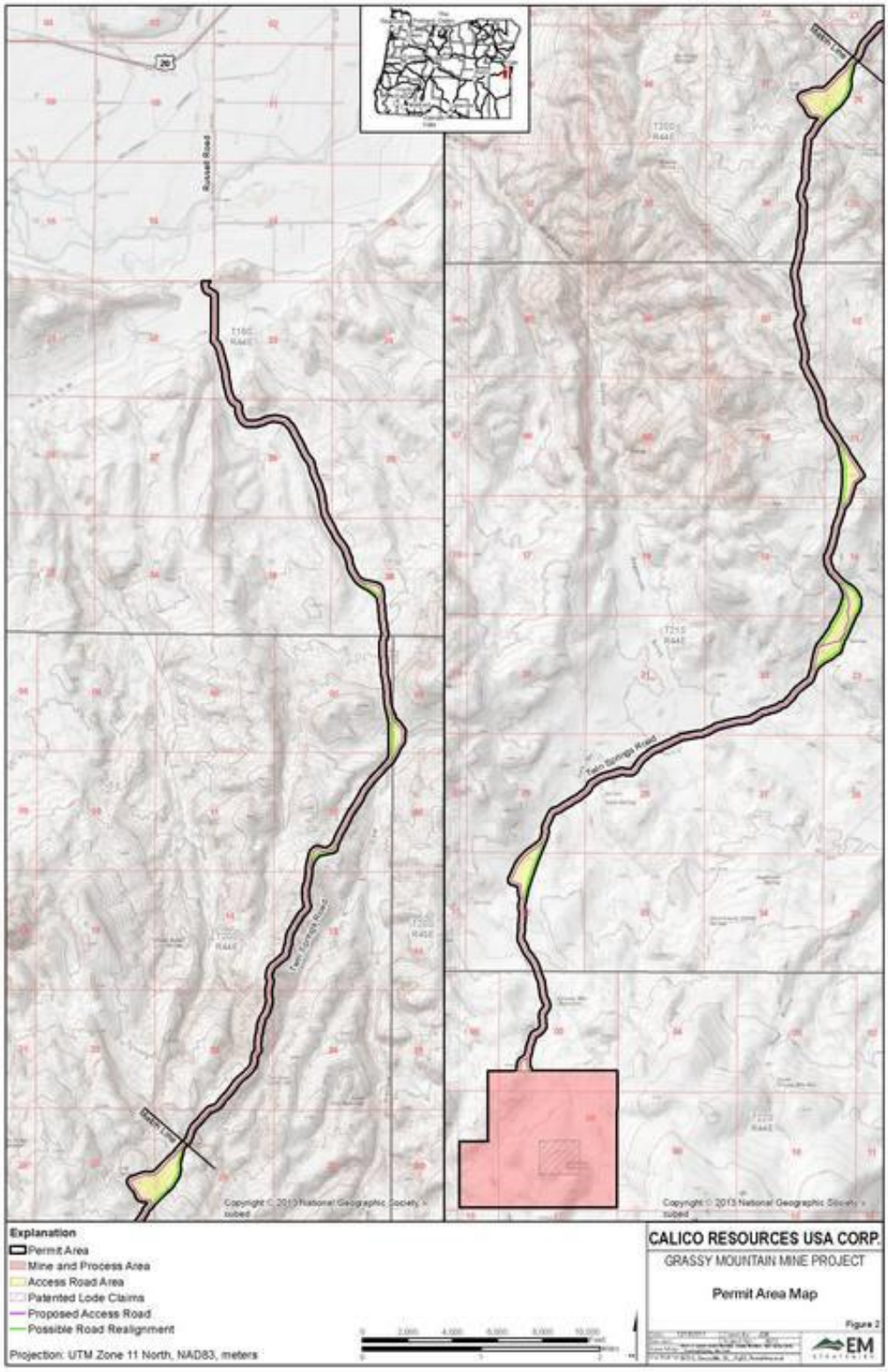
In general, the proposed mining and precious metal processing operations will consist of an underground mine and ore processing facilities, including a conventional mill and tailings storage facility, and waste rock storage areas, as well as other support facilities. The Project will include the following major components:

- One underground mine;
- One waste rock storage area;
- One carbon-in-leach processing plant;
- Two borrow pit areas;
- One tailings storage facility;
- Run-of-Mine (ROM) ore stockpile;
- One reclaim pond;
- A water supply well field and pipeline, associated water delivery pipelines, and power;
- A power substation and distribution system;
- Two ventilation shafts;
- Access and haul roads;
- Ancillary facilities that include the following: haul, secondary, and exploration roads; Truck workshop; warehouse; storm water diversions; sediment control basins; reagent and fuel storage; storage and laydown yards; explosive magazines; fresh water storage; monitoring wells; meteorological station, an administration/security building; borrow areas; growth media stockpiles; a landfill; and solid and hazardous waste management facilities to manage wastes; and
- Reclamation and closure, including the potential development of an E Cell for the TSF.

Location Map



Permit Area Map



Calico proposes to mine approximately 3.0 million tons of mill-grade ore and 0.2 million tons of waste rock (total of 3.2 million tons). The material (both ore and waste) will be extracted from the underground mine using conventional underground mining techniques of drilling, blasting, mucking, loading, and hauling. Calico will use hydraulic loaders to load the ore and waste into the haul trucks. The haul trucks will transport the waste rock to the waste rock disposal areas near the tailings facility and transport the ore to the ROM stockpile adjacent to the crushing and milling facilities. The ore will be leached in a carbon-in-leach processing plant to recover the precious metals into a "pregnant" leach solution. The pregnant solution will then be processed for metal recovery and further off-site refining. Exploration activities, expected to disturb up to 10 acres, will occur within the Project Area. The acreage of proposed surface disturbance associated with the Project as a whole is approximately 265.8 aces.

The Estimated Disturbance Acreage is approximately 265 acres of proposed surface disturbance for the planned underground mine, process plant, waste-rock storage, tailings storage, ore stockpile, water-well sites and distribution system, electrical power substation and distribution system, ancillary facilities, reclamation, and closure. The Proposed Surface Disturbance for the Grassy Mountain Mine is in Section 4 of this report.

Extraction of the estimated mineral reserves is planned via a proposed underground mine that will be accessed via one decline and a system of internal ramps. Two shafts are planned for ventilation and secondary egress. The planned mining method is drift-and-fill with diesel-powered mining equipment. Cemented rock fill and uncemented rock fill will be used for backfill. The mine design is based on a production rate of 1,300 to 1,400 tons per day over four days per week, with two shifts per day, to provide sufficient material to feed the 750 tons per day to the mill on a seven day per week basis. The nominal development size is 15 feet wide by 15 feet high for the main decline, 13 feet wide by 13 feet high for horizontal access to production areas, and the production headings will be 20 feet wide x 13 feet high. Ground support was designed to maintain a safe operation.

Two shafts are included in the design to be used for ventilation and secondary egress. The planned mining method is drift-and-fill ("D&F"). CRF and rock fill ("RF") will be used for backfill. The planned proportions will be 46 percent CRF and 54 percent RF.

The nominal development size is 15 feet wide by 15 feet high for the main decline and 13 feet wide by 13 feet high for horizontal access to production areas. Production heading size will be 20 feet wide x 13 feet high. This heading size will allow the miners and associated diesel mining equipment access the flexibility to maximize production from the mine as well as minimize waste haulage from the development headings. The mining cycle involves drilling, blasting, and mucking for the development and production access. The final part of the mining cycle is to backfill the stopes.

A single waste rock storage area will be constructed over the life of the Project to temporarily store the approximately 0.2 million tons of material. A haul road will connect the portal with the waste rock storage area. The area underlying the waste rock storage areas will be cleared and grubbed prior to construction. The waste rock storage area will be located with the storm water diversion structure for the TSF on public lands. The facility will need to be constructed in compliance with Oregon's regulations and a geo-technical study will be done to ensure the design and construction of the facility will be safe in the event of an earthquake.

The underground workings will be backfilled where needed for support, with Rock Fill and Cemented Rock Fill. It is assumed that the cement will lock in and neutralize potential acid generation when backfilled into the stopes; further work will be necessary to confirm this assumption.

The ventilation network was designed to comply with U.S ventilation standards for underground mines [Code of Federal Regulations / Title 30. Underground metal and nonmetal mines. Washington, DC: U.S. Government Printing Office, Office of the Federal Register]. Regulatory concentrations for gases are specified by the 1973 American Conference of Industrial Hygienists ("ACGIH") threshold limit values ("TLV"s) [71 Fed. Reg. 3 28924 (2006)]. For diesel particular matter ("DPM"), a permissible exposure limit ("PEL") of 160 µg/m3 total carbon is specified in the U.S. diesel rule for metal/nonmetal mines [71 Fed. Reg. 28924 (2006)].

Mine Safety and Health Administration ("MSHA") sets an airflow requirement for the dilution of gas emissions, and an additional airflow requirement for dilution of DPM. These values are published with the list of approved engines on MSHA's internet website. Airflow of 54,000 ft3/min was selected as a minimum reference for the ventilation design in order to meet the MSHA ventilation standards.

The Grassy Mountain process flowsheet involves crushing and grinding the ore, gravity separation, and a carbon-in-leach (CIL) cyanide circuit, electrowinning recovery, and cyanide detoxification.

The Grassy Mountain gold-silver mineralization is considered to be amenable to the proposed recovery process that will involve a combination of gravity concentration and cyanide leaching. A nominal process plant treatment rate of 750 short tons per day has been designed to recover and concentrate gold and silver. The plant will be of the conventional CIL type and is designed to operate with two shifts per day, 365 days per year, with an overall plant availability of 91.3%. The process plant will produce gold doré bars to be sold to gold refiners.

The following is a summary of the process flowsheet:

- Crushing and stockpile;
- Grinding and classification;
- Gravity concentration with concentrate intensive leaching;
- CIL leaching;
- Carbon management;
- Gold room; and
- DetTailings Disposal

The proposed TSF will be located in the broad valley immediately west of the Grassy Mountain mine portal and process facilities, outside of the patent parcel. The TSF will require embankments on the north and west sides of the valley. The embankments will be constructed in stages using downstream construction. At an average deposition rate of 680 tons per day (tpd) and total capacity of 3.2 million tons, the facility will have an approximate design life of 12.9 years.

The TSF will be a 100% geomembrane-lined facility with continuous primary and secondary containment. Process solution will be managed with two independent underdrain and supernatant pool decant return water systems. Anticipated maximum flow rates for each system have been estimated using a monthly time-step water balance. The supernatant pool will be maintained away from the embankment on the eastern side of the facility as shown on Drawing C1.

The TSF has been designed as a zero-discharge facility capable of storing the 500-year, 24-hour storm and an allowance for wave action. Permanent and temporary stormwater diversions will collect and divert a majority of the stormwater runoff around the facility to a natural drainage on the north side of the TSF.

3 OPERATIONAL ENVIRONMENTAL PROTECTION MEASURES

3.1 Air Emissions

Appropriate air quality permits will be obtained from the ODEQ for the Project facilities and land disturbance. As per ODEQ regulations, the Project air quality operating permit will be authorized by the ODEQ prior to Project commissioning. Committed air quality practices will include dust control for mine unit operations as described by the ODEQ-required Fugitive Dust Control Plan. In general, the Fugitive Dust Control Plan will provide for water application of haul roads and other disturbed areas, chemical dust suppressant application (such as magnesium chloride) where appropriate, and other dust control measures as per accepted and reasonable industry practice. Also, disturbed areas will be seeded with an interim seed mix to minimize fugitive dust emissions from surfaces without vegetation, where appropriate.

Appropriate emission control equipment will be installed and operated in accordance with the construction and operating air permits. Where required, pollution control devices installed by equipment manufacturers will control combustion emissions. Pollution control equipment will be installed, operated, and maintained in good working order to minimize emissions.

3.2 Cultural Resources

A Class III cultural resources survey is being performed for the Project Area and the Cultural Baseline Report will be included in the Consolidated Permit Application. Avoidance is the Oregon SHPO and BLM-preferred treatment for preventing effects to historic properties (a historic property is any prehistoric or historic site eligible to the National Register of Historic Places [NRHP]) or unevaluated cultural resources.

If avoidance is not possible or is not adequate to prevent adverse effects, Calico will undertake data recovery at the affected historic properties in accordance with the Programmatic Agreement between the BLM, Oregon State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation. Development of a treatment plan, data recovery, archaeological documentation, and report preparation will be based on the "Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation," 48 CFR 44716 (September 29, 1983), as amended or replaced. If an unevaluated site cannot be avoided, additional information will be gathered, and the site will be evaluated. If the site does not meet eligibility criteria as defined by

the Oregon SHPO, no further cultural work will be performed. If the site meets eligibility criteria, a data recovery plan or appropriate mitigation will be completed under the Programmatic Agreement. Once data recovery has been completed at a historic property, the BLM will issue a Notice to Proceed for work at that location.

3.3 Erosion and Sediment Control

Best Management Practices (BMPs) will be used to limit erosion and reduce sediment in precipitation runoff from Project facilities and disturbed areas during construction, operations, and initial stages of reclamation. BMPs may include, but are not limited to, diversion and routing of storm water using accepted engineering practices, such as diversion ditches, and the placement of erosion control devices, such as sediment traps, and rock and gravel cover.

Re-vegetation of disturbed areas will reduce the potential for wind and water erosion. Following construction activities, areas such as cut-and-fill embankments and growth media stockpiles will be seeded as soon as practical and safe. Concurrent reclamation will be maximized to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures will be inspected periodically, and repairs performed as needed.

Surface water diversion channels and ditches will be constructed as necessary around surface facilities and waste rock storage areas to control storm water run-on to these sites. Surface water control ditches and sediment retention ponds will be constructed in accordance with BMPs as outlined in the Best Management Practices for Reclaiming Surface Mines in Washington and Oregon (DOGAMI 1997) and in the Tailings Facility and Ancillary Facilities Design Report (refer to the DGOAMI Consolidated Permit Application). Sediment ponds and diversion ditches are sized to contain a 100-year, 24-hour precipitation event. Run-on diversion channels and ditches will remain as permanent features after final reclamation and mine closure.

Run-off control structures include silt traps and fences constructed of certified weed-free straw bales, or geotextile fabric, and sediment ponds. Sediment control measures are implemented as necessary to reduce soil movement within the site and to minimize off-site effects. These structures will be maintained throughout the life of the Project. Soil collected in these structures will be periodically removed and placed in soil stockpiles or used for reclamation. These features will be removed once vegetation is established and sediment runoff has stabilized.

3.4 Waters of the State

Process components will be designed, constructed and operated in accordance with DOGAMI and ODEQ regulations. Proposed process facilities will be zero discharge and the TSF will have a composite liner system in accordance with ODEQ design criteria. Waste rock has been determined to have the potential to generate acid and/or mobilize deleterious constituents and therefore will be managed on containment. The details of this plan will be included in the DOGAMI Consolidated Permit Application.

Storm water management will occur as identified in the Tailings Facility and Ancillary Facilities Design Report which will be included in the BLM Plan of Operations and the DOGAMI Consolidated Permit Application. The actual locations and numbers of sediment controls will be

determined during final design and where appropriate during operations. In either case the controls will be developed in accordance with the storm water plan. If any ponds will be over 20 feet in height or impound over 20 acre-feet of water, a dam permit will be obtained from OWRD. Sediment removed from the sediment control structures will be placed on the waste rock storage areas during operations and will be disposed of in an approved disposal site after closure. Additional information on sediment control is in Section 3.3 above.

3.5 Monitoring

A plan for monitoring the proposed Project that was developed for the Project Chemical Mining application is included in the DOGAMI Consolidated Permit Application. The monitoring plan will be updated as the detailed engineering is completed, and the monitoring requirements become more defined.

3.6 Growth Media and Cover Salvage and Storage

Suitable growth media will be salvaged and stockpiled during the development of the facilities, during construction of the waste rock storage areas and the TSF, and construction of other Project facilities.

Following stripping, growth media will be stockpiled within the proposed disturbance areas. Growth media stockpiles will be located such that they will not be disturbed by mining operations. The surfaces of the stockpiles will be contoured with slopes no steeper than 2.5H:1V to reduce erosion. To further minimize wind and water erosion, growth media stockpiles will be seeded after contouring with an interim seed mix developed in conjunction with the BLM. Diversion channels and/or berms will be constructed around the stockpiles as needed to prevent erosion from overland runoff. BMPs such as silt fences or staked weed-free straw bales will be used as necessary to contain sediment in runoff.

Salvageable growth media from the Project surface disturbance will be stockpiled at centralized locations. Growth media will be salvaged for reclamation. Soils on slopes that are less than ten percent will be salvaged to a depth of three feet. Soil on slope at 15 percent or less will be salvaged to a depth of two feet. Soils on slopes greater than 15 percent will be salvage to a depth of one foot. Growth media will consist of soils and alluvium stripped prior to surface disturbance activities. Any growth media remaining in the stockpiles for one or more planting seasons will be seeded with an interim seed mix to stabilize the material to reduce erosion and minimize the establishment of undesirable weeds.

Approximately 551,759 bank cubic yards (bcy) of growth media will be salvaged from the footprint of the facilities. Facilities that will not have growth media salvaged are the water pipeline, fence, growth media stockpiles, and exploration areas. These bcy convert to approximately 690,000 cubic yards based on a 25 percent swell factor. This volume could change based on actual field conditions encountered. On sloped terrain, some soil may be salvaged by pushing available natural growth media cover downhill with a dozer to construct toe berms to prevent rocks from scattering on the hillside below the stockpile toes.

3.7 Wildlife and Migratory Birds

If possible, land clearing and surface disturbance will be timed to prevent destruction of active bird nests or young of birds during the avian breeding season (annually in accordance with the BLM policies) to comply with the Migratory Bird Treaty Act (MBTA). If surface disturbing activities are unavoidable during the avian breeding and nesting season, Calico will have a qualified biologist survey the areas proposed for disturbance to determine the presence of active nests immediately prior to the disturbance. If active nests are located, or if other evidence of nesting is observed (mating pairs, territorial defense, carrying nesting material, transporting of food) the area will be avoided to prevent destruction or disturbance of nests until birds are no longer present.

Operators will be trained to monitor mining and process areas for the presence of larger wildlife such as deer. Mortality information will be recorded. Calico will establish wildlife protection policies that will prohibit the feeding or harassment of wildlife.

3.8 Protection of Surface Monuments

To the extent practicable, Calico will protect all survey monuments, witness corners, reference monuments, bearing trees, and line trees against unnecessary or undue destruction, obliteration, or damage. If in the course of operations any monuments, corners, or accessories are destroyed, Calico will immediately report the matter to the appropriate authority. Prior to obliteration, destruction, or damage during surface disturbing activities, Calico will contact the BLM to develop a plan for any necessary restoration or reestablishment activity of the affected monument. Calico will bear the cost for the restoration or re-establishment activities including the fees for an Oregon Professional Land Surveyor.

3.9 Noxious Weeds and Invasive Nonnative Species

Calico recognizes the economic and environmental impact that can result from the establishment of noxious weeds and has committed to a proactive approach to weed control. A noxious weed monitoring and control plan will be implemented during construction and continue through operations. The plan will be included in the BLM Plan of Operations and the DOGAMI Consolidated Permit Application. It will contain a risk assessment, management strategies, provisions for annual monitoring and treatment evaluation, and provisions for treatment. The results from annual monitoring will be the basis for updating the plan and developing annual treatment programs.

3.10 Inadvertent Cultural Discoveries

All Inadvertent Cultural Discoveries will follow the BLM and Oregon SHPO regulations. Calico has created an Inadvertent Discovery Plan for Cultural Resources-Grassy Mountain, which will be used throughout all aspects of the exploration, mining and reclamation activities at Grassy.

Pursuant to 43 CFR 10.4(c) and (d), Calico will immediately stop all activities in the vicinity of the inadvertent cultural discovery and not commence again for 30 days after certification is received from the BLM-authorized officer, or a binding agreement is executed between the federal

agency and the affiliated Indian tribes. According to 43 CFR 10.4d(2): "The activity that resulted in the inadvertent discovery may resume thirty (30) days after certification by the notified Federal agency of receipt of the written confirmation of notification of inadvertent discovery if the resumption of the activity is otherwise lawful. The activity may also resume, if otherwise lawful, at any time that a written, binding agreement is executed between the federal agency and the affiliated Indian tribes or Native Hawaiian organizations that adopt a recovery plan for the excavation or removal of the human remains, funerary objects, sacred objects, or objects of cultural patrimony following 10.3(b)(1) of these regulations. The disposition of all human remains, funerary objects, sacred objects, or objects of cultural patrimony must be carried out following 10.6."

3.11 Fire Protection Measures

All applicable state and federal fire laws and regulations will be complied with and all reasonable measures will be taken to prevent and suppress fires in the Project Area.

All equipment will be properly muffled and equipped with suitable and necessary fire suppression equipment, such as fire extinguishers and hand tools. All Project-related traffic will observe prudent speed limits to enhance public safety, protect wildlife and livestock, and minimize dust emissions. All activities will be conducted in conformance with applicable federal and state health and safety requirements.

Water for fire protection will be distributed from the fire water tank located at the base of Grassy Mountain via a network of piping and will be maintained under a constant pressure with a jockey pump. The piping will be looped and sectionalized to minimize loss of fire protection during maintenance. Where located outside buildings, fire water piping will be buried below the ground surface to eliminate the potential of pipes freezing.

Yard hydrants will be limited to the fuel storage tank area. Wall hydrants will be used in lieu of yard hydrants, and these will be located on the outside walls of the buildings in cabinets that will be heated during winter months.

Fire protection within buildings will include standpipe systems, sprinkler systems, and portable fire extinguishers. Standpipe systems will be provided in all structures that exceed 46 feet in height, as well as where required by building code, local authorities, or the insurance underwriter.

Sprinklers will be provided at the following locations or to protect the following items:

- Truck workshop;
- Assay laboratory;
- Over hydraulic or lube packs that contain more than 120 gallons of fluid;
- Lube-storage rooms;
- Any conveyor belts that are within tunnels or other enclosed spaces which would be hazardous to fight fires manually;
- Transformers; and
- Warehouse.

3.12 Public Safety Measures

Public safety will be maintained throughout the life of the Project. All equipment and other facilities will be maintained in a safe and orderly manner.

In the event that any existing roads in the Project Area are severely damaged as a result of Project activities, Calico will return them as to their original condition.

3.13 Quality Assurance Plan

A plan for ensuring quality assurance developed for the proposed Project will be included in the BLM Plan of Operations and the DOGAMI Consolidated Permit Application.

3.14 Waste Disposal and Hazardous Waste Management

Employee training plans will cover appropriate disposal practices, which will include which wastes may be placed in a landfill or in the waste rock dump, management of used filters, oily rags, fluorescent light bulbs, aerosol cans, and other regulated substances. All waste will be disposed off site. Used solvent, liquids drained from aerosol cans, accumulations of mercury fluorescent lights, and used antifreeze may be regulated by RCRA. Calico anticipates that the mine will fall in the "small generator" category.

Used lubricants and solvents will be characterized according to the Resource Conservation and Recovery Act (RCRA) requirements and will be stored appropriately. Calico may obtain a Hazardous Waste Identification Number from the Oregon Department of Environmental Equality (ODEQ). The mine is expected to be in the "conditionally exempt small quantity generator" category as defined by the United States Environmental Protection Agency (EPA). Used solvents are the only identified potential hazardous wastes at this time. Calico will institute a waste management plan that will identify the wastes generated at the site and their means of disposal.

Used oil and coolant will also be stored at the truck workshop in secondary containment. These will be either recycled or disposed of in accordance with state and federal regulations. Used containers will be disposed of or recycled according to federal, state, and local regulations.

Solid wastes generated by the mine and process departments will be collected in dumpsters near the point of generation. Industrial solid waste will be disposed of in an on-site Class III landfill in accordance with ODEQ regulations. A training program will be implemented to inform employees of their responsibilities in proper waste disposal procedures.

Calico will have a trained response team at the site 24 hours per day to manage potential spills of regulated materials at the site. Response for transportation-related releases of regulated materials bound for the site will be the responsibility of the local and regional agencies. However, where appropriate, Calico may assist with response to off-site incidents, including providing resources, based on agency requests.

Hazardous materials will be transported, stored, and used in accordance with federal, state, and local regulations. Employees will be trained in the proper transportation, use, and disposal of

hazardous materials. Spill contingency and emergency preparedness measures are laid out in the Emergency Response Plan, which will be included in the DOGAMI Consolidated Permit Application.

Calico will submit a Petroleum Contaminated Soil Management Plan to the Oregon Department of Geology and Mineral Industries (DOGAMI) and BLM describing how all petroleum contaminated soils will be transported to an off-site facility.

4 RECLAMATION AND CLOSURE

Reclamation of disturbed areas resulting from activities outlined in this Reclamation Plan will be completed in accordance with the BLM and ODEQ regulations. The purpose of Subpart 43 CFR 3809 - Surface Management is to prevent unnecessary or undue degradation of public lands by operations authorized by the mining laws. Anyone intending to develop mineral resources on public lands must prevent unnecessary or undue degradation of the land and reclaim disturbed areas. This subpart establishes procedures and standards to ensure that operators and mining claimants meet this responsibility and provide for the maximum possible coordination with appropriate state agencies to avoid duplication and to ensure that operators prevent unnecessary or undue degradation of public lands by operations authorized by the mining laws. The State of Oregon requires that a reclamation plan be developed for any new mining project and for expansions of existing operations (OAR 632-037-0070).

The Project disturbance areas are summarized in the Proposed Surface Disturbance for the Grassy Mountain Mine table below. The areas proposed for disturbance can be divided into the following: open pit; waste rock storage areas; milling and processing facility; a TSF; borrow areas; growth media stockpiles; haul roads; buildings and yard areas around mine; process plant; administration; laboratory; and ancillary facilities. Calico anticipates that the surface mine components will be reclaimed and revegetated.

Proposed Surface Disturbance for the Grassy Mountain Mine			
Component	**Public Acres**	**Private Acres**	**Total Acres**
Portal Area	0.0	3.3	3.3
Waste Rock Storage Area	7.5	0.0	7.5
Tailings Storage Facility (TSF)	101.2	0.0	101.2
Process/Administration Area[1]	15.0	2.5	17.5
Laydown/Yard Areas	17.2	0.0	17.2
Roads	13.5	1.8	15.3
Water Tank and Road	0.0	0.5	0.5
Water Wells and Water Pipeline[2]	11.8	0.8	12.6
Fence[3]	15.4	0.0	15.4
Borrow Areas	44.7	3.0	47.7
Diversion Ditches and Sediment Basins	8.6	0.0	8.6
Growth Media Stockpiles	8.3	0.0	8.3
Exploration[4]	5	5	10

Proposed Surface Disturbance for the Grassy Mountain Mine			
Total	**248.9**	**16.9**	**265.8**

[1]This includes the mill, refining plant, administrative building, parking lot, security building, mining contractor yard, reagent storage, assay laboratory, and substation.
[2]Includes the water supply pipeline at 16,164 feet with a 30-foot construction disturbance width and well locations each at 0.25 acres.
[3]Includes the perimeter fence at 22,358 feet with a 30-foot construction disturbance width.
[4]The actual location of the exploration activities within the Project Area is currently unknown and is assumed to be on all public lands.

Surface management regulations 43 CFR 3809.420 establish the performance standards that apply to this Plan. The State of Oregon has established mining, reclamation, water quality, and air quality regulations. Measures taken to prevent unnecessary or undue degradation at the proposed Project are listed below. These measures will be implemented during the design, construction, operation, and closure of the Project:

- All regulated components of the facility will be designed and constructed to meet or exceed BLM/DOGAMI/ODEQ/ODWR design criteria;
- Mineral exploration and development drill holes, monitoring and observation wells, and production wells subject to State of Oregon regulations will be properly abandoned to prevent potential contamination of water resources;
- Roads will be constructed to the minimum necessary width;
- Regulated wastes will be managed according to applicable regulations;
- Surface disturbance will be minimized while optimizing the recovery of mineral resources;
- Fugitive dust and other air emissions from disturbed and exposed surfaces will be controlled in accordance with ODEQ regulations and permits;
- Calico will comply with applicable federal and state water quality standards, including the Federal Water Pollution Control Act, as amended (30 U.S.C. 1151 et seq.);
- Surface water drainage control will be accomplished by diverting storm water, isolating facility runoff, and minimizing erosion;
- Where suitable as a growth media, surface soils and alluvium will be managed as a growth media resource and removed, stockpiled, and replaced during reclamation; and
- A reclamation plan will be implemented that addresses earthwork and re-contouring, re-vegetation and stabilization, detoxification and disposal, and monitoring operations necessary to satisfactorily reclaim the proposed disturbance including: roads; process ponds; tailings facilities; stockpiles; buildings; and equipment.

4.1 Proposed Reclamation Schedule

The proposed Project will be active for approximately 14 years, which includes one year of construction, ten years of mining and processing, and three years of closure and reclamation. Several years beyond that date may be anticipated for ground water monitoring. This schedule may be modified based on the rate of mining and future commodities prices.

Concurrent reclamation will be ongoing over the life of the Project in areas that have reached their final configurations. Reclamation of TSF dam face will be started in Year 8 when final build-out

is expected to be completed. At final build-out, the TSF will be recontoured to an overall slope of 3H:1V or less. Upon completion of mining, the TSF recontouring, growth media placement, and seeding will be completed pursuant to the Final Plan for Permanent Closure and reclamation schedule submitted for the Project.

Closure of the TFS will commence in Year 11. Reclamation of this facility is expected to be concurrent with drain down operations. Closure and reclamation of the process facilities and ancillary facilities will begin after the completion of mining and processing.

4.2 Post-Mining Land Use and Reclamation Goals

The same land uses of mineral exploration and development, livestock grazing, wildlife habitat, and dispersed recreation will remain following closure with an emphasis on the last three uses. Calico will work with the agencies and local governments to evaluate alternative land uses that could provide long-term socioeconomic benefits from the mine infrastructure. Post-closure land uses are in conformance with the BLM Vale District Management Plan and Malheur County Land Use Plans.

The objectives of the reclamation program are as follows:

- Provide a stable post-mining landscape that supports defined land uses;
- Maintain existing access to private land;
- Minimize erosion damage and protect water resources through control of water runoff and stabilization of components;
- 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 appropriate plant species in order to establish long-term productive plant com munities compatible with existing land uses; and
- Maintain public safety by stabilizing or limiting access to landforms that could constitute a public hazard.

4.3 Growth Media Balance

A preliminary growth media balance for the Project, shown below in the Growth Media Balance table, indicates approximately 420,083 cubic yards of material will be required to cover the Project facilities to a depth of 12 to 24 inches. Borrow material is also considered to be a suitable substitute for growth media, as well as cover material for the TSF.

Growth Media Balance			
Facility	**Area (acres)**	**Growth Media Depth (feet)**	**Volume (cubic yards)**
Mine Portal	3.3	0	0
Waste Rock Storage Area	7.5	1	14,878
Tailings Storage Facility	101.2	2.0	326,314
Process/Administration Area	17.5	1.0	28,233

Growth Media Balance			
Laydown/Yard Area	17.2	1.0	27,749
Roads	13.5	1.0	21,780
Water Tank and Road	0.5	0	0
Water Wells and Water Pipelines	12.6	0	0
Fence	15.4	0	0
Borrow Areas	47.7	0	0
Diversion Ditches and Sediment Basins	38.6	0	0
Growth Media Stockpiles	8.3	0	0
Landfill	0.7	1.0	1,129
Exploration	10	0	0
Total	**265.8**	**-**	**420,083**

4.4 Re-vegetation, Seeding, and Planting

Reclaimed surfaces will be re-vegetated to control runoff, reduce erosion, provide forage for wildlife and livestock, and reduce visual impacts. Seed will be applied with either a rangeland drill or with a mechanical broadcaster and harrow, depending upon accessibility. Seedbed preparation and seeding will take place in the fall after grading and top-soiling of reclaimed areas.

Reclamation seed mixtures and application rates, which are based on BLM requirements, as shown below in the Seed Mix for the Project Area table, will be used in the reclamation cost estimate (RCE). This mixture will 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, according to the species' effectiveness in providing erosion protection, the ability to grow within the constraints of the low annual precipitation experienced in the region, suitability for site aspect, and the elevation and soil type.

Seed Mix for the Project Area	
Grassy Mountain Seed Mix List[1]	
Species Common Name (Species Scientific Name)	**Pounds/Acre (PLS)**
Shrubs	
Wyoming big sagebrush	0.10
Grasses	
Bluebunch wheatgrass	8.00
Bottlebrush squirreltail	2.00

[1] *Early contemporaneous re-vegetation will be monitored, and final seed mixtures will be evaluated and modified depending on monitoring results.*

The proposed seed mixture and application rates are subject to modification by the BLM. The actual seed mixture and application rates will be determined prior to reseeding based on the results of reclamation in other areas of the mine, concurrent reclamation, or changes by the BLM in its seed mix requirements.

4.5 Post-Mining Contours and Topography

The final grading plan for the Project is designed in part to minimize the visual impacts of the disturbance proposed by Calico. Slopes will be recontoured with standard mine mobile equipment (i.e., dozers, trucks, loaders, scrapers) to blend with surrounding topography, interrupt straight-line features and facilitate revegetation, where practicable. Where feasible, large constructed topographic features, such as waste rock storage areas, may have rounded crests and variable slope angles to resemble natural landforms.

4.6 Final Grade and Slope Stability Criteria

4.6.1 Mine Portal

The decline will be plugged with rock approximately 100 feet inside the portal entrance. Then the portal entrance will be filled with the material that was used to construct the portal pad. The slopes in the vicinity of the portal area will be returned to near original grade. Once this is completed the surface will be covered with growth media and revegetated and the portal will not be visible.

4.6.2 Waste Rock Storage Facility

All 0.2 million tons of waste rock will be removed from the waste rock storage area and placed on the TSF to aid in the development of the final surface slope of the TSF. As a result, the final grade of the waste rock storage area will be returned to near original contour.

4.6.3 Tailings Storage Facility

Reclamation methods for the TSF will recognize ore and solution characteristics, site conditions, and climatic conditions. Pursuant to the requirements of ODEQ, a summary of the principal closure steps follows.

All organic material originally stockpiled from clearing the area will be used in constructing the tailings cap to promote final reclamation and revegetation. The initial step will involve dewatering the supernatant pond and topping the TSF pile with a one-foot rockfill layer. The engineered rock fill surface will be applied to create an undulating, but sloped surface. The organic material from the remaining local stockpiles will be pulled over the rockfill layer and revegetated. Contact precipitation (snowmelt and rain) from the capped revegetated TSF will be routed to the two settling ponds. From the settling pond and rocked spillway, flows will then be routed to open natural areas and constructed dispersion terraces to slow the velocity of the flow to enhance infiltration and evaporation. The settling pond will be designed for the 100-year, 24-hour storm event.

Calico will focus on the use of effective cover materials by performing investigations on the effectiveness of materials to be used. Growth media will be hauled to the TSF surfaces from growth media stockpiles and the borrow areas located near the facility. The cover for the TSF is generally designed to accomplish the following;

Limit infiltration of meteoric water;
Isolate process materials from storm water runoff;
Limit erosion; and
Support successful revegetation.

Slope stability analyses on the TSF were performed using industry practices and experience from similar projects.

4.6.4 Erosional Stability

Soils salvaged during construction of mine components as well as some of the near-surface alluvial material mined from the open pits will be used as growth media cover during reclamation. The soils survey completed in the Project Area by the Natural Resource Conservation Service (NRCS) provides an inventory of available growth media (refer to DOGAMI Consolidated Permit Application). This inventory has been utilized to estimate the likely mix of growth media available for each component and to allow a detailed evaluation of the site-specific stability of the proposed major reclamation components.

Analyses and recent similar experience at Nevada mines indicate that the use of erosion control BMPs during reclamation activities will greatly reduce the sediment migration from the facilities until vegetation can be established. Calico will maintain BMPs (sediment control structures) at the base of reclaimed slopes to prevent or limit excessive erosion until vegetation has established.

4.7 Facility Reclamation

4.7.1.1 Waste Rock Storage Facility

All 0.2 million tons of waste rock will be removed from the waste rock storage area and placed on the TSF to aid in the development of the final surface slope of the TSF. Once the waste rock is removed the underlying synthetic liner will be removed and disposed. Any remaining native material that was part of the liner system will be placed with the waste rock. Growth media will then be applied to the disturbed surface and revegetated.

4.7.1.2 Tailings Storage Facility

Reclamation methods for the TSF will recognize ore and solution characteristics, site conditions, and climatic conditions. Pursuant to the requirements of ODEQ, a summary of the principal closure steps follows.

All organic material originally stockpiled from clearing the area will be used in constructing the tailings cap to promote final reclamation and revegetation. The initial step will involve dewatering the supernatant pond and topping the TSF pile with a one-foot rockfill layer. The engineered rock fill surface will be applied to create an undulating, but sloped surface. The organic material from the remaining local stockpiles will be pulled over the rockfill layer and revegetated. Contact precipitation (snowmelt and rain) from the capped revegetated TSF will be routed to the two settling ponds. From the settling pond and rocked spillway, flows will then be routed to open natural areas and constructed dispersion terraces to slow the velocity of the flow to enhance infiltration and evaporation. The settling pond will be designed for the 100-year, 24-hour storm event.

The conceptual closure design of the TSF is intended to meet the OAR requirements. In accordance with the OAR 340-043-0140 (5) requirement, the tailings surface will be covered with a composite cover designed to prevent water and air infiltration. The closure cover will consist of (from bottom to top) the regraded tailings surface, operation layer of mine waste or on-site borrow (as needed for equipment access), a geomembrane liner, 18 to 24 inches of growth medium, and seed mix to revegetate the growth medium with native species. The typical closure cover system detail is presented in Drawing C10.

The following design components have been considered during the PFS design and will help facilitate closure once mining has ceased:

- During the staged construction of the TSF, the growth medium beneath the embankments and within the TSF basin will be removed prior to embankment construction and stockpiled for use during closure.
- At the end of milling, water will pumped out of the supernatant pool. The surface of the TSF will then be allowed to dry for one to two years.
- Once the surficial tailings have sufficiently dried out, the TSF surface will be graded to maintain positive surface flow to the northeast to prevent ponding water. Surface water run-off developing on the surface of the impoundment will be directed off the

impoundment through an open channel that will tie into the permanent diversion channel on the east side of the TSF.

- There are no back-dams that will permanently impound the natural tributary drainages upstream of the TSF below the permanent diversion channels. During the reclamation period, the perimeter access road and any temporary stormwater diversion channels can be backfilled and reclaimed to facilitate surface flows and prevent ponding.
- The downstream embankments have been designed with 2.5H:1V downstream slopes that exceed the OAR 632-037-0130 (9) requirement for closure.
- The underdrain collection system installed above the geomembrane liner will help speed consolidation, settlement and draindown of the tailings during the closure period.
- Monitoring and management of TSF draindown will be required for a period of time after the completion of mining. During this time, monitoring and measurement of draindown flow rates and quality will be performed to assist with refinement of long-term closure plans.
- Draindown water may be managed with spray evaporators until flow rates decrease to the point that the reclaim pond can be retrofitted into an evaporation cell.

4.7.1.3 Tailings Storage Facility Cover

Calico will focus on the use of effective cover materials by performing investigations on the effectiveness of materials to be used. The results of these investigations will be included with in the DOGAMI Consolidated Permit Application and the BLM Plan of Operations. Growth media will be hauled to the TSF surfaces from growth media stockpiles and the borrow areas located near the facility. The cover for the TSF is generally designed to accomplish the following:

- Limit infiltration of rainwater and snowmelt;
- Isolate process materials from storm water runoff;
- Limit erosion; and
- Support successful revegetation.

4.7.1.4 Tailings Storage Facility Recontouring, Resoiling, and Revegetation

The TSF will be recontoured to an average final slope configuration not steeper than 2.5H:1V on the dam face to provide for long-term mass stability. As discussed above, the surface of the impounded tailings will be covered and the cover will slope to a drainage system to shed water off the relatively flat surface. The toe of the recontoured slopes will end inside and at the edge of the lined facility such that the subsequently placed cover material will direct surface runoff off the lined area of the TSF. The dam face will also include slope breaks horizontally along contour approximately every 100 vertical feet. Slope breaks will be small flat benches up to 20 feet wide and blended into the slopes. The toe and crest of the facility will also be rounded to blend into the adjacent slopes. Minimizing the total continuous slope length with benches and rounding the toe and crests will help to limit erosion until vegetation is established.

4.7.1.5 Solution Management

At the time of the TSF closure, draindown will be managed by a regime of active and passive evaporation within the supernatant pool, the reclaim pond, E cells, and recirculation back to the TSF. As the solution is removed from inventory through evaporation, portions of the TSF surface will be reclaimed and covered with a growth media cover. Once draindown flows are low enough to be managed through evaporation at the lined pond below the TSF, the remainder of the TSF will be reclaimed as described above.

Four phases of solution management or process fluid stabilization (PFS) will be required throughout the closure process, with blending of strategies from one phase to another:

- Phase I - active evaporation at the supernatant pool and reclaim pond and recirculation;
- Phase II - active and evaporation at the reclaim pond only, and passive evaporation at the supernatant pool. Latter stages of Phase II are characterized by intermittent active evaporation within the pond footprints. Pond inventories are eliminated at maximum in-pond active evaporation rates, and then evaporation is halted and inventories allowed to accumulate to maximum operating volumes prior to the next active evaporation event;
- Phase III - passive evaporation only at the reclaim pond and conversion of the pond to an E cell; and
- Phase IV – long-term passive evaporation using E cells.

This approach acknowledges the initially higher drainage rates and the need to prevent release from the system, while effectively eliminating inventory at maximum drainage rates from the TSF. Also, since recirculation and evaporation at the supernatant pool will result in additional infiltration into the TSF, the supernatant pool evaporation system will be eliminated first in preference for downstream active evaporation within the lined pond. Finally, active management will be phased out by improving the TSF cover and eliminating residual drain down to a level that can be handled by passive systems. The passive systems may then be partially reduced in size over time as flows reach steady state.

Long-term effluent discharge will be managed pursuant to the requirements of ODEQ (OAR 340-043-130). This will include the construction of an E cell or another ODEQ-approved method. The amount of the annual long-term discharge will be used to establish the number of acres of lined pond that will be needed to provide evaporation of draindown fluids during Phase IV of PFS. The costs for converting the existing event pond into an E cell and constructing the new E cell will be established in the RCE section of the DOGAMI Consolidated Permit Application.

4.7.1.6 Facility Cover

Calico will focus on the use of effective cover materials by performing investigations on the effectiveness of materials to be used. The results of these investigations will be included in the RCE section of the DOGAMI Consolidated Permit Application. Growth media will be hauled to the TSF surfaces from growth media stockpiles and the borrow areas. The cover for the TSF is generally designed to accomplish the following:

- Limit infiltration of rainwater and snowmelt;
- Isolate process materials from storm water runoff;
- Limit erosion; and
- Support successful revegetation.

4.7.1.7 Recontouring, Seeding, and Planting

The TSF will be recontoured to an average final slope configuration not steeper than 2.5H:1V on the dam face to provide for long-term mass stability. As discussed above, the surface of the impounded tailings will be covered, and the cover will slope to a drainage system to shed water off the relatively flat surface. The toe of the recontoured slopes will end inside and at the edge of the lined facility such that the subsequently placed cover material will direct surface runoff off the lined area of the TSF. The dam face will also include slope breaks horizontally along contour approximately every 100 vertical feet. Slope breaks will be small flat benches up to 20 feet wide and blended into the slopes. The toe and crest of the facility will also be rounded to blend into the adjacent slopes. Minimizing the total continuous slope length with benches and rounding the toe and crests will help to limit erosion until vegetation is established.

4.7.1.8 Reclaim Pond Closure

When no longer needed for solution management, the Reclaim Pond will be converted into an E cell. Under the RCE, assumptions have been made to convert the Reclaim Pond into an E cell since the cell is a double-lined facility with leakage collection and recovery systems (LCRS). As part of the design, the converted E cell will be covered with six inches of growth media and seeded.

4.8 Milling and Refining Facility

Soils under and adjacent to the fuel storage areas would be tested for contamination. The results will be submitted to the ODEQ as part of a "Final Closure Activities Report," which will summarize closure activities and status.

Earth moving equipment, the crusher, and the plant processing facility, along with all materials and chemicals associated with the mining operation will be removed from the site at final closure. Chemicals will be disposed of at an approved solid waste management facility. All chemical reagents (including NaCN), petroleum products, solvents and other hazardous or toxic materials in the mill not salvaged will be removed from the site and either reused or disposed of according to federal and state regulations. All salvageable equipment, instrumentation, and unused petroleum products and solid wastes from the mill operation will be used or recycled. Non-hazardous solid wastes will be disposed of at a Class III landfill.

4.9 Underground Mine

At the permanent cessation of all mining activities, any openings to the surface will be permanently sealed by the placement of concrete and rock plugs, or steel bulkheads. The vent raise will be sealed by the placement of a concrete plug, covered with at least one foot of growth medium and revegetated.

Removal of underground facilities and equipment will consist of the following steps:

- Underground piping, pumps, tanks and pumping equipment will be removed and salvaged, or disposed of in an approved solid waste disposal facility.
- Piping that cannot be salvaged for reuse will 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 will be removed, as practicable, and salvaged for use at another facility or disposed of in an approved solid waste disposal facility.
- Non-reactive equipment (e.g., HDPE pipe) may be left underground.
- Remaining fuel, lubricants and explosives will be removed from the underground workings and transported to other sites or disposed of according to federal and state standards and regulations.

All salvageable equipment, instrumentation, and unused petroleum products and chemicals and solid wastes from the underground mine will be used or recycled. Examples include piping, pumps, diesel, lubricating fluids, etc. Used and waste petroleum products and chemicals will be disposed of at a Class I landfill. Non-hazardous solid wastes would be disposed of at a Class III landfill. Water pipelines from the underground workings will be removed and hauled off site.

4.10 Road and Yard Features

Roads without a defined post-mining use will be reclaimed concurrently as they are no longer needed for access. Where the original topography exceeds 3H:1V, the road cut will be filled with the road bed material to blend with existing topography and to ensure no steeper than 3H:1V slopes except where cut banks are located generally in bedrock.

Roads and safety berms will be recontoured or regraded to approximate the original contour. Where the road is located on fill, the side slopes will be rounded and regraded to 2.5H:1V. Finished slopes will be relatively similar to the surrounding topography. Compacted road surfaces will be ripped, covered with growth media from the safety berms or road fill, and re-vegetated.

Some access roads will be needed to access monitoring points. As monitoring is completed and the facility is considered to be closed, the access road will be reclaimed, as determined by the BLM and DOGAMI.

4.11 Measures to Minimize Sediment Loading to Surface Drainages

Runoff from the TSF area and other slopes will occur following precipitation events; however, regraded slope angles, revegetation (including growth media placement) and BMPs will be used to limit erosion and reduce sediment in runoff. Silt fences, sediment traps, or other BMPs will be used to prevent migration of eroded material until reclaimed slopes and exposed surfaces have demonstrated erosional stability.

Long-term drainage structures installed for the main access will include properly installed ditches, water-bars, cross drains, and design flow culverts, as needed.

4.12 Disposition of Buildings and Ancillary Facilities

During final mine closure, buildings and structures will likely be dismantled and materials will be salvaged or removed to the proposed landfill or other authorized landfill. Concrete foundations and slabs will be broken using a track-hoe mounted hydraulic hammer or similar methods and buried in place under approximately three feet of material in such a manner to prevent ponding and to allow vegetation growth. After demolition and salvage operations are complete, the disturbed areas will be covered with approximately 12 inches of growth media and revegetated.

All reagents and explosives will be removed or appropriately disposed of. Any surface pipelines will be removed and salvaged or disposed. Underground pipeline ends will be capped and left in place. Unneeded utility poles will be cut off at ground level and removed.

All mining equipment, trailers, supplies, the cement silo, and other mine site infrastructure will also be removed from the site.

4.13 Facilities Not Subject to Reclamation

As determined by the BLM, roads on public lands suitable for public access or which continue to provide public access consistent with pre-mining conditions will not be reclaimed at mine closure. Narrow access roads may remain on large haul roads after they have been re-contoured and seeded.

4.14 Post Reclamation Monitoring and Maintenance

Post reclamation monitoring and maintenance will include the following:

- Following mine closure, berm and sign maintenance, site inspections, and any other necessary monitoring for the period of reclamation responsibility will be conducted. Monitoring of revegetation success will be conducted annually until the revegetation standards have been met and will include noxious weed monitoring and abatement as necessary.
- Calico will monitor the TSF drainage flow and chemistry. Mitigation will be developed if necessary.
- Post-mining ground water quality will be monitored according to the requirements established by the ODEQ upon approval of the Chemical Mining Permit the goal of demonstrating the site poses no potential to degrade waters of the state through the successful implementation of the detailed Final Plan for Permanent Closure. The Reclamation Cost Estimate will contain costs for five years of ground water monitoring.
- Revegetation monitoring will be conducted for a minimum of five years following implementation of revegetation activities or until revegetation success has been achieved. Revegetation monitoring will occur based on seasonal growth patterns, precipitation, and weather conditions.

- Noxious weed monitoring and control will be implemented for a five-year period following closure.

Surface erosion would be visually monitored on a weekly basis by Calico during storm events, or periods of high runoff; the frequency may be more often depending on weather conditions. Erosion control BMPs would be implemented as needed. Examples include: diversion ditches to prevent run-on to the mine site and culverts to carry water across access roadways.

Security measures implemented at the mine site during operations would be installed during reclamation, including gating and warning signs. At closure, additional safety measures would be employed by Calico as necessary to secure the abandoned mining operations.

Revegetation monitoring of the reclaimed facilities would be conducted at both the mine and mill sites for at least three years following final reclamation. The monitoring would involve photo-documentation and be conducted during the "peak green" spring season. This program would be coordinated with the BLM and DOGAMI. Reclaimed areas not meeting regulatory standards would be evaluated, and corrective actions implemented. These measures could include, if necessary, additional soil amendments, reseeding, and installation of erosion control measures. This obligation would cease when the reclamation goals and requirements have been achieved, and upon release of all related reclamation bond(s).

Once all the final reclamation is completed, yearly post-reclamation maintenance would involve remedial dirt work and reseeding, if required. Yearly visits to the site would be conducted to monitor the success of revegetation for a three-year period, or until attainment of revegetation standards.

4.15 Drill Hole Plugging and Water Well Abandonment

Mineral exploration and development drill holes, monitoring, and production wells subject to ODWR regulations will be abandoned in accordance with applicable rules and regulations (OAR 690-220-0005 through 690-220-0140). Boreholes will be sealed to prevent cross contamination between aquifers and the required shallow seal will be placed to prevent contamination by surface access.

Monitoring wells around the TSF will be maintained until Calico is released of this requirement by the ODEQ. These wells will then be plugged and abandoned according to the requirements of the State Engineer.

6-4-7: MINING IN EXCLUSIVE FARM USE ZONE:

A. A land use permit is required for mining more than one thousand (1,000) cubic yards of material or excavation preparatory to mining of a surface area of more than one acre.

B. A permit for mining of aggregate shall be issued only for a site included on an inventory in the Malheur County comprehensive plan. (Ord. 86, 12-7-1993)

Exhibit 4

2.6.3.3 Growth Media Salvage and Stockpiles

As shown on Figure 5 there are eleven soil map units, comprised of seven soil types and one undifferentiated soil group, were identified in the soil survey performed by IMS (1989 and 1991). The map unit boundaries and symbols are shown on the soil map in Figure 5. The map unit descriptions are presented in Table 2-4. Each map unit description provides basic information about the map unit such as predominant soil or soils of the unit, slope, and rock fragment content. Although there are 11 soil units mapped in the project study area, only 9 of these occur within the permit boundary for the purposes of the soil study area. Map units 6 and 11 do not occur in the soil study area so they are not included in Table 2-5.

Table 2.4: Soil Survey Map Unit Descriptions

Map Unit	Name and Description
1	Farmell-Rock outcrop complex, 8 to 30 percent slopes
2	Farmell-Chardoton very cobbly soil, 15 to 30 percent slopes
3	Farmell-Chardoton very cobbly soil, 4 to 15 percent slopes
4	Farmell-Chardoton extremely stony soil, 4 to 15 percent slopes
5	Farmell-Chardoton soil, 8 to 15 percent slopes
6	Ruckles very stony loam, 8 to 30 percent slopes
7	Shano silt loam, 2 to 6 percent slopes
8	Soil A extremely gravelly sandy loam, 15 to 30 percent slopes
9	Virtue loam, 2 to 8 percent slopes
10	Xeric Torriorthents, 8 to 30 percent slopes
11	Soil B very gravelly sand loam, 8 to 30 percent slopes

Table 2.5: Taxonomic Classification of Soil Series

Series	Family
Chardoton	Fine, montmorillonitic, mesic Xerollic Paleargids
Farmell	Fine, montmorillonitic, mesic Xerollic Haplargids
Ruckles	Clayey-skeletal, montmorillonitic, mesic Lithis Argixerolls
Shano	Coarse-silty, mixed, mesic Xerollic Camborthids
Soil A	Fine-loamy, mixed mesic Xerollic Haplargids
Soil B	Clayey-sketetal, montmorillonitic, mesic Xerollic Duraargids
Virtues	Fine-silty, mixed, Xerollic Durarids
	Xertic Torriorthents

Soil found on the ridges is typically less than 30-inches deep, and are high in rock fragments throughout the profile. Farmell and Chardoton soil, with high amounts of clay in the sub-soil and varying amounts of surficial rock fragments, is found throughout the project study area. The moderately fine textured Virtue soil has a hard silica and carbonate hard pan layer at about 20 to 30 inches below the surface. Deep, coarse-textured Shano soil is found along drainage channels. Ruckles soil is typically found over areas where the underlying bedrock is basalt.

Soil A and B have high percentages of surficial rock fragments. Soil A is found on slopes of 15 to 30 percent. Soil B is found in areas with slopes of about 8 percent. The map unit characteristics of these soils are listed in Table 2.4. Suitability for reclamation is also included in the table.

Salvageable growth media from the Project surface disturbance will be stockpiled at centralized locations, as shown on Figure 3. Growth media will be salvaged for reclamation. Soils on slope that are less ten percent will be salvaged to a depth of three feet. Soil on slope at 15 percent of less will be salvaged to a depth of two feet. Soils on slopes greater than 15 percent will be salvage to a depth of one foot. Section 3.1.1 presents further discussion on growth media salvage. Growth media will consist of soils and alluvium stripped prior to surface disturbance activities. Any growth media remaining in the stockpiles for one or more planting seasons will be seeded with an interim seed mix to stabilize the material to reduce erosion and minimize the establishment of undesirable weeds.

Approximately 551,759 bank cubic yards (bcy) of growth media will be salvaged from the footprint of the facilities. Facilities that will not have growth media salvaged are the water pipeline, fence, growth media stockpiles, and exploration areas. These bcy convert to approximately 690,000 cubic yards based on a 25 percent swell factor. Figure 5 shows the distribution of the growth media (soils) within the area of Project surface disturbance. This volume could change based on actual field conditions encountered. On sloped terrain, some soil may be salvaged by pushing available natural growth media cover downhill with a dozer to construct toe berms to prevent rocks from scattering on the hillside below the stockpile toes.

2.6.3.4 Storm Water and Sediment Control Structures

Surface water diversion channels and ditches will be constructed as necessary around surface facilities and waste rock storage areas to control storm water run-on to these sites (Figure 3). Surface water control ditches and sediment retention ponds will be constructed in accordance with BMPs as outlined in the Best Management Practices for Reclaiming Surface Mines in Washington and Oregon (DOGAMI 1997) and in the Tailings Facility and Ancillary Facilities Design Report (Appendix E). Sediment ponds and diversion ditches are sized to contain a 100-year, 24-hour precipitation event. Run-on diversion channels and ditches will remain as permanent features after final reclamation and mine closure.

Run- off control structures include silt traps and fences constructed of certified weed-free straw bales, or geotextile fabric, and sediment ponds. Sediment control measures are implemented as necessary to reduce soil movement within the site and to minimize off-site effects. These structures will be maintained throughout the life of the Project. Soil collected in these structures will be periodically removed and placed in soil stockpiles or used for reclamation. These features will be removed once vegetation is established and sediment runoff has stabilized.

2.6.3.5 Borrow Areas

Three borrow areas are located south of the portal, north of the mill, and on the east edge of the Project Area. Borrow material will be required for areas that need prepared subgrade materials, drainage materials, pipe bedding materials, road surfacing materials, retarding layer materials, closure cover materials, growth media, mine backfill, and riprap. Depth of potential borrow is expected to be between five and 60 feet.

The development of aggregate borrow areas within the Project Area will be necessary to provide the construction aggregate and the material to be used in the underground backfill and TSF construction. This surface mining will require drilling using diesel-powered blast hole drill rigs.

LOCATION CHARDOTON ID

Established Series
Rev. RAC/ALH/RWL
10/2000

CHARDOTON SERIES

The Chardoton series consists of very deep, well drained soils with very slow permeability that formed in a thin mantle of loess over silty alluvium from loess and weathered volcanic ash over loamy alluvium from basalt and volcanic ash.. Chardoton soils are on plains. Slopes are 0 to 4 percent. Mean annual precipitation is about 11 inches and the mean annual temperature is about 52 degrees F.

TAXONOMIC CLASS: Fine, smectitic, mesic Xeric Paleargids

TYPICAL PEDON: Chardoton silt loam -- on a nearly level lava flow trough, at 3,100 feet elevation in rangeland. (Colors are for dry soil unless otherwise noted.)

A--0 to 1 inch; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular and interstitial pores; neutral (pH 6.8); abrupt smooth boundary. (0 to 3 inches thick)

E--1 to 2 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate very thin platy structure parting to strong fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine vesicular and very fine, and fine tubular pores; slightly alkaline (pH 7.4); abrupt wavy boundary. (1 to 4 inches thick)

2Bt1--2 to 5 inches; brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; pale brown (10YR 6/3) silt coats on faces of peds; strong medium subangular blocky structure parting to strong very fine angular blocky; hard, firm, moderately sticky and moderately plastic; many very fine roots; many fine interstitial and common very fine tubular pores; continuous distinct clay films on faces of peds and in pores; cracks 1 to 3 mm wide; slightly alkaline (pH 7.6); abrupt wavy boundary. (1 to 4 inches thick)

2Bt2--5 to 12 inches; light yellowish brown (10YR 6/4) silty clay, brown (10YR 4/3) moist; dark yellowish brown (10YR 3/4) moist organic stains on faces of peds; strong coarse columnar structure parting to strong coarse and medium angular blocky; very hard, very firm, very sticky and very plastic; common very fine roots between peds and few very fine roots in the peds; common very fine and fine tubular pores; continuous prominent clay films on faces of peds and in pores; cracks 1 to 5 mm wide; moderately alkaline (pH 8.4); clear wavy boundary. (6 to 10 inches)

2Bt3--12 to 18 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; common faint dark yellowish brown (10YR 3/4) moist organic stains on faces of peds; strong medium angular blocky structure; hard, firm, very sticky and very plastic; common very fine roots; few very fine tubular pores; continuous distinct clay films on faces of peds and in pores; moderately alkaline (pH 8.0); clear wavy boundary. (0 to 20 inches thick)

2Btk1--18 to 24 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; yellowish brown (10YR 5/4) coatings on faces of peds; moderate medium angular blocky structure; hard, firm, very sticky and very plastic; common very fine roots; few very fine tubular pores; many distinct clay films on faces of peds and in pores; about 20 percent hard cicada nodules; common fine lime veins; slightly effervescent matrix; moderately alkaline (pH 8.4); clear wavy boundary. (4 to 12 inches thick)

2Btk2--24 to 28 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 4/3) moist; dark yellowish brown (10YR 4/4) coatings on faces of peds; strong medium angular blocky structure; hard, very firm, moderately sticky and moderately plastic; common very fine roots; few very fine tubular pores; common distinct clay films on faces of peds and in pores; about 20 percent hard cicada nodules; common fine lime veins; slightly effervescent matrix; moderately alkaline (pH 8.4); abrupt wavy boundary. (0 to 12 inches thick)

3Bk1--28 to 36 inches; pale brown (10YR 6/3) loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; common very fine lime veins; slightly effervescent matrix; moderately alkaline (pH 8.4); gradual smooth boundary. (6 to 24 inches thick)

3Bk2--36 to 61 inches; very pale brown (10YR 7/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common large masses of strongly effervescent segregated lime; moderately alkaline (pH 8.2); gradual wavy boundary. (0 to 30 inches thick)

3C--61 to 65 inches; light yellowish brown (10YR 6/4) fine sandy loam, brown (7.5YR 4/4); massive; slightly hard, very friable, slightly sticky and slightly plastic; slightly effervescent; moderately alkaline (pH 8.3); clear smooth boundary. (0 to 8 inches thick)

4Btkb--65 to 75 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; strong fine angular blocky structure; very hard, firm, moderately sticky and moderately plastic; slightly effervescent; strongly alkaline (pH 8.6).

TYPE LOCATION: Ada County, Idaho; about 4 miles south of Orchard; approximately 250 feet north and 50 feet east of the southwest corner of section 8, T. 2 S., R. 4 E.; USGS Orchard Quadrangle; (Latitude - 43 degrees, 15 minutes, 33 seconds N. and Longitude - 116 degrees, 00 minutes, 54 seconds W.).

RANGE IN CHARACTERISTICS:
Average annual soil temperature - 52 to 56 degrees F.
Depth to abrupt textural change - 1 to 4 inches
Depth to calcium carbonates - 14 to 36 inches
Depth to base of argillic horizon - 25 to 48 inches
Depth to bedrock - greater than 60 inches
Particle-size control section - 35 to 55 percent clay; 0 to 5 percent rock fragments
Moisture control section - moist less than 90 consecutive days when the soil temperature is greater than 47 degrees F.

E horizon
Value - 5 or 6 dry, 3 or 4 moist
Clay content - 12 to 18 percent
Rock fragments - 0 to 5 percent total
Reaction - slightly acid through slightly alkaline

Bt horizon
Value - 4 through 6 dry, 3 through 5 moist (silt coats are 6 or 7 dry)
Chroma - 3 or 4 dry or moist
Texture - SIC, SICL or C
Clay content - 35 to 55 percent
Rock fragments - 0 to 5 percent total (mainly gravel)
Reaction - slightly acid through moderately alkaline

Btk horizon
Value - 5 through 7 dry, 3 through 5 moist
Chroma - 3 or 4 dry or moist
Texture - SIC, C, CL, SICL or SIL

Clay content - 25 to 45 percent
Rock fragments - 0 to 5 percent total (mainly gravel)
Calcium carbonate equivalent - 1 to 5 percent
Reaction - slightly alkaline or strongly alkaline

Bk horizon
Hue - 7.5YR or 10YR
Value - 6 or 7 dry, 4 or 5 moist
Chroma - 3 or 4 dry or moist
Texture - L, SIL, or VFSL
Clay content - 10 to 22 percent
Rock fragments - 1 to 5 percent (mainly gravel)
Calcium carbonate equivalent - 0 to 5 percent
Reaction - slightly alkaline or moderately alkaline

Buried Bt horizons are common, but below a depth of 60 inches.

COMPETING SERIES: These are the Acoma, Berdugo, Biscaro (T), Borda, Bowns, Brent, Gooding, Hagata (T), Jowec, Locey (T), Lodico (T), Poall, Reba and Spangenburg series. Acoma soils have 15 to 35 percent gravel in the particle-size control section. Berdugo soils are 10 to 20 inches deep to the base of the argillic horizon and have AAST of 47 to 50 degrees F. Biscaro and Hagata soils are 20 to 40 inches deep to a paralithic contact. Borda soils are 40 to 60 inches deep to bedrock and have AAST of 47 to 52 degrees F. Bowns, Locey and Lodico soils are 20 to 40 inches to bedrock. Brent soils have A horizons 8 to 12 inches thick. Gooding soils are 40 to 609 inches to a duripan. Jowec soil are 15 to 25 inches deep to base of argillic horizon. Poall soils do not have an E horizon or cicada krotovinas within the lower part of the argillic horizon. Reba soils have A horizons greater than 6 inches thick and AAST of 49 to 51 degrees F. Spangenburg soils do not have an E horizon and have AAST of 47 to 50 degrees F.

GEOGRAPHIC SETTING: Chardoton soils are lava flow troughs on shield volcanoes and lava plains. Elevations range from 2,850 to 3,500 feet. Slopes are 0 to 4 percent. The soils formed in silty alluvium from loess and weathered volcanic ash over loamy alluvium from basalt and volcanic ash. Average annual precipitation is 8 to 14 inches. Average annual temperature is 50 to 54 degrees F. Frost-free period is 130 to 150 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Catchell, Chilcott, Lankbush, Power, Tindahay soils and the competing Bowns soils. Catchell and Chilcott soils have a duripan at a depth of 20 to 40 inches. Power and Lankbush soils have less than 35 percent clay in the textural control section. Tindahay soils lack an argillic horizon and have sandy textures in the textural control section.

DRAINAGE AND PERMEABILITY: Well drained; very slow and slow runoff; very slow permeability.

USE AND VEGETATION: The Chardoton soils are used mainly for rangeland. Natural vegetation is bluebunch wheatgrass, Thurber needlegrass, basin wildrye, Wyoming big sagebrush and threetip sagebrush.

DISTRIBUTION AND EXTENT: Southwestern Idaho; MLRA 11. These soils are inextensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Ada County, Idaho, 1977.

REMARKS: Diagnostic horizons and features recognized in this pedon:

Ochric epipedon - zone from surface to 2 inches (A and E horizons)
Argillic horizon - zone from 2 to 28 inches (2Bt1, 2Bt2, 3Bt3, 2Btk1 and 2Btk2 horizons)
Abrupt textural change - at 2 inches (upper boundary of 2Bt1 horizon)

Particle-size control section - zone from 2 to 22 inches
Soil moisture regime - aridic bordering xeric

The Chardoton soils mapped in Elmore County Area, Idaho soil survey have a duripan between 40 and 60 inches deep which is not a recognized horizon of this series and should be correlated to a different series.

The classification of this pedon has been revised as of 4/00 from Xerollic Paleargids to Xeric Paleargids based on revisions to Soil Taxonomy.

The term silty alluvium used in this series concept infer a localized influence on the mixed loess and weathered ash mantle by overland flow of running water.

National Cooperative Soil Survey
U.S.A.

LOCATION FARMELL OR+ID

Established Series
Rev. BBL/AON/TDT
04/2000

FARMELL SERIES

The Farmell series consists of very deep, well drained soils on uplands. They formed in old alluvium and are capped with a layer of younger loess. Slopes are 0 to 50 percent. The mean annual precipitation is about 10 inches and the mean annual temperature is about 48 degrees F.

TAXONOMIC CLASS: Fine, smectitic, mesic Xeric Haplargids

TYPICAL PEDON: Farmell silt loam, cultivated. (Colors are for dry soil unless otherwise noted.)

Ap--0 to 7 inches; light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; many roots; few medium pores in the top 3 inches, many very fine irregular pores from 3 to 7 inches; slightly alkaline (pH 7.8); abrupt smooth boundary. (6 to 8 inches thick)

AB--7 to 12 inches; light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many roots; many fine tubular pores; slightly alkaline (pH 7.8); clear smooth boundary. (0 to 6 inches thick)

BA--12 to 15 inches; light brownish gray (10YR 6/2) silty clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many roots; many very fine tubular pores; moderately alkaline (pH 8.0); clear wavy boundary. (3 to 6 inches thick)

Bt1--15 to 22 inches; light brownish gray (10YR 6/2) silty clay, dark brown (10YR 3/3) moist; moderate medium prismatic parting to strong medium subangular blocky structure; hard, firm, moderately sticky and very plastic; many roots; many very fine tubular pores; common faint clay films on faces of peds and in pores; moderately alkaline (pH 8.2); clear wavy boundary. (5 to 8 inches thick)

Bt2--22 to 30 inches; pale brown (10YR 6/3) silty clay, dark brown (10YR 4/3) moist; strong fine and medium angular blocky structure; hard, firm, moderately sticky and very plastic; many roots; few very fine tubular pores; few faint clay films on faces of peds and in pores; moderately alkaline (pH 8.4); clear wavy boundary. (6 to 10 inches thick)

Bk1--30 to 38 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent; lime segregations along root channels; moderately alkaline (pH 8.4); gradual wavy boundary. (6 to 10 inches thick)

Bk2--38 to 43 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent; few lime streaks; moderately alkaline (pH 8.4); gradual wavy boundary. (3 to 5 inches thick)

Bk3--43 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; violently effervescent; strongly alkaline (pH 8.8).

TYPE LOCATION: Malheur County, Oregon; 600 feet east of the well and windmill, 600 feet west of north and south fence line in the NE1/4 NE1/4 SE1/4 section 3, T. 16 S., R. 46 E.

RANGE IN CHARACTERISTICS: The mean annual soil temperature ranges from 48 to 53 degrees F. Farmell soils are usually dry but are moist in some parts between 4 to 12 inches for a cumulative period equal to less than one-half of the time that the soil temperature exceeds 41 degrees F., and moist between depths of 4 to 12 inches for at least 60 days out of the 120 days following the winter solstice and are dry for 45 consecutive days or more between 4 to 12 inches within the 4-month period following the summer solstice. Depth to bedrock is more than 60 inches. Depth to carbonates is 18 to 36 inches. The soils lack rock fragments.

The A or Ap horizon has value of 6 dry and 3 moist and chroma of 2 or 3 moist and dry. It is neutral to slightly alkaline.

The Bt horizon has value of 6 or 7 dry and 3 to 5 moist, chroma of 2, 3 or 4 moist and dry. It is silty clay loam, clay or silty clay with 35 to 50 percent clay. Clay films are common to continuous and faint to distinct. It has weak or moderate prismatic and moderate or strong subangular or blocky structure. It is slightly to moderately alkaline.

COMPETING SERIES: These are the Buncelvoir, Diaz (T), Glasgow, Lanktree, Oppio, Risley, Schamp, and Trunk series. Diaz soils are strongly effervescent at 12 to 24 inches and are 20 to 40 inches to bedrock. Glasgow and Trunk soils are 20 to 40 inches to bedrock. Lanktree soils have an E horizon and are neutral to slightly alkaline and lack the high silt of the Farmell soils. Oppio soils are neutral to moderately acid and have a lithic contact at depths of 20 to 30 inches. Risley soils are 20 to 30 inches to a paralithic contact. Schamp soils have formed in loamy alluvium superimposed over very cobbly loam alluvium and lack the high silt of the Farmell soils. Buncelvoir soils have carbonates at depths of 10 to 18 inches.

GEOGRAPHIC SETTING: Farmell soils are on uplands with slopes of 0 to 50 percent. Elevation is 2,600 to 4,600 feet. The soils are formed in loess-capped, old silty alluvium from mixed materials. The climate is semiarid with a mean annual precipitation of 8 to 12 inches. The mean July temperature is about 68 to 72 degrees F.; mean winter temperature is about 26 to 30 degrees F.; mean annual temperature is 46 to 51 degrees F. The frost-free period is 90 to 135 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Beirman, Chilcott and Virtue series. The Beirman soils have more than 60 percent clay. The Chilcott and Virtue soils have duripans.

DRAINAGE AND PERMEABILITY: Well drained; moderate to rapid runoff; slow permeability.

USE AND VEGETATION: The principal use is for range. Dryland grain is produced under summer fallow conditions.

DISTRIBUTION AND EXTENT: Northwestern Malheur County, Oregon, and southwestern and south central Idaho. The series is inextensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Portland, Oregon

SERIES ESTABLISHED: Cassia County, Idaho, Eastern Part, 1987.

REMARKS: Diagnostic horizons and features:

Ochric epipedon - the zone from the surface to a depth of 12 inches (Ap and AB horizons).

Argillic horizon - the zone from 15 to 30 inches (Bt1 and Bt2 horizons).

National Cooperative Soil Survey
U.S.A.

CALICO RESOURCES USA CORP.
GRASSY MOUNTAIN MINE PROJECT
MALHEUR COUNTY, OREGON

WILDLIFE RESOURCES BASELINE REPORT

APRIL 2018
REVISED OCTOBER 2018

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Appendix E Comprehensive List of Wildlife Species Observed

ATTACHMENTS

Attachment A: Wildlife Resources Baseline Study for the Grassy Mountain Gold Project, September 2014

LIST OF ABBREVIATIONS AND ACRONYMS

BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
Calico	Calico Resources USA Corp.
CF Cards	compact flash cards
cm	centimeter
DOGAMI	Department of Geology and Mineral Industries
EMS	EM Strategies, Inc.
ESA	Endangered Species Act
FSA	Farm Service Agency
GIS	Geographic Information Systems
GPS	Global Positioning System
HDR	HDR Engineering, Inc.
IPaC	Information for Planning and Consultation
NAIP	National Agriculture Imagery Program
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWC	Northwest Wildlife Consultants, Inc.
NWGAP	Northwest Regional Gap Analysis Project
OAR	Oregon Administrative Rule
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statute
Project	Grassy Mountain Mine Project
T&E	threatened and endangered
TES	Threatened, Endangered, and Sensitive Species
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WSA	Wildlife Study Area

1 INTRODUCTION

The purpose of this baseline report is to characterize wildlife resources in the study area prior to the start of proposed mining operations at the Grassy Mountain Mine Project (Project) in Malheur County, Oregon. EM Strategies, Inc. (EMS) was contracted by Calico Resources USA Corp. (Calico) to conduct a review of existing wildlife information and a variety of field surveys. The surveys required, and the applicable survey areas, were identified in the *Wildlife Resources Environmental Baseline Work Plan* (EMS 2017). These surveys were intended to provide all the necessary baseline data to fulfill Oregon Administrative Rule (OAR) 632-037-0055 of the Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon Revised Statute (ORS) 517.956, and other relevant Oregon Administrative Rules (OARs) and ORSs.

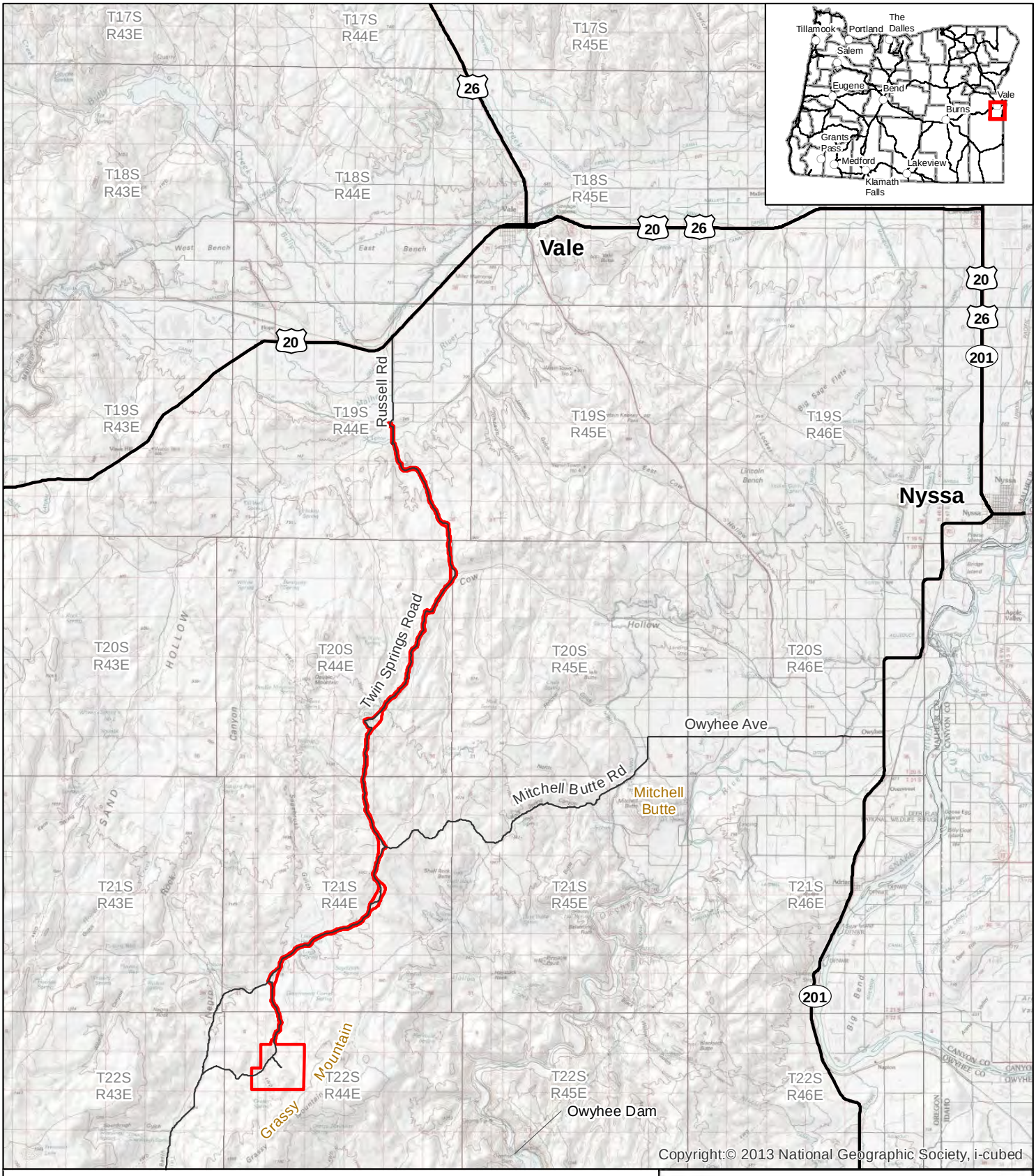
A portion of the text and data used in this report has been incorporated from the September 2014 *Wildlife Resources Baseline Study* prepared for the Project by Northwest Wildlife Consultants, Inc. (NWC), for previously surveyed areas within the current permit area. This report documents results from the 2014 NWC report, as well as new results from surveys conducted in 2017 and 2018 by EMS. The 2014 NWC report is included as Attachment A. Additional data collection may be required based on the findings of the groundwater study being prepared for the Project.

2 RESOURCE STUDY AREA

The Project is in Malheur County, Oregon, approximately 22 miles south-southwest of Vale (Figure 1) and consists of two areas: the Mine and Process Area and the Access Road Area (Permit Area) (Figure 2).

The Mine and Process Area is located on three patented lode mining claims and unpatented lode mining claims that cover an estimated 886 acres. These patented and unpatented lode mining claims are part of a larger land position that includes 419 unpatented lode mining claims and nine mill site claims on lands administered by the Bureau of Land Management (BLM). All proposed mining would occur on the patented claims, with some mine facilities on unpatented claims. The Mine and Process Area is in all or portions of Sections 5 through 8, Township 22 South, Range 44 East (T22S, R44E) (Willamette Meridian).

The Access Road Area is located on public land administered by the BLM, and private land controlled by others (Figure 2). A portion of the Access Road Area is a Malheur County Road named Twin Springs Road. The Access Road Area extends north from the Mine and Process Area to Russell Road, a paved Malheur County Road. The Access Road Area is in portions of Section 5, T22S, R44E, Sections 3, 10, 11, 14, 15, 21 through 23, 28, 29, and 32, T21S, R44E, Sections 1, 12 through 14, 23, 26, 27, and 34, T20S, R44E, Sections 6 and 7, T20S, R45E, and Sections 22, 23, 26, 35, and 36, T19S, R44E (Willamette Meridian). The width of the Access Road Area is 300 feet (150 feet on either side of the access road centerline) to accommodate possible minor widening or re-routing, and a potential powerline adjacent to the access road. There are several areas shown that are significantly wider than 300 feet on the Permit Area Map (Figure 2), which are areas where the final alignment has not yet been determined. The final engineering of the road



Explanation

- Permit Area
- Existing Road

Projection: UTM Zone 11 North, NAD83, meters

0 5,000 10,000 Feet

0 1 2 Miles

N

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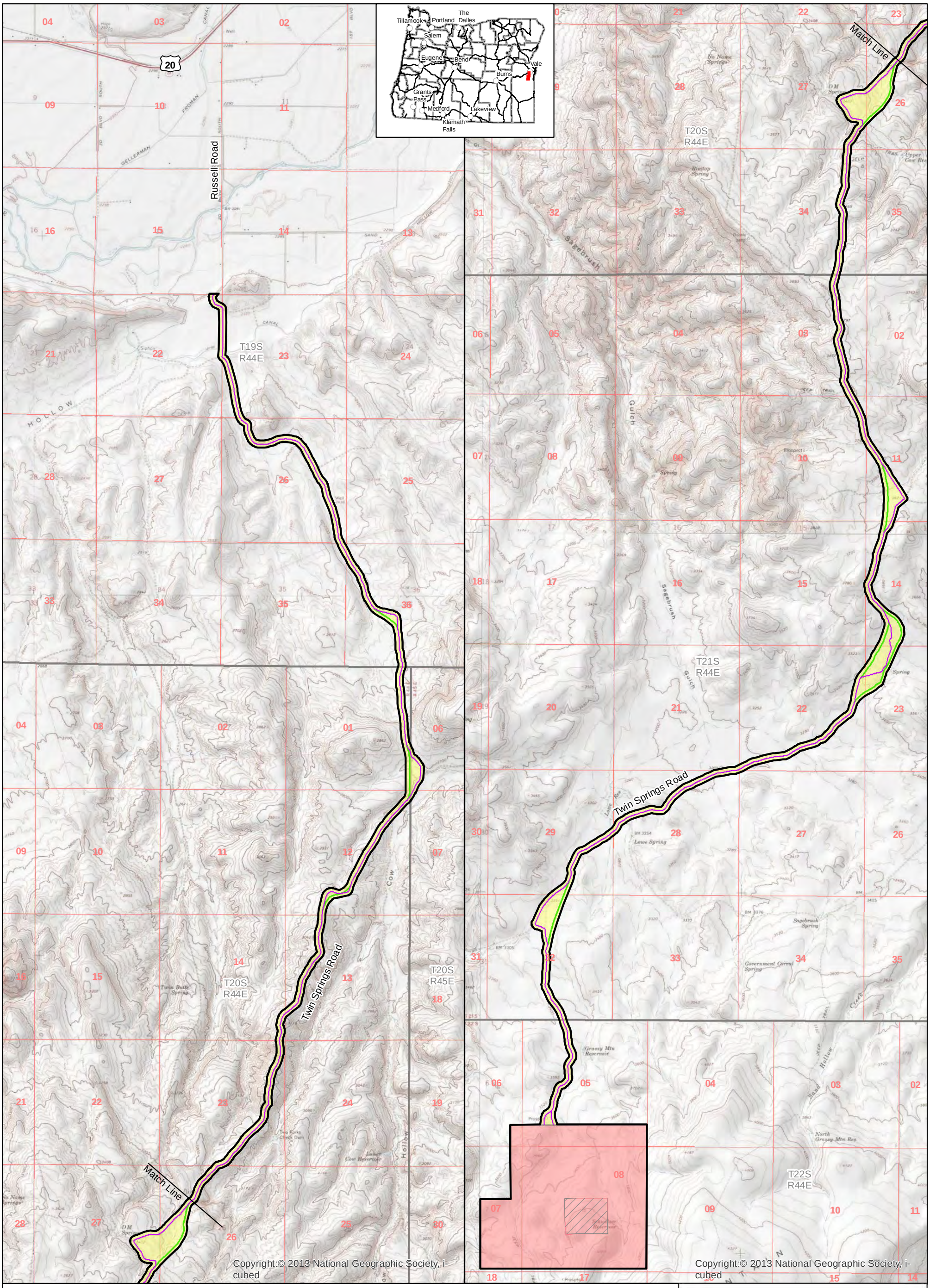
GRASSY MOUNTAIN MINE PROJECT

Location Map

Figure 1

Date:	12/19/2017	Drawn By:	JDB
Revised:		Project No.:	3672
Base Map:	USGS 100K quads: Boise, Brogan, Vale, Weiser		
File Name:	3672G_GrassyMtn_BL__Fig01_LocationMap.mxd		

EM STRATEGIES



Explanation

- Permit Area
- Mine and Process Area
- Access Road Area
- Patented Lode Claims
- Proposed Access Road
- Possible Road Realignment

Projection: UTM Zone 11 North, NAD83, meters

0 2,000 4,000 6,000 8,000 10,000 Feet

0 1 2 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Permit Area Map

Figure 2

Date:	12/19/2017	Drawn By:	JDB
Revised:		Project No.	3672
Base Map:	USGS 7.5' quads: Double Mountain, Grassy Mountain, Kane Spring East, Sourdough Spring, Vale West		
File Name:	3672G_GrassyMtn_BL__Fig02_PermitAreaMap.mxd		

EM STRATEGIES

will be consistent throughout, and within the Permit Area. The Access Road Area also includes a buffer on either side of the proposed road width for the collection of environmental baseline data. The road corridor will be 40 feet wide, which includes a 24-foot wide road travel width (12 feet on either side of the road centerline), four-foot wide shoulders on each side of the road, minimum one-foot wide ditches on each side of the road, and appropriate cut and fill. The Access Road Area totals approximately 876 acres.

A portion of the Permit Area was surveyed in 2013 and 2014 by NWC. The results of the NWC survey are presented in the September 2014 *Wildlife Resources Baseline Study for the Grassy Mountain Gold Project* (Attachment A). The Permit Area changed after the NWC survey. Portions of the new Permit Area that were not surveyed by NWC were surveyed by EMS in 2017 and 2018. The combination of the NWC and EMS survey areas comprises the Wildlife Study Area (WSA) (Figure 3). This report is documentation of the results of both surveys. Information from the 2014 NWC report is incorporated into this report.

3 REGULATORY FRAMEWORK

3.1 Federal

The Council on Environmental Quality regulations discuss "human environment" at 40 Code of Federal Regulations 1508.14. This term broadly relates to the biological, physical, social, and economic elements of the environment. It includes the wildlife resources category. Relevant data is to be used in describing the affected environment as the basis for determining the effects (direct and indirect) of a proposed action. The 2008 BLM National Environmental Policy Act (NEPA) Handbook (H-1790-1) describes potential NEPA-related federal requirements.

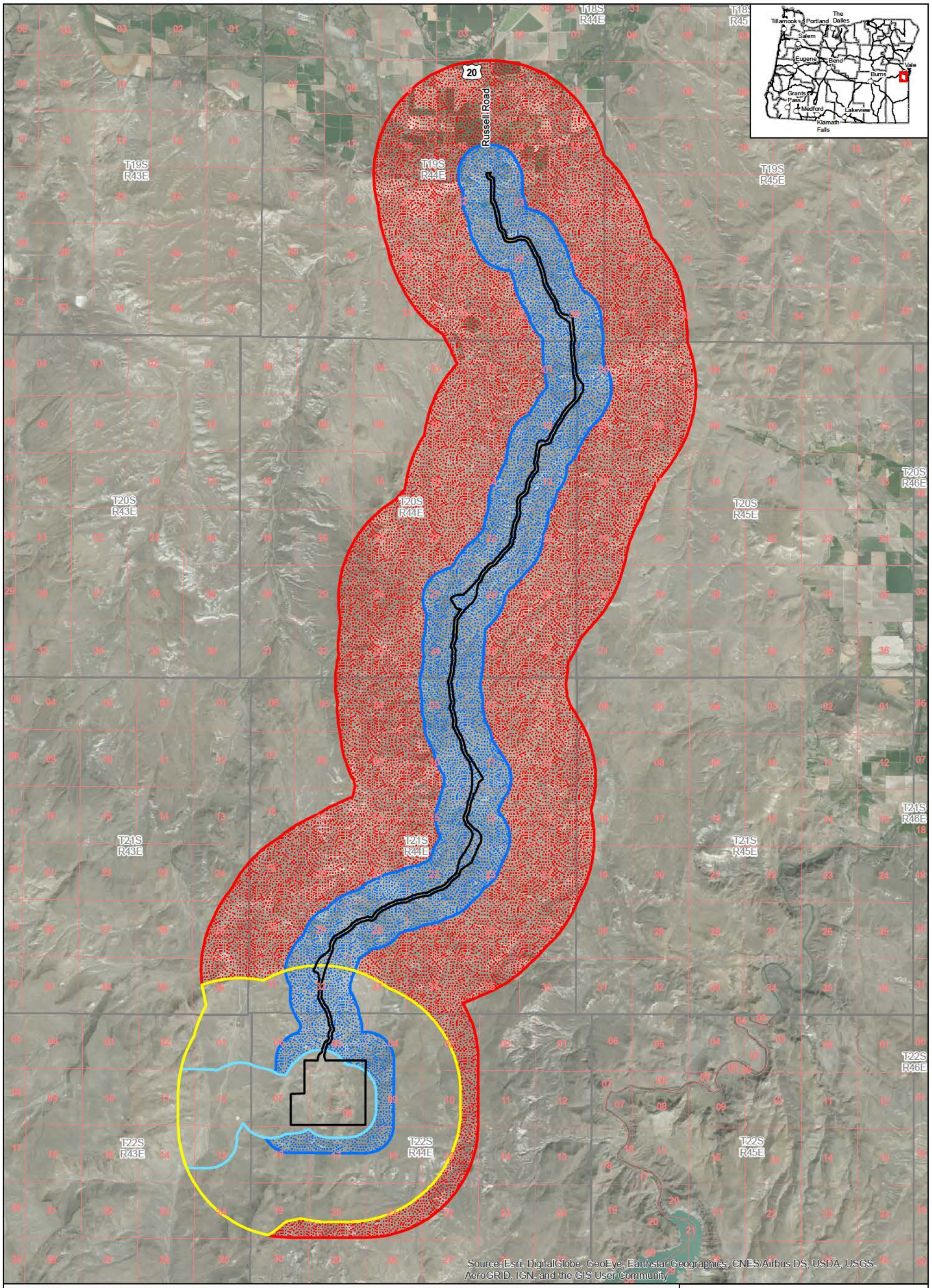
Other federal requirements, such as the Endangered Species Act (ESA) consultations, and critical habitat procedural requirements are discussed in Chapter 175, "Wildlife and Vegetation Protection; Environmental Regulation of the American Law of Mining" (Holland and Hart 2010). The following sections provide a list of relevant federal regulations.

3.1.1 Federal Endangered Species Act

Section 7 of the ESA (19 United States Code [U.S.C] § 1536(c)), as amended, states that any actions authorized, funded, or carried out by a federal agency do not jeopardize the continued existence of a federally-listed endangered or threatened species, or result in the destruction or adverse modification of federally-listed designated critical habitat. The action agencies are required to consult with the United States Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration to determine whether federally-listed threatened and endangered (T&E) species or designated critical habitat are found within the vicinity of the proposed project, and to determine the proposed action's potential effects on those species or critical habitats.

3.1.2 Bald and Golden Eagle Protection Act

When first enacted in 1940, the Bald and Golden Eagle Protection Act (16 U.S.C.§ 668) (BGEPA) prohibited the take, transport or sale of bald eagles, their eggs, or any part of an eagle except where expressly allowed by the Secretary of the Interior. The BGEPA was amended in 1962 to extend the prohibitions to the golden eagle (*Aquila chrysaetos*).



Explanation

- Permit Area
- 2017-2018 EMS Two-mile Buffer WSA
- 2017-2018 EMS 0.5-mile Buffer WSA
- 2013-2014 NWC Two-mile Buffer WSA
- 2013-2014 NWC 0.5-mile Buffer WSA

Projection: UTM Zone 11 North, NAD83, meters

0 1 2 3 4 Miles

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GRASSY MOUNTAIN MINE PROJECT

Wildlife Study Areas

Figure 3

Date: 03/30/2018	Drawn By: JDB/SMH
Revised:	Project No.: 3678
Base Map: USGS 100K quad: Vale	
File Name: 3678GH_GrassyMtn_Wildlife	

EM STRATEGIES

3.1.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 U.S.C. §§ 703-712) implements various treaties and conventions for the protection of migratory birds. Under this Act, taking, killing, or possessing migratory birds (including any part, nest, or egg) is unlawful.

3.1.4 Bureau of Land Management (Manual 6840) – Special Status Species

The BLM's policy for management of special status species is in BLM Manual Section 6840 (BLM 2008a). Special status species include the following:

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

3.2 State

The Oregon Department of Fish and Wildlife (ODFW) manages fish and wildlife populations through objectives specified in various management plans. ODFW has direct responsibility for wildlife protection. In the Permit Area, the BLM manages habitat to support fish and wildlife.

The State of Oregon has threatened, endangered, and sensitive (TES) species provisions that protect native vertebrates and plants on state lands (ORS Sections 496.172 to 496.192; 498.026; and 564.100 to 564.135) and requires consideration of the impacts of any action on private land, in this case chemical mining, on T&E species (ORS Sections 517.956. 496.012, and 506.109).

ORS Section 517.956 establishes standards and protection measures that all chemical mining operations will follow that ensure protection measures for fish and wildlife are consistent with ODFW policies, including the following:

a) Protective measures to maintain an objective of zero wildlife mortality;

b) On-site and off-site mitigation ensuring there is no overall net loss of habitat value;

c) No loss of existing critical habitat of any state or federally-listed threatened or endangered species;

d) Fish and wildlife mortality shall be reported in accordance with a monitoring and reporting plan approved by ODFW;

e) ODFW shall establish by rule standards for review of a proposed chemical process mining operation for the purpose of developing conditions for fish and wildlife habitat protection that satisfy the terms of this section for inclusion in a consolidated permit by DOGAMI; and

f) Surface reclamation of a chemical process mine site shall ensure environmental protection and that a self-sustaining ecosystem, comparable to undamaged ecosystems in the area, has been established in satisfaction of the operator's habitat restoration obligations.

The purpose of OAR Chapter 635 Division 420 is to prescribe the standards for ODFW review of proposed chemical process mining operations to protect wildlife and their habitat and to further the Wildlife Policy (ORS 496.012) and the Food Fish Management Policy (ORS 506.109) of the State of Oregon. Baseline data collection will be consistent with what is required in developing a wildlife protection plan in accordance with OAR 635-420-0010, standards to protect wildlife in accordance with OAR 635-420-0015-0025, a habitat mitigation plan in accordance with OAR 635-420-0030, and wildlife mitigation plan in accordance with OAR 635420-0060.

The wildlife mitigation plan shall include the information required in OAR 635-415-0020(5). Affected wildlife habitats shall be evaluated using methodologies approved by the ODFW which are well-documented, measurable and verifiable. Examples of habitats that shall be addressed in the mitigation plan include, but are not limited to, the following:

a) Surface waterways, streams, springs, seeps, wetlands and other wildlife habitats;

b) Riparian areas;

c) Big game habitat;

d) Bird habitat;

e) Habitat for state or federally-listed threatened or endangered species, and state sensitive species;

f) Reproduction and nursery areas;

g) Fish spawning areas;

h) Geomorphic and edaphic habitats including cliffs, caves, sand dunes, playas and local distinctive soils that, along with their vegetation, contrast markedly with the surrounding area; and

i) Wildlife migration and movement corridors.

In addition, ODFW manages wildlife species populations through management objectives specified in their respective management plans; BLM manages adequate habitat to support these numbers. BLM and ODFW work cooperatively to benefit the management of wildlife and wildlife habitat as described in the memorandum of understanding of 2001 between the two agencies.

4 STUDY METHODOLOGY

4.1 Literature Review

A portion of the baseline characterization outlined in this report has been incorporated from the September 2014 NWC report (Attachment A). Prior to initiating the 2017 field surveys, the results of the literature review in the NWC report were reviewed, and updated information on special status species was requested from the USFWS, the Oregon Biodiversity Information Center (ORBIC), and ODFW. ORBIC maintains a computerized inventory of the wildlife, plant, and ecological community resources of Oregon.

4.2 Field Studies

The protocols for the field studies were established in the *Environmental Baseline Work Plans* (EMS 2017). The areas surveyed by NWC in 2014 and EMS in 2017 and 2018 are illustrated in Figure 3. Surveys were conducted within the Permit Area and a 0.5-mile buffer, or the Permit Area and a two-mile buffer, dependent on the species. Throughout this report, the areas will be referred to as 0.5-Mile Buffer WSA, and Two-Mile Buffer WSA. The following studies were performed within each study area:

Two-Mile Buffer WSA

- Greater sage-grouse habitat assessment and lek survey
- Golden eagle nest survey
- Nesting raptor survey
- General observations of special status species and non-listed species

0.5-Mile Buffer WSA

- Pygmy rabbits and white-tailed jackrabbit (leoprids)
- Bats
- Burrowing owl
- Landbirds
- General wildlife encounter surveys

4.2.1 Wildlife Habitat Mapping and Categorization

The habitat categories in the Permit Area were qualitatively categorized based on their importance to fish and wildlife, in accordance with the ODFW Fish and Wildlife Habitat Mitigation Policy. Habitat categorization was developed using a combination of the results of the terrestrial vegetation surveys of the Permit Area (EMS 2018; HDR Engineering, Inc. [HDR] 2014; HDR 2015) and the United States Geological Survey (USGS) Northwest Regional Gap Analysis Project (NWGAP) land cover classifications (USGS 2011).

Mapping was conducted using a combination of aerial photograph interpretation and on-the-ground verification. Initial habitat boundaries were delineated at a scale of 1:5,000 in a digital geographic information system (GIS) using National Agriculture Imagery Program (NAIP) one-meter resolution orthophoto quadrangle county mosaics (United States Department of Agriculture [USDA] Farm Service Agency [FSA] 2009; USDA FSA 2011; USDA FSA 2012), digital raster graphics of standard series USGS topographic maps, and the Natural Resources Conservation Service (NRCS) soil survey geographic database (NRCS 2017).

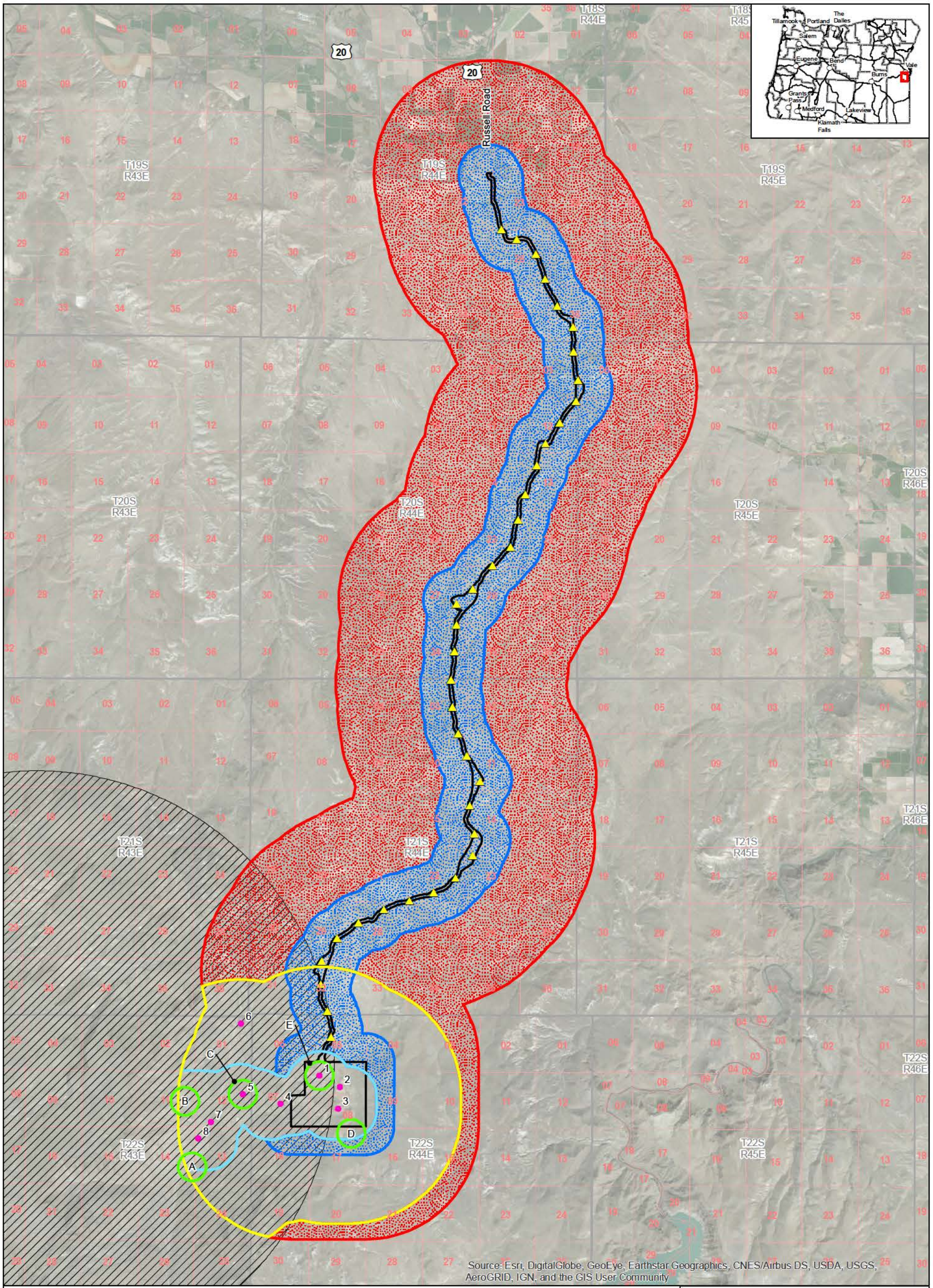
Biologists ground-verified and adjusted boundaries, further delineated habitat types, and developed detailed descriptions of each habitat type. These data were used to develop habitat categories based on vegetation type and wildlife species use. Habitat types were mapped according to current vegetation rather than according to the potential ecological climax for any given location.

Habitat types were rated for habitat quality in the Permit Area based on definitions found in OAR 635-415-0025. This rule defines six habitat categories and establishes mitigation goals and implementation standards for each (Table 1).

Table 1: ODFW Mitigation Goals and Implementation Standards by Habitat Category

Habitat Category	Habitat Characteristics	Mitigation Goal	Achieved by
1	Irreplaceable, essential and limited	No loss of habitat quantity or quality	Avoidance
2	Essential and limited	No net loss of habitat quantity or quality and to provide a net benefit of habitat quantity or quality	In-kind, in-proximity mitigation
3	Essential, important and limited	No net loss of habitat quantity or quality	In-kind, in-proximity mitigation
4	Important	No net loss of habitat quantity or quality	In-kind or out-of-kind, in-proximity or off-proximity mitigation
5	Having high potential to become either essential or important	Net benefit in habitat quantity and quality	Actions that improve habitat conditions
6	Low potential to become essential or important	Minimize impacts	Conscientious Project design

Additional GIS layers, including ODFW Core and Low Density Areas for greater sage-grouse (*Centrocercus urophasianus*), lek locations, and known raptor nest shape files, were used to further refine the habitat category of a habitat type and area. ODFW has identified throughout the range of the greater sage-grouse Core Areas and Low Density Areas based on the locations of known leks (ODFW 2013a). A Core Area is considered by ODFW to be a Category 1 habitat, irreplaceable, essential, and limited; none of this habitat exists within the Two-Mile Buffer WSA. Low Density Areas are considered by ODFW to be Category 2, essential and limited. A portion of the Permit Area is designated Low Density Area (ODFW 2013a) (Figure 4). This designation is a coarse filter based on lek locations. The final habitat assessment depended on a site-specific determination of whether these areas either contain habitat upon which sage-grouse depend or contain signs of use by this species. Where neither applied, the habitat categorization was based on vegetation characteristics or the presence of other sensitive species.



Explanation

- Permit Area
- 2017-2018 EMS Two-mile Buffer WSA
- 2017-2018 EMS 0.5-mile Buffer WSA
- 2013-2014 NWC Two-mile Buffer WSA
- 2013-2014 NWC 0.5-mile Buffer WSA
- Large Avian Plot Locations (2013-2014)
- Small Avian Plot Locations (2013-2014)
- Burrowing Owl Call Stations (2017)
- Low Density Area

Projection: UTM Zone 11 North, NAD83, meters

Miles: 0 1 2 3 4

N

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GRASSY MOUNTAIN MINE PROJECT

ODFW Greater Sage-Grouse Low Density Area, Avian Survey Plots, and Burrowing Owl Call Stations

Figure 4

Date: 03/30/2018	Drawn By: SMH		
Revised:	Project No.: 3678		
Base Map: USGS 100K quad: Vale			
File Name: 3678H_GrassyMtn_Wildlife_Projects_Sum_Rpt.mxd			

EM STRATEGIES

4.2.2 Large-Plot Avian Surveys

Large-plot avian surveys were conducted by NWC in 2013 and 2014. A variable circular-plot method (Reynolds et al. 1980) was used to obtain information on species composition and relative abundance of birds on and near the Project during diurnal hours. This survey protocol was primarily designed for studying use by large birds (i.e., waterbirds and raptors), but information for all species observed was recorded during each survey. Five 800-meter radius study plots were established (Figure 4). Plots were non-overlapping and were located to provide optimal viewing conditions and thorough coverage. The avian ecologist positioned at the center of the plot recorded all vertebrate wildlife seen or heard during 20-minute point counts. Species, number, flight height, weather, etc., were collected. Survey starting point locations and times of the day were alternated among surveys to reduce spatial and temporal bias. All survey plots were surveyed four times within each of the four survey seasons. Survey dates for each season were:

- Summer: June 24 – August 14, 2013; four visits to five plots, 20 surveys
- Fall: September 4 – October 24, 2013; four visits to five plots, 20 surveys
- Winter: November 25, 2013 – February 26, 2014; four visits to five plots, 20 surveys
- Spring: March 19 – May 29, 2014; four visits to five plots, 20 surveys

In four seasons between June 2013 to May 2014, 80 20-minute avian use surveys were conducted for the Project. Flight paths of special status species or raptors were hand-plotted on topographic maps in the field. All detected vertebrate wildlife were recorded, whether inside or outside the fixed-point plot. The avian use surveys conducted in 2013 and 2014 were adequate to characterize avian use in the Permit Area vicinity during all seasons of the year since the composition of the avian population would most likely not have changed substantially between surveys; therefore, large-plot avian surveys were not conducted during the 2017 or 2018 field surveys.

4.2.3 Small-Plot Avian Surveys

Small-plot avian surveys were also conducted by NWC in 2013 and 2014 to complement the large-plot avian surveys. Small-plot avian surveys focused on smaller birds (especially passerines) and utilized the range of habitats in the general vicinity of the Project. These surveys involved the establishment of eight fixed-radius points or plots (Ralph et al. 1993) in summer 2013 (Figure 4). The small-plot avian surveys were conducted 16 times throughout the year, with four complete surveys during each season: summer (June through August), fall (September through October), winter (November through February), and spring (March through May). A total of 128 surveys were conducted.

Plots covered each habitat type within the Two-Mile Buffer WSA (Table 2). Each study plot had a radius of 100 meters. Plots were surveyed by an experienced avian ecologist using a ten-minute observation period, and all surveys were completed between sunrise and five hours after sunrise, consistent with standard protocols. Surveys were not conducted when wind and weather conditions were likely to hamper the researcher's ability to detect whatever birds were present. General data recorded included date, time, and weather variables. Data associated with bird detections included species and number, age and sex, behavior and habitat. The avian use surveys conducted in 2013 and 2014 were adequate to characterize avian use in the Permit Area vicinity during all seasons of the year since the composition of the avian population would most likely not have changed

substantially between surveys; therefore, small-plot avian surveys were not conducted during the 2017 or 2018 field surveys.

Table 2: Small-Plot Descriptions

Plot	Description
1	Exposed rock surrounded by sagebrush shrub-steppe habitat.
2	Exposed rock surrounded by sagebrush shrub-steppe habitat.
3	A small amount of exposed rock but was primarily sagebrush shrub-steppe habitat.
4	A mix of big sagebrush shrub-steppe, exotic annual grassland, and exposed rock habitats.
5	Within native perennial grassland.
6	Included a pond with riparian vegetation and a small sagebrush shrub-steppe component.
7	Sagebrush shrub-steppe with some exotic annual grassland.
8	A small patch of sagebrush shrub-steppe surrounded by exotic annual grassland.

4.2.4 Raptor, Golden Eagle, and Burrowing Owl Nest Surveys

4.2.4.1 Raptors and Golden Eagles

The objective of the raptor and golden eagle nest survey was to provide information about breeding activities in the Two-Mile Buffer WSA. The nest searches were performed in accordance with the protocols in *Inventory Methods for Raptors: Standards for Components of British Columbia Biodiversity* (Ministry of Sustainable Resource Management 2001). An aerial survey of the 2014 Permit Area and a two-mile buffer was conducted on April 27, 2014, by NWC. An aerial survey of the Two-Mile Buffer WSA was conducted by EMS April 21 and 22 and April 28 and 29, 2017, and February 6, 2018, in conjunction with the greater sage-grouse lek surveys. Flight lines were recorded for the 2017 and 2018 surveys (Appendix A).

All potential nesting areas (e.g., trees, rock formations, and transmission line towers), were examined during the 2014, 2017, and 2018 aerial surveys. All potential and confirmed raptor nests were recorded using a hand-held Global Positioning System (GPS) unit, regardless of activity status. Determination of nest status (active, inactive, unknown) was made using a combination of visual clues such as adult behavior, presence of eggs or young, presence or absence of whitewash (excrement), or observational data from the ground-based surveys. Inactive nests (no sign of present usage) were assessed for the type of bird that may have built the nest.
Subsequent to the aerial surveys, ground-monitoring surveys were conducted June 21 through 23, 2017, to determine the status of golden eagle territorial pairs and the outcome of any breeding attempts within the Two-Mile Buffer WSA. Adults and potential nest sites were observed from an appropriate distance during ground surveys. Methods followed standard protocols used throughout the range of this species (Pagel et al. 2010).

4.2.4.2 Burrowing Owls

Broadcast call surveys were performed to locate burrowing owls and their burrows (Conway and Simon 2003; Conway et al. 2007) on the following dates: May 17 and 18, June 21 and 22, and July 3 and 4, 2017. A total of 39 survey stations were called along the access road in the Permit Area (Figure 4). The survey stations were located approximately 800 meters apart. Upon arriving

at a station, the biologist spent a three-minute waiting period scanning the horizon with and without binoculars. Then the primary song call was played over a three-minute period with a 360-degree rotation. The total time at each survey station was a minimum of six minutes.

Any responding owls were watched to determine possible nest burrow locations. If no burrows were found, or it was too dark to search, the biologist returned the next day to look for burrows near the detection. A comprehensive search for potential nest burrows within 600 meters of the observation point of the owl was conducted. All burrows with an entrance diameter of greater than ten centimeters (cm) were closely examined for signs of use by burrowing owls, including feathers, pellets, whitewash, nest material such as dung, prey and their parts, or loose soil across the breadth of the burrow floor. While conducting other wildlife surveys, all potential burrows that could be used by burrowing owls were examined for signs of burrowing owl activity including molted feathers, prey remains, pellets, scat, and tracks.

4.2.5 Greater Sage-Grouse Surveys

The ODFW GIS data layer for greater sage-grouse Core and Low Density Areas (ODFW 2013a) (Figure 4) served as the foundation for characterizing habitat for this species. Suitable habitat was defined by the structure and quality of sagebrush shrub-steppe and its proximity to meadows, springs, or riparian areas.

4.2.5.1 Brood-Rearing Surveys

Brood-rearing surveys were conducted twice between June 15 and July 31, 2014, by NWC; and June 22 through 24 and July 2 through 4, 2017, in the Two-Mile Buffer WSA by EMS. The surveys focused on meadow and/or riparian habitat associated with the springs that were identified from USGS maps and the National Hydrography Dataset (NHD) (USGS 2017). The habitat around the springs was searched for sage-grouse and their sign (e.g., scat, tracks, feathers, carcasses). Areas intensively searched for sign included the interface between sagebrush and mesic meadows, in particular the area beneath sagebrush shrubs where hens and broods might shelter.

The surveys were conducted by walking meandering transects following the standard protocols in Hagen (2011). Survey tracks were recorded (Appendix A). All sage-grouse scats were recorded. Scats were also designated as winter scat (i.e., composed of sagebrush) or spring/summer scat (i.e., fibrous plant matter, invertebrates present). Small, slender scats, narrow in circumference, containing fibrous plants and abundant invertebrate remains were classified as juvenile scat. Any clocker scats were also recorded. Clocker scats are relatively large scat that are composed of smaller scats compacted together typical of nesting hens.

4.2.5.2 Winter Use Surveys

Winter use surveys were conducted by NWC on December 20, 2013, and January 14 and 15, 2014. The surveys were conducted on the ground, on foot and snowmobile, and followed standard protocols (Hagen 2011). Survey tracks were recorded (Appendix A).

The 2018 winter use surveys were conducted by EMS from the air with a bell 206 L4 helicopter. Two biologists conducted the survey. The first flight was conducted January 25 and consisted of 0.25-mile parallel transects throughout the Two-Mile Buffer WSA. Transects were flown approximately 50 to 150 feet above the ground at speeds of approximately 40 miles per hour. Flight tracks were recorded (Appendix A).

The second survey was conducted 12 days later, on February 6, 2018, which further refined the survey area flown on January 25. Areas consisting of shrubs were delineated via desktop analysis and provided as polygon shapes. These areas were flown with 0.25-mile transects or with a centrally located transect across patches of sagebrush within the polygon. Areas that consisted of agricultural lands, grass, or shrub patches without sagebrush were not surveyed as they do not provide winter habitat for sage-grouse. Flight tracks were recorded (Appendix A).

4.2.5.3 Lek Surveys

Lek surveys were conducted in suitable habitat throughout the Two-Mile Buffer WSA. Existing information on known leks was obtained from ODFW GIS layers and from conversations with the ODFW district biologist (Milburn 2014). No leks are known to occur within the Two-Mile Buffer WSA; therefore, the survey was a search for previously unknown leks.

Surveys were conducted by NWC on April 10 and 28, 2014. In 2014, the surveys were performed on the ground. The 2017 surveys were conducted on April 21 and 22 and 28 and 29 by EMS and performed from the air. Within the Low Density Area, transects were flown at 0.25-mile density. Outside of the Low Density Area, transects were flown at 0.25- to 0.5-mile density (Appendix A).

4.2.6 Leporid Survey

Surveys for two leporid species of concern - pygmy rabbit (*Brachylagus idahoensis*) and white-tailed jackrabbit (*Lepus townsendii*) - were conducted within the 0.5-Mile Buffer WSA. Meandering transects were walked through suitable habitat. In 2014, leporid surveys were conducted in early winter and again in late spring, times when use of burrows by pygmy rabbits is expected to be highest. The 2017 surveys were performed in May and early July.

The 2017 survey protocol for pygmy rabbit surveys was based on guidelines developed by the multi-state interagency working group titled: Surveying for Pygmy Rabbits (*Brachylagus idahoensis*), Interagency Pygmy Rabbit Working Group, June 2004 version, Boise District, Idaho BLM (Ulmschneider et. al 2004). Potentially suitable habitat that was intensively surveyed included locations with mature big sagebrush, sagebrush draws, patches of sagebrush that were uneven in height and density, and drainages. Spiral and parallel transects were used to survey the potential habitat.

Any observed pygmy rabbits and/or their sign (e.g., burrows, scat, runways) were recorded with a GPS waypoint and photographed. Any burrows were classified as active (clean entrances with signs of use such as the presence of pellets and/or tracks) or inactive (cobwebs, plant debris in entrance, or collapsed). Pellets were classified as pygmy rabbit scat if they were from four to six millimeters (longest axis was measured) and were in piles under sagebrush and/or deposited as carpets of scats. The scats were classified as fresh (dark, glossy, moist), recent (brown or dark gray in color), and old (bleached gray, crumbled easily).

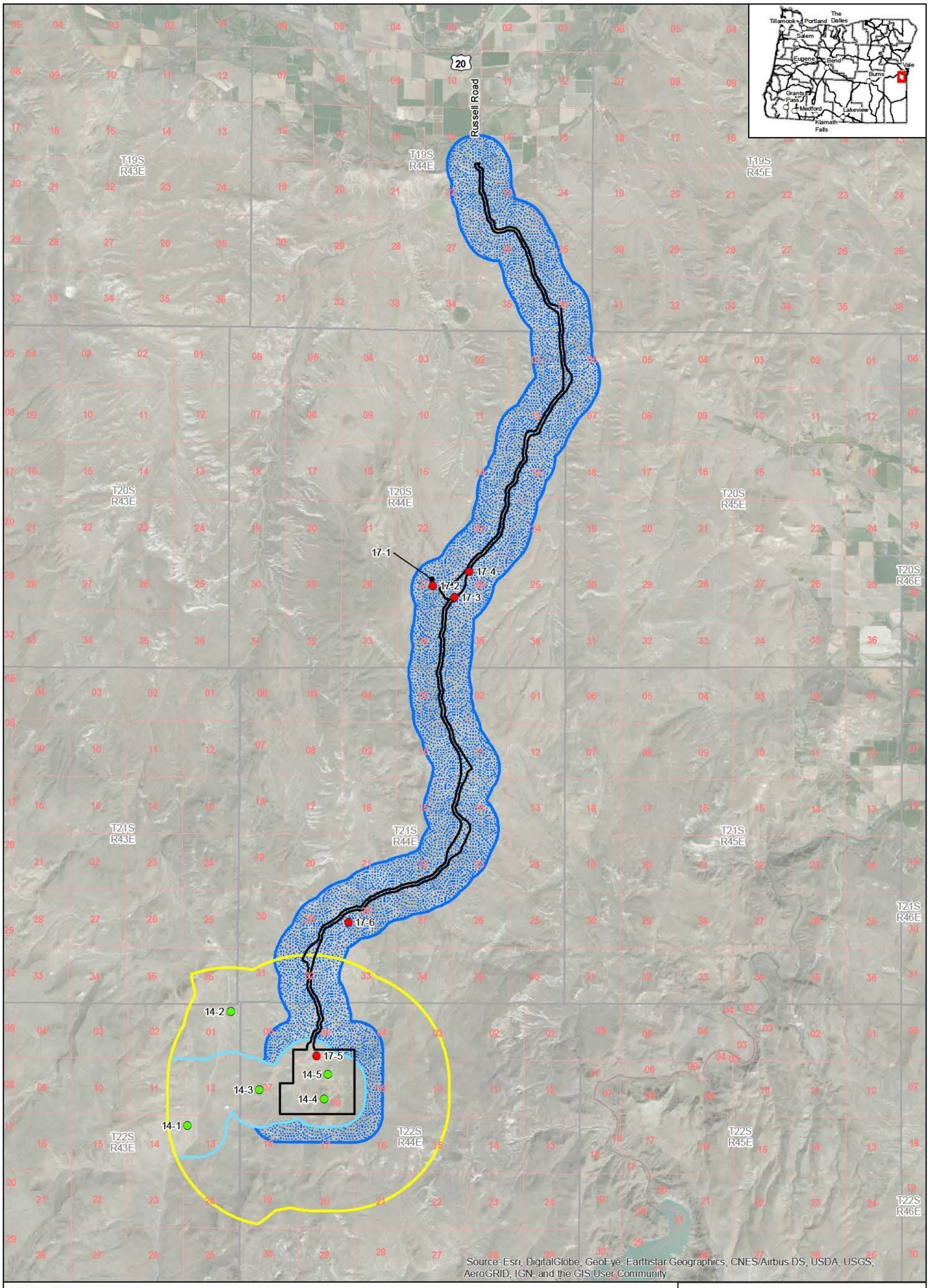
All detections of leporids and their sign (pellets and burrows), as well as survey routes, were recorded using a hand-held GPS unit (Appendix A).

4.2.7 Bat Species Investigation

Acoustic bat surveys were conducted in 2013 and 2014 by NWC and in 2017 by EMS to collect baseline information on bat species use of the 0.5-Mile Buffer WSA. In 2014, five bat detector locations were established in or near the Permit Area at landscape features (rock outcrops, water) most likely to attract bats (Table 3 and Figure 5). Data were collected for a total of 21 nights between June 24 and October 25, 2013; and between April 8 and May 30, 2014. Pettersson D500x ultrasound detectors were used to record the echolocation calls of bats onto compact flash cards (CF cards); each was set to begin recording before dusk and to stop after dawn. Downloaded calls were analyzed using SonoBat® 3.05 acoustic identification software to identify bat species where possible.

Table 3: Bat Detector Location Descriptions

Bat Detector Location	Feature Description
2014	
14-1	In a small patch of sagebrush shrub-steppe surrounded by exotic annual grassland (and coincided with the center of small-avian plot 8).
14-2	By a pond with riparian vegetation and a small sagebrush shrub-steppe component. This plot was within the 2-mile Buffer but more than a mile from the Permit Area (and coincided with the center of small-avian plot 6).
14-3	In annual exotic grassland near the base of a small cliff containing numerous pockets and cracks.
14-4	On the hill where mining is proposed overlooking a slope of scree and jumbled rock. (This location was within small-avian plot 3.)
14-5	At the base of a rock outcrop surrounded by sagebrush shrub-steppe. (This location was within small-avian plot 3.)
2017	
17-1	DM Spring, oriented across water below cottonwood trees, dense mesic vegetation, primarily surrounded by exotic annual grassland upslope
17-2	DM Spring oriented upstream near rock outcrops, some willows, intact sagebrush upslope
17-3	Trough – water in trough, overflows onto ground present as sheet with very shallow pools (<1 cm depth), surrounded by exotic annual grassland, farther away, some sagebrush in narrow ephemeral drainage to north
17-4	Rock outrcrop in downcut ephemeral drainage, complex outcrop on both sides of draw, > 20 feet high from bottom of draw, numerous cracks, fissures, etc. sparse sagebrush upslope
17-5	Ephemeral drainage – oriented north in shallow drainage surrounded by sagebrush and some grasses
17-6	In sagebrush, oriented downslope toward Lowe Spring, abundant bare ground due to livestock



Explanation

- Permit Area
- 2017-2018 EMS 0.5-mile Buffer WSA
- 2013-2014 NWC Two-mile Buffer WSA
- 2013-2014 NWC 0.5-mile Buffer WSA
- Bat Detector Locations (2017)
- Bat Detector Locations (2013-2014)

Projection: UTM Zone 11 North, NAD83, meters

0 1 2 3 4 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Bat Detector Locations

Figure 5

Date: 03/30/2018	Drawn By: JDB/SMH
Revised:	Project No.: 3678
Base Map: USGS 100K quad: Vale	
File Name: 3678H_GrassyMtn_WildlifeMonitoringLocations.mxd	

EM STRATEGIES

In 2017, acoustic surveys were conducted for bat species at six sites within the 0.5-Mile Buffer WSA associated with the access road (Table 3 and Figure 5). Pettersson ultrasonic detectors (Model D240X) connected to digital recorders were used to record bat calls on May 27 and 28 and June 21, 22, and 23. The detectors were turned on between approximately 6:30 p.m. to 7:45 p.m. and operated throughout the night to sample the temporal activity of bats. Equipment was taken down between 6:00 a.m. and 8:30 a.m. The detectors were placed in locations most likely to have bat activity such as rock outcrops, water, and an ephemeral drainage that might be used as a travel corridor.

Echolocation calls were downloaded and analyzed using SonoBat software (DNDesign, Arcata, California). Recorded calls were compared to reference calls available within the SonoBat software. Characteristics of echolocation calls can be used to distinguish even between closely related species. While intraspecific variation in call characteristics is largely relative to interspecific variation, separation of some species can be problematic, especially when only a few call samples are available.

Good call sequences contained greater than one and usually many (greater than ten) calls in which the signal was clearly distinguishable from noise, appeared fully formed (i.e., no missing call components), and might have displayed harmonics that indicated that calls were well recorded. Poor quality recordings had poor signal-to-noise ratios and were of short duration (less than 2.5 milliseconds), reduced bandwidth, or oversimplified shapes. Poor quality recordings are reported in the results as possible identifications and/or are provided as a percent confidence on identification.

4.2.8 General Wildlife Encounters

All terrestrial wildlife species observed during all surveys were recorded. Data recorded for some of these incidental observations included date, time, location, and number of individuals.

5 RESULTS AND DISCUSSION

NWC conducted field surveys between June 24, 2013, and May 30, 2014. EMS conducted field surveys between April 18, 2017, and February 6, 2018. GIS information for all surveys is included in Appendix A and field survey data sheets for all surveys are included in Appendix D.

5.1 Review of Existing Information

The online Information for Planning and Consultation (IPaC) response from the USFWS (Consultation Code: 01EOFW00-2018-SLI-0114) stated that no federally listed or proposed species, or proposed and final designated critical habitat, occur within the Permit Area and/or may be affected by the Project (Appendix B). A list of rare, threatened, and endangered animal records within the Two-Mile Buffer WSA was obtained from ORBIC in April 2017 (Appendix C). The occurrences reported are shown in Figure 6. The species reported are listed in Table 4.

Table 4: ORBIC Occurrences of Wildlife Species within the Two-Mile Buffer WSA

Species	Federal Status	State Status
Desert horned lizard (*Phrynosoma platyrhinos*)	None	None
Golden eagle (*Aquila chrysaetos*)	Regulated under BGEPA	N/A
Great Basin black-collared lizard (*Crotophytus bicinctores*)	None	None
Ferruginous hawk (*Buteo regalis*)	BLM Sensitive	Sensitive
Northern leopard frog (*Lithobates pipiens*)	BLM Sensitive	None
Western burrowing owl (*Athene cunicularia hypugaea*)	BLM Sensitive	Sensitive

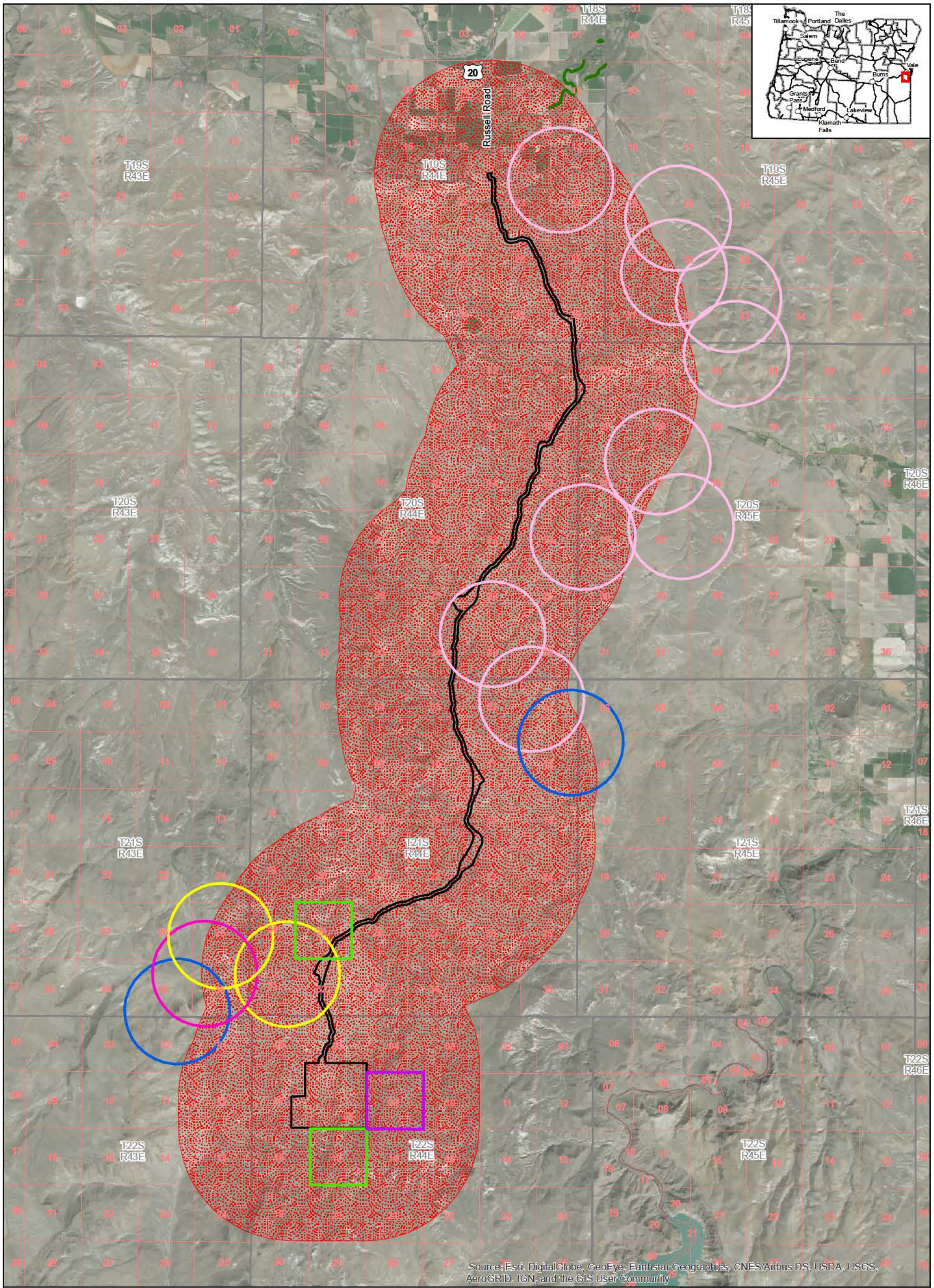
ORBIC and the USFWS provided information on the location of known golden eagle nests within the Two-Mile Buffer WSA. ORBIC reported two occupied nests were observed in 2012. USFWS reported one additional golden eagle nest (Figure 6). In addition, special status vertebrate wildlife species that might be expected to occur (based on their distribution and habitat requirements) within the Two-Mile Buffer WSA are listed in Table 5 (NWC 2014). Special status species identified during the information review included those that are BLM Sensitive and Strategic species within the Vale District (BLM 2008b), those that are ODFW Sensitive Species within the Northern Basin and Range Ecoregion (ODFW 2016), or both.

Table 5: Federal and State Listed, Proposed, and Sensitive Species Potentially Occurring in Vicinity of the Wildlife Study Area

Species	Federal Status	State Status
Greater sage-grouse (*Centrocercus urophasianus*)	BLM Sensitive	Sensitive
Swainson's hawk (*Buteo swainsoni*)	BLM Sensitive	Sensitive
White-tailed jack rabbit (*Lepus townsendii*)	BLM Sensitive	Sensitive
Pygmy Rabbit (*Brachylagus idahoensis*)	BLM Sensitive	Sensitive
Townsend's big-eared bat (*Corynorhinus townsendii*)	BLM Sensitive	Sensitive
Spotted bat (*Euderma maculatum*)	BLM Sensitive	Sensitive
Fringed myotis (*Myotis thysanodes*)	BLM Sensitive	Sensitive

5.2 Wildlife Habitat Mapping

Three-tenths of a mile of the northernmost portion of the Permit Area, approximately ten acres, is irrigated agricultural row crops. The area has been extensively grazed for several years. Conditions on the ground are largely a result of seeding with crested wheatgrass (*Agropyron cristatum*) in rangeland improvement projects and in response to wildfire. Approximately 52 percent of the Two-Mile Buffer WSA has been impacted by wildfire during the period of 1980 to 2018 (BLM 2018) (Figure 7).



Explanation

- Permit Area
- 2017-2018 EMS Two-mile Buffer WSA

ORBIC Wildlife Data

- Desert Horned Lizard
- Ferruginous Hawk
- Golden Eagle
- Great Basin Black-Collared Lizard
- Northern Leopard Frog
- Western Burrowing Owl

- USFWS Reported Golden Eagle Nests 2017

Projection: UTM Zone 11 North, NAD83, meters

Miles: 0 1 2 3 4

N

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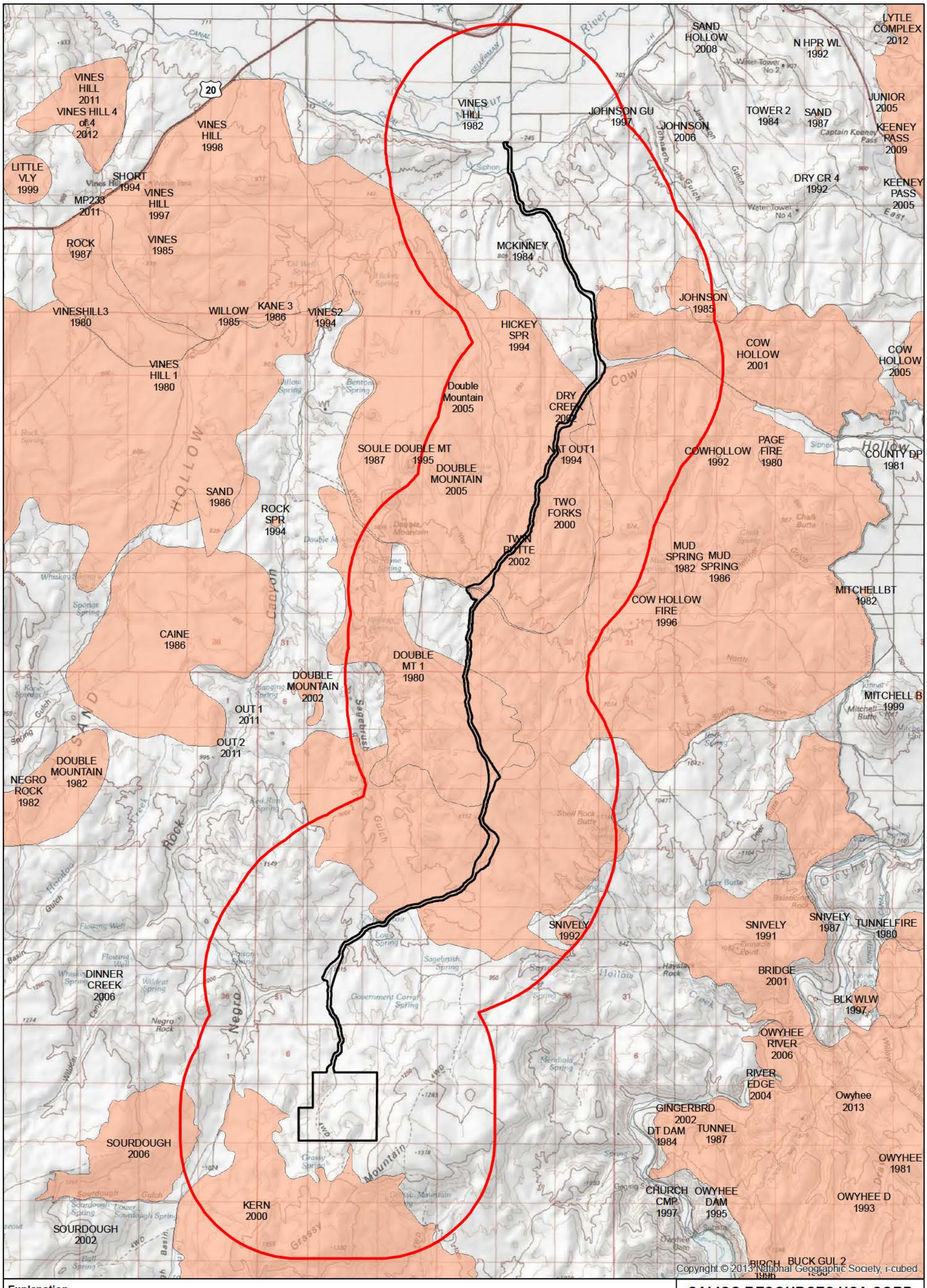
ORBIC & USFWS Occurrences of Wildlife Species within the Two-mile Buffer WSA

Figure 6

Date: 03/30/2018	Drawn By: JDB/SMH
Revised:	Project No.: 3678
Base Map: USGS 100K quad: Vale	
File Name: 3678G_GrassyMtn_ORBIC.mxd	

EM STRATEGIES



Explanation

- Permit Area
- 2017-2018 EMS Two-mile Buffer WSA
- Fire History (1980-2013)

Projection: UTM Zone 11 North, NAD83

0 1 2 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Wildfire History

Figure 7

Date:	03/30/2018	Drawn By:	GSL/SMH
Revised:		Project No.:	3678
Base Map:	USGS 100K quad: Vale		
File Name:	3678H_GrassyMtn_Wildfire_Hx.mxd		

Five vegetation community types were identified within the Permit Area during the 2014, 2015, and 2017 field surveys (EMS 2018): Wyoming Big Sagebrush/Crested Wheatgrass; Crested Wheatgrass Seeding; Bluebunch Wheatgrass/Cheatgrass/Annual; Wyoming Big Sagebrush/Bluebunch Wheatgrass; and Burned Yellow Rabbitbrush/Bluebunch Wheatgrass. Cheatgrass (*Bromus tectorum*) was a dominant species in every plant community, likely due to disturbance from grazing and wildfire.

Three general land cover types and five specific habitat types were found within the Permit Area; these are described below, summarized in Table 6, and mapped in Figure 8.

Table 6: Land Cover and Habitat Types within the Permit Area

General Land Cover Type	Habitat Type	Habitat Type Description	Acres in Permit Area (Direct Impact)
Developed	Road	Compacted gravel or dirt roads devoid of vegetation and offering no value to wildlife.	56
	Agricultural	Cultivated fields	10
Grassland	Exotic Annual Grassland	Dominated by exotic annuals, particularly cheatgrass, and medusahead. Wildlife use predicated more on soil type and open landscape than on vegetation. Common breeder is horned lark. Also used by pronghorn antelope, American badger, coyote, Merriam's and Belding's ground squirrels, and burrowing owl.	228
	Perennial Grassland	Dominated by perennial bunchgrass. Shrubs, if present, are an inconspicuous component. Provides forage for Merriam's and Belding's ground squirrels, which in turn provide prey for ferruginous hawk, golden eagle, and other raptors, as well as American badger and coyote. Common breeding species include horned lark and western meadowlark. May support burrowing owl where soils are deep and sandy. Exotic annuals – especially cheatgrass – found between bunchgrasses. Due to low precipitation and cattle grazing, wildlife use limited primarily to spring.	135
Shrub-steppe	Sagebrush Shrub-steppe	Dominated by >20% cover of Wyoming big sagebrush and/or yellow rabbitbrush. Offer high quality breeding habitat for shrub obligate species including loggerhead shrike, sage thrasher, Brewer's sparrow, sagebrush sparrow, and black-throated sparrow. Also supports western meadowlark, lark sparrow, and mourning dove. In sandy or rocky soils, sagebrush lizard, desert horned lizard, Great Basin collared lizard, long-nosed leopard lizard, striped whipsnake, western rattlesnake, and other reptiles likely to be found. Exotic grasses, especially cheatgrass, found beneath and between shrub layer throughout Permit Area.	1,262
Total Acres			**1,631**

Russell Road

Match Line

T19S R44E

T20S R44E

T20S R45E

T21S R44E

T22S R44E

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Explanation

- Permit Area
- Developed Road
- Agricultural
- Exotic Annual Grassland
- Perennial Grassland
- Sagebrush Shrub-Steppe

Projection: UTM Zone 11 North, NAD83, meters

0 2,000 4,000 6,000 8,000 10,000 Feet

0 1 2 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Wildlife Habitat Types within the Permit Area

Figure 8

Date:	03/30/2018	Drawn By:	JDB/SMH
Revised:		Project No.:	3678
Base Map:	USGS 7.5 quads: Double Mountain, Grassy Mountain, Kane Spring Butte, Sourdough Spring, Vale West		
File Name:	3678H_GrassyMtn_Wildlife_Habitat.mxd		

EM STRATEGIES

5.2.1 Developed-Road and Agricultural

Approximately 56 acres of the Permit Area are developed in the form of compacted gravel or dirt roads relatively devoid of vegetation and offering little value to most wildlife. Roads are a potential source of the spread of noxious and invasive exotic grasses and weeds. They also constitute a potential source of fatality for birds, snakes, lizards, and mammals, though there is currently very little traffic on the roads within the Permit Area. Also within this habitat type are cultivated agricultural fields at the north end of the Permit Area (approximately ten acres). This habitat type is all characterized as Category 6 habitat, with low potential to become important or essential.

5.2.2 Grassland-Exotic Annual Grassland

Approximately 228 acres of the Permit Area is exotic annual grassland. This habitat type occurs in areas that are heavily grazed and is dominated by exotic annuals - particularly cheatgrass and medusahead (*Taeniatherum caput-medusae*). Native bunchgrasses are absent or a minor component. Heavy livestock grazing, and low and very seasonal precipitation result in low value to wildlife, as exotic annual grasslands provide little nutrition or cover. Wildlife use of this habitat is predicated more on soil type and open landscape than on vegetation. The most common breeding bird is horned lark (*Eremophila alpestris*). This habitat is also used by pronghorn antelope (*Antilocapra americana*), American badger (*Taxidea taxus*), coyote (*Canis latrans*), Merriam's ground squirrel (*Urocitellus canus*) and Belding's ground squirrel (*Urocitellus beldingi*), and burrowing owl (*Athene cunicularia*). During late winter and spring, an abundance of Merriam's ground squirrels (which is expected to vary among years, but which was quite high in spring 2014) likely provides good hunting for mammalian predators and raptors, including ferruginous hawk (*Buteo regalis*), golden eagle, northern harrier (*Circus cyaneus*), and prairie falcon (*Falco mexicanus*). Based on habitat type, condition, and use by wildlife, all the exotic annual grassland within the Permit Area is characterized as Category 4 - important habitat.

5.2.3 Grassland-Native Perennial Grassland

Approximately 75 acres of the Permit Area are perennial grassland. This habitat type is dominated by crested wheatgrass, an introduced species that was seeded in the area. Bluebunch wheatgrass and Sandberg bluegrass are the dominant native perennial grasses, which together comprise an average of 22 percent of the ground cover (EMS 2017; HDR 2015). Shrubs (big sagebrush and yellow rabbitbrush), if present, are an inconspicuous component. This habitat provides forage and some cover for Merriam's and Belding's ground squirrels, which in turn provide prey for ferruginous hawk, golden eagle, and other raptors, as well as American badger and coyote. Common breeding species include horned lark and western meadowlark (*Sturnella neglecta*). This habitat likely provides important forage for pronghorn and may support burrowing owl denning and breeding where soils are deep and sandy. Exotic annuals—especially cheatgrass—are found between the bunchgrasses, where they tend to outcompete more nutritional forbs and limit this habitat's value to wildlife.

5.2.4 Shrub-steppe-Sagebrush Shrub-steppe

Approximately 1,262 acres of the Permit Area are sagebrush shrub-steppe. This habitat is dominated by greater than 15 percent cover of Wyoming big sagebrush and yellow rabbitbrush (EMS 2017; HDR 2015). This habitat type offers high-quality breeding habitat for shrub obligate

species including loggerhead shrike (*Lanius ludovicianus*), sage thrasher (*Oreoscoptes montanus*), Brewer's sparrow (*Spizella breweri*), sagebrush sparrow (*Artemisiospiza nevadensis*), and black-throated sparrow (*Amphispiza bilineata*). Also breeding in this habitat are western meadowlark, lark sparrow (*Chondestes grammacus*), common nighthawk (*Chordeiles minor*), and mourning dove (*Zenaida macroura*). In sandy or rocky soils, sagebrush lizard (*Sceloporus graciosus*), desert horned lizard (*Phrynosoma platyrhinos*), pygmy short-horned lizard (*Phrynosoma douglasii*), Great Basin collared lizard (*Crotaphytus bicinctores*), long-nosed leopard lizard (*Gambelia wislizenii*), western whiptail (*Cnemidophorus tigris*), striped whipsnake (*Masticophis taeniatus*), western rattlesnake (*Crotalus atrox*), and other reptiles are found.

5.3 Large-Plot Avian Surveys

Seventeen species were detected during large-plot avian surveys conducted by NWC between June 2013 and May 2014 (Table 7). Three of these species, horned lark, western meadowlark, and common raven (*Corvus corax*), were found during all seasons and accounted for 137 of the 171 individuals detected. Observations of large birds outside of the plots are listed in Table 8.

Golden eagles were detected during all seasons. Ferruginous hawks, a BLM Sensitive species, were detected during summer and spring (and found nesting during the 2014 raptor nest survey [Section 5.5]). The burrowing owl, also a BLM Sensitive species, was detected in the summer and fall of 2013, but was not found during any subsequent surveys. Other raptors detected outside of the large-plot surveys were northern harrier, red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*), short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), and prairie falcon. The prairie falcon was confirmed nesting within the Two-Mile Buffer WSA; northern harrier was believed to be nesting within the Two-Mile Buffer WSA in 2014, and long-eared owl was estimated to have bred successfully in 2013.

Table 7: Avian Species Observed in Large-Plot Avian Surveys

Species	Summer[1]		Fall[2]		Winter[3]		Spring[4]	
	# GRP	# IND	# GRP	# IND	# GRP	# IND	# GRP	# IND
Waterfowl		**0**		**0**		**0**		**13**
Green-winged teal	0	0	0	0	0	0	1	13
Raptors		**0**		**0**		**0**		**2**
Buteos		0		0		0		1
Red-tailed hawk	0	0	0	0	0	0	1	1
Eagles		0		0		0		1
Golden eagle	0	0	0	0	0	0	1	1
Gamebirds		**1**		**0**		**0**		**0**
Chukar	1	1	0	0	0	0	0	0
Shorebirds		**0**		**0**		**0**		**1**
Long-billed curlew	0	0	0	0	0	0	1	1
Passerines		**26**		**116**		**27**		**155**
Songbirds		25		115		21		150
Western king-bird	0	0	0	0	0	0	1	1
Loggerhead shrike	3	3	0	0	0	0	2	2
Horned lark	8	16	14	110	6	19	13	95
Barn swallow	0	0	1	3	0	0	0	0
Rock wren	0	0	1	1	0	0	2	2
Sage thrasher	1	1	0	0	0	0	2	2
Brewer's sparrow	0	0	0	0	0	0	4	6

Species	Summer[1]		Fall[2]		Winter[3]		Spring[4]	
	# GRP	# IND	# GRP	# IND	# GRP	# IND	# GRP	# IND
Vesper sparrow	1	1	0	0	0	0	0	0
Sagebrush sparrow	0	0	0	0	0	0	1	2
White-crowned sparrow	0	0	0	0	0	0	1	3
Western meadowlark	4	4	1	1	2	2	13	37
Corvids	0	1		1		6		5
Common raven	1	1	1	1	4	6	5	5
Totals	**19**	**27**	**18**	**116**	**12**	**27**	**48**	**171**

Survey dates:
[1] Summer: June 24 through August 14, 2013; four visits to five plots = 20 surveys
[2] Fall: September 4 through October 24, 2013; four visits to five plots = 20 surveys
[3] Winter: November 25, 2013 through February 26, 2014; four visits to five plots = 20 surveys
[4] Spring: March 19 through May 29, 2014; four visits to five plots = 20 surveys

Table 8: Avian Species Observed Outside of Large-Plot Avian Surveys

Species	Summer 2013	Fall 2013	Winter 2013-14	Spring 2014	Total
Canada goose	0	0	10	0	10
American wigeon	0	0	0	4	4
Mallard	2	0	0	0	2
Northern shoveler	1	0	0	0	1
Northern harrier	1	0	0	1	2
Red-tailed hawk	1	1	0	1	3
Ferruginous hawk	2	0	0	2	4
Rough-legged hawk	0	1	0	0	1
Golden eagle	2	3	9	3	17
Long-billed curlew	0	0	0	2	2
Long-eared owl	3	0	0	0	3
Short-eared owl	0	1	0	0	1
Burrowing owl	1	2	0	0	3
Prairie falcon	2	0	0	0	2
Totals	**15**	**8**	**19**	**13**	**55**

5.4 Small-Plot Avian Surveys

Forty-seven species were detected during small-plot avian surveys conducted between June 2013 and May 2014 (Table 9). Of these, 25 were found only at plot 6, which was more than a mile from the Permit Area and contained habitats not found in the Permit Area. Together, the pond, marsh, and riparian trees at plot 6 constituted an oasis that attracted not only waterfowl, marsh birds, and riparian obligates (some of which nested there) but also migrants (including passerines) that used this taller, denser vegetation for cover and foraging during stopovers. Twenty-two species were detected at the other seven plots in habitat that is found within the Permit Area (Figure 4).

Horned lark and western meadowlark were each found at six of the seven small plots, the only species found during all four survey seasons, and the most commonly detected species. Rock wren (*Salpinctes obsoletus*) was detected during spring, summer, and fall seasons (at the three plots containing a small amount of exposed rock). Six species were detected multiple times during spring and summer seasons; these were Brewer's sparrow, lark sparrow, loggerhead shrike, Say's phoebe (*Sayornis saya*), sagebrush sparrow, and sage thrasher (Table 9). All these birds are

presumed to breed in or near the Permit Area, and active nests of horned lark, lark sparrow, and common nighthawk were found incidentally during other surveys.

Table 9: Avian Species Observed in Small-Plot Avian Surveys

Species	Study Plots								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
Gadwall	0	0	0	0	0	4	0	0	**4**
American wigeon	0	0	0	0	0	2	0	0	**2**
Mallard	0	0	0	0	0	28	0	0	**28**
Northern pintail	0	0	0	0	0	4	0	0	**4**
Blue-winged teal	0	0	0	0	0	3	0	0	**3**
Green-winged teal	0	0	0	0	0	14	0	0	**14**
California quail	0	1	0	0	0	0	0	0	**1**
Northern harrier	0	0	0	0	0	4	0	0	**4**
Ferruginous hawk	0	0	0	0	0	0	1	0	**1**
American coot	0	0	0	0	0	3	0	0	**3**
Killdeer	0	0	0	0	1	6	0	0	**7**
Greater yellowlegs	0	0	0	0	0	1	0	0	**1**
Mourning dove	0	0	0	0	0	10	1	0	**11**
Long-eared owl	0	0	0	0	0	3	0	0	**3**
Common nighthawk	0	0	0	0	0	13	0	0	**13**
Northern flicker	0	0	0	0	0	1	0	0	**1**
Say's phoebe	0	1	0	3	0	1	0	0	**5**
Loggerhead shrike	0	1	0	1	0	0	2	0	**4**
Cassin's vireo	0	0	0	0	0	2	0	0	**2**
Common raven	0	5	0	0	0	0	0	0	**5**
Horned lark	29	11	17	0	79	2	82	100	**320**
Cliff swallow	0	0	0	0	0	20	0	0	**20**
Barn swallow	25	0	0	0	0	41	0	0	**66**
Mountain chickadee	0	0	0	0	0	4	0	0	**4**
Rock Wren	0	5	7	4	0	0	0	0	**16**
Canyon wren	0	0	1	0	0	0	0	0	**1**
Ruby-crowned kinglet	0	0	0	0	0	2	0	0	**2**
Mountain bluebird	12	6	0	0	0	0	0	0	**18**
American robin	0	0	0	0	0	1	0	0	**1**
Sage thrasher	2	5	0	0	0	0	0	0	**7**
European starling	0	0	0	0	0	17	0	0	**17**
Brewer's sparrow	4	3	0	2	0	0	3	1	**13**
Lark sparrow	2	6	3	1	0	1	0	0	**13**
Black-throated sparrow	0	0	1	0	0	0	0	0	**1**
Sagebrush sparrow	3	0	3	0	0	0	0	0	**6**
Song sparrow	0	0	0	0	0	9	0	0	**9**
Swamp sparrow	0	0	0	0	0	2	0	0	**2**
White-crowned sparrow	0	0	0	5	0	0	0	0	**5**
Dark-eyed junco	0	0	0	1	0	0	0	0	**1**
Lazuli bunting	0	0	0	0	0	1	0	0	**1**
Red-winged blackbird	0	0	0	0	0	96	0	0	**96**
Tricolored blackbird	0	0	0	0	0	9	0	0	**9**
Western meadowlark	11	19	15	14	7	2	5	0	**73**
Brewer's blackbird	1	0	0	0	0	2	0	0	**3**
Brown-headed cowbird	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	3

Species	Study Plots								
	1	2	3	4	5	6	7	8	9
House finch	0	0	0	0	0	0	6	0	**6**
Lesser goldfinch	0	0	0	0	0	4	0	0	**4**
Total	**89**	**63**	**47**	**31**	**87**	**315**	**100**	**101**	**833**

Mountain bluebirds (*Sialia currucoides*) were detected at two plots, but these detections occurred on a single fall survey day. Twelve other species were detected on a single occasion and at a single plot: ferruginous hawk, California quail (*Callipepla californica*), mourning dove, common raven, barn swallow (*Hirundo rustica*), canyon wren (*Catherpes mexicanus*), black-throated sparrow, white-crowned sparrow (*Zonotrichia leucophrys*), dark-eyed junco (*Junco hyemalis*), Brewer's blackbird (*Euphagus cyanocephalus*), and house finch (*Haemorhous mexicanus*) (Table 9).

5.5 Raptor Nest Surveys

5.5.1 NWC 2013, 2014 Surveys

5.5.1.1 Ground Survey 2013

Three raptor nests were active in 2013 (Figure 9). One of these, a common raven nest, was active again in 2014. A burrowing owl nest was identified by the presence of an adult owl and an abundance at the burrow entrance of pellets and excrement of this species. Only a single individual was ever seen at any one time, however, so whether a breeding attempt occurred remains uncertain. (Surveys did not begin in 2013 until after breeding would be expected to be complete.) The burrowing owl is a BLM Sensitive species. A successful breeding attempt by long-eared owls was documented by the presence at the pond of three young of this species and a stick nest in a tree with pellets and excrement in and beneath it. This nest was likely originally built by black-billed magpies (*Pica hudsonia*).

5.5.1.2 Aerial Survey 2014

One active ferruginous hawk nest was observed within the Two-Mile Buffer WSA during the April 27, 2014, aerial raptor nesting survey performed by NWC (NWC 2014) (Figure 9).

Within ten meters of the active ferruginous hawk nest, there was an inactive alternate nest. There were also two older inactive nests built by ferruginous hawks approximately two and three kilometers to the northeast and east-northeast of the active nest. These nests likely represented a separate ferruginous hawk breeding territory from the past. The ferruginous hawk is a BLM Sensitive species.

Three active common raven nests were also located during the aerial survey (Figure 9). These nests could be used in future years by raptors, especially by great horned owl (*Bubo virginianus*) or prairie falcon, both of which will use stick nests constructed by other species. There were two other inactive stick nests (besides those of ferruginous hawk) identified during the aerial survey.

Figure 9: Raptor Nest Survey Results (Confidential – submitted separately)

Active raptor nest density in 2014 was extremely low in the Two-Mile Buffer WSA, despite the great abundance of ground squirrels (Merriam's and Belding's). It is likely that nesting substrate is a more important factor in limiting use of this area by breeding raptors than is prey abundance or availability. The only trees in the survey area were the few small deciduous ones associated with the lone pond, and only the few rock outcrops and rimrock provided substrate for placement of the stick nests used by most raptors.

5.5.2 EMS 2017 Survey

5.5.2.1 Aerial Survey

Raptor nest surveys were flown within the Two-Mile Buffer WSA on April 21 and 28, 2017, in conjunction with the greater sage-grouse lek surveys. Potential nesting sites for raptors were surveyed from 100 feet to 350 feet from the aircraft. Nest sites transect routes were flown along likely habitat on rock outcropping, cliff faces, trees, and power line structures. The flight tracks are included in Appendix A.

No occupied raptor nests were recorded during the aerial survey. A single red-tailed hawk was observed on two occasions during the surveys south of Grassy Mountain along the rimrock. Although there were many perch sites, no nests were found in the area. It is suspected the hawk may be resident of the Owyhee Canyon cliff faces immediately south of Grassy Mountain, as both times the hawk departed the area in the direction of the canyon to the south. A red-tailed hawk was also observed perched on a power transmission pole southeast of the Permit Area.

5.5.2.2 Ground Survey

Raptors

Seven raptor nests were recorded during the June 21 through 23, 2017, ground surveys (Figure 9). Two stick raptor nests were recorded on a southeast oriented rock outcrop in Sagebrush Gulch: a large raptor nest was approximately 25 feet from the ground on an approximately 35-foot high outcrop; and a small raptor nest is situated east of the larger nest at approximately the same height. No raptors were observed at or near the nests during visits on June 21 and 22. No evidence of occupancy such as recent white wash and/or feathers was observed at the larger nest. However, one old pellet, possibly from a red-tailed hawk, as well as a few old bleached rabbit bones were found below the nest. The small raptor nest had abundant white wash on the rock face below the nest and a few dark downy feathers were visible in sticks above the nest bowl. It is possible a common raven used the nest at one time, however no raven pellets or feathers were found below the nest.

A pair of red-tailed hawks was observed perched and flying near the golden eagle nest OR GE 1327. The birds were observed in courtship behavior during the May 27 survey. Numerous perch sites were found on several rocks and sagebrush on the ridge line approximately 750 feet southeast of the nest location with abundant white wash, molted feathers, and prey remains of rabbits. No further breeding activity at this nest was observed during the June and July surveys.

A female Cooper's hawk (*Accipiter cooperii*) was recorded June 23 in the cottonwood trees that surround the pond below Sagebrush Spring. At least three small stick nests were observed in the trees. The hawk gave an alarm call but remained in the cover of the trees while the biologist

surveyed the site for sage-grouse broods from approximately 100 meters away. No Cooper's hawks were observed during site visits on July 4 and 5 and it is unlikely any of the nests were used by Cooper's hawks.

On June 22, an inactive large raptor nest was recorded in a cottonwood tree at No Name Springs. Two adult red-tailed hawks were observed soaring approximately 0.25 mile south of the nest tree. No raptors were observed perched in or near the tree during a one-hour observation period. No sign (e.g., whitewash, scat, feathers, prey remains, pellets) was found below or near the nest. On June 23, an inactive prairie falcon nest was recorded on a rock outcrop at the south end of Double Mountain. No falcons were observed during a 1.5-hour monitoring session. Molted feathers, old egg shells, and pellets were present beneath the nest ledge. No downy feathers, recent prey remains, or scat, which could suggest use in 2017, were found. Two pairs of rock doves (*Columbia livia*) were nesting in a horizontal ledge in the outcrop. A hive of bees occupied a pothole in the outcrop. Two closed-leghold trap sets were also located along the base of the outcrop.

Burrowing Owls

No burrowing owls or burrowing owl nests were found during the three broadcast surveys conducted in 2017. No evidence of burrowing owl presence within the 0.5-Mile Buffer WSA, such as pellets, feathers, tracks, and scat, were found during surveys conducted for other wildlife species. Suitable breeding habitat is present along the access road in locations dominated by grass and low shrubs. Numerous burrows dug by ground squirrels, badgers, and coyotes, which could provide potential nest sites, are found throughout the 0.5-Mile Buffer WSA.

5.5.3 EMS 2018 Survey

Observations of raptors and raptor nests were recorded January 25 and February 6, 2018, while flying aerial winter sage-grouse surveys in the Two-Mile Buffer WSA. A red-tailed hawk was observed perched at a large raptor nest in a cottonwood tree along the Malheur River. A second red-tailed hawk was observed perched at a large raptor nest in a cottonwood tree next to a farm house.

A pair of ferruginous hawks was recorded at a platform nest in the foothills south of the J H Canal. One bird was perched on the platform and the other bird flushed from the ground near the platform. A ferruginous hawk nest was recorded upslope of Cow Hollow on a low relief rock outcrop approximately ten feet above the ground. A pair of prairie falcons was recorded at the nest identified in 2017 on a rock outcrop at the south end of Double Mountain.

5.6 Golden Eagle Nest Monitoring

5.6.1 NWC 2013, 2014 Survey

The golden eagle nests located and monitored by NWC in the 2014 aerial survey are outside of the Two-Mile Buffer WSA, and therefore, are not discussed in this report.

5.6.2 EMS 2017 Survey

5.6.2.1 Aerial Survey

An aerial survey was conducted of the Two-Mile Buffer WSA on April 21 and 28, 2017, in conjunction with the greater sage-grouse lek survey. No occupied golden eagle nests were observed.

5.6.2.2 Ground Survey

Golden eagle nest OR GE 1327, which is within the Two-Mile Buffer WSA, was observed for a four-hour period on May 27. A pair of red-tailed hawks was engaged in courtship behavior near the nest, however no golden eagles were observed.

5.6.3 EMS 2018 Survey

Observations of golden eagles were recorded during the aerial survey for winter use by greater sage-grouse in the Two-Mile Buffer WSA. Golden eagle nest OR GE 1327 was observed from the air on both January 24 and February 6; no golden eagles were observed near the nest nor were recent greens present in the nest. Two golden eagle nests were recorded on a pinnacle rock outcrop approximately 0.75-mile upslope of Sagebrush Gulch (Figure 9). An adult golden eagle flushed from the rock outcrop. One nest is approximately 30 feet above the ground while the other nest is approximately 40 feet above the ground on a 60-foot rock outcrop. Both nests are located on ledges. One eagle was observed perched on the outcrop on January 24 while a pair of eagles was observed at the outcrop during the February 6 survey. The eagles were variously seen flying together or perched on the outcrop with nests. In addition, observations of four adults and one immature golden eagle were recorded during both the January 24 and February 6 flights at locations that were not associated with nest sites.

5.7 Greater Sage-Grouse Surveys

Portions of the Permit Area and the Two-Mile Buffer WSA are designated by ODFW as Low Density Area (Figure 4). Based on actual habitat type and condition, however, little or none of this area constitutes high quality sage-grouse habitat. The vegetation community is poor-quality big sagebrush shrub-steppe with an understory of exotic grasses (see Section 5.2). Greater sage-grouse surveys were conducted in shrub-dominated portions of the Two-Mile Buffer WSA.

5.7.1 NWC 2013-2014 Surveys

5.7.1.1 Brood Rearing Surveys

Greater sage-grouse brood-rearing surveys were conducted on June 25, 2013, and July 25, 2013. No sign of use of the Two-Mile Buffer WSA by greater sage-grouse was detected. No birds were encountered, nor were any feathers, tracks, or scat found. No greater sage-grouse or their sign were encountered during any other field surveys. Scat of this species can persist for many months and even years; therefore, the lack of such sign is indicative of little or no use of the Two-Mile Buffer WSA by this species in recent years.

5.7.1.2 Winter Use Surveys

Winter use surveys were conducted on December 20, 2013, and January 14 and 15, 2014; the latter were done under ideal conditions, clear days with a covering of snow on the ground. No sign of use of the survey area by greater sage-grouse was detected. No birds were encountered, nor were any feathers, tracks, or scat found.

5.7.1.3 Lek Surveys

No known greater sage-grouse leks are known to exist within the Two-Mile Buffer WSA (Milburn 2014). No sign of this species was found during any surveys prior to the April lekking season; therefore, there were no areas of potential concentration to be checked for leks. Listening for drumming males during the hour before and after sunset (on April 10 and April 28, 2014) yielded no detections of greater sage-grouse or their leks.

5.7.2 EMS 2017-2018 Surveys

5.7.2.1 Brood Rearing Surveys

No sage-grouse hens and chicks or evidence of sage-grouse presence (e.g., scat, tracks, feathers) were found in any of the surveyed spring locations during the June and July 2017 surveys.

5.7.2.2 Winter Use Surveys

No greater sage-grouse were detected during the two aerial winter-use surveys in January and February 2018.

5.7.2.3 Lek Surveys

No leks were found during ten hours of aerial transect surveys in April 2017.

5.8 Leporid Surveys

5.8.1 NWC 2013-2014 Surveys

No high-quality pygmy rabbit habitat was identified within the 0.5-Mile Buffer WSA. The most nearly suitable areas were surveyed on November 26, 2013, and May 30, 2014. No pygmy rabbits or their sign (scat or burrows) were detected. No pygmy rabbits or their sign were detected during any of the other surveys conducted within the Two-Mile Buffer WSA.

No high-quality white-tailed jackrabbit habitat was identified within the 0.5-Mile Buffer WSA. The most likely areas were surveyed on November 26, 2013, and May 30, 2014. No white-tailed jackrabbits were encountered, and all jackrabbit pellets found were in habitat more characteristic of the widespread congeneric black-tailed jackrabbit. No white-tailed jackrabbits were detected during any of the surveys conducted within Two-Mile Buffer WSA.

5.8.2 EMS 2017 Survey

No pygmy rabbits or their sign (e.g., burrows, scat, tracks) were found in the 0.5-Mile Buffer WSA along the access road during the May and July 2017 surveys. Potentially suitable habitat is present in the extensive patch of sagebrush that extends from DM Spring south approximately 2.5 miles. Within this area, surveys focused on patches of sagebrush that were uneven in height and density and in drainages. The sagebrush habitat in the other mapped patches lacks the shrub density and canopy cover characteristic of occupied pygmy rabbit habitat as described by Ulmschneider et al. (2004).

Small scats produced by juvenile cottontail rabbits in summer can be similar in size to those of pygmy rabbits. To confirm species attribution of these scats, three samples were collected and submitted for species identification via DNA analysis to the University of Idaho Laboratory for Ecological, Evolutionary and Conservation Genetics. The scats were from mountain cottontails (*Sylvilagus nuttallii*), not pygmy rabbits.

During the 2017 surveys, no white-tailed jackrabbits were observed in any of the survey areas. The large lagomorph scats found were typical of black-tailed jackrabbit not the larger scats produced by white-tailed jackrabbits. This species can also be readily observed during aerial surveys, but none were detected during the low-elevation 2018 winter aerial surveys conducted for sage-grouse. Potential habitat is present in the sagebrush steppe habitat in the southern portion of the 0.5-Mile Buffer WSA along the access road.

5.9 Acoustic Bat Surveys

5.9.1 NWC 2013-2014 Surveys

No caves or mine adits were found during the field surveys, and no areas with potential to concentrate roosting or maternal colonies were identified within the Permit Area. Bat detectors were operational from before sunset to after sunrise at each of the five locations (Figure 6) during a total of 21 nights between June 24 and October 25, 2013, and between April 8 and May 30, 2014. Ten species of bats were detected over the course of the study (Table 10). The number and locations of detections are listed in Table 11.

Table 10: Bat Species Detected by Survey Station June 2013 through May 2014

Common Name	Scientific Name	Protection Status	Detector Location				
			1	2	3	4	5
California myotis	*Myotis californicus*	ODFW Sensitive		X	X		
Small-footed myotis	*Myotis ciliolabrum*	None	X	X	X	X	X
Long-eared myotis	*Myotis evotis*	None					X
Yuma myotis	*Myotis yumanensis*	None	X			X	
Hoary bat	*Lasiurus cinereus*	ODFW Sensitive			X		
Silver-haired bat	*Lasiomycteris noctivagans*	ODFW Sensitive	X	X	X		X
Canyon bat	*Parastrellus hesperus*	None	X	X	X	X	X
Big brown bat	*Eptesicus fuscus*	None					X
Spotted bat	*Euderma maculatum*	BLM Sensitive ODFW Sensitive		X			
Pallid bat	*Antrozous pallidus*	BLM Sensitive		X		X	X

Common Name	Scientific Name	Protection Status	Detector Location				
			1	2	3	4	5
		ODFW Sensitive					

Table 11: Bat Species Detected by Month: June 2013 through May 2014

Common Name	Month						
	Apr	May	Jun	Jul	Aug	Sep	Oct
California myotis		X	X	X	X		
Small-footed myotis	X	X	X	X	X	X	
Long-eared myotis				X			
Yuma myotis			X	X		X	X
Hoary bat						X	
Silber-haired bat	X	X		X		X	X
Canyon bat	X	X		X	X	X	
Big brown bat					X		
Spotted bat							X
Pallid bat				X	X		

Small-footed myotis appears to be present near the Permit Area from at least April through September. Canyon bat and California myotis are also likely present in the Permit Area through a majority of the survey season, with the latter having a slightly more protracted period of presence. Silver-haired bat appears to move through the area during spring and late summer migration with some regularity. The other species detected are uncommon or rare, with the possible exception of pallid bat, for which there were detections at three locations (Table 10) and on several nights in July and August (Table 11).

5.9.2 EMS 2017 Survey

Three bat species were detected during the acoustic surveys (Table 12). Three of the six survey locations did not have any recordings. All equipment was working.

Table 12: Bat Species Detected on May 27 and 28 and June 21 to 23, 2017

Common Name	Scientific Name	Protection Status	Detector Location					
			17-1	17-2	17-3	17-4	17-5	17-6
California myotis	*Myotis californicus*	ODFW Sensitive	X	X	X			
Small-footed myotis	*Myotis ciliolabrum*	None	X	X	X			
Silver-haired bat	*Lasiomycteris noctivagans*	ODFW Sensitive		X	X			

Fewer species were detected in 2017 as compared to 2014 likely due to only five survey nights. In addition, the 0.5-Mile Buffer WSA of the Permit Area along the access road provides little structural diversity that can provide day-roosting habitat for bats. No adits, shafts, or caves were found. Potential day-roosting habitat consists of a few rock outcrops and the deciduous trees at DM Spring. The three sites with recordings had water that probably attracted bats for foraging and drinking.

5.10 General Wildlife Observations

Wildlife species and habitats occurring within and adjacent to the 0.5-Mile Buffer WSA are consistent with desert areas of the Great Basin and consist of desert-rangeland type habitat where sagebrush and grasses are the dominant species. A comprehensive list of all vertebrate wildlife species observed during the NWC and EMS surveys is in Appendix E.

Mule deer (*Odocoileus hemionus*) and pronghorn antelope are present in the 0.5-Mile Buffer WSA year-round, but in low densities. ODFW-designated mule deer winter range is bisected by approximately five miles of the north end of the Access Road Area (ODFW 2015). During the NWC surveys in 2014, the largest herds of mule deer and pronghorn antelope were observed at the northern end of the Permit Area along the access road where they presumably feed in the alfalfa fields. During the 2017 EMS surveys, mule deer and pronghorn antelope were observed primarily in the vicinity of springs. Elk (*Cervus canadensis*) scat was noted in a few locations near springs and one bull elk was observed near an unnamed spring east of Sagebrush Gulch. During the 2018 aerial winter sage-grouse surveys, groups of mule deer were recorded throughout the Two-Mile Buffer WSA while a herd of 30 pronghorn antelope was observed in Cow Hollow. No elk were observed.

Use of the 0.5-Mile Buffer WSA is low by water-dependent species, such as the migratory waterfowl and shorebirds that travel within the Pacific Flyway. Lake Owyhee, located six miles to the southeast of the site, attracts several species of migrating waterfowl, shorebirds, and passerines. Many of these birds cross the 0.5-Mile Buffer WSA in transit. Sagebrush-dependent species, like sage sparrow, occur in the 0.5-Mile Buffer WSA, but in low numbers due to the high degree of disturbance to the existing habitat and the dominance of cheatgrass. Raptor use is common.

During the NWC surveys, the Pacific chorus frog (*Pseudacris regilla*) was detected numerous times at the single pond within the Permit Area and at DM Spring. The sagebrush lizard and western fence lizard were generally associated with small rock outcrops, like those at Small Avian Plots 1-3. The long-nosed leopard lizard, Great Basin collared lizard, western whiptail, desert horned lizard, and pygmy short-horned lizard were encountered primarily in sagebrush shrub-steppe and in sandy soil types.

Ground squirrels, especially Merriam's, were extremely abundant in the 0.5-Mile Buffer WSA. They provide an important source of prey for the raptor species that breed in the area. Both badger and coyote were present; these species prey on the abundant ground squirrels, create their own burrows and expand those of their prey, and provide potential burrows for burrowing owls and other wildlife. A bobcat (*Lynx rufus*) was encountered on one occasion during the NWC survey, and tracks were found during winter surveys. Porcupines (*Erethizon dorsatum*) were observed in several locations within the 0.5-Mile Buffer WSA.

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APPENDIX B

U.S. FISH & WILDLIFE SERVICE IPAC CONSULTATION

United States Department of the Interior

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In Reply Refer To:
Consultation Code: 01EOFW00-2018-SLI-0114
Event Code: 01EOFW00-2018-E-00212
Project Name: Grassy Mountain

December 01, 2017

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact the Endangered Species Division at the Service's Oregon Fish and Wildlife Office at (503) 231-6179. For information regarding listed marine and anadromous species under the jurisdiction of NOAA Fisheries Service, please see their website (http://www.nwr.noaa.gov/habitat/habitat_conservation_in_the_nw/habitat_conservation_in_the_r).

Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Oregon Fish And Wildlife Office
2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398
(503) 231-6179

Project Summary

Consultation Code: 01EOFW00-2018-SLI-0114

Event Code: 01EOFW00-2018-E-00212

Project Name: Grassy Mountain

Project Type: MINING

Project Description: Exploration project permit area and access road

Project Location:

Approximate location of the project can be viewed in Google Maps:
https://www.google.com/maps/place/43.78722054961776N117.31858383599294W

Counties: Malheur, OR

Endangered Species Act Species

There is a total of 0 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

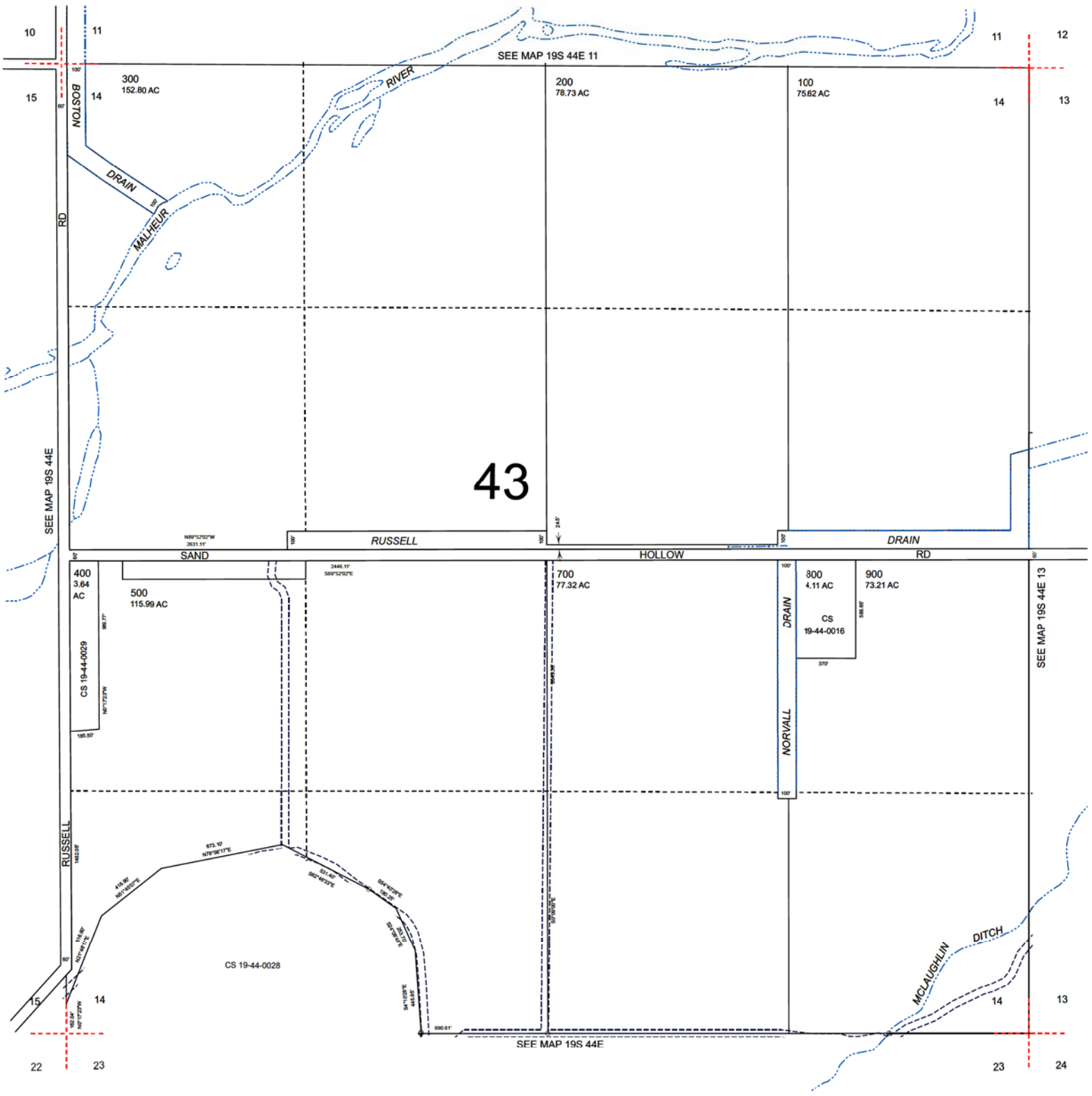
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

0 200 400 600 800 Feet

SECTION 14 T.19S. R.44E. W.M.
MALHEUR COUNTY
1" = 400'

19S44E14

Cancelled
600



Revised: MA
07/31/2013

19S44E14

clemow
associates LLC

January 25, 2019

Paramount Gold Nevada Corporation/Calico Resources USA Corporation
Attention: Nancy J. Wolverson
665 Anderson Street
Winnemucca, Nevada 89445

Re: **Grassy Mountain Mine – Malheur County, Oregon**
Trip Generation

C&A Project Number 20180803.00

Dear Ms. Wolverson,

This transportation analysis letter supports the proposed Grassy Mountain Mine project in Malheur County, Oregon. The following items are specifically addressed in this letter:

1. Property Description and Background Information
2. Development Trip Generation
3. Consideration of Transportation Policies
4. Summary

1. PROPERTY DESCRIPTION AND BACKGROUND INFORMATION

The proposed Grassy Mountain Mine is located in Malheur County, approximately 22 road miles south-southwest of Vale, Oregon and is accessed via a transportation network under multiple road authorities. From Vale, mine is accessed to the west on US Highway 20 (Oregon Department of Transportation authority), south on Russell Road (Malheur County), which becomes Twin Springs Road (Bureau of Land Management (BLM)), and further south on a project access road (Private).

A July 19, 2018 *Preliminary Feasibility and Technical Report* has been prepared documenting Grassy Mountain mineral reserves and proposed mining operations. A Transportation Baseline Study and a Transportation Baseline Report have been prepared documenting the existing roadway system, agency authority, and governing adopted plans. Preliminary roadway design documents have also been prepared identifying a typical roadway section, and a plan and profile for the Bureau of Land Management and Private roadway improvements.

Existing vehicular travel on the Main Access Road (combined roadways south of US 20) includes farm equipment and farm support vehicles associated with the farms on Russell Road, recreational travel to access Twin Springs Campground and Lake Owyhee, and support vehicles for water well drilling operations occurring in the Mine and Process Area.

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2. DEVELOPMENT TRIP GENERATION

Following initial construction, mine trip generation results from mining equipment, support vehicles, and private motor vehicles. Company-owned and commercial service vehicle types include pick-up trucks, service vehicles (trucks), and passenger shuttles. Additionally, there will be employee personal vehicle trips along the Main Access Road; however, a daily shuttle bus/van service between Vale and the mine is proposed, which will substantially reduce personal vehicle trips. Further, all mining and process operations will occur on-site; i.e., there is no off-site transport of mining produced materials except the final shipment of gold and silver bars to a refinery via armored car which will occur approximately once a week.

Information provided in the *Preliminary Feasibility and Technical Report, Section 16.9 – Mine Personnel,* summarizes mining operation requirements Table 16.14. This information includes staffing for mine management, operation, maintenance, and technical services. Additional information supplementing the technical report has also been provided by the Applicant.

During its 10-year processing duration, the mine is anticipated to employ up to 110 employees during peak operations, comprising approximately 63 mine workers, 35 plant operations and maintenance workers, and 12-15 administrative staff. The shift system for administrative personnel is planned to be 5 days on and 2 days off, at 10 hours per day. Production-related mining personnel (operators, fitters, electricians, and assistants) will work a shift system of 4 days on and 3 days off in two teams. Each team will provide 12 hours per day coverage allowing the mine to operate 24 hours per day, 4 days per week. Some personnel may work additional overtime through weekends for care and maintenance requirements, as needed.

The operating calendar is based on 360 operating days per year.

Because of the unique mining business nature, development trip generation data is not available in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition – or any edition, and published trip generation data for comparable uses/developments does not exist. As such, the following trip generation estimates are based on detailed Applicant-provided for the proposed mining operation.

Company-Owned and Commercial Service Vehicle Traffic

Pick-up Trucks – The Applicant anticipates having up to five (5) pick-up trucks traveling between the Vale area and the mine on a daily basis. The number of trips will fluctuate but it is anticipated each vehicle will make 1.5 round trips per day.

Service Vehicles – The Applicant anticipates there will be up to five (5) service vehicles traveling between the Vale area and the mine on a daily basis. Company-owned vehicles provide equipment service and deliver supplies including materials, chemicals, and parts. Commercial service vehicles include refuse hauling and fuel delivery. In total, these vehicles will typically make one round trip each per day; however, it is conservatively estimated each vehicle will make 1.5 round trips per day.

Shuttle Buses/Vans – The mine is located approximately 22 miles from Vale and there is no on-site employee living accommodation. As a result, all employees will travel between the Vale area and the mine on a daily basis. To reduce motor vehicle trip generation, the Applicant will actively promote ridesharing/carpooling and may provide a daily shuttle bus/van service depending on demand, further reducing motor vehicle trip generation. If this service is provided, the Applicant anticipates there will be up to four (4) shuttle vehicles traveling between the Vale area and the mine on a daily basis. Note the trip generation estimate is based on a "worst case" scenario where a shuttle service is not provided.

Employee Vehicle Traffic

Employee Private Motor Vehicles – The Applicant anticipates there will be up to 110 employees during peak operations traveling between the Vale area and the mine on a daily basis. While ridesharing/carpooling may occur, and/or a shuttle bus/van service provided (thereby reducing overall mine trip generation), it is conservatively assumed each employee will make 1 round trip per day and no shuttles are provided.

Daily Trip Generation Summary of Applicant-Provided Data

- **Company Pick-up Trucks:** 5 vehicles x 2 one-way trips (1 entering trip + 1 exiting trip) x 1.5 round trips per day = 15 trips.
- **Company and Commercial Service Vehicles:** 5 vehicles x 2 one-way trips (1 entering trip + 1 exiting trip) x 1.5 round trips per day = 15 trips.
- **Company Shuttle Buses/Vans:** If these vehicle trips occur they will eliminate significantly more employee vehicle trips than are created. As such, it is conservatively estimated there will be 0 trips.
- **Employee Vehicles:** 110 employees x 2 one-way trips (1 entering trip + 1 exiting trip) x 1 round trip per day = 220 trips.
- **Total Daily Trip Generation: 15 + 15 + 0 + 220 = 250 trips.**

Development Trip Generation - Summary

Based on Applicant-provided data, it is conservatively estimated the mine will generate 250 average daily motor vehicle trips during peak mining operations. This estimate assumes there is no Company-provided shuttle bus/van service and there is no employee ridesharing/carpooling; i.e. each employee drives a separate vehicle.

3. CONSIDERATION OF TRANSPORTATION POLICIES

The Malheur County Transportation System Plan (TSP), *Chapter 9.4 – Recommended Policies for Protection of Transportation Facilities, Other Policies Protecting Transportation Facilities*, states "*[Additional consideration is necessary if] (t)he proposed use shall impose an undue burden on the public transportation system. For developments that are likely to generate more than 400 average daily motor vehicle trips (ADTs), the applicant shall provide adequate information, such as a traffic impact study or traffic counts, to demonstrate the level of impact to the surrounding street system. The developer shall be required to mitigate impacts attributable to the project*.

Based on the trip generation information provided in this analysis, the proposed mining operation will generate fewer than 400 average daily motor vehicle trips and no further transportation analysis is necessary.

4. SUMMARY

The following conclusions are made based on the analysis contained in this letter.

1. Following initial construction, the mining project will have trip generation resulting from mining equipment, support vehicles, and private motor vehicles. Company-owned and commercial service vehicle types include pick-up trucks, service vehicles (trucks), and passenger shuttles. Additionally, there will be employee personal vehicle trips; however, a daily shuttle bus/van service between Vale and the mine site may be provided, reducing the number of personal vehicle trips.

2. During its 10-year processing duration, the mine is anticipated to employ up to 110 employees during peak operations, comprising approximately 63 mine workers, 35 plant operations and maintenance workers, and 12-15 administrative staff.

3. The mine will operate 24 hours per day, 4 days per week. Some personnel may work additional overtime through weekends for care and maintenance requirements, as needed. The operating calendar is based on 360 operating days per year.

4. Based on Applicant-provided data, it is conservatively estimated the mine will generate 250 average daily motor vehicle trips. This estimate assumes there is no Company-provided shuttle bus/van service and there is no employee ridesharing/carpooling; i.e. each employee drives a separate vehicle.

5. Based on the trip generation information provided in this analysis, the proposed mining operation will generate fewer than 400 average daily motor vehicle trips and the proposed mining operation trip generation is with the policy threshold identified in the Malheur County Transportation System Plan. No further transportation analysis is necessary.

Sincerely,

Christopher M. Clemow, PE, PTOE
Transportation Engineer

REGISTERED PROFESSIONAL ENGINEER
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OREGON
Jan. 16, 1996
CHRISTOPHER M CLEMOW
RENEWS 31 DEC 2019