GRASSY MOUNTAIN MINE PROJECT

Alternatives Assessment Report

Submitted to:

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CALICO RESOURCES

CONTENTS

FIGURES

APPENDICES

EXECUTIVE SUMMARY

Calico Resources USA Corp. (Calico), a wholly-owned subsidiary of Paramount Gold Nevada Corp. (Paramount), owns and controls 100 percent of the mineral tenure of the unpatented mining claims, patented mining claims, and mining leases that comprise the Grassy Mountain Mine Project (Project). The Project consists of two claims groups that are situated near the western edge of the Snake River Plain in eastern Oregon, 22 miles south-southwest of Vale, Oregon, and about 70 miles west of Boise, Idaho.

Calico proposes to mine approximately 2.07 million short tons (US) (Mst) of mill-grade ore and 0.27 Mst of waste rock (total of 2.34 Mst) for a Mine life of approximately 7.8 years; however, the Tailings Storage Facility (TSF) has been sized to contain 3.7 Mst should additional reserves be identified. The material (both ore and waste) will be extracted from the underground mine using conventional underground mining techniques, including drilling, blasting, mucking, loading, and hauling at a rate of approximately 1,300 to 1,400 short tons per day (stpd), four days per week. 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 Temporary Waste Rock Storage Facility (TWRSF) near the TSF and transport the ore to the ore stockpile adjacent to the crushing and milling facilities. The ore will be crushed and leached in a carbon-in-leach (CIL) processing plant at a rate of 750 stpd, seven days per week. The leached tailings will then be pumped in a slurry to the TSF, with supernatant solution recovered and pumped back to the Mill.

This Alternatives Analysis Assessment includes the identification and analysis of environmental impacts of the proposed mining operation for items specifically requested by the Oregon Department of Geology and Mineral Industries (DOGAMI). This report discusses the following alternatives and their relative impacts in the following sections.

MINING AND PROCESSING

The following mining alternatives were evaluated:

- Proposed Action (Underground Mine with TSF). Based on Calico's current Proposed Action, this consists of the extraction of underground mined material, transporting to the surface, where 0.27 Mst of waste will be placed in a synthetically lined TWRSF and 2.07 Mst of tailings from the ore milling will be placed in a synthetically lined TSF.
- Alternative 1A (Open Pit Mine with TSF). This alternative consists of extracting approximately 79.9 Mst of ore using a surface/open pit mining method, with approximately 22.5 Mst of ore processed in a mill and placed in a synthetically lined TSF, with the remaining 57.4 Mst of waste placed in a synthetically lined permanent Waste Rock Storage Facility (WRSF).
- Alternative 1B (Open Pit Mine with Heap Leach Pad [HLP]). This alternative consists of extracting approximately 108.6 Mst of ore using a surface/open pit mining method, with approximately 55.3 Mst of ore crushed and placed in a synthetically lined HLP, and the remaining 53.3 Mst of waste placed in a synthetically lined WRSF.

A comparison of the overall impacts from the Proposed Action and the two alternatives are summarized below:

- The Proposed Action has the least impacts (most positive) on air quality; archaeological resources; noise; threatened, sensitive, or endangered species; surface water and groundwater; vegetation; and wildlife. The Proposed Action also has the smallest surface disturbance area.
- The Proposed Action and the two alternatives result in about equal impacts to existing cultural/historical resources; land use; fish; and geologic hazards
- Alternatives 1A and 1B have more positive impacts on socioeconomic conditions compared to the Proposed Action.

WATER SUPPLY

The following water supply alternatives were evaluated:

- Proposed Action (Onsite Water Wells). Ore will be mined and milled per the Proposed Action, which includes the makeup water supplied from the Production Wellfield and mine dewatering. Water will be pumped from the production wells approximately 2.8 miles away, through an 8-inch high density polyethylene (HDPE) pipeline located adjacent to the Mine access road.
- Alternative 2 (Municipal Water Supply). Ore will be mined and milled per the Proposed Action; however, makeup water will be supplied from the City of Vale, which was assumed to be via a 25.3-mile pipeline constructed from Vale, Oregon, to the Mine site.

A comparison of the overall impacts from the Proposed Action and the alternative are summarized below:

- Both the Proposed Action and the alternative results in about equal long-term impacts to air quality; archeology; cultural/historical resources; land use; fish; geologic hazards; noise; socioeconomic conditions; threatened, sensitive, or endangered species; surface water; vegetation; and wildlife.
- The Proposed Action will have a greater short-term (negative) impact to the local groundwater.
- The alternative may have a greater short-term (negative) impacts on noise.

POWER SUPPLY

The following power supply alternatives were evaluated:

- Proposed Action (Overhead Transmission Line). Ore will be mined and milled per the Proposed Action, which includes hydroelectric-generated power being supplied to the Project from Idaho Power via a 25.3-mile-long overhead transmission line. The existing transmission line will be upgraded at the Hope Substation near Vale, Oregon, to the end of Russell Road, for a distance of approximately 5.2 miles. A new transmission line will be constructed for approximately 17.3 miles along the Cow Hollow and Twin Springs roads, and for 2.8 miles along the Mine access road.
- Alternative 3A (Combination Upgraded Overhead and Buried Transmission Line). Ore will be mined and milled per the Proposed Action; however, hydroelectric-generated power will be supplied to the Project from Idaho Power via a 25.3-mile-long combination overhead and buried

transmission line. The existing transmission line will be upgraded at the Hope Substation near Vale, Oregon, approximately the end of Russell Road for a distance of approximately 5.2 miles. A new buried transmission line constructed for 17.3 miles along the Cow Hollow and Twin Springs roads, and for 2.8 miles along the Mine access road.
- Alternative 3B (Onsite Generators). Ore will be mined and milled per the Proposed Action; however, power will be generated onsite using diesel generators instead of from line power.

A comparison of the overall impacts from the Proposed Action and the two alternatives are summarized below:

- The Proposed Action and the two alternatives have no impact, or equal impact, to archeological resources; cultural/historical resources; fish; land use; geologic hazards; socioeconomic conditions; surface water and groundwater; and vegetation.
- The Proposed Action and Alternative 3A have no impact, or equal long-term impact, to air quality from the Project and a potential short-term (negative) impact to endangered or threatened species. Even with the avian protection and mitigation measures included in the design, the Proposed Action has the additional short-term potential of injuring or killing birds, or altering local migratory routes, and short-term impacts to wildlife.
- Alternative 3B has the largest (negative) impact to noise. It should be noted that the emissions generated from this alternative may result in non-compliance with the Cleaner Air Oregon rules.
- When considering other impacts, the Proposed Action would have a greater (negative) visual impact.

RECLAMATION

The following reclamation alternatives were evaluated:

- Proposed Action (Infrastructure Removal and Limited Access). The proposed post -closure land uses for the Project are livestock grazing or range land, wildlife habitat, and recreational land, with opportunities to consider mineral exploration and development when feasible. Therefore, structures will be removed, facilities will be reclaimed and infrastructure removed (i.e., roads, power supply, and water) to generally match pre-mining conditions.
- Alternative 4 (Post -Closure Industrial Land Use). The post -closure land use alternative would consider promoting access and leaving the infrastructure and buildings for subsequent use. Therefore, while the facilities will be reclaimed, the Project site infrastructure (buildings, production water wells, waterline, transmission line, Mine access roads, and Mine haul roads) would remain in place for post -closure industrial land use.

A comparison of the overall impacts from the Proposed Action and the alternative is summarized below:

- The Proposed Action has the least impacts on air quality; noise; threatened, sensitive, or endangered species; vegetation; and wildlife.
- Both the Proposed Action and the alternative results in about equal long-term impacts to archeological resources; cultural/historical resources; land use; fish; geologic hazards; and surface water.

- The alternative has a more positive impact on socioeconomic conditions compared to the Proposed Action.

TAILINGS STORAGE FACILITY

The tailings siting and tailings deposition trade-off studies are summarized below, based on a technical memorandum prepared by Golder Associates Inc. (Golder, 2019).

Five TSF sites were considered, and a ranking matrix was developed that consolidates the advantages and disadvantages of each option to support the selection of a preferred option. The current site (Golder's Option 2) was selected as the preferred TSF location because it received the best overall ranking. Golder also reviewed three tailings deposition methods, and the conventional slurry tailings deposition method was selected as the preferred method.

ACRONYMS

ADR	adsorption desorption and recovery
amsl	above mean sea level
ARD	acid rock drainage
BLM	Bureau of Land Management
Calico	Calico Resources USA Corp.
CIC	carbon-in-column
CIL	carbon-in-leach
CRF	cemented rockfill
DOGAMI	Oregon Department of Geology and Mineral Industries
E-Cell	Evaporation Cell
ft	foot/feet
FS	Feasibility
gpm	gallons per minute
H:1V	horizontal to one vertical
HDPE	high density polyethylene
HLP	Heap Leach Pad
Hz	hertz
kstpd	thousand tons (US) per day
kV	kilovolt
Mst	million short tons (US)
MV	megavolts
MW	megawatt
NRHP	National Register of Historic Places
OAR	Oregon Administrative Rule
Paramount	Paramount Gold Nevada Corp.
PEA	Preliminary Economic Assessment
PFS	Prefeasibility
POO	Plan of Operations
Project	Grassy Mountain Mine Project

ROW	right of way
stpd	short tons per day
TSF	Tailings Storage Facility
TWRSF	temporary waste rock storage facility
UV	ultraviolet
WRSF	Waste Rock Storage Facility

1. INTRODUCTION

Calico Resources USA Corp. (Calico), a wholly-owned subsidiary of Paramount Gold Nevada Corp. (Paramount), owns and controls 100 percent of the mineral tenure of the unpatented mining claims, patented mining claims, and mining leases that comprise the Grassy Mountain Mine Project (Project). The Project consists of two claims groups that are situated near the western edge of the Snake River Plain in eastern Oregon, 22 miles south-southwest of Vale, Oregon, and about 70 miles west of Boise, Idaho. The Project site location is presented in Figure 1.

Calico proposes to mine approximately 2.07 million short tons (US) (Mst) of mill-grade ore and 0.27 Mst of waste rock (total of 2.34 Mst) for a Mine life of approximately 7.8 years; however, the Tailings Storage Facility (TSF) has been sized to contain 3.7 Mst should additional reserves be identified. The material (both ore and waste) will be extracted from an underground mine using conventional underground mining techniques, including drilling, blasting, mucking, loading, and hauling at a rate of approximately 1,300 to 1,400 short tons per day (stpd), four days per week. Calico will use hydraulic loaders to load the ore and waste into haul trucks. The haul trucks will transport the waste rock to the Temporary Waste Rock Storage Facility (TWRSF) near the TSF and transport the ore to the ore stockpile adjacent to the crushing and milling facilities. The ore will be crushed and leached in a carbon-in-leach (CIL) processing plant at a rate of 750 stpd, seven days per week. The leached tailings will then be pumped in a slurry to the TSF, with supernatant solution recovered and pumped back to the Mill.

In general, the proposed mining and metal processing operations will consist of an underground mine and ore processing facilities, including a conventional mill and TSF, a TWRSF, and other support facilities, as shown in Figure 2. The Project will include the following major components:

- An underground mine, with Mine portal, decline, and ventilation shaft;
- TSF with Tailings Embankment, Tailings Impoundment, and Reclaim Pond;
- TWRSF;
- Process Plant area, which includes the Process Plant building, control room, crushing facilities, conveyors, ore bins, control rooms, CIL processing plant, reagent storage building (including chemical and reagent storage), gold room, and Collection Pond;
- Infrastructure and ancillary facilities that include Project site main gate and guard house, administration office and change house, assay laboratory and sample preparation area, truck workshop and warehouse, wash pads, Process Plant workshop and warehouse, meteorological station, explosive magazines, parking areas, ore stockpiles, solid and liquid hazardous waste storage, and fuel storage and dispensing area;
- Roads, including upgrades to the Twin Springs and Cow Hollow roads, and construction of the Mine access, internal access, and Mine haul roads;
- Yards and laydown areas;
- Growth Media Stockpiles;
- Water supply, including Production Wellfield, water pipeline, raw water storage tank, and Potable Water Treatment Plant;

- Power supply that includes a power substation, upgraded 14.4 kilovolt (kV) overland power transmission system, new 14.4 kV overland power transmission system, onsite power lines, and generators;
- Permanent and temporary stormwater diversion channels;
- Other areas, including the exploration areas, septic system, and perimeter fence;
- Quarry; and
- Reclamation Borrow Areas.

1.1 BACKGROUND

Calico developed a Preliminary Economic Assessment (PEA) (MMC, 2015) that considered and underground mine with milling and a 3.2 Mst TSF. Upon completion of underground mining, an option for an open pit with crushing and a 65.4 Mst Heap Leach Pad (HLP) was identified. The PEA assumed that water for the project would be obtained from the dewatering of underground workings and from local water supply wells. The PEA also considered a new transmission line from the City of Vale versus onsite diesel-powered generators, and selected the transmission line as the preferred option.

Calico issued a Prefeasibility (PFS) report (MDA, 2018), which presented a plan for an underground mine sized for 1.7 Mst, and a mill with a TSF sized to contain the mined amount, plus an additional 1.5 Mst of capacity, for a total TSF capacity of 3.2 Mst. The PFS assumed that water for the project would be obtained from the dewatering of underground workings and from local water supply wells. The PFS also considered a new transmission line from the City of Vale versus onsite natural gas powered generators, and selected the transmission line as the preferred option.

Calico published a Feasibility (FS) report (Ausenco, 2020), which presented a plan for an underground mine sized for 2.1 Mst, with a mill and TSF sized to contain the mined amount, plus an additional 1.1 Mst of capacity, for a total TSF capacity of 3.2 Mst. The FS identified that water for the project would be obtained from the dewatering of underground workings and from local water supply wells, and that power would be supplied using a new transmission line from the City of Vale.

1.2 BASIS FOR ALTERNATIVES ANALYSIS

Oregon Administrative Rule (OAR) 632-037-0045 states, "The applicant shall submit to the Department a consolidated application that includes but is not limited to the following sections:

(1) General Information;
(2) Existing Environment – Baseline Data;
(3) Operating Plan;
(4) Reclamation and Closure Plan;
(5) Alternatives Analysis."

OAR 632-037-0075 details the requirements for the alternatives analysis, which are as follows:

> "(1) The alternatives analysis shall include an identification and analysis of the environmental impacts of the proposed mining operation and alternatives to avoid or minimize adverse impacts and/or enhance the quality of the human and natural environment.
> (2) The alternatives analyzed by the applicant or contractor shall include, but not be limited to, the following:
> (a) Alternative locations for mine facilities, including heap leach pads, roads, impoundments, ponds, ore storage areas and waste disposal areas;
> (b) Alternative designs, processes (including chemical processes), operations and scheduling for mine facilities and operations, including heap leach pads, roads, impoundments, ponds, ore storage areas and waste disposal areas;
> (c) Alternative water supply;
> (d) Alternative power supply; and
> (e) Alternative reclamation procedures.
> (3) The alternatives analysis shall include sufficient detail in the description of each alternative so that affected agencies and the public may evaluate the comparative merits of each alternative."

This Alternatives Analysis was prepared to meet the requirements specified above and was further developed based on guidance provided by DOGAMI during meetings between Calico and DOGAMI in 2020 and 2021.

1.3 ALTERNATIVES ANALYSIS METHODOLOGY

The evaluation of alternatives was focused on environmental and social impacts as specified in OAR 632-037-0075 and includes the following:

1. Air quality
2. Archaeological resources
3. Cultural/historical resources
4. Existing land use and land use designations
5. Fish, including fish habitat and aquatic biology
6. Geologic hazards, including geology
7. Noise
8. Socioeconomic conditions
9. Threatened, sensitive, or endangered species, which includes state or federally listed threatened or endangered species and habitat, and state sensitive species and habitat
10. Surface water and groundwater
11. Vegetation
12. Wildlife, including wildlife habitat
13. Other resources

The alternatives considered and analyzed in this report align with the purpose and need of the Proposed Action and includes sufficient detail in the description of each alternative, so that affected agencies and the public may evaluate the comparative merits and potential environmental impacts of each alternative.

Following the development of these alternatives to this level, each alternative was evaluated based on the environmental and social aspects listed above individually utilizing site-specific data, such as baseline studies.

1.4 ALTERNATIVES CONSIDERED

This Alternatives Analysis includes the identification and analysis of environmental and social impacts of three mining and processing alternatives, two water supply alternatives, three power supply alternatives, and two reclamation alternatives. All alternatives compared were developed assuming that they would meet local, state, and federal regulatory requirements and guidance, such as the lining of chemical mining processing facilities. This Alternatives Analysis includes the following alternatives:

- Mining and Processing
  - Proposed Action (Underground Mine with TSF). Based on Calico's current Proposed Action, this consists of the extraction of underground mined material, transporting to the surface, where up to 0.27 Mst of waste rock will be placed in a synthetically lined TWRSF and 2.07 Mst of tailings from the ore milling will be placed in a synthetically lined TSF.
  - Alternative 1A (Open Pit Mine with TSF). This alternative consists of extracting approximately 79.9 Mst of ore and waste rock using a surface/open pit mining method, with approximately 22.5 Mst of ore processed in a mill and placed in a synthetically lined TSF, with the remaining 57.4 Mst of waste rock placed in a synthetically lined permanent Waste Rock Storage Facility (WRSF).
  - Alternative 1B (Open Pit Mine with Heap Leach Pad [HLP]). This alternative consists of extracting approximately 108.6 Mst of ore and waste rock using a surface/open pit mining method, with approximately 55.3 Mst of ore crushed and placed in a synthetically lined HLP, and the remaining 53.3 Mst of waste rock placed in a synthetically lined WRSF.
- Water Supply
  - Proposed Action (Onsite Water Wells). Ore will be mined and milled per the Proposed Action, which includes the makeup water supplied from the Production Wellfield and Mine dewatering. Water will be pumped from the production wells approximately 2.8 miles away (distance from Well No. 5 to Plant Site), through an 8-inch high density polyethylene (HDPE) pipeline located adjacent to the Mine access road.
  - Alternative 2 (Municipal Water Supply). Ore will be mined and milled per the Proposed Action; however, makeup water will be supplied from the City of Vale, which was assumed to be via a 25.3-mile pipeline constructed from Vale, Oregon, to the Mine site.
- Power Supply
  - Proposed Action (Overhead Transmission Line). Ore will be mined and milled per the Proposed Action, which includes hydroelectric-generated power being supplied to the Project from Idaho Power via a 25.3-mile-long overhead transmission line. The existing transmission line will be upgraded at the Hope Substation near Vale, Oregon, to the end of Russell Road, for a distance of approximately 5.2 miles. A new transmission line constructed for 17.3 miles along the Cow Hollow and Twin Springs roads, and for 2.8 miles along the Mine access road.

   - Alternative 3A (Combination Upgraded Overhead and Buried Transmission Line). Ore will be mined and milled per the Proposed Action; however, hydroelectric-generated power will be supplied to the Project from Idaho Power via a 25.3-mile-long combination overhead and buried transmission line. The existing transmission line will be upgraded at the Hope Substation near Vale, Oregon, to the end of Russell Road, for a distance of approximately 5.2 miles. A new buried transmission line constructed to the Mine site for 17.3 miles along the Cow Hollow and Twin Springs roads, and for 2.8 miles along the Mine access road.
   - Alternative 3B (Onsite Generators). Ore will be mined and milled per the Proposed Action; however, power will be generated onsite using generators instead of from line power.

- Reclamation
   - Proposed Action (Infrastructure Removal and Limited Access). The proposed post -closure land uses for the Project are livestock grazing or range land, wildlife habitat, and recreational land, with opportunities to consider mineral exploration and development when feasible. Therefore, structures will be removed, facilities will be reclaimed and infrastructure removed (i.e., roads, power supply, and water) to generally match pre-mining conditions.
   - Alternative 4 (Post-Closure Industrial Land Use). The post -closure land use alternative would consider promoting access and leaving the infrastructure and buildings for subsequent use. Therefore, while the facilities will be reclaimed, the Project site infrastructure (buildings, production water wells, waterline, transmission line, Mine access roads, and Mine haul roads) would remain in place for post -closure industrial land use.

This Alternatives Analysis Assessment report also summarizes the results of the TSF siting and tailings deposition trade off studies developed by Golder Associates , Inc. (Golder, 2019).

2. MINING AND PROCESS ALTERNATIVES

The Proposed Action and two mining and processing alternatives were evaluated in this Alternatives Analysis, which are presented in this section.

2.1 PROPOSED ACTION – UNDERGROUND MINE WITH TAILINGS STORAGE FACILITY

2.1.1 OVERVIEW

The Project will consist of an underground gold and silver ore mine using the mechanized cut and fill mining method, and a process facility to mill, refine, and melt gold and silver ore into doré bars for further processing offsite. A quarry will be developed to support the backfill of the underground mine, and the construction of the TSF and other mining facilities. Waste rock generated from the mining operation will be stored in a TWRSF prior to being utilized as supplementary cemented rock fill (CRF) in the underground workings. Mine waste from the milling process will be stored within the TSF. The Proposed Action is presented in Figure 3.

Calico proposes to mine approximately 2.07 Mst of mill-grade ore and 0.27 Mst of waste rock (total of 2.34 Mst); however, the TSF has been sized to contain 3.7 Mst should additional reserves be identified. 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. Hydraulic loaders will load the ore and waste into haul trucks. The haul trucks will transport the waste rock to the TWRSF near the TSF and transport the ore to the ore stockpile adjacent to the crushing and milling facilities. The ore will be crushed and leached in a CIL processing plant to recover the precious metals by adsorption onto activated carbon. The activated carbon will be processed through an elution circuit to generate a "pregnant" solution that will then be processed for metal recovery and further offsite refining.

2.1.2 UNDERGROUND MINING

The underground mine will be developed using drill and blast techniques. A main ramp will be established from the Mine portal to the bottom level. Level access will be mined from the main ramp to the production area. As ore is removed from the production area, CRF will be placed to fill the production drifts, eliminating voids in the production area. The CRF will require a backfill batch plant at the surface. The primary sources of rock fill used in the CRF will be the basalt rock sourced from the nearby Quarry and waste rock stored on the TWRSF. Rock fill will be crushed using a mobile crushing unit located in the Quarry. The waste rock will be used if this is determined to be protective of the environment.

2.1.3 PROCESSING FACILITIES

Ore from the underground mine will be hauled using underground trucks from the production area to an ore stockpile on surface. A front-end loader will take the material from the stockpile to a mobile crushing unit that will include a jaw crusher as the primary stage, a screen, and a secondary cone crusher for further size reduction. Crushed ore will be conveyed to a fine-ore bin, from which the ore will be conveyed to the

Mill via a feed conveyor. The crushed ore will be ground by a ball mill in closed circuit with a hydro-cyclone cluster. The hydro-cyclone overflow will flow to a leach/CIL circuit via a pre-aeration tank. Lime will be added during pre-aeration to control pH, and cyanide will be added to the first leach tank. The leach/CIL circuit consists of a pre-aeration tank, two leach tanks, and a series of seven CIL tanks.

Leached gold and silver will be adsorbed onto activated granular carbon, which will be reverse-circulated through each of the CIL tanks. Slurry will advance through the seven CIL tanks. Barren carbon will be added to the last tank and flow through the circuit in the opposite direction to the slurry. Loaded carbon removed from CIL Tank 1 will be fed to the elution process. The elution process will strip gold and silver from the carbon into solution. Pregnant solution (solution loaded with gold and silver) will be transferred to the gold room, and stripped carbon will be regenerated in the propane-fired carbon regeneration kiln before being recycled to the CIL circuit.

The gold room will house the electrowinning cells, retort, barring furnace, and associated support equipment. In the electrowinning cells, gold and silver will be plated onto cathodes using electrolysis. Periodically, the electrowinning cells will be opened and the sludge cleaned out manually with a high-pressure spray. Sludge from the cells will flow by gravity to the electrowinning-sludge-filter feed tank and pumped through a filter press to be dewatered. Dewatered sludge will be collected in trays and placed in the mercury retort to dry the sludge and remove mercury. Dried sludge will be removed from the retort and combined with fluxes in a flux mixer before being charged into the melting furnace, where the sludge will be melted and poured into doré bars.

The CIL tailings will be pumped to an agitated cyanide detoxification tank, where lime will be added to buffer pH; copper sulfate will be added as a reaction catalyst; and sodium metabisulfite will be added. Detoxified slurry will overflow from the detoxification tank to the tailings pump box, where it will be pumped to the TSF.

2.1.4 TAILINGS STORAGE FACILITY

The proposed TSF will be located in the broad valley immediately west of the Mine portal and Process Plant area. The TSF will fill the native valley and require staged embankment constructions on the north and west sides. The embankments will be constructed in three stages (cumulative storage capacity of 1.0, 2.07, and 3.67 Mst for Stages 1, 2, and 3, respectively) using downstream construction techniques.

The TSF will be a geomembrane-lined facility with continuous primary and secondary containment and leakage collection and leakage detection systems where process solutions are expected to be localized. Process solutions will be managed with the following two independent return water systems that return collected water from the TSF back to the Mill for re-use in the process circuit:

- Supernatant water at the Tailings Impoundment will be collected and managed at the supernatant pool and pumped back to the Process Plant for re-use.
- As the tailings consolidate, water will flow downward. To reduce the hydraulic head on the geomembrane and promote two-dimensional drainage of the tailings, a tailings underdrain collection system above the geomembrane liner will convey underdrain flows via gravity to the

Reclaim Pond at the northern downstream toe of the facility where the water will be pumped back to the Process Plant for re-use.

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 action above the anticipated normal operation pool. Permanent and temporary stormwater diversion channels will collect and divert a majority of the stormwater runoff around the facility to a natural drainage north of the TSF.

2.1.5 TEMPORARY WASTE ROCK STORAGE FACILITY

A geomembrane-lined TWRSF area has been designed adjacent to the TSF to provide temporary containment of waste rock produced during ongoing mining operations. Containment, leak collection and leak detection systems for the TWRSF are the same as those for the TSF. The underdrain collection piping system will be hydraulically separate from the TSF and collected underdrain flows will be routed to the Reclaim Pond through a solid wall pipe for independent monitoring and sampling.

2.1.6 INFRASTRUCTURE

2.1.6.1 Power Supply

Electrical power will be supplied to the Mine via an overhead transmission line owned and maintained by Idaho Power. The power demand will be approximately 5.3 megawatts (MW). The infrastructure will include a 25-mile distribution circuit, a new 69/34.5 kV to 14 megavolts (MV) transformer, and a new 34.5-kV 167 amp regulator. The existing overhead transmission line will be upgraded at the Hope Substation near Vale, Oregon, to the to the end of Russell Road, for a distance of approximately 5.2 miles. A new transmission line constructed for 17.3 miles along the Cow Hollow and Twin Springs roads, and for 2.8 miles along the Mine access road.

2.1.6.2 Water Supply

Makeup water will be obtained from the Production Wellfield, dewatering of the underground workings, and recycled process water captured in the Tailings Impoundment and Reclaim Pond. The Production Wellfield will be located approximately 2.8 miles north of the Mine near Twin Springs Road. Water from the Production Wellfield will be piped through a combination of underground and aboveground piping to a freshwater tank, located south of the Process Plant area. From the freshwater tank, the fresh water will be distributed around the Mine area.

2.1.7 MINE LIFE AND STAFFING

The Proposed Action has a Mine life of approximately 7.8 years of operation and would employ approximately 100 people.

2.1.8 POST -CLOSURE LAND USE AND RECLAMATION

The proposed post -closure land uses for the Project are livestock grazing or range land, wildlife habitat, and recreational land, with opportunities to consider mineral exploration and development when feasible. This post -closure land use is in conformance with the Bureau of Land Management (BLM) Vale District Management Plan and Malheur County Land Use Plans.

The reclaimed TSF, Quarry, and Mine portal will be the remaining landforms associated with the Project following reclamation. Other facilities such as the TWRSF, power lines, and Process Plant area will be removed from the Project site. Where practical, areas impacted by the Project will be reclaimed to support the post -closure land use described above, and will generally consist of the following:

- The adit opening, Mine portal and ventilation shaft to the surface will be permanently sealed by the placement of concrete and rock plugs, or steel bulkheads, covered with fill and growth media, and revegetated.
- Waste rock that is not used underground for CRF backfill during operations will be transferred to the TSF at the end of operations. Therefore, no waste rock is planned to be on the TWRSF at reclamation. The TWRSF lining system will be cut and removed, including the leakage collection and leakage detection system and disposed of offsite. The surface will be regraded to promote positive drainage and covered with 12 inches of growth media and revegetated.
- Reclamation of the TSF will start with transfer of any waste rock remaining in the TWRSF at the end of operations into the TSF. Regrading of the tailings surface will then be performed to shift the low point of the surface from the eastern edge to the north embankment where an overflow structure, including a concrete drop structure, will be constructed.
- Upon completion of grading the tailings surface, construction of the cover for the TSF impoundment will be initiated. The TSF cover system will consist of a geomembrane liner, a drainage layer, and layer of revegetated growth media.
- Once tailings underflow rates reduce to levels appropriate for passive water management, the Reclaim Pond will be retrofitted to a geomembrane-lined passive Evaporation Cell (E-Cell).
- All buildings and facilities that can be dismantled will be removed. Non-movable physical aspects, such as the Plant site, will be contoured to match the original site topography and revegetated. All foundations remaining from decommissioned structures and made from inert materials, such as concrete, will be broken up and covered. After demolition and salvage operations are complete, the disturbed areas will be covered with 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 of.
- Cow Hollow Road and Twin Springs Road, including all upgrades, will be transferred to Malheur County and will not be reclaimed.
- The Mine access road, which connects the Twin Springs Road to the Mine, and all internal access and Mine haul roads, will be reclaimed from two-way gravel roads to one-way primitive roads to allow for post-reclamation monitoring. All other roads shall be removed.

2.2 ALTERNATIVE 1A – OPEN PIT MINE WITH TAILINGS STORAGE FACILITY

2.2.1 OVERVIEW

Under this alternative, the ore will be mined using a surface mining method instead of underground mining resulting in an open pit. The metals will be recovered through a CIL recovery plant, and the tailings will be stored in a TSF, which is the same process described for the Proposed Action. This alternative results in a substantially larger volume of material being processed and a corresponding larger TSF that will be located in the same general area as the TSF in the Proposed Action. This alternative also results in a substantially larger volume of waste rock being generated from the excavation of the open pit, which will result in a permanent Waste Rock Storage Facility (WRSF) being constructed for the storage of waste rock and overburden. It was assumed that the overburden from the open pit would be suitable for TSF construction materials, and a quarry was not needed.

The open pit mining method is a surface mining technique that extracts minerals from an open pit, or excavation, in the ground. The open pit mining method operates on a much larger scale that uses larger mining equipment than underground mining because the economic mineral is usually at depth and requires the overlying non-economic material, referred to as overburden or waste rock, to be removed. This alternative assumes that Mine haul trucks will haul 5,000 tons (US) per day (5 kstpd) of ore to the Mill, versus 0.75 kstpd for the Proposed Action.

Using the mineral resource model developed from exploration data, a conceptual level open pit shell was estimated with a 50-degree pit slope to mine economically viable ore that was based on a gold price of $1,800 per ounce. The open pit excavation was estimated to consist of approximately 22.5 Mst of ore, with approximately 57 Mst of waste rock, resulting in a total open pit volume of approximately 79.5 Mst.

Alternative 1A is presented in Figure 4.

2.2.2 MINING

For this alternative, ore will be mined using conventional open pit operations, which includes drilling and blasting, loading using excavators or loaders, and hauling ore and waste rock with an assumed fleet of eight Caterpillar 777 Mine haul trucks, along with supporting auxiliary mining equipment, such as motor graders, bulldozers, loaders, water trucks, etc. This alternative assumed that Mine haul trucks will haul 5 kstpd of ore to the Mill over a 12-year mining life.

The open pit is anticipated to be up to approximately 74 acres in size.

2.2.3 PROCESSING

Ore will be hauled to a three-stage crushing system (primary jaw crusher, secondary cone crusher, and tertiary ball mill). Gold will be recovered using a CIL recovery circuit, with the tailings deposited in a TSF. The process flowsheet for this alternative will be the same as for the Proposed Action, but the Mill and recovery system will be sized and operated at a rate of 5 kstpd rather than 0.75 kstpd.

For the purpose of the Alternatives Analysis, the footprint of the Process Plant area was assumed to be the same as the Proposed Action; however, these facilities will be larger in actuality.

2.2.4 TAILINGS STORAGE FACILITY

The TSF will be located in the same general location as the TSF for the Proposed Action, within the broad valley immediately north of the open pit. The TSF will fill the native valley and require staged embankment constructions on the north and west sides. The TSF embankment will be constructed in a downstream manner.

The TSF for this alternative was estimated to contain the approximately 22.5 Mst of tailings, which is approximately an order of magnitude larger than the 3.7 Mst TSF for the Proposed Action. The TSF was assumed to be constructed in the same manner as the Proposed Action and will be a geomembrane-lined facility with continuous primary and secondary containment and leak detection systems where process solutions are expected to be localized. The TSF was estimated to cover approximately 216 acres, with a maximum embankment height of approximately 180 feet (ft).

Similar to the Proposed Action, process solutions will be managed with two independent return water systems that return collected water from the TSF back to the Mill for re-use in the process circuit.

2.2.5 PERMANENT WASTE ROCK STORAGE FACILITY

Alternative 1A includes a permanent WRSF containing approximately 57.4 Mst, which is approximately two orders of magnitude larger than the 0.2 Mst TWRSF in the Proposed Action. The permanent WRSF will be synthetically lined in the event that waste rock generates acid rock drainage (ARD). The permanent WRSF is anticipated to cover approximately 215 acres and will be located near the open pit.

2.2.6 INFRASTRUCTURE

For the purpose of the Alternatives Analysis, the infrastructure requirements for this alternative, such as power, water, laydown areas, stockpiles, etc., were assumed to be the same as for the Proposed Action; however, these facilities will be larger in actuality.

2.2.7 MINE LIFE AND STAFFING

Alternative 1A has a Mine life of approximately 12.7 years of operation and would employ approximately 100 people.

2.2.8 POST -CLOSURE LAND USE AND RECLAMATION

For the purpose of the Alternatives Analysis, it was assumed that the reclamation requirements and post-closure land use for this alternative will be the same as for the Proposed Action.

Upon cessation of mining operations, a closure cover will be constructed over the permanent WRSF, which will be identical to that proposed for the TSF in the Proposed Action. The reclaimed TSF, permanent WRSF and open pit will be the remaining landforms associated with the Project following reclamation. Other facilities, such as the power lines and Process Plant facilities, will be removed from the Project site. However, a key difference is that a seasonal pit lake may form post-closure depending on the balance of rainfall, evaporation, groundwater inflow, and pit floor elevation (the pit floor will be at an elevation of approximately 3,000 ft above mean sea level [ft amsl], and the current groundwater table in the area of the resource is at an elevation between 3,100 and 3,200 ft amsl).

2.3 ALTERNATIVE 1B – OPEN PIT MINE WITH HEAP LEACH PAD

2.3.1 OVERVIEW

Alternative 1B includes using a surface mining method instead of underground mining, and gold will be recovered through cyanide leaching on an HLP, with processing of the pregnant solution in a carbon adsorption desorption recovery (ADR) plant instead of milling and CIL metals recovery process. Similar to Alternative 1A, this alternative also results in a substantially larger volume of waste rock being generated from the excavation of the open pit, which will result in a permanent WRSF being constructed for the storage of waste rock and overburden. It was assumed that the overburden from the open pit would be suitable for TSF construction materials, and the Quarry was not needed.

This alternative assumed that Mine haul trucks will haul 15 kstpd of ore to the crusher, versus 0.75 kstpd for the Proposed Action.

For this alternative, the lower process costs result in a lower cutoff grade and a larger volume of ore than the other alternatives. The lower grade ore will be crushed to a coarser particle size, assumed to be a sandy gravel size, versus milled to a clayey silt size for the Proposed Action and Alternative 1A. The low-grade ore will be stacked in the HLP, and barren cyanide solution will be applied to the ore lift. Pregnant solution will be collected at the base of the HLP, and the solution will be pumped to a carbon ADR plant that will include a series of cascading carbon-in-column (CIC) tanks. The solution will be recirculated to the HLP in a closed circuit. Gold and silver will be stripped and recovered from the carbon.

Using the mineral resource model developed from exploration data, a conceptual level open pit shell was estimated with a 50-degree pit slope to mine economically viable ore that was based on a gold price of $1,800 per ounce. The open pit excavation was estimated to consist of approximately 53 Mst of low-grade ore, with approximately 55 Mst of waste rock, resulting in a total open pit volume of approximately 109 Mst.

Alternative 1B is presented in Figure 5.

2.3.2 MINING

For this alternative, ore will be mined using conventional open pit operations, which includes drilling and blasting, loading using excavators or loaders, and hauling ore and waste rock with an assumed fleet of 11

Caterpillar 777 Mine haul trucks, along with supporting auxiliary mining equipment, such as motor graders, bulldozers, loaders, water trucks, etc. This alternative assumed that Mine haul trucks will haul 15 kstpd of low-grade ore to the crusher.

The open pit for this alternative is anticipated to be up to approximately 97 acres in size.

2.3.3 PROCESSING

Ore will be hauled from the open pit to a three-stage crushing system (primary jaw crusher, with secondary and tertiary cone crusher). Crushed ore will be placed on an HLP, solution will be applied and recovered, and gold will be recovered from the leach solution in the ADR plant.

For the purpose of the Alternatives Analysis, the footprint of the Process Plant area was assumed to be the same as the Proposed Action; however, these facilities will be larger in actuality.

2.3.4 HEAP LEACH PAD AND INTERNAL PROCESS POND

The HLP for this alternative was estimated to contain approximately 53.3 Mst of crushed ore. Similar to the TSF in the Proposed Action and Alternative 1A, the HLP will be synthetically lined to minimize losses to groundwater and the environment; however, the containment system was assumed to be comprised of a primary geosynthetic liner, leak detection system, and a secondary composite liner in accordance with OAR 340-043-0120.

For the purpose of this Alternatives Analysis, it was assumed that the ore will be durable enough such that solution can be stored within the pore spaces of the crushed ore and an internal pond can be used to minimize the HLP footprint and reduce wildlife exposure to cyanide solution. Within the limits of the internal pond, the containment system will be comprised of a geomembrane-lined facility with continuous primary and secondary containment and leak detection systems where process solutions are expected to be localized.

The proposed HLP will be located in the broad valley immediately north of the open pit (i.e., in the area proposed for the TSF in Alternative 1A). The HLP will fill the native valley and require an embankment to serve as a buttress to improve the HLP stability and provide containment for process solution.

The HLP was estimated to cover approximately 147 acres, with a maximum ore height of approximately 340 ft.

2.3.5 PERMANENT WASTE ROCK STORAGE FACILITY

The permanent WRSF for this alternative was assumed to contain approximately 53.3 Mst and will be synthetically lined in the event that waste rock generates ARD. The permanent WRSF was anticipated to cover up to approximately 219 acres and will be located near the open pit.

2.3.6 INFRASTRUCTURE

For the purpose of this Alternatives Analysis, the infrastructure requirements, such as power, water, laydown areas, stockpiles, etc., for this alternative was assumed to be the same as for the Proposed Action; however, these facilities will be larger in actuality.

2.3.7 MINE LIFE AND STAFFING

Alternative 1B has a Mine life of approximately 10 years of operation and would employ approximately 130 people.

2.3.8 POST -CLOSURE LAND USE AND RECLAMATION

Upon completion of mining operations, ore loading of the HLP will cease; however, solution application and circulation between the ADR, ponds, and HLP will continue until gold recovery becomes uneconomical and the solution inventory is reduced to an amount that can be managed post-operations.

Upon cessation of mining and solution processing operations, a closure cover will be constructed over the permanent WRSF and HLP, which will be identical to that proposed for the TSF in the Proposed Action. The reclaimed HLP, permanent WRSF and open pit will be the remaining landforms associated with the Project following reclamation. Other facilities such as the power lines and Process Plant area will be removed from the Project site. However, a key difference is that a seasonal pit lake may form post-closure depending on the balance of rainfall, evaporation, groundwater inflow, and pit floor elevation (the pit floor will be at an elevation of approximately 3,000 ft amsl, and the current groundwater table in the area of the resource is at an elevation between 3,100 and 3,200 ft amsl).

2.4 ALTERNATIVES ANALYSIS

A table with a detailed description of impacts and associated with the Proposed Action and two alternatives is presented in Appendix A, and the relative impacts are summarized below:

1. The primary criteria in assessing air quality impacts are the amount of fugitive dust and exhaust emissions. The Proposed Action presents the lowest short-term and long-term impacts to air quality, since it has the smallest footprint area, shortest Mine life and has a smaller fleet of smaller equipment that is primarily underground.
2. The primary criterion in assessing the archeological resources are the number and extent of impacted resources. The Proposed Action presents the lowest impact these archeological resources, since it has the least amount of major facilities (i.e., TSF and TWRSF) with the smallest footprint area.
3. The primary criteria in evaluating cultural/historical resources are the number and extent of resources impacted. No cultural/historical resources have been identified within the Project area, with the exception of three sites unevaluated as National Register of Historic Places (NRHP) located within the Mine access road area. The Cow Hollow Road and Twin Springs Road upgrades, and Mine access road, would not significantly differ between the Proposed Action and two

alternatives. Therefore, the Proposed Action and two alternatives have no impact, or equal impact, to cultural/historical resources.

4. The primary criteria in assessing the impacts to land use is identifying if the alternative does not meet the currently approved land use. Because grazing, wildlife, recreation, and mining are acceptable land uses, the Proposed Action and two alternatives have no impact.
5. The primary criteria in assessing the impacts to fish is identifying the area, or extent, of impacted fish habitat. Fish are unlikely to occur within the Project area (there are no surface water bodies). The Cow Hollow Road and Twin Springs Road upgrades, and Mine access road, would not significantly differ between the Proposed Action and two alternatives. Therefore, the Proposed Action and two alternatives have equal short-term and long-term impacts to fish, fish habitat, and aquatic biology.
6. The primary criterion in assessing geologic hazards is determining if an alternative impacts an identified hazard. No geologic hazards have been noted within the Project area. The Cow Hollow Road and Twin Springs Road upgrades, and Mine access road, would generally not differ between the Proposed Action and two alternatives. Therefore, the Proposed Action and two alternatives have no impact, or equal impact, to geologic hazards.
7. The primary criteria in assessing noise impacts is the amount of noise generated from such activities as crushing, milling and mining activities over the Project duration. The Proposed Action presents the lowest short-term and long-term impacts to noise, since it has the lowest production rate (and corresponding smallest crusher and mill), smallest footprint area, shortest Mine life and uses a smaller fleet of smaller equipment that is primarily operated underground.
8. The primary basis in assessing the socioeconomic conditions is person years of employment, which is a combination of the number of people employed and project duration. Alternatives 1A and 1B presents the highest impact to socioeconomic conditions, since these two alternatives have the highest person years of employment (approximately 1,250 person years for Alternatives 1A and 1B, versus approximately 770 person years for the Proposed Action).
9. The primary criteria in evaluating threatened, sensitive, or endangered species are avoiding populated or migratory areas, and minimizing the Project footprint area. There are no federal endangered species within the Project area, but there are several species noted as threatened, sensitive, or endangered by the State of Oregon. The Proposed Action presents the lowest short-term and long-term impacts to threatened, sensitive, or endangered species and their habitat, since it has the least amount of major facilities (i.e., TSF and TWRSF), the smallest footprint area, uses has a smaller fleet of smaller equipment that is primarily underground (lowest noise and emissions impacts) and has the shortest Mine life.
10. The primary criteria in assessing surface water are impacts to permanent water features are the ability to divert unimpacted upgradient surface water around Mine facilities, and the amount of area that is removed from the watershed. Surface water is limited to ephemeral streams. Diversion channels would be designed to divert upgradient surface water around mining facilities. The Proposed Action would have the least short-term and long-term impacts to surface water since it has the least amount of major facilities (i.e., TSF and TWRSF) with the smallest footprint area. Alternatives 1A and 1B have the greatest impact to surface water since they remove precipitation from the surface water system due to the open pit, and will impact the Deposit Stock Tank spring.

The criteria used in assessing groundwater impacts are the long-term groundwater quality and groundwater levels. Poor groundwater quality has been noted in the vicinity of, and downgradient of, the mine. During operations, for either underground or open pit mining, a hydraulic sink will be created to allow for mining that draws the poor quality groundwater to the mine and will be used for makeup water. This may improve groundwater quality in the adjacent wells in the short term. For the Proposed Action, the post mining groundwater quality is likely to be similar to pre-mining conditions. For the two alternatives, the pits will be a permanent groundwater sink and the poor quality groundwater will continue to flow into, and concentrate in, the open pit; therefore, downgradient groundwater quality may improve in the long term.

Dewatering will be required for both underground and open pit mining, and the groundwater levels are expected to return to pre-mining conditions after reclamation. The Proposed Action is expected to have the lowest long-term impact to ground water levels since the reclaimed open pit alternatives will likely result in a seasonal pit lake that may draw down the local groundwater regime.

11. The primary criteria in assessing the impacts to vegetation are the loss vegetated area post -closure and the introduction of noxious weeds. The Proposed Action presents the lowest long-term impact to vegetation, since it has the smallest footprint area.
12. The primary criteria in assessing impacts to wildlife are the loss of post -closure habitat and the duration that mining occurs and displaces wildlife. The Proposed Action presents the lowest long-term impact to wildlife and wildlife habitat, since it has the least amount of major facilities (i.e., TSF and TWRSF), the smallest footprint area, uses a smaller fleet of smaller equipment that is primarily underground (lowest noise and emissions impacts) and has the shortest Mine life.
13. When considering other impacts, the Proposed Action is within the currently defined Plan of Operations (POO) limits, while Alternatives 1A and 1B extend outside of the POO limits. The Proposed Action also has the lowest visual impacts because it has the least amount of major facilities (i.e., TSF and TWRSF), the smallest footprint area, and is primarily underground.

A comparison of the overall impacts from the Proposed Action and the two alternatives are summarized below:

- The Proposed Action has the least impacts (most positive) on air quality; archaeological resources; noise; threatened, sensitive, or endangered species; surface water and groundwater; vegetation; and wildlife.
- The Proposed Action and the two alternatives result in about equal impacts to existing cultural/historical resources; land use; fish; and geologic hazards.
- Alternatives 1A and 1B have more positive impacts on socioeconomic conditions compared to the Proposed Action.

3. WATER SUPPLY

The overall Project site water balance for the Proposed Action is negative and requires makeup water at an estimated average annual rate of 53 gallons per minute (gpm). The Proposed Action sources the makeup water from four production wells (wells 3, 4, 5, and 7), located approximately 2.8 miles north of the Project. This section considers an alternative source for makeup water from the City of Vale.

3.1 PROPOSED ACTION – ONSITE WATER WELLS

Raw water will be pumped from as many as four production wells to a raw water storage tank via a 2.8-mile-long buried pipeline to a raw water tank, and then piped for use at the Project as needed. The pipeline will be buried in a trench along the Mine access road right of way (ROW) to minimize ultraviolet (UV) exposure to the HDPE pipe and prevent the risk of the water line freezing in winter months.

The wellfield location and approximate routing of the waterline is shown in Figure 6.

3.2 ALTERNATIVE 2 – MUNICIPAL WATER SUPPLY

Alternative 2 consists of utilizing the municipal water supply from the City of Vale to provide makeup water for the Project. The makeup water would be conveyed to Project via a buried pipeline that was assumed to be approximately 25.3 miles long. The pipeline will be an 8-inch-diameter HDPE pipe installed within the Russell, Cow Hollow, Twin Springs roads, and Mine access road ROW, with two pump stations to address the hydraulic head in the pipeline.

The waterline alignment in relation to the Project is shown in Figure 7.

3.3 ALTERNATIVES ANALYSIS

A table with a detailed description of impacts associated with the Proposed Action and alternative is presented in Appendix B, and the impacts are summarized below:

1. The primary criteria in assessing air quality impacts are the amount of fugitive dust and exhaust emissions. The Proposed Action and the alternative have no impact, or equal long-term impact, to air quality.
2. The primary criterion in assessing the archeological resources are the number and extent of impacted resources. The Proposed Action and the alternative have no impact, or equal impact, to the archeological resources.
3. The primary criteria in evaluating cultural/historical resources are the number and extent of resources impacted. No cultural/historical resources have been identified within the Project area with the exception of three unevaluated NRHP sites located within the Mine access road area. It was assumed that engineering controls would be implemented to mitigate impacts in the road ROW, therefore the Proposed Action and the alternative have no impact, or equal impact, to cultural/historical resources.

4. The primary criteria in assessing the impacts to land use is identifying if the alternative does not meet the currently approved land use. Because grazing, wildlife, recreation, and mining are acceptable land uses, the Proposed Action and the alternative do not have an impact.
5. The primary criteria in assessing the impacts to fish is identifying the area, or extent, of impacted fish habitat. Fish are unlikely to occur within the Project area (there are no surface water bodies). It was assumed that engineering controls would be implemented to mitigate impacts in the road ROW, therefore the Proposed Action and the alternative have no impact, or equal impact, to fish.
6. The primary criterion in assessing geologic hazards is determining if an alternative impacts an identified hazard. No geologic hazards have been noted within the Project area or ROW. The Proposed Action and the alternative have no impact, or equal impact, to the geologic hazards.
7. The primary criteria in assessing noise impacts is the amount of noise generated from such activities as crushing, milling and mining activities over the Project duration. The noise from the two pumps stations in Alternative 2 may have an increased impact as compared to the Proposed Action.
8. The primary basis in assessing the socioeconomic conditions is person years of employment, which is a combination of the number of people employed and project duration. There is no difference in employment and project duration, therefore the Proposed Action and the alternative have no impact, or equal impact, to socioeconomic conditions.
9. The primary criteria in evaluating threatened, sensitive, or endangered species are avoiding populated or migratory areas, and minimizing the Project footprint area. There are no federal endangered species within the Project area, but there are several species noted as threatened, sensitive, or endangered species by the State of Oregon. It was assumed that engineering controls would be implemented to mitigate impacts in the road ROW; therefore, the Proposed Action and the alternative have no impact, or equal impact, to threatened, sensitive, or endangered species.
10. The primary criteria in assessing surface water are impacts to permanent water features are the ability to divert unimpacted upgradient surface water around Mine facilities, and the amount of area that is removed from the watershed. The Proposed Action and alternative have no impact, or equal long-term impact, to the surface water.

    The primary basis in assessing groundwater is impacts the long-term groundwater levels. The Proposed Action will draw approximately 53 gpm on an average annual basis from the local aquifer during operations may result in a short-term impact, but groundwater levels are expected to return to pre-mining conditions after reclamation.
11. The primary criteria in assessing the impacts to vegetation are the loss of vegetated area post - closure and the introduction of noxious weeds. The Proposed Action and the alternative have no impact, or equal long-term impact, to vegetation.
12. The primary criteria in assessing impacts to wildlife are the loss of post -closure habitat and the duration that mining occurs and displaces wildlife. The Proposed Action and the alternative have no impact, or equal long-term impact, to wildlife.
13. When considering other impacts, the Proposed Action and alternative have no impact, or equal impact, to visual impacts.

A comparison of the overall impacts from the Proposed Action and the alternative are summarized below:

- Both the Proposed Action and the alternative results in about equal long-term impacts to air quality; archeology; cultural/historical resources; land use; fish; geologic hazards; noise; socioeconomic conditions; threatened, sensitive, or endangered species; surface water; vegetation; and wildlife.
- The Proposed Action will have a greater short-term (negative) impact to the local groundwater.
- The alternative may have a greater short-term (negative) impacts on noise.

4. POWER

The Proposed Action includes hydroelectric-generated power being supplied to the Project from Idaho Power via a 25.3-mile overhead transmission line. This section presents two alternative means of providing power to the Project: the first alternative (Alternative 3A) is a combination of an upgraded overhead and buried transmission line, and the second alternative (Alternative 3B) being onsite generators in place of transmission lines.

4.1 PROPOSED ACTION – OVERHEAD TRANSMISSION LINE

The Proposed Action for power supply will be to supply power to the Project via an overhead transmission line that is owned and maintained by Idaho Power. The overhead transmission line will be upgraded from the Hope Substation near Vale, Oregon, to the Mine area, for a distance of approximately 25.3 miles. At the end of the upgraded overhead transmission line, a new overhead transmission line will be constructed for approximately 17.3 miles along the Cow Hollow and Twin Springs roads' ROW, and for 2.8 miles along the Mine access road, to a substation located near the Process Plant area. At closure, the newly constructed overhead transmission line along the Mine access road and the substation at the Mine will be removed.

This Proposed Action will require two backup 60 hertz (Hz) diesel-powered generators to supply power in the event of a short term power loss to the Project.

The overhead transmission line alignment in relation to the Project is shown in Figure 8.

4.2 ALTERNATIVE 3A – COMBINATION UPGRADED OVERHEAD AND BURIED TRANSMISSION LINE

Power for this alternative will be supplied to the Project via a combination of an upgraded transmission line and a buried transmission line that is owned and maintained by Idaho Power. The overhead transmission line will be upgraded from the Hope Substation near Vale, Oregon, towards the Mine, for a distance of approximately 5.2 miles. At the end of the upgraded overhead transmission line, a new buried transmission line will be constructed from along the Cow Hollow Road, Twin Springs Road, and Mine access road ROW for a distance of approximately 20.1 miles. The buried transmission line was estimated to require three underground cables installed in concrete encased conduit, with access vaults every 500 ft. The trench was estimated to be 4 ft wide by 7 ft deep, so that the conduit/cable was below the frost depth.

This alternative will require two backup 60 Hz diesel-powered generators to supply power in the event of a short term power loss to the Project.

The buried transmission line alignment in relation to the Project is shown in Figure 9.

4.3 ALTERNATIVE 3B – ONSITE GENERATORS

Alternative 3B would consist of generating power onsite from four diesel-powered generators located adjacent to the Process Plant.

This alternative will require three 60 Hz diesel-powered generators and one backup 60 Hz diesel-powered generator to supply power to the aboveground mining operations, and one 60 Hz diesel-powered generator and one 60 Hz backup diesel-powered generator to supply power to the underground mining operations. To accommodate the power demand for the Project, the generators will operate 24 hours per day, 365 days per year, with the backup generators running approximately 500 hours per year.

The genset location in relation to the Project is shown in Figure 10.

4.4 IMPACTS

A table with a detailed description of impacts and associated with the Proposed Action and two alternatives is presented in Appendix C, and the impacts are discussed below:

1. The primary criteria in assessing air quality impacts are the amount of fugitive dust and exhaust emissions. The Proposed Action and Alternative 3A has no impact, or equal long-term impact, to air quality from the Project. Alternative 3B has a greater impact on air quality because of the operation of the diesel-fired generators and onsite fuel storage.
2. The primary criterion in assessing the archeological resources are the number and extent of impacted resources. It was assumed that engineering controls would be implemented to mitigate impacts in the road ROW, therefore the Proposed Action and two alternatives have no impact, or equal impact to the archeological resources.
3. The primary criteria in evaluating cultural/historical resources are the number and extent of resources impacted. No cultural/historical resources have been identified within the Project area with the exception of three unevaluated NRHP sites located within the Mine access road area. It was assumed that engineering controls would be implemented to mitigate impacts in the road ROW, therefore the Proposed Action and two alternatives have no impact, or equal impact to cultural/historical resources.
4. The primary criteria in assessing the impacts to land use is identifying if the alternative does not meet the currently approved land use. Because grazing, wildlife, recreation, and mining are acceptable land uses, the Proposed Action and two alternatives have no impact.
5. The primary criteria in assessing the impacts to fish is identifying the area, or extent, of impacted fish habitat. Fish are unlikely to occur within the Project area (there are no surface water bodies). It was assumed that engineering controls would be implemented to mitigate impacts in the road ROW, therefore the Proposed Action and two alternatives have no impact, or equal impact, to fish.
6. The primary criterion in assessing geologic hazards is determining if an alternative impacts an identified hazard. No geologic hazards have been noted within the Project area or ROW. The Proposed Action and the two alternatives have no impact, or equal impact, to the geologic hazards.

7. The primary criteria in assessing noise impacts is the amount of noise generated from such activities as crushing, milling and mining activities over the Project duration. Alternative 3B has the largest impact to noise because of the operation of the diesel-fired generators.
8. The primary basis in assessing the socioeconomic conditions is person years of employment, which is a combination of the number of people employed and project duration. There is no difference in employment and project duration, therefore the Proposed Action and the two alternatives have no impact, or equal impact, to socioeconomic conditions.
9. The primary criteria in evaluating threatened, sensitive, or endangered species are avoiding populated or migratory areas, and minimizing the Project footprint area. There are no federal endangered species within the Project area, but there are several species noted as threatened, sensitive, or endangered species by the State of Oregon. As the Proposed Action and Alternative 3A would be constructed in the road ROW, this has a potential short-term impact threatened, sensitive, or endangered species, while the Proposed Action has the additional short-term potential of injuring or killing birds, or altering local migratory routes.
10. The primary criteria in assessing surface water are impacts to permanent water features are the ability to divert unimpacted upgradient surface water around Mine facilities, and the amount of area that is removed from the watershed. The Proposed Action and two alternatives have no impact, or equal impact, to the surface water.

    The primary basis in assessing groundwater is impacts the long-term groundwater levels. The Proposed Action and two alternatives have no impact, or equal impact, to the groundwater.
11. The primary criteria in assessing the impacts to vegetation are the loss of vegetated area post - closure and the introduction of noxious weeds. The Proposed Action and the two alternative have no impact, or equal long-term impact, to vegetation.
12. The primary criteria in assessing impacts to wildlife are the loss of post -closure habitat and the duration that mining occurs and displaces wildlife. The Proposed Action and Alternative 3A have the potential for short-term impacts to wildlife.
13. When considering other impacts, the Proposed Action would have a greater potential for visual impacts.

A comparison of the overall impacts from the Proposed Action and the two alternatives are summarized below:

- The Proposed Action and the two alternatives have no impact, or equal impact, to archeological resources; cultural/historical resources; fish; land use; geologic hazards; socioeconomic conditions; surface water and groundwater; and vegetation.
- The Proposed Action and Alternative 3A have no impact, or equal long-term impact, to air quality from the Project and a potential short-term (negative) impact to endangered or threatened species. Even with the avian protection and mitigation measures included in the design, the Proposed Action has the additional short-term potential of injuring or killing birds, or altering local migratory routes, and short-term impacts to wildlife.
- Alternative 3B has the largest (negative) impact to noise. It should be noted that the emissions generated from this alternative may result in non-compliance with the Cleaner Air Oregon rules. When considering other impacts, the Proposed Action would have a greater (negative) visual impact.

5. RECLAMATION

The proposed post -closure land uses for the Project are livestock grazing or range land, wildlife habitat, and recreational land, with opportunities to consider mineral exploration and development when feasible. This post -closure land use is in conformance with the BLM Vale District Management Plan and Malheur County Land Use Plans.

This section presents an alternative post -closure land use in which the Project site infrastructure, such as the buildings, power, and water, remains in place to facilitate an industrial post -closure land use in the Project area. The Underground operations, Mine portal, Mine ventilation shaft, TSF, TWRSF, and Quarry will be closed in the same manner as the Proposed Action.

5.1 PROPOSED ACTION – INFRASTRUCTURE REMOVAL AND LIMITED ACCESS

The reclamation plan for the Proposed Action is presented in Section 2.1.8. Specific to the Alternatives Assessment, the following Project site infrastructure will be removed:

- All buildings and facilities will be decommissioned, dismantled, and materials will be salvaged, sold, used elsewhere, or removed and disposed of offsite in an authorized landfill. Non-movable physical aspects, such as the Process Plant area footprint and building foundations, will be recontoured to match the original site topography and will be revegetated. All foundations remaining from decommissioned structures, made from inert materials such as concrete, will be broken up and covered with fill and growth media, which includes concrete slabs, and revegetated. Before burial, all exposed rebar that has a potential to protrude through the completed backfill will be cut level with the remaining concrete.
- All Project roads and yard features, including parking areas, will be reclaimed as they are no longer needed for access.
- All infrastructure, including the water supply and new overhead transmission power line (i.e., for 17.3 miles along the Cow Hollow and Twin Springs roads, and for 2.8 miles along the Mine access road) will be decommissioned and dismantled, and materials will be salvaged, sold, used elsewhere, or removed and disposed of offsite in an authorized landfill. Project roads and yard features, including parking areas, will be reclaimed as they are no longer needed for access. The Mine access road will be closed including recontouring to match the original site topography and revegetated.

The Proposed Action reclaimed site is presented in Figure 11.

5.2 ALTERNATIVE 4 – POST MINING INDUSTRIAL LAND USE

The alternative for the reclamation plan will include changing the post -closure land use from livestock grazing or range land, wildlife habitat, and recreational land, to an industrial post -closure land use that promotes access with the infrastructure and buildings remaining. Therefore, while the reclamation of the major mining facilities (i.e., underground Mine, TSF, TWRSF, Quarry, Reclamation Borrow Areas, etc.) will be the same as the Proposed Action, Alternative 4 will transfer over the Project area and infrastructure to the BLM or to Malheur County, including the buildings, Mine access road, power supply, and water supply.

Alternative 4 reclaimed site is presented in Figure 12.

5.3 ALTERNATIVES ANALYSIS

A table with a detailed description of impacts and associated with the Proposed Action and alternative is presented in Appendix D, and the impacts of the Proposed Action and the alternative are discussed below:

1. The primary criteria in assessing air quality impacts are the amount of fugitive dust and exhaust emissions. The Proposed Action has the lowest long-term impact to air quality as it minimizes access to and activity in the Project area.
2. The primary criterion in assessing the archeological resources are the number and extent of impacted resources. As the Alternatives Analysis is comparing the reclamation of previously disturbed areas, the Proposed Action and the alternative have no impact, or equal impact, to the archeological resources.
3. The primary criteria in evaluating cultural/historical resources are the number and extent of resources impacted. As the Alternatives Analysis is comparing the reclamation of previously disturbed areas, the Proposed Action and the alternative have no impact, or equal impact, to the cultural/historical resources.
4. The primary criteria in assessing the impacts to land use is identifying if the alternative does not meet the currently approved land use. Because grazing, wildlife, recreation, and mining are acceptable land uses, the Proposed Action does not have an impact.
5. The primary criteria in assessing the impacts to fish is identifying the area, or extent, of impacted fish habitat. Fish are unlikely to occur within the Project area (there are no surface water bodies). As the Alternatives Analysis is comparing the reclamation of previously disturbed areas, the Proposed Action and the alternative have no impact, or equal impact, to fish habitat.
6. The primary criterion in assessing geologic hazards is determining if an alternative impacts an identified hazard. No geologic hazards have been noted within the Project area or ROW. The Proposed Action and the alternative have no impact, or equal impact, to the geologic hazards.
7. The primary criteria in assessing noise impacts is the amount of noise generated from such activities as crushing, milling, and mining activities over the Project duration. The Proposed Action would have the least long-term impact to noise.
8. The primary basis in assessing the socioeconomic conditions is person years of employment, which is a combination of the number of people employed and project duration. Alternative 4 provides an opportunity to have long-term sustainable employment after the Project has been reclaimed and has the largest impact to socioeconomic conditions.
9. The primary criteria in evaluating threatened, sensitive, or endangered species are avoiding populated or migratory areas and minimizing the Project footprint area. The Proposed Action has limited access and has the least long-term impact to threatened, sensitive, or endangered species.
10. The primary criteria in assessing surface water are impacts to permanent water features are the ability to divert unimpacted upgradient surface water around Mine facilities, and the amount of

area that is removed from the watershed. The Proposed Action and alternative have no impact, or equal long-term impact, to the surface water.

The primary basis in assessing groundwater is impacts to the long-term groundwater levels. The Proposed Action has the Production Wellfield removed as part of reclamation and has the least long-term impact to groundwater.

11. The primary criteria in assessing the impacts to vegetation are the loss of vegetated area post -closure and the introduction of noxious weeds. The Proposed Action has limited access and a higher degree of restoration, and has the least long-term impact to vegetation.
12. The primary criteria in assessing impacts to wildlife are the loss of post -closure habitat and the duration that mining occurs and displaces wildlife. The Proposed Action has limited access and less post -closure human activity and has the least long-term impact to wildlife.
13. When considering other impacts, Alternative 4 has the greatest long-term visual impacts because the buildings remain.

A comparison of the overall impacts from the Proposed Action and the alternative are summarized below:

- The Proposed Action has the least impacts on air quality; noise; threatened, sensitive, or endangered species; vegetation; and wildlife.
- Both the Proposed Action and the alternative results in about equal long-term impacts to archeological resources; cultural/historical resources; land use; fish; geologic hazards; and surface water.
- The alternative has a more positive impact on socioeconomic conditions compared to the Proposed Action.

6. TAILINGS STORAGE FACILITY

The following discussions for the tailings siting and tailings deposition trade-off studies were based on the technical memorandum provided by Golder (Golder, 2019) and presented in Appendix E.

6.1 TAILINGS SITING

Golder (2019) prepared an options analysis to identify a preferred location for the TSF and identified five locations. Golder prepared a ranking matrix that evaluated their Options 1 through 5 to consolidate the advantages and disadvantages of each option to support the selection of a preferred option. The ranking applied a 40-percent weighting to Technical Criteria and a 60-percent weighting to Human Safety and Environmental Protection.

The Technical Criteria considered were volume of earthworks material (Embankment Fill), ease of construction, complexity and reliability of stormwater management, efficiency of pumping and piping of the tailings to the TSF and return water back to the Mill, and tailings rate of rise (lower rate of rise allows for increased solidification of tailings and increased water for re-use in milling/processing circuit). The key factors evaluated for Human Safety and Environmental Protection were disturbance area (impact to environment), zero discharge facility (potential to impact ground water), geotechnical stability of the facility (safety and environmental risks to downstream receptors), public access around the Project site (impact to public access), TSF location within the Project boundary, and post-closure reclamation (potential to affect long-term post-closure use and reliability).

Golder's Option 2 (the location of the TSF in the Proposed Action) was selected as the preferred TSF location because it received the best overall ranking in addition to having the best total ranking for both Technical Criteria and Human Safety and Environmental Protection.

6.2 TAILINGS DEPOSITION

Tailings is the term used in the mining industry for mineral waste created from grinding and milling ore for precious metal removal (Golder, 2019). The milling reduces the ore to a material with a particle-size distribution typical of a silt and fine sand, and the remaining "barren" minerals (tailings) exist in the form of a slurry after metal removal. The tailings are then sent to permanent storage in a repository, which is ultimately reclaimed and closed for environmental stability.

The conventional slurry and high-density slurry (i.e., partially dewatered) are typically pumped to a lined storage facility behind an earth-fill or rock-fill dam where the tailings drain and form a consolidated mass; the drained water is recycled in the milling and processing circuit. The filtered and paste tailings options would require the construction of additional infrastructure to mechanically dewater the tailings prior to storage.

Mechanically dewatering tailings to a paste or filtered condition prior to permanent disposal provided a negligible benefit to the project, and the design for the Grassy Mountain Mine Project incorporated tailings stored in a conventional slurry TSF. Due to the relatively small quantity of tailings and short life of the Mine, it was judged that the high cost of producing dewatered tailings was detrimental to the Project's economic feasibility; it would be cost-prohibitive to construct and operate a filtration dewatering system. Additionally, mechanical dewatering of the tailings would likely create a net excess water scenario that would require water treatment prior to discharge.

7. REFERENCES

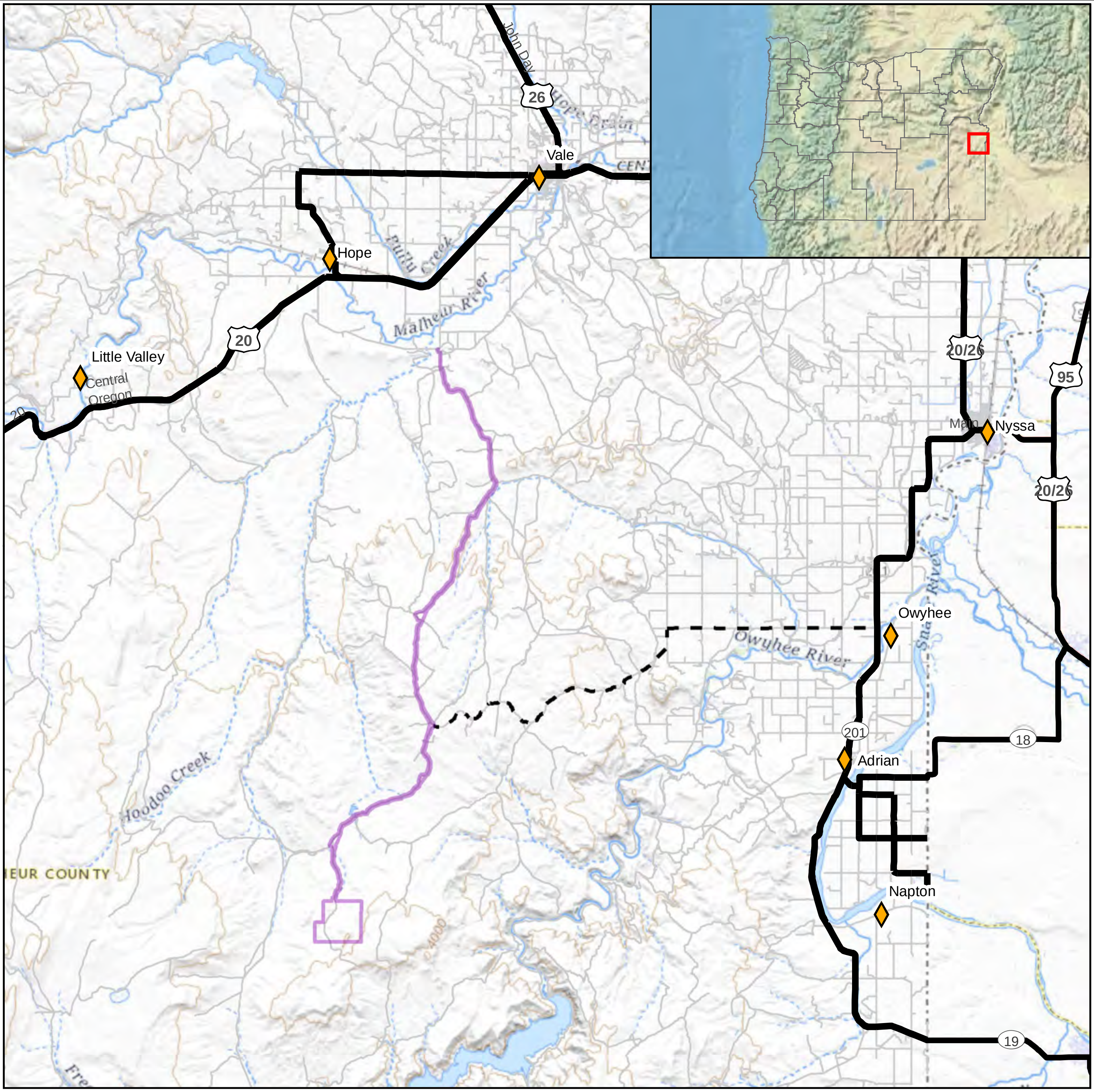
Ausenco, 2020. Grassy Mountain Project, Oregon, USA, NI 43-101 Technical Report on Feasibility Study. September

Golder Associates Inc. (Golder). 2019. Grassy Mountain Project – Tailings Storage Facility, Tailings Storage Facility Location Options Analysis.

Mine Development Associates (MDA). 2018. Preliminary Feasibility Study and Technical Report for the Grassy Mountain. July.

Metal Mining Consultants, Inc. (MMC). 2015. Amended Preliminary Economic Assessment, Calico Resources Corp., Grassy Mountain Project, Malheur County, Oregon, USA. July.

FIGURES



Legend

PoO Boundary

Emergency Access Road

Roads

1 ":4 Miles

0 1 2 4Miles

N W E S

Scale as shown when plotted at 8.5"x11".

Notes:
1. Figure references 1983 UTM zone 11N datum.
2. Road and highway system were referenced from the Bureau of land Management.

Site/Report:

Calico Resources USA Corp. Grassy Mountain Mine

Alternatives Analysis

Figure:

Location Map

SLR

CALICO RESOURCES

Date:	December, 2021			Figure:
Project No:	108.02203.00001			1
By:	MS	Chk'd:	TM	

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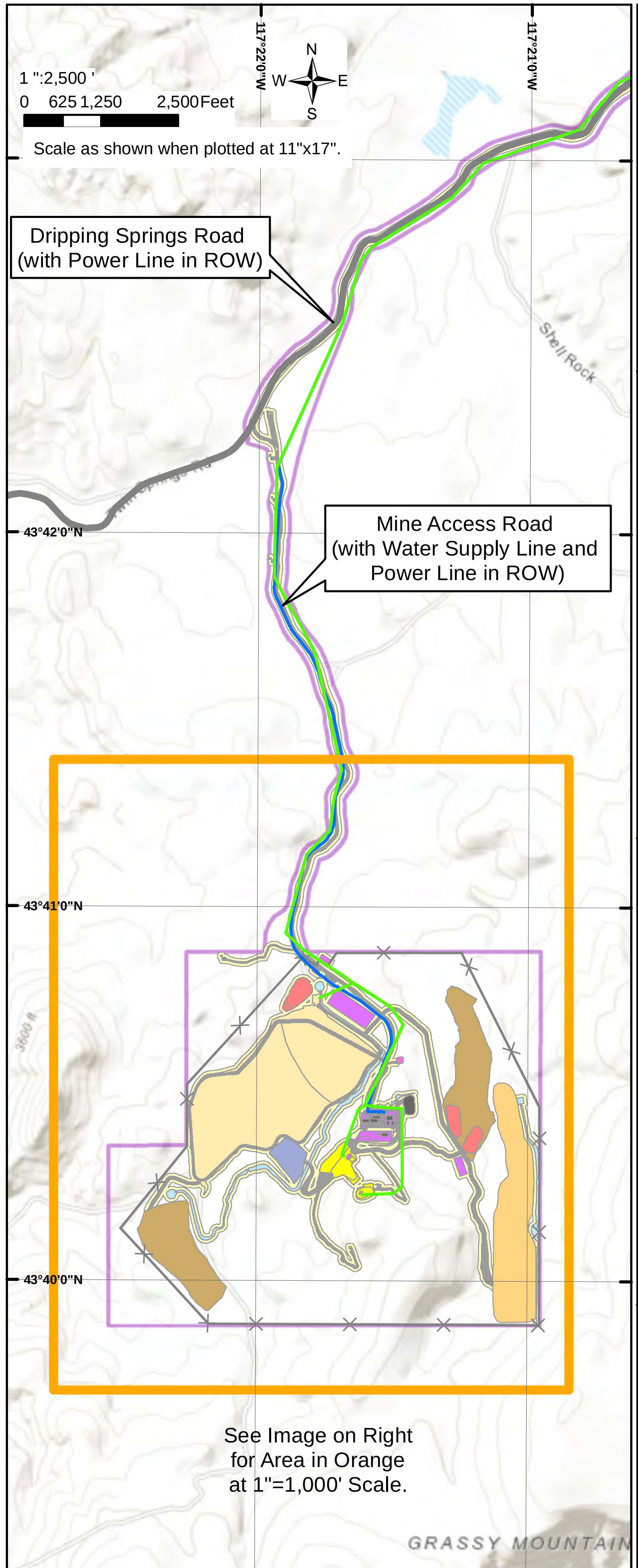

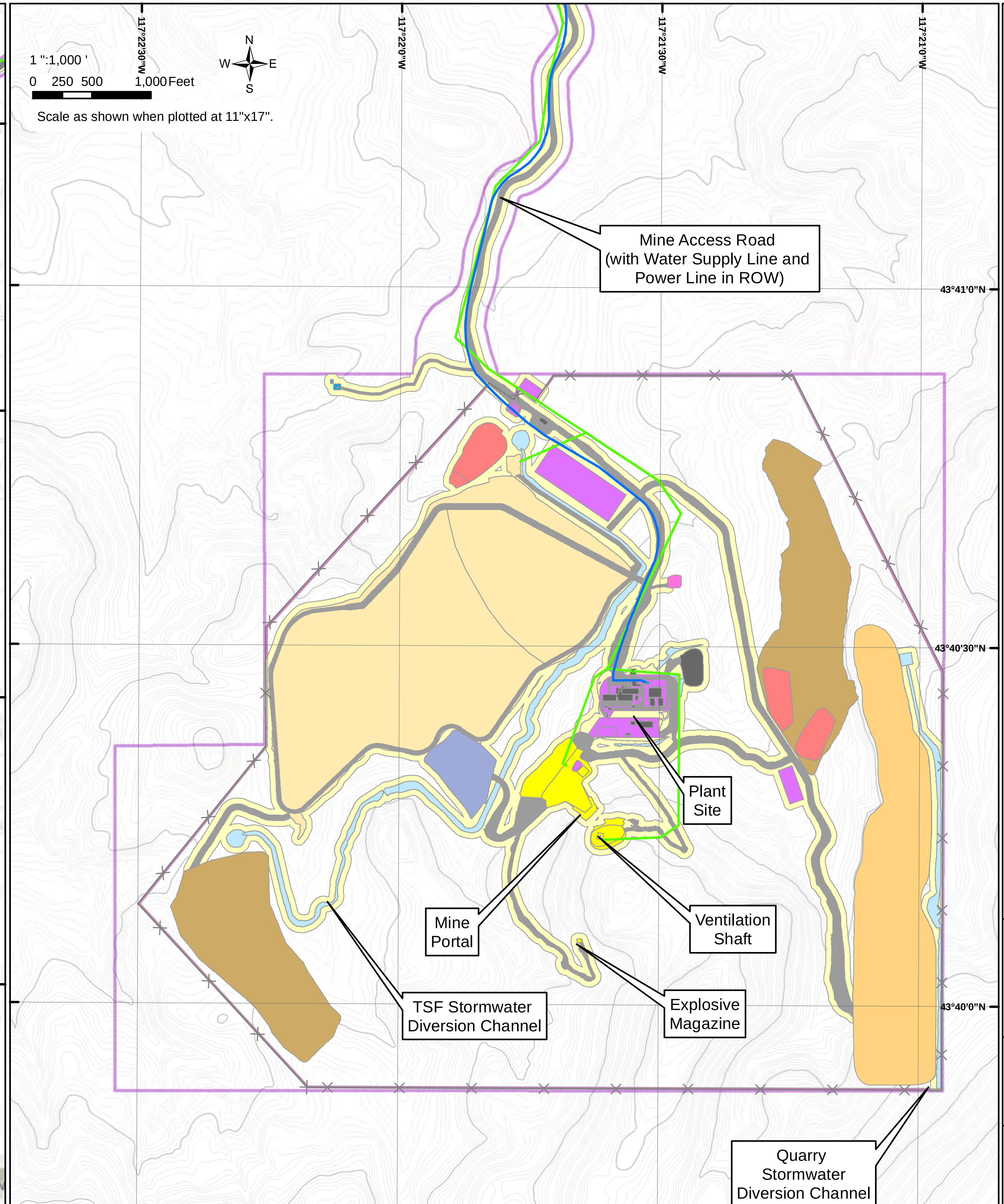

Legend

- PoO Boundary
- Fence Line
- Power Line
- Water Supply Line
- Quarry
- Reclamation Borrow Areas
- Growth Media Stockpiles
- Yards, Laydown Areas, and Stockpiles
- Underground Mine
- Process Plant
- Infrastructure & Ancillary Facilities
- Foundations and Buildings
- Power Supply
- Temporary Waste Rock Storage Facility
- Tailings Storage Facility
- Water Supply
- Roads
- Stormwater Diversion Channel
- Disturbed Area
- Existing 25ft Major Contour
- Existing 5ft Minor Contour

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Currently Proposed
Mine Layout

SLR

CALICO RESOURCES

Date: December, 2021		Figure:
Project No: 108.02203.00001		2
By: MS	Chk'd: TM	

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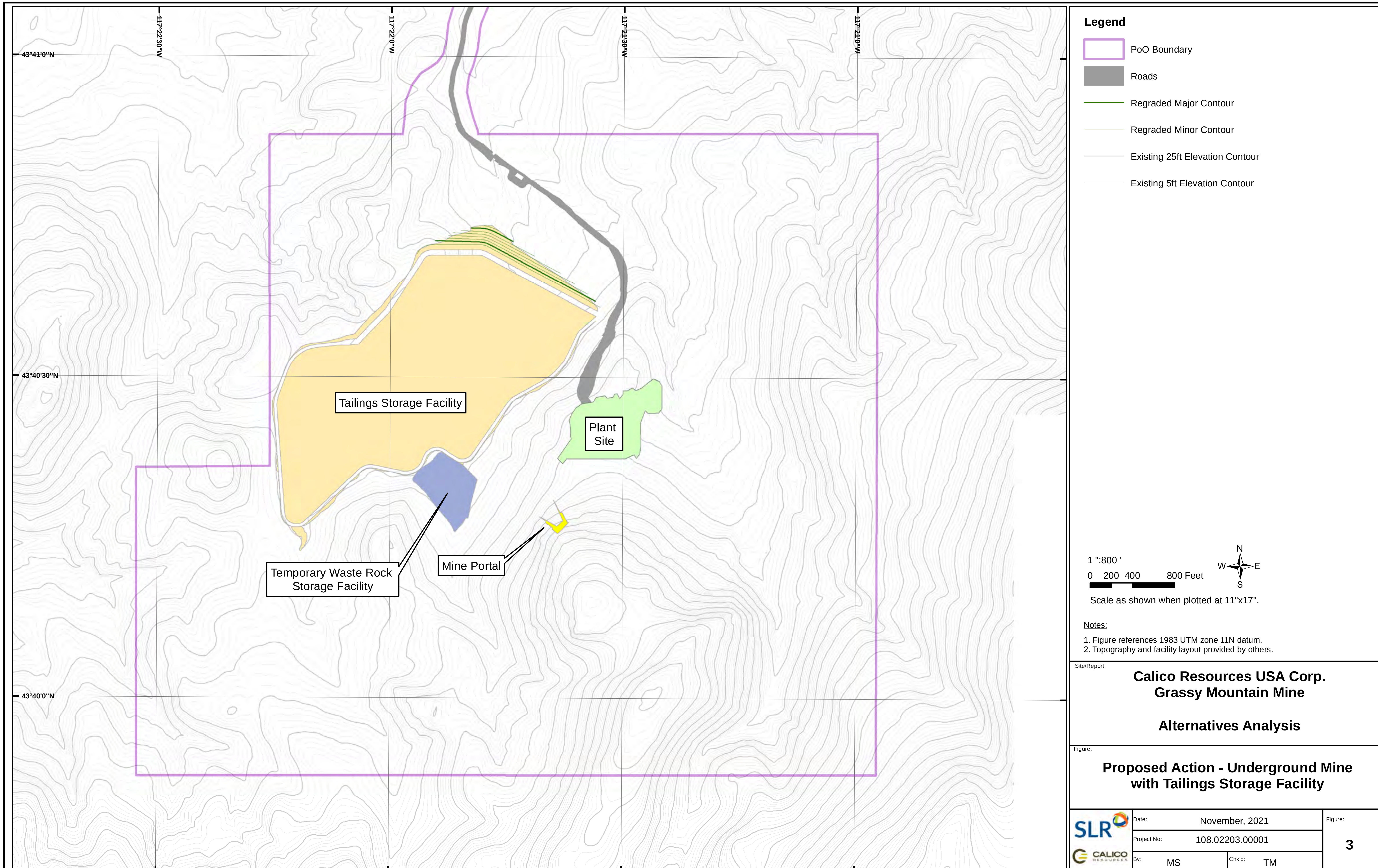

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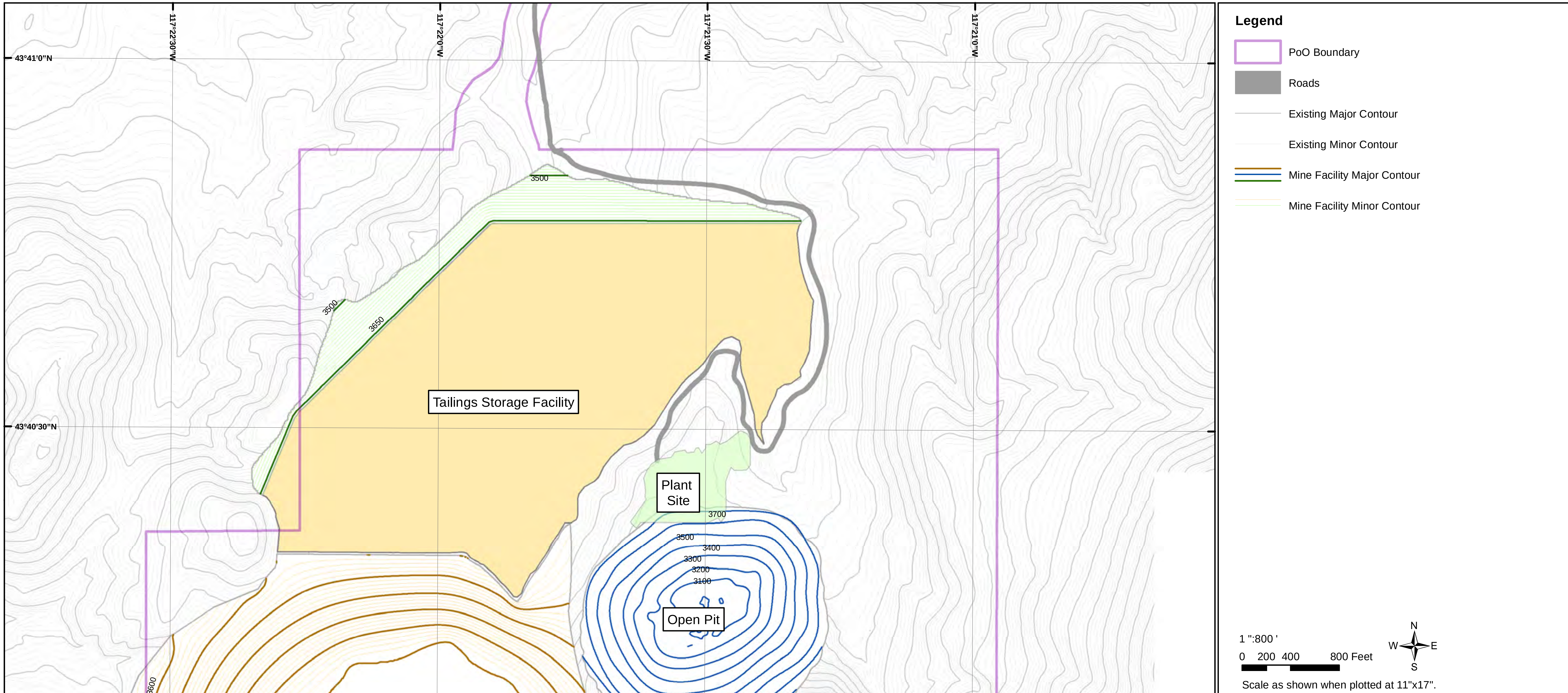

Scale as shown when plotted at 11"x17".

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Alternative 1A - Open Pit Mine with Tailings Storage Facility

Date:	December, 2021		Figure: 4
Project No:	108.02203.00001		
By: MS		Chk'd: TM	

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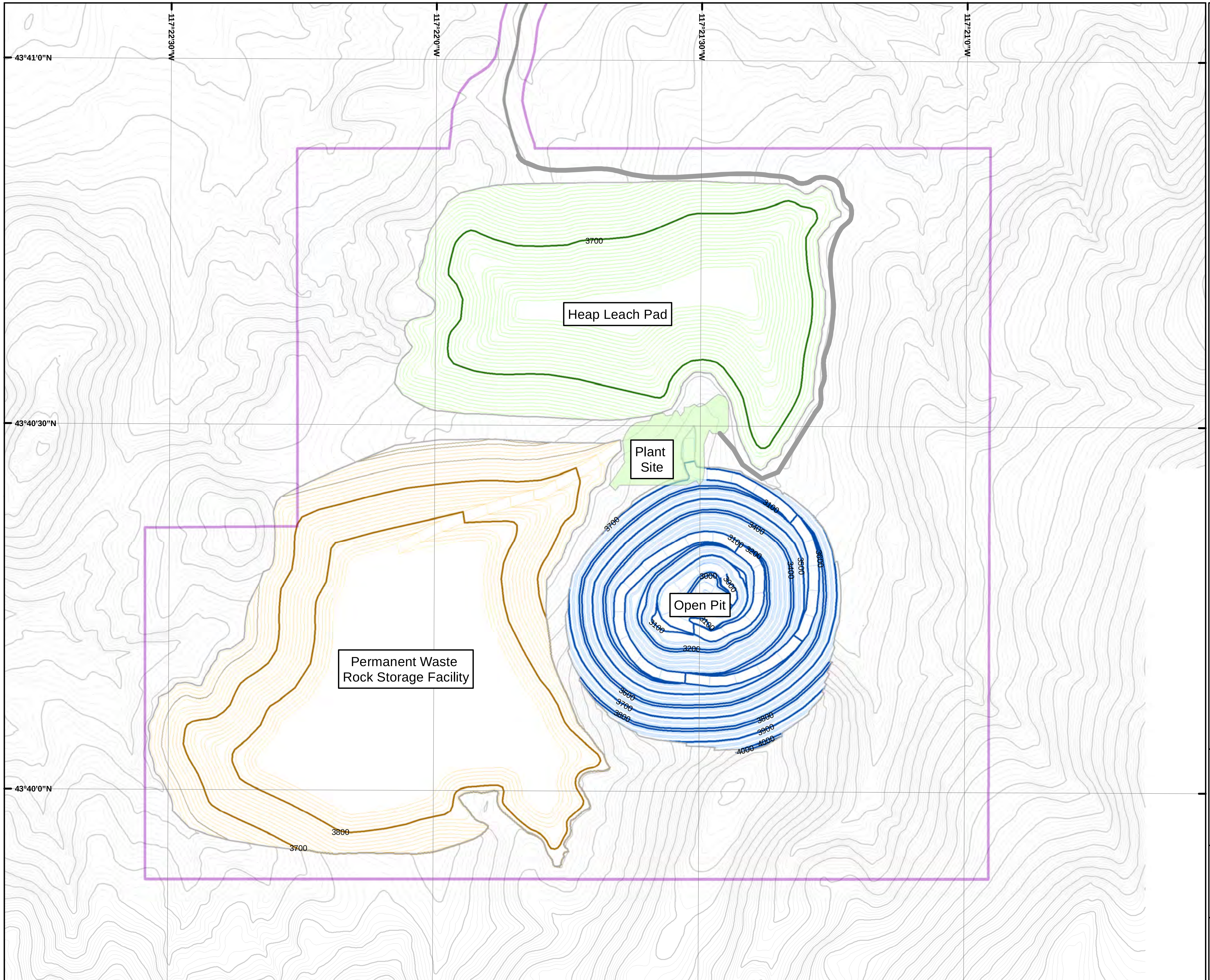

Legend

- PoO Boundary
- Roads
- Existing Major Contour
- Existing Minor Contour
- Mine Facility Major Contour
- Mine Facility Minor Contour

1 ":800 '

0 200 400 800 Feet

N W E S

Scale as shown when plotted at 11"x17".

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Alternative 1B - Open Pit Mine with Heap Leach Pad

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Date:	December, 2021		Figure:
Project No:	108.02203.00001		5
By:	MS	Chk'd:	TM

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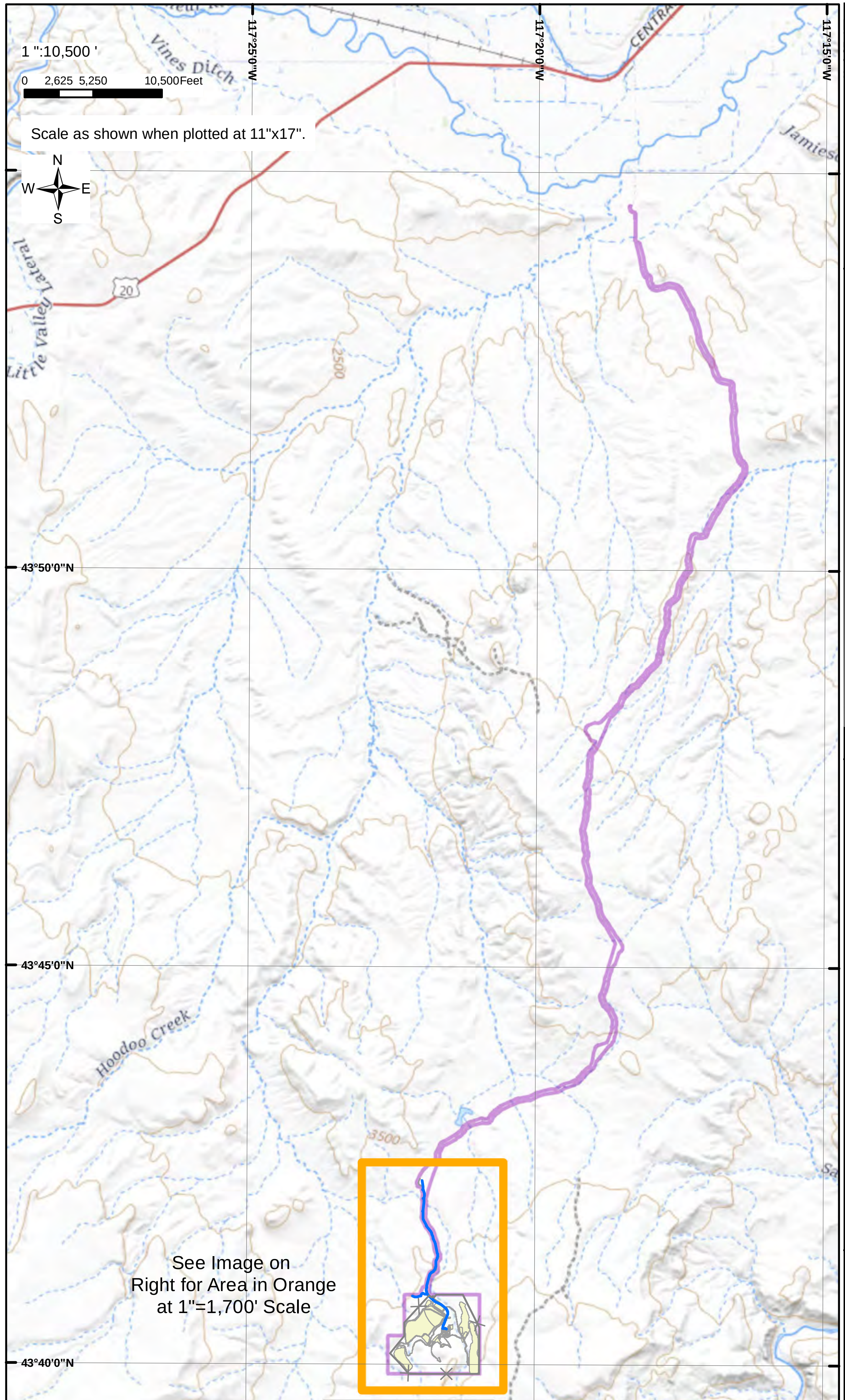

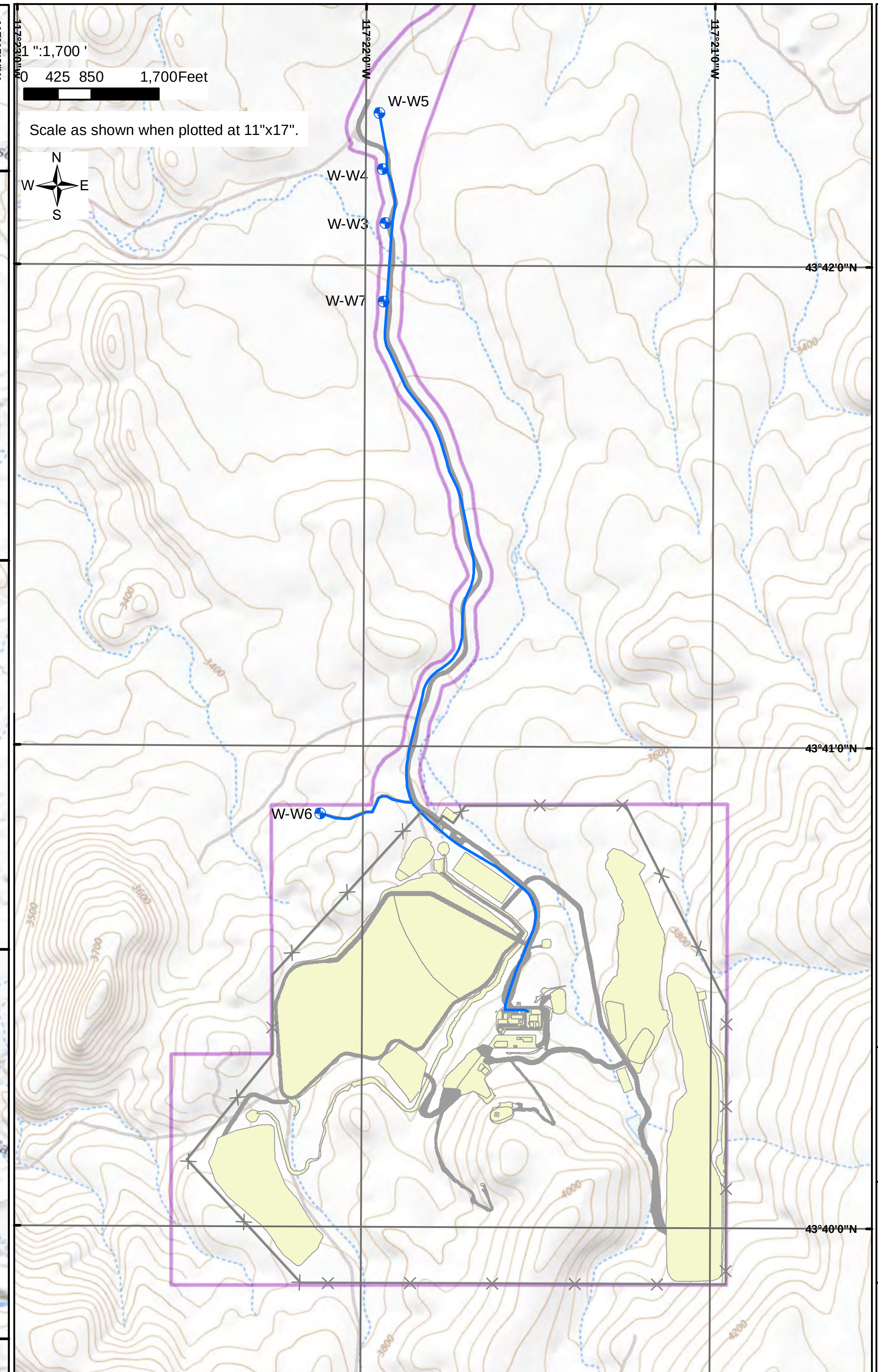

Legend

- PoO Boundary
- Fence Line
- Production Well
- Water Production Line
- Roads

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Proposed Action-
Onsite Water Wells

Date: December, 2021		Figure: 6
Project No: 108.02203.00001		
By: MS	Chk'd: TM	

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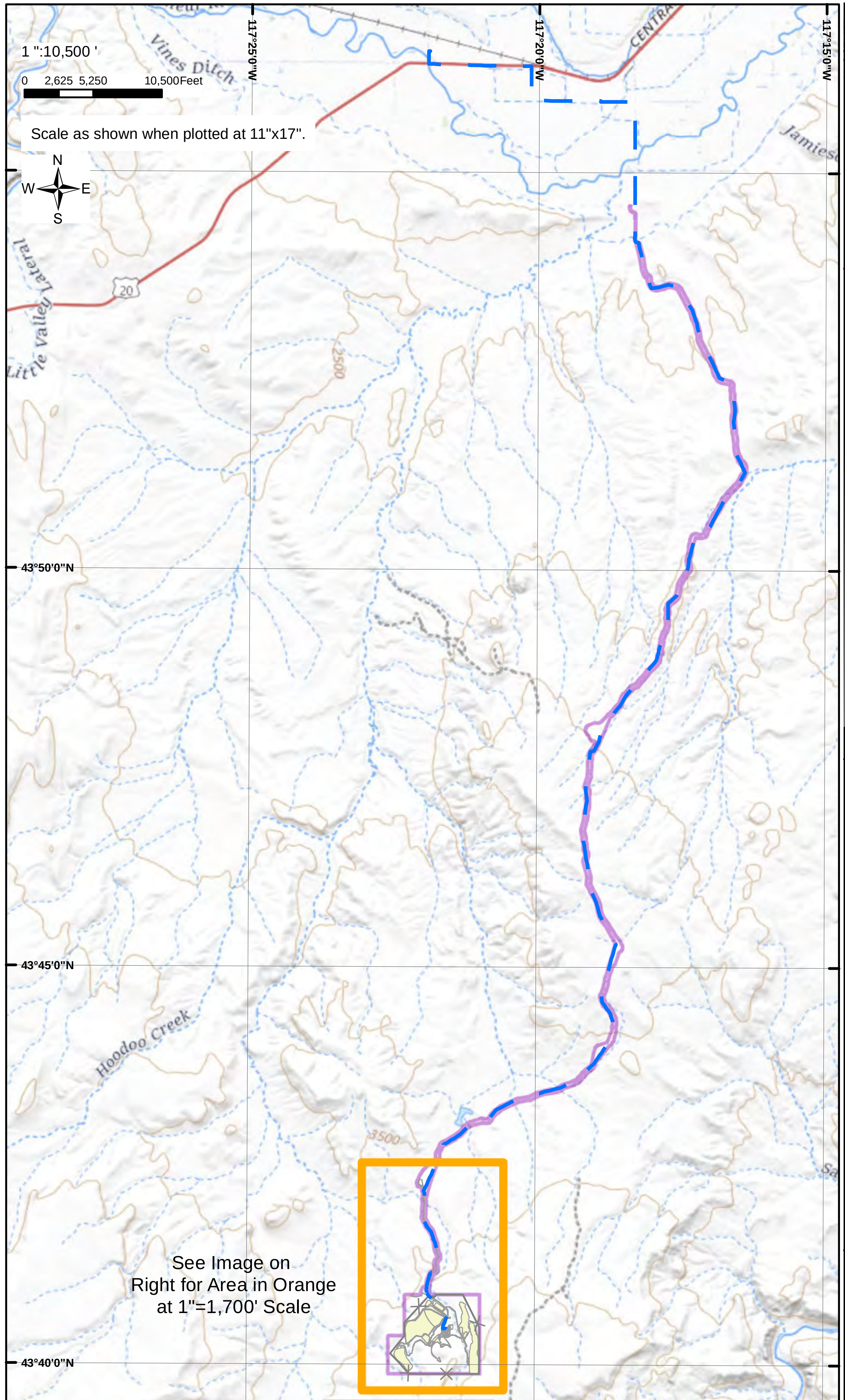

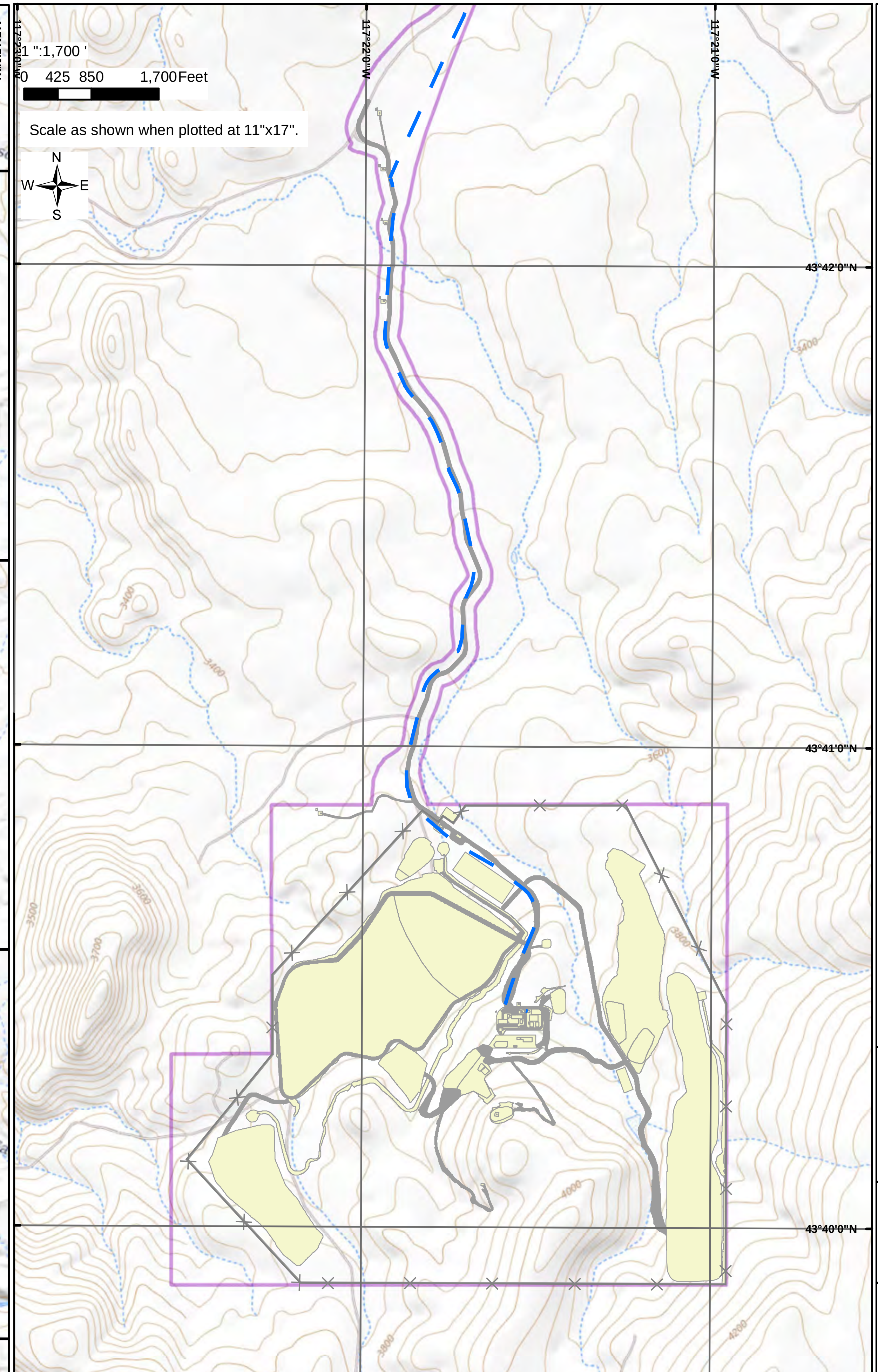

Legend

- PoO Boundary
- Fence Line
- Municipal Water Line
- Roads

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Alternative 2 -
Municipal Water Supply

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CALICO RESOURCES

Date: December, 2021		Figure: 7
Project No: 108.02203.00001		
By: MS	Chk'd: TM	

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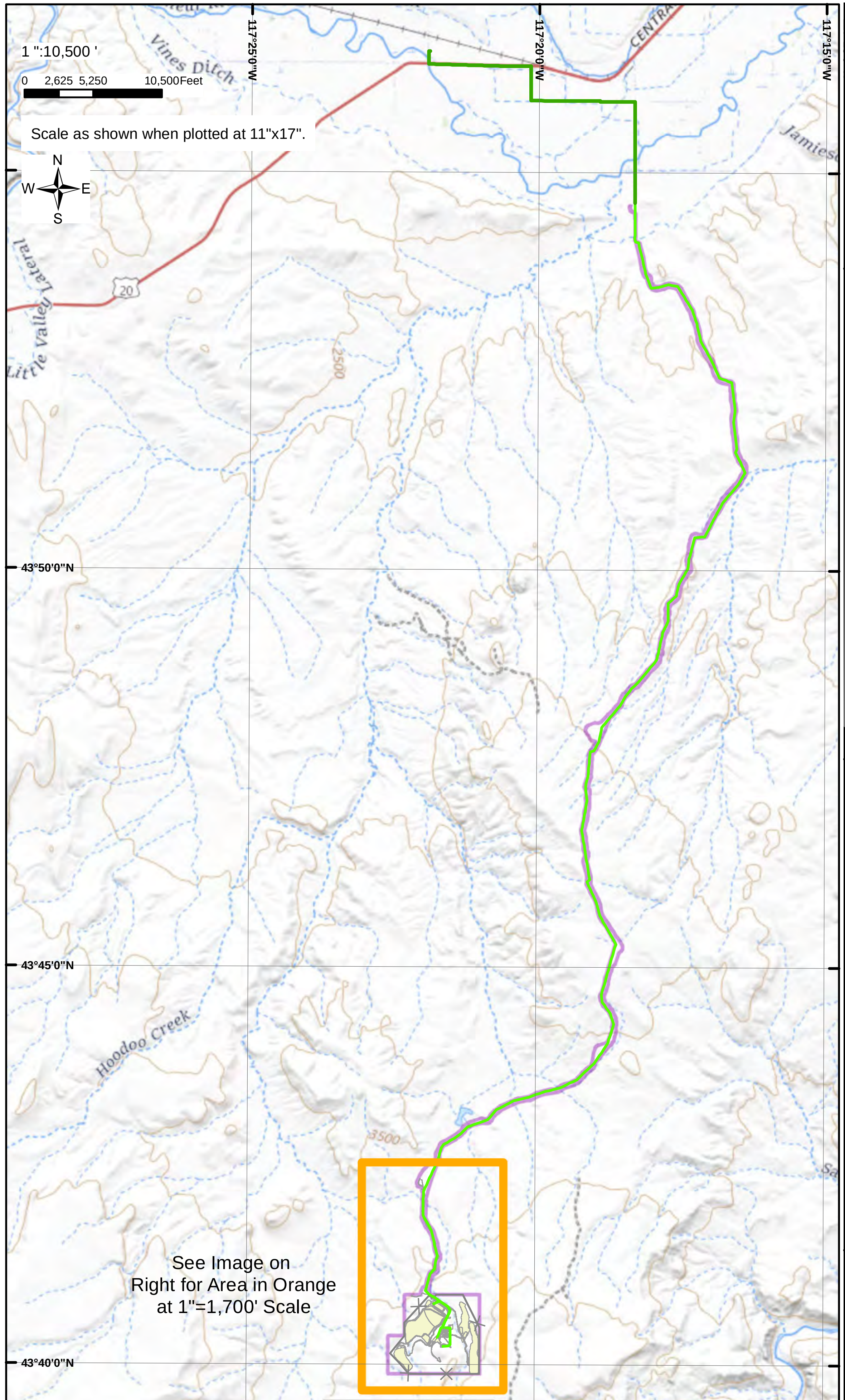

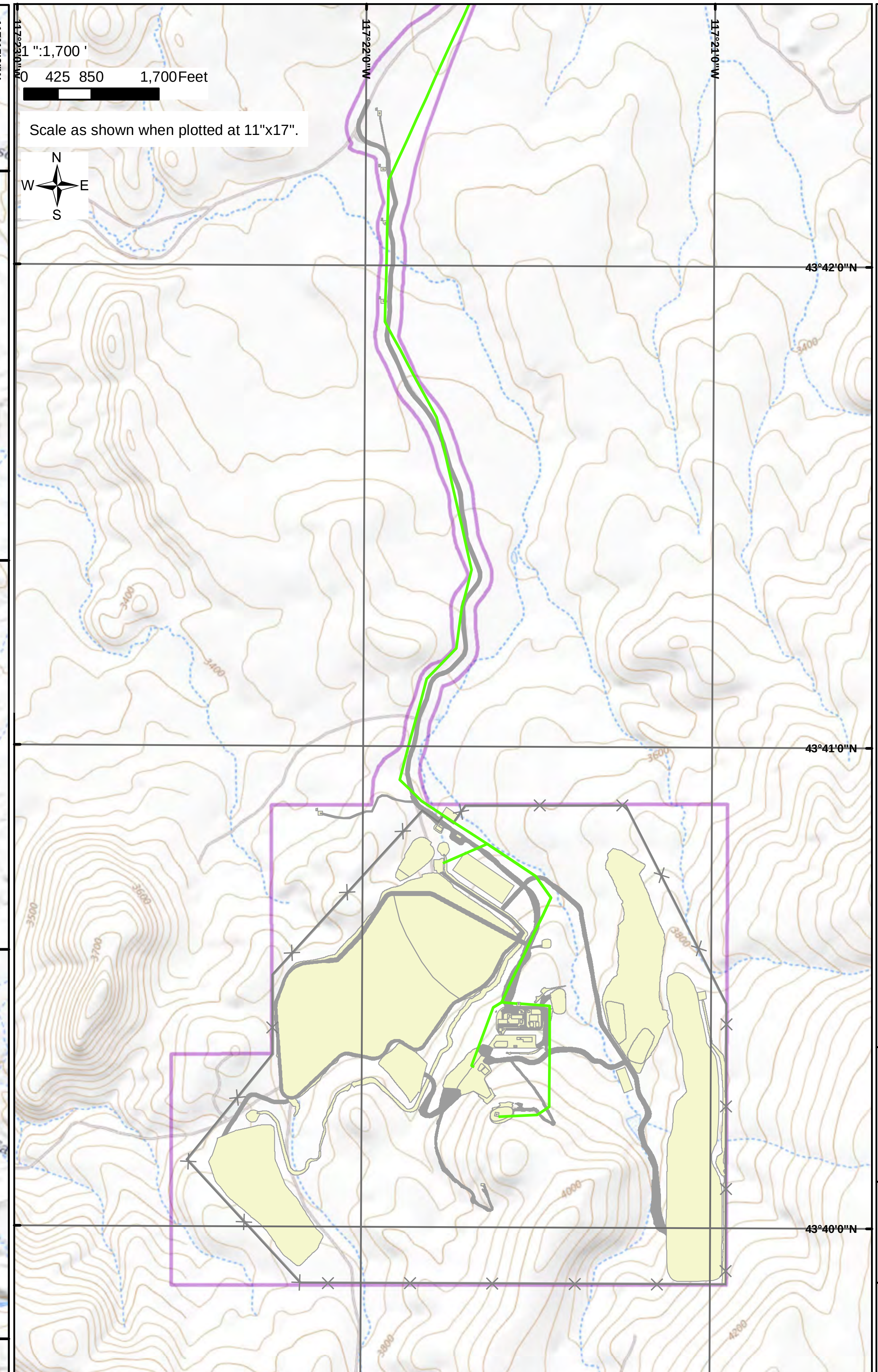

Legend

- PoO Boundary
- Fence Line
- Upgraded Overhead Power Line
- New Overhead Power Line
- Roads

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Proposed Action -
Overhead Power Line

SLR / CALICO RESOURCES	Date: December, 2021		Figure: 8
	Project No: 108.02203.00001		
	By: MS	Chk'd: TM	

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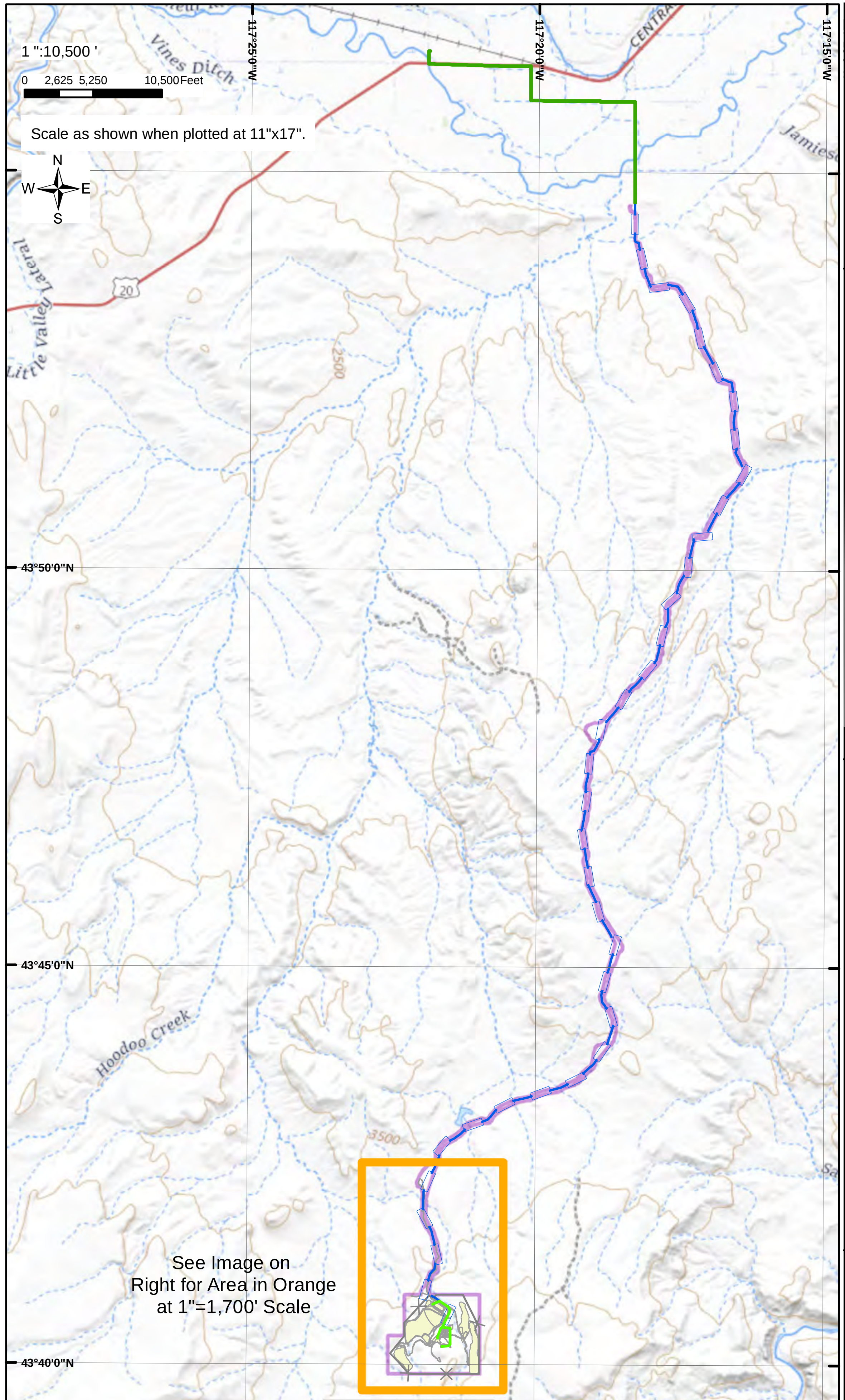

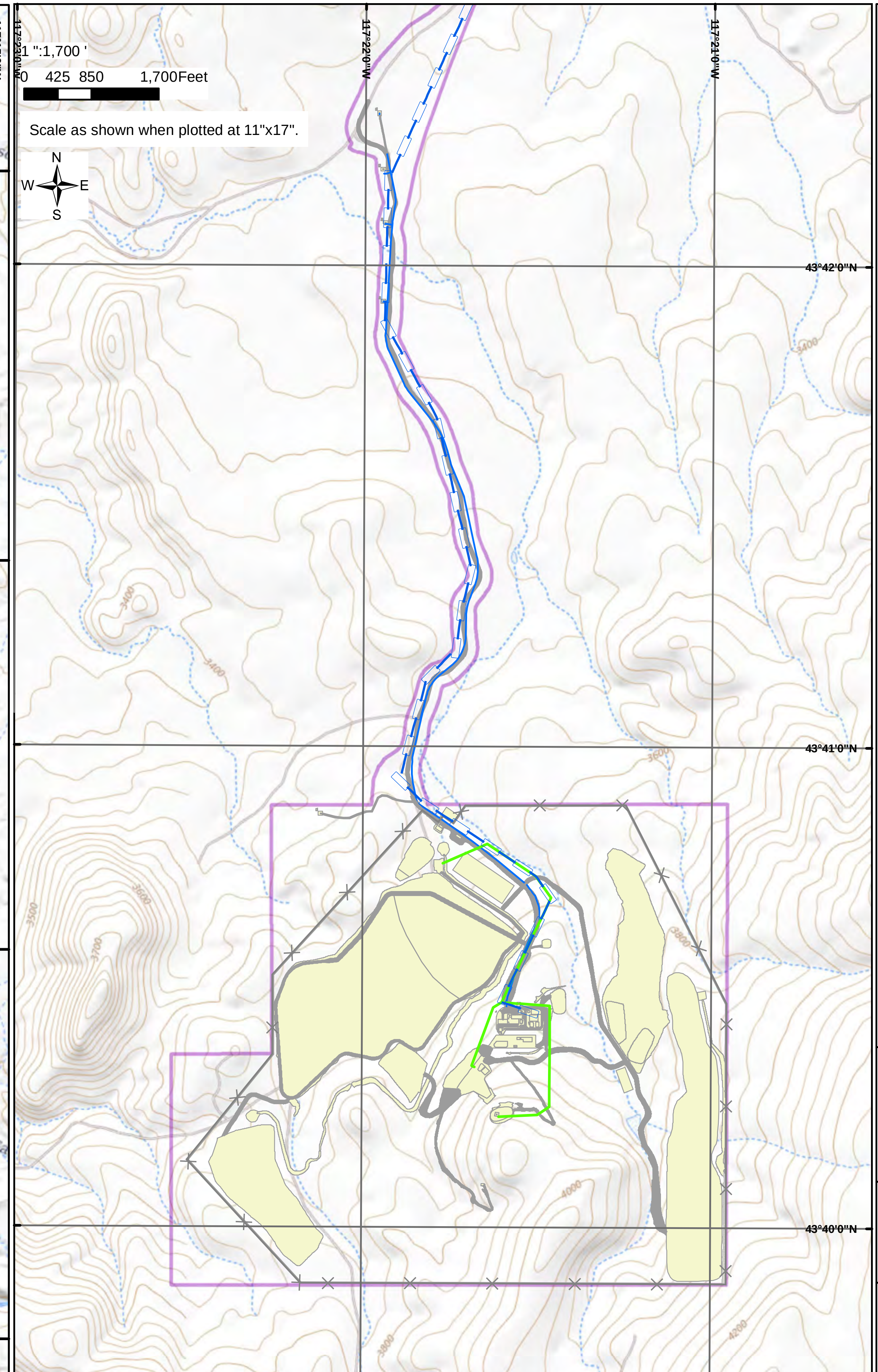

Legend

- PoO Boundary
- Fence Line
- Upgraded Overhead Power Line
- New Buried Power Line
- Power Line
- Roads

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Alternative 3A - Combination Upgraded Overhead and Buried Power Line

SLR / CALICO RESOURCES	Date: December, 2021		Figure: 9
	Project No: 108.02203.00001		
	By: MS	Chk'd: TM	

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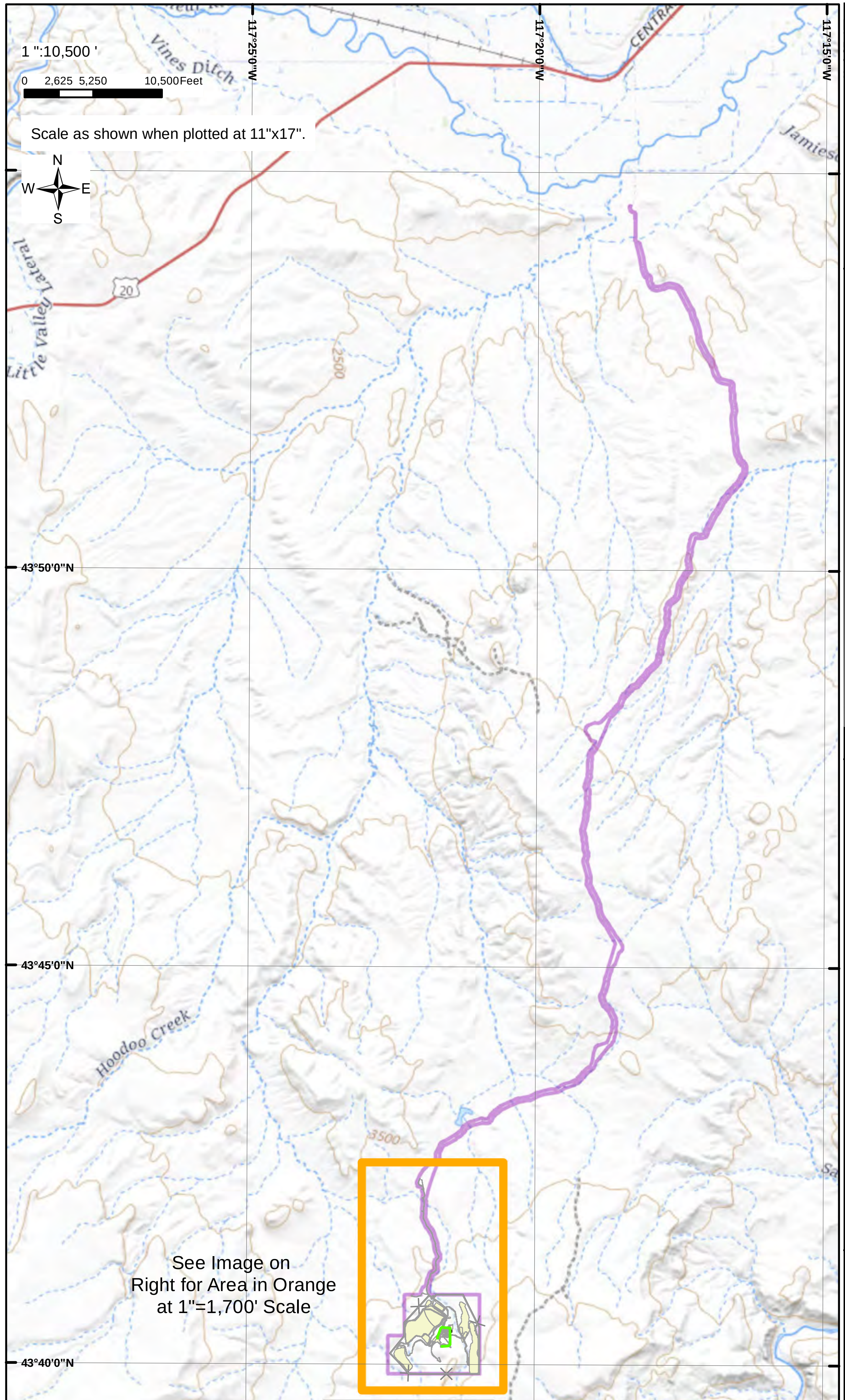

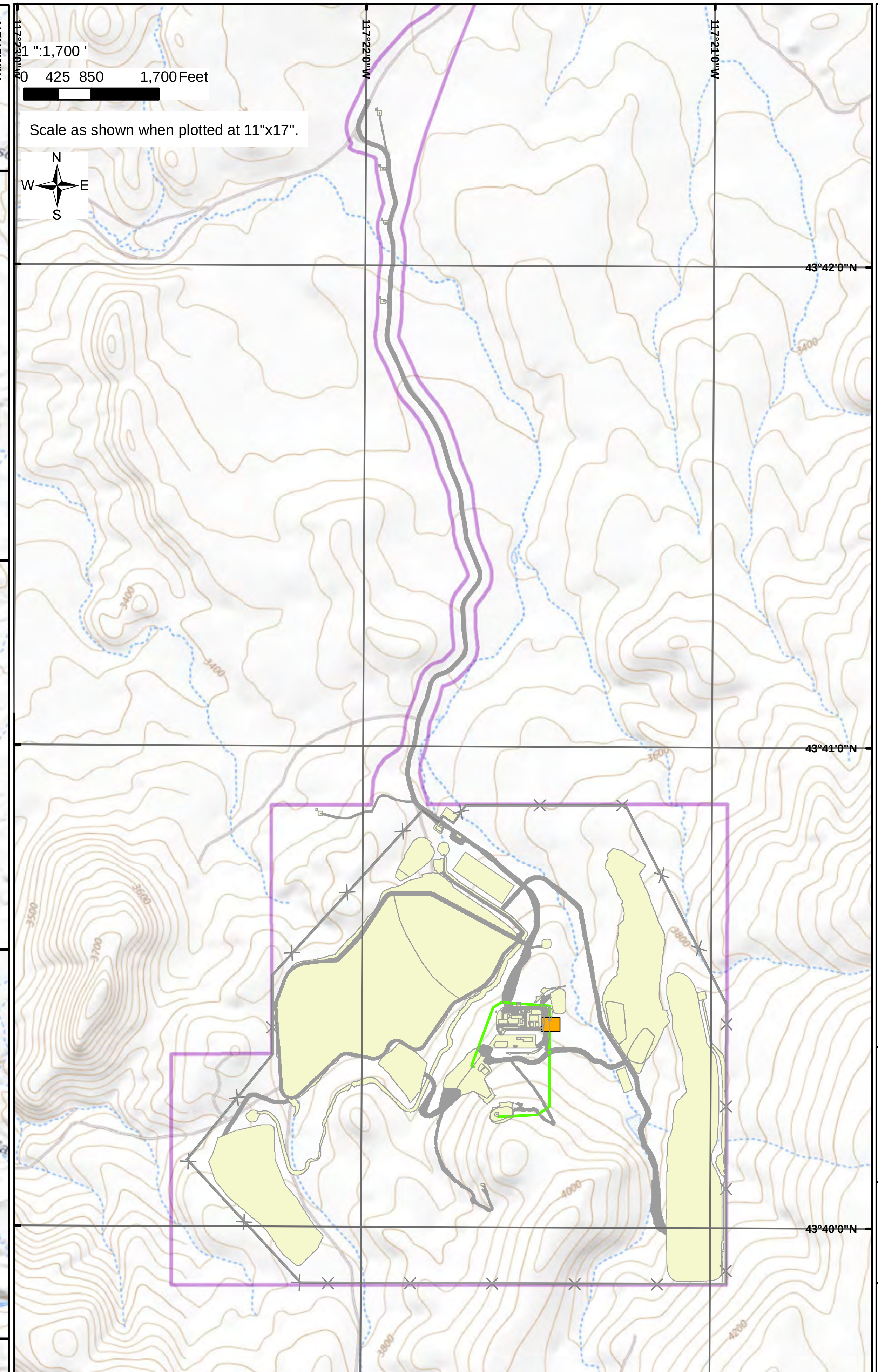

Legend

- PoO Boundary
- Fence Line
- New Overhead Power Line
- Diesel Powered Generators
- Roads

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

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Grassy Mountain Mine

Alternatives Analysis

Figure:

Alternative 3B -
Onsite Generators

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Date: December, 2021		Figure:
Project No: 108.02203.00001		10
By: MS	Chk'd: TM	

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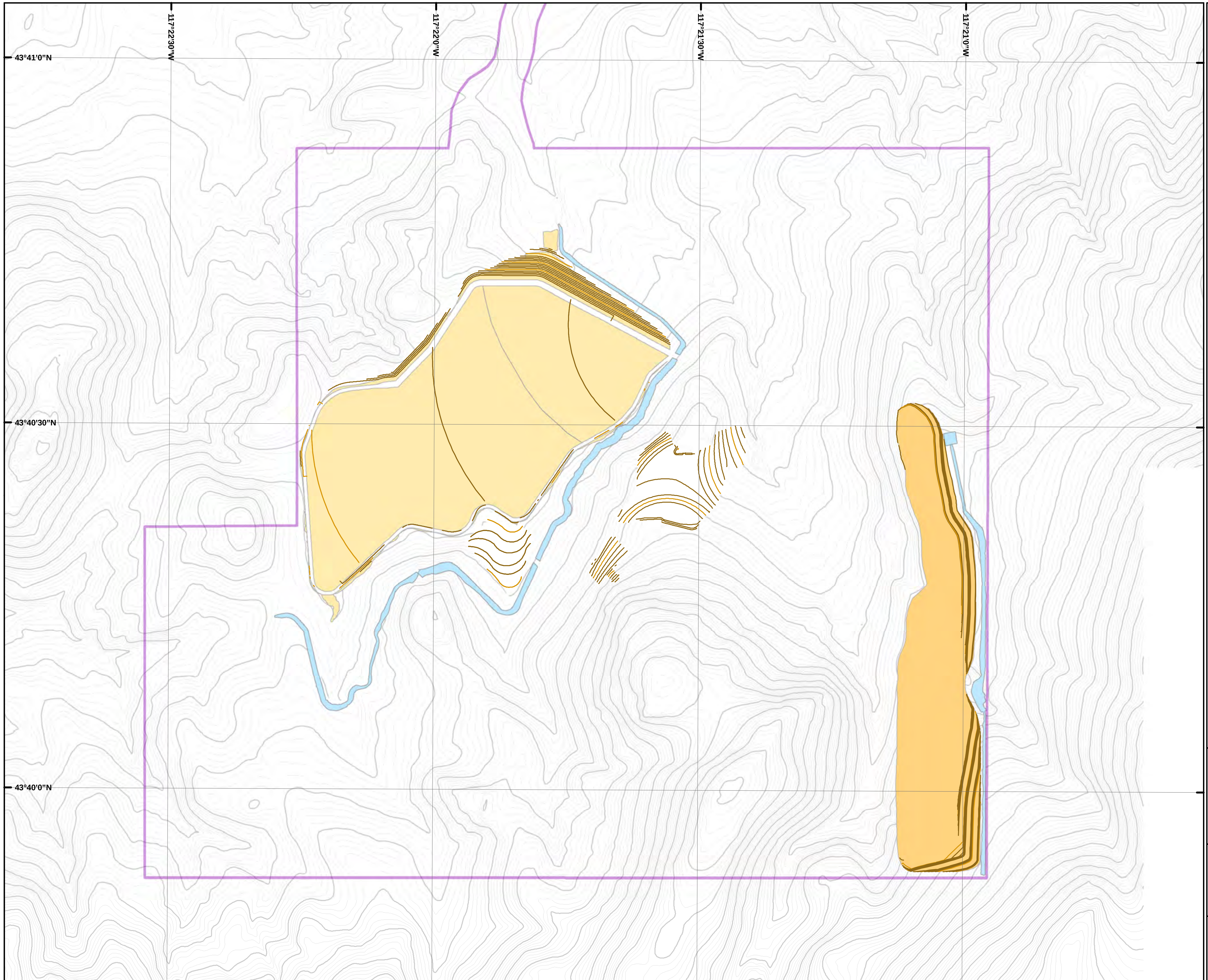

Legend

- PoO Boundary
- Quarry
- Tailings Storage Facility
- Stormwater Diversion Channel
- Reclaimed 25ft Elevation Contours
- Reclaimed 5ft Elevation Contours
- Existing 25ft Elevation Contour
- Existing 5ft Elevation Contour

1 ":800 '

0 200 400 800 Feet

N W E S

Scale as shown when plotted at 11"x17".

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Proposed Action -
Infrastructure Removal and Limited Access

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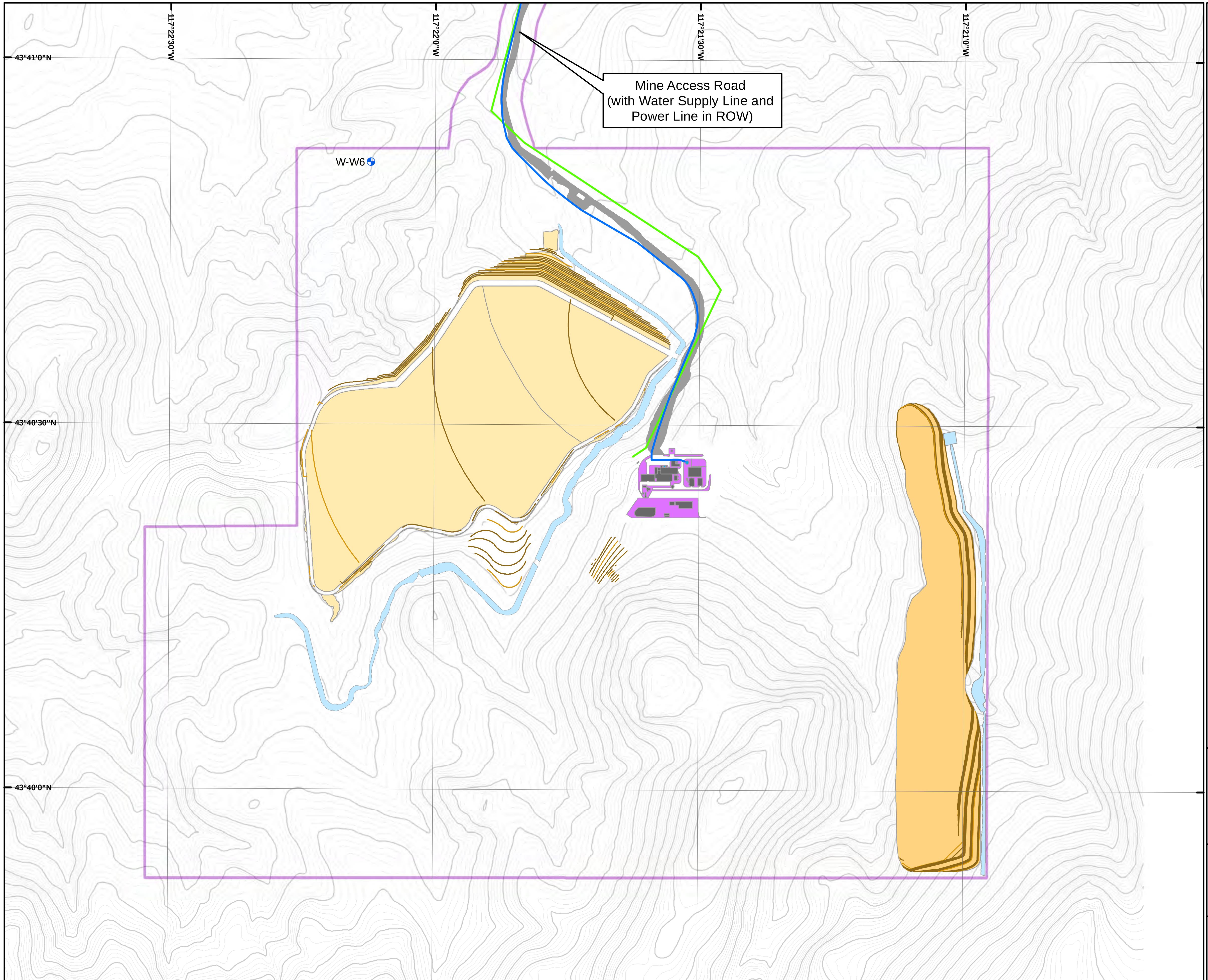
Date:	December, 2021		Figure:
Project No:	108.02203.00001		11
By: MS		Chk'd: TM	



Legend

- PoO Boundary
- Power Line
- Production Well
- Water Supply Line
- Quarry
- Tailings Storage Facility
- Yard
- Process Plant
- Stormwater Diversion Channel
- Water Supply
- Roads
- Reclaimed 25ft Elevation Contours
- Reclaimed 5ft Elevation Contours
- Existing 25ft Elevation Contour
- Existing 5ft Elevation Contour

1 ":800 '

0 200 400 800 Feet

N W E S

Scale as shown when plotted at 11"x17".

Notes:

1. Figure references 1983 UTM zone 11N datum.
2. Topography and facility layout provided by others.

Site/Report:

Calico Resources USA Corp.
Grassy Mountain Mine

Alternatives Analysis

Figure:

Alternative 4 - Post-Closure Industrial Land Use

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Date: December, 2021		Figure: 12
Project No: 108.02203.00001		
By: MS	Chk'd: TM	

APPENDIX A

MINING ALTERNATIVES ANALYSIS

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Mine	Underground with TSF	Open Pit	Open Pit
	2.070 Mst ore + 0.27 Mst waste = 2.34 M tons	79.9 Mst	108.6 Mst
Waste Rock Storage Facility	0.27 Mst (TWRSF, Lined)	79.9 Mst - 22.5 Mst =57.4 Mst (WRSF, Unlined)	108.6 Mst - 53.3 Mst =55.3 Mst (WRSF, Unlined)
Processing Plant	CIL	CIL	CIC
Quarry	Yes	No	No
TSF	3.7 Mst	22.5 Mst	N/A
HLP	N/A	N/A	53.3 Mst
Run-of-Mine (ROM) ore stockpile	Yes	Yes	Yes
Pond	External Reclaim	External Reclaim	Internal Pregnant Pond System
Water Supply	Mine dewatering and five production wells	Pit dewatering and five production wells	Pit dewatering and five production wells
A power substation and distribution system	Line Power from Vale	Line Power from Vale	Line Power from Vale
Ventilation shaft	Yes	N/A	N/A
Access and haul roads	Yes	Yes	Yes
Ancillary facilities	Yes	Yes	Yes
Processing Rate	0.75 kstpd	5 kstpd	15 kstpd
Mine Life (years)	7.8	12.7	10.0
Project Staffing during operations	Approximately 100 people	Approximately 100 people, with different categories/classifications than the Proposed Action	Approximately 130 people, with different categories/classifications than the Proposed Action
Typical Equipment	Per Ausenco, 2020. Grassy Mountain Project, Oregon, USA, NI 43-101 Technical Report on Feasibility Study. September	• Eight Caterpillar 777 haul trucks • Two 992 loaders • Three D9 dozers • Two water trucks • Two 12G motor grader • Two drills • Additional 8 pickup trucks • Fuel Truck • Service Truck • Powder/explosives truck	• Eleven Caterpillar 777 haul trucks • Three 992 loaders • Four D9 dozers • Two water trucks • Two 12G motor grader • Four drills • Additional 8 pickup trucks • Fuel Truck • Service Truck • Powder/explosives truck

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
	Disturbed Area (Acres)		
Underground Mine / Open Pit	0.5	74.1	97.1
Tailings Storage Facility (TSF)	99.2	216.0	147.0
Waste Rock Storage Facility (WRSF)	8.4	215.0	219.0
Process Plant, Infrastructure and Ancillary Facilities	211.5	211.5	211.5
Roads			
Yards and Laydown Areas			
Growth Media Stockpiles			
Water Supply			
Power Supply			
Stormwater Diversion			
Other Areas			
Quarry			
Reclamation Borrow Area			
Total Disturbed Area	319.6	716.6	674.6

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
EVALUATION CRITERIA			
Air Quality	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. 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.	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. 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. For this Alternative, the increased mining equipment (e.g., haul trucks, dozers, etc.), processing equipment (crushing equipment), and Project duration would increase air emissions compared to the Proposed Action.	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. 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. For this Alternative, the increased mining equipment (e.g., haul trucks, dozers, etc.), processing equipment (crushing equipment), and Project duration would increase air emissions compared to the Proposed Action.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Archeological Resources	The Proposed Action has the potential to affect two prehistoric archaeological resources that require further evaluation, testing, or both to determine their NRHP status. Proposed facilities or activities that may affect these sites include the plant site and tailings storage facility. One National Register of Historic Places (NRHP) eligible site is in the near, but outside of proposed areas of disturbance. An additional four resources whose NRHP status is unevaluated are within the Mine and Process Plant area (Figure 3), but not within areas of proposed ground disturbance. Eleven archaeological resources with unevaluated NRHP status are within the Access Road Area. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Road widening, realignment, or other ground disturbance or changes in current use of the road have the potential to affect these resources. Additional evaluation, testing, or both is needed to determine the NRHP status of these resources.	Alternative 1A has the potential to affect five prehistoric archaeological within the Mine and Process Plant area. One of these resources is NRHP eligible; the remaining four require additional evaluation, testing, or both to determine their NRHP status. Alternative 1 facilities that may affect archaeological resources include the TSF, WRSF, and open pit. An additional resource whose NRHP status is unevaluated is not within areas of proposed ground disturbance. Eleven archaeological resources with unevaluated NRHP status are within Access Road Area. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Road widening, realignment, or other ground disturbance or changes in current use of the road have the potential to affect these resources. Additional evaluation, testing, or both is needed to determine the NRHP status of these resources.	Alternative 1B has the potential to affect five prehistoric archaeological within the Mine and Process Plant area. One of these resources is NRHP eligible; the remaining four require additional evaluation, testing, or both to determine their NRHP status. Alternative 1B facilities that may affect archaeological resources include the open pit, WRSF, and heap leach pad. An additional resource whose NRHP status is unevaluated is not within areas of proposed ground disturbance. Eleven archaeological resources with unevaluated NRHP status are within Access Road Area. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Road widening, realignment, or other ground disturbance or changes in current use of the road have the potential to affect these resources. Additional evaluation, testing, or both is needed to determine the NRHP status of these resources.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Cultural/Historical Resources	No historical cultural resources, which are NRHP listed, recommended as NRHP eligible, or are NRHP Unevaluated and needing additional assessment have been identified within the Mine and Process Plant area. Three historical/cultural resources with unevaluated NRHP status are within Access Road Area. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Road widening, realignment, or other ground disturbance or changes in current use of the road have the potential to affect these resources. Additional evaluation, testing, or both is needed to determine the NRHP status of these resources.	No historical cultural resources, which are NRHP listed, recommended as NRHP eligible, or are NRHP Unevaluated and needing additional assessment have been identified within the Mine and Process Plant area. Three historical/cultural resources with unevaluated NRHP status are within Access Road Area. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Road widening, realignment, or other ground disturbance or changes in current use of the road have the potential to affect these resources. Additional evaluation, testing, or both is needed to determine the NRHP status of these resources.	No historical cultural resources, which are NRHP listed, recommended as NRHP eligible, or are NRHP Unevaluated and needing additional assessment have been identified within the Mine and Process Plant area. Three historical/cultural resources with unevaluated NRHP status are within Access Road Area. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Road widening, realignment, or other ground disturbance or changes in current use of the road have the potential to affect these resources. Additional evaluation, testing, or both is needed to determine the NRHP status of these resources.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Existing Land Use and Land Use Designations	The Land Use Study Area is zoned for Exclusive Range Use (ERU) and Exclusive Farm Use (EFU) in the Malheur County Code (MCC). Mining and accessory infrastructure proposed as part of the Proposed Action is an allowed use of BLM-administered land in and near the Land Use Study Area if the Proposed Action can be developed in a manner that protects other sensitive resources, per the Southeastern Oregon Resource Management Plan (SEORMP) energy and mineral resource objectives. The Malheur Planning Commission issued a Conditional Use Permit (CUP) on May 23, 2019.	The impacts would be equal to the Proposed Action.	The impacts would be equal to the Proposed Action.
Fish, Fish Habitat, and Aquatic Biology	A review of existing information from the Oregon Department of Fish and Wildlife (ODFW) indicated fish are unlikely to occur within the Aquatic Resources Study Area partially due to a fish barrier downstream at Rye Field Reservoir, and the ephemeral nature of the drainages in the Aquatic Resources Study Area. Therefore equal short-term and long-term impacts are expected.	A review of existing information from the Oregon Department of Fish and Wildlife (ODFW) indicated fish are unlikely to occur within the Aquatic Resources Study Area partially due to a fish barrier downstream at Rye Field Reservoir, and the ephemeral nature of the drainages in the Aquatic Resources Study Area. Therefore equal short-term and long-term impacts are expected.	A review of existing information from the Oregon Department of Fish and Wildlife (ODFW) indicated fish are unlikely to occur within the Aquatic Resources Study Area partially due to a fish barrier downstream at Rye Field Reservoir, and the ephemeral nature of the drainages in the Aquatic Resources Study Area. Therefore equal short-term and long-term impacts are expected.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Geology and Geologic Hazards	Geologic hazards evaluated in the Geological Study Area include seismicity / earthquake hazards, slope failures/landslides, volcanic eruptions, and unsuitable soil / soil erosion. The Geology Study Area is located in a region of low seismic risk. No active or potentially active faults are known in the Geology Study Area. The closest fault with historic surface rupture, the Lost River Fault, is located near Challis, Idaho, approximately 110 miles northeast of the Geology Study Area. The closest potential Holocene age faults are located over 20 miles north of the Geology Study Area. The probability of the occurrence of an earthquake with a magnitude greater than 5.0 over the next ten years is less than 0.03 (3%). The Proposed Action would extract approximately 3 Mst of ore and 0.2 Mst of waste rock. In all the areas where mining and processing will take place, suitable topsoil will be stripped and stockpiled for reclamation. Upon closure, the waste rock stored in the TWRSF will be used as a secondary source of underground rock fill or placed on the TSF.	In all the areas where mining and processing will take place, suitable topsoil will be stripped and stockpiled for reclamation. Upon closure, the WRSF and TSF will be reclaimed in place, and a seasonal pit lake may be created. The impacts to geology and geologic hazards would be the same as the Proposed Action; however, this alternative would extract approximately 22.5 Mst of ore and 57.4 Mst of waste rock.	In all the areas where mining and processing will take place, suitable topsoil will be stripped and stockpiled for reclamation. Upon closure, the WRSF and TSF will be reclaimed in place, and a seasonal pit lake may be created. The impacts to geology and geologic hazards would be the same as the Proposed Action; however, this alternative would extract approximately 22.5 Mst of ore and 57.4 Mst of waste rock.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Noise	Noise-generating sources associated with the Proposed Action include the crushing and screening plant, the Process Plant, equipment, and vehicles.	Under this alternative, there would be more noise associated with the large number and size of haul trucks hauling ore and waste material from the open pit. Because the staffing level was estimated to be approximately the same as the Proposed Action, the number of vehicles would be about the same for staff, but there would be increased traffic/noise from additional support vehicles (e.g., fuel and reagent delivery). There would be elevated noise from blasting the open pit; however, the blasts would be scheduled for off-peak periods, and the number of blasts per day/week would be limited.	Under this alternative, there would be more noise associated with the large number and size of haul trucks hauling ore and waste material from the open pit. Because the staffing level was estimated to be approximately 30% larger than the Proposed Action, there would be increased traffic/noise from additional staff and support vehicles (i.e., fuel and reagent delivery). There would be elevated noise from blasting the open pit; however, the blasts would be scheduled for off-peak periods, and the number of blasts per day/week would be limited.
Socioeconomic Conditions	The Proposed Action would employ approximately 100 people for 8 years. Calico would implement a local-hire-preference policy, resulting in beneficial impacts to the surrounding communities.	The alternative would employ approximately the same workforce as the Proposed Action for 13 years (5 years longer than Proposed Action). Calico would implement a local-hire-preference policy, resulting in beneficial impacts to the surrounding communities.	This alternative was estimated to employ a workforce approximately 30% larger than the Proposed Action for 10 years (2 years longer than Proposed Action). Calico would implement a local-hire-preference policy, resulting in beneficial impacts to the surrounding communities.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
State or federally listed Threatened or Endangered Species an Habitat, and State Sensitive Species and Habitat	No species found in the area are listed under the Federal Endangered Species Act. However, several species that are listed as threatened, endangered, or sensitive by the State of Oregon are present in the area, including the Ferruginous hawk (Buteo regalis), Western burrowing owl (Athene cunicularia hypugaea), Greater sage-grouse (Centrocercus urophasianus), Swainson's hawk (Buteo swainsoni), White-tailed jack rabbit (Lepus townsendii), Pygmy Rabbit (Brachylagus idahoensis), Townsend's big-eared bat (Corynorhinus townsendii), Spotted bat (Euderma maculatum), and Fringed myotis (Myotis thysanodes). A number of these species are also listed as "BLM Sensitive." The golden eagle is protected under the Bald and Golden Eagle Protection Act, and all migratory birds are protected by the Migratory Bird Treaty Act. Additionally, a number of areas are designated as sensitive habitat, including BLM Greater Sage-Grouse Habitat Management Areas.	This alternative would include disturbance of a larger area than the Proposed Action and would also require a larger TSF and WRSF, with greater area of disturbance. Therefore, greater impacts to listed or sensitive species present in the area and their habitat can be expected from this alternative.	This alternative would result in a larger mining area and WRSF, which would result in the disturbance of a larger area than the Proposed Action. Additionally, use of a heap leach pad (HLP) and process ponds could result in exposure of wildlife, including listed or sensitive species, to cyanide solutions. Therefore, greater impacts to listed or sensitive species present in the area and their habitat can be expected from this alternative.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Surface water and groundwater	Surface water features in the Proposed Action area consist of ephemeral or intermittent drainages. During operations, surface water and stormwater would be managed through diversion channels and ditches constructed around the surface facilities, which would change the surface drainage patterns but would eventually discharge into the historic drainage patterns further downstream. During operations, groundwater would be extracted to allow for underground mining and from the Production Wellfield to provide makeup water for processing. However, groundwater conditions would be expected to return to pre-mining conditions after reclamation.	Surface water features in this Alternative consist of ephemeral or intermittent drainages. During operations, surface water and stormwater would be managed through diversion channels and ditches constructed around the surface facilities, which would change the surface drainage patterns but would eventually discharge into the historic drainage patterns further downstream. During operations, groundwater would be extracted to allow for open pit excavation and from the Production Wellfield to provide makeup water for processing. However, groundwater conditions would be expected to return to pre-mining conditions after reclamation. Therefore, the impacts to surface water and groundwater would be the same as the Proposed Action.	Surface water features in this Alternative consist of ephemeral or intermittent drainages. During operations, surface water and stormwater would be managed through diversion channels and ditches constructed around the surface facilities, which would change the surface drainage patterns but would eventually discharge into the historic drainage patterns further downstream. During operations, groundwater would be extracted to allow for open pit excavation and from the Production Wellfield to provide makeup water for processing. However, groundwater conditions would be expected to return to pre-mining conditions after reclamation. Therefore, the impacts to surface water and groundwater would be the same as the Proposed Action.
Vegetation	Vegetation in the survey area consists of desert-rangeland-type habitat where sagebrush and grasses are the dominant species and is consistent with desert area of the Great Basin. The Proposed Action would impact the following vegetation communities: Wyoming Big Sagebrush/Crested Wheatgrass, Crested Wheatgrass Seeding, Bluebunch Wheatgrass/Cheatgrass/Annual, Wyoming Big Sagebrush/Bluebunch Wheatgrass, and Burned Yellow Rabbitbrush/Bluebunch Wheatgrass.	This alternative would include disturbance of a larger area than the proposed project because a surface mining method would be used. This mining method would also require a larger TSF and WRSF, with greater area of disturbance. Therefore, greater impacts to vegetation communities present in the area can be expected from this alternative.	This alternative would include disturbance of a larger area than the proposed project because a surface mining method would be used. This mining method would also require a larger WRSF, and the construction/operations of a HLP with greater area of disturbance than the TSF in the Proposed Action. Therefore, greater impacts to vegetation communities present in the area can be expected from this Alternative.

Table A-1
Alternative Analysis: Mine

Parameter	Proposed Action: Underground Mine with TSF	Alternative 1A: Open Pit Mine with TSF	Alternative 1B: Open Pit Mine with HLP
Wildlife and Wildlife Habitat	Habitat types include surface waterways (e.g., streams, springs, wetlands), riparian areas, big game habitat, bird habitat, reproduction and nursery areas, fish spawning areas, and wildlife movement and migration corridors. Wildlife species and habitats occurring within and adjacent to the Wildlife Survey Area are consistent with desert area of the Great Basin and consist of desert-rangeland-type habitat where sagebrush and grasses are the dominant species.	This alternative would include disturbance of a larger area than the Proposed Action. This mining method would also require a larger TSF and WRSF, with greater area of disturbance. Therefore, greater impacts to wildlife species and habitat present in the area and their habitat can be expected from this alternative.	This alternative would include disturbance of a larger area than the Proposed Action. This mining method would also require a larger WRSF and an HLP that is larger than the TSF in the Proposed Action, with greater area of disturbance. Therefore, greater impacts to wildlife species and habitat present in the area and their habitat can be expected from this alternative.
Other Resources			

APPENDIX B

WATER SUPPLY ALTERNATIVES ANALYSIS

Table B-1
Alternative Analysis: Water Supply

Parameter	Proposed Action	Alternative 2: Municipal Water Supply
Water Supply	Mine dewatering and five production wells that will be pumped to the site in a 2.8-mile pipeline	Assumed 25.3-mile waterline from the City of Vale
	Disturbed Area (Acres)	
Underground Mine / Open Pit	0.5	0.5
Tailings Storage Facility (TSF)	99.2	99.2
Waste Rock Storage Facility (WRSF)	8.4	8.4
Process Plant, Infrastructure and Ancillary Facilities	7.2	7.2
Roads	24.9	24.9
Yards and Laydown Areas	73.7	73.7
Growth Media Stockpiles	18.2	18.2
Water Supply	6.3	60.8
Power Supply	0.0	0.0
Stormwater Diversion	11.9	11.9
Other Areas	25.5	25.5
Quarry	42.9	42.9
Reclamation Borrow Area	0.0	0.0
Total Disturbed Area	318.7	373.2

Table B-1
Alternative Analysis: Water Supply

Parameter	Proposed Action	Alternative 2: Municipal Water Supply
	EVALUATION CRITERIA	
Air Quality	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. 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.	The fugitive dust and emissions would have no impact, or equal long-term impact, as the Proposed Action.
Archeological Resources	Ground disturbance from the excavation of proposed water wells and the 2.8-mile-long trench to bury the water pipeline has the potential to affect one NRHP eligible prehistoric archaeological resources and five resources that need additional evaluation or testing before their NRHP status can be determined. One of these resources is a multicomponent resource meaning it has prehistoric and historical components. Ground disturbance will be within the access road ROW.	This alternative includes a pipeline system within the Russell, Cow Hollow, Twin Creek roads, and Mine access road ROW, with two pump stations to address the hydraulic head in the pipeline. Engineering controls would be implemented to mitigate impacts to the one NRHP eligible prehistoric archaeological resource and twelve resources whose NRHP status is unevaluated and would need additional evaluation, testing, or both. One of these resources is a multicomponent resource meaning it has prehistoric and historical components.
Cultural/Historical Resources	Engineering controls would be implemented to mitigate impacts from the excavation of proposed water wells and the 2.8-mile-long trench to bury the water pipeline has the potential to affect two cultural/historical resources that need additional evaluation or testing before their NRHP status can be determined. One of these resources is a multicomponent resource meaning it has prehistoric and historical components. Ground disturbance will be within the access road ROW.	This alternative includes a pipeline system within the Russell, Cow Hollow, Twin Creek roads, and Mine access road ROW, with two pump stations to address the hydraulic head in the pipeline. Engineering controls would be implemented to mitigate impacts to affect three cultural/historical resources with unevaluated NRHP status. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Additional evaluation, testing, or both is needed to determine the NRHP status of these resources.

Table B-1
Alternative Analysis: Water Supply

Parameter	Proposed Action	Alternative 2: Municipal Water Supply
Existing Land Use and Land Use Designation	The Land Use Study Area is zoned Exclusive Range Use (ERU) and Exclusive Farm Use (EFU) in the Malheur County Code (MCC). Mining and accessory infrastructure proposed as part of the Proposed Action is an allowed use of BLM-administered land in and near the Land Use Study Area if the Proposed Action can be developed in a manner that protects other sensitive resources, per the Southeastern Oregon Resource Management Plan (SEORMP) energy and mineral resource objectives. The Malheur Planning Commission issued a Conditional Use Permit (CUP) on May 23, 2019.	The existing land use and land use designation would be the same as the Proposed Action.
Fish, Fish Habitat and Aquatic Biology	A review of existing information from Oregon Department of Fish and Wildlife (ODFW) indicated that fish are unlikely to occur within the Aquatic Resources Study Area partially due to a fish barrier downstream at Rye Field Reservoir, and the ephemeral nature of the drainages in the Aquatic Resources Study Area. Therefore no impacts are expected.	During the construction of the municipal water line, water crossings would be designed to minimize impacts to fish, fish habitat and aquatic biology. The alternative would have no impact, or equal long-term impact, as the Proposed Action.

Table B-1
Alternative Analysis: Water Supply

Parameter	Proposed Action	Alternative 2: Municipal Water Supply
Geology and Geologic Hazards	Geologic hazards evaluated in the Geological Study Area include seismicity/earthquake hazards, slope failures/landslides, volcanic eruptions and unsuitable soil/soil erosion. The Geology Study Area is located in a region of low seismic risk. No active or potentially active faults are known in the Geology Study Area. The closest fault with historic surface rupture, the Lost River Fault, is located near Challis, Idaho, approximately 110 miles northeast of the Geology Study Area. The closest potential Holocene age faults are located over 20 miles north of the Geology Study Area. The probability of the occurrence of an earthquake with a magnitude greater than 5.0 over the next ten years is less than 0.03 (3%). The Proposed Action would extract approximately 3 Mst of ore and 0.2 Mst of waste rock. In all the areas where mining and processing will take place, suitable topsoil will be stripped and stockpiled for reclamation. Upon closure, the waste rock stored in the TWRSF will be used as a secondary source of underground rock fill or placed on the TSF. The Proposed Action would result in an average annual dewatering rate of approximately 25 gpm from the underground mine, and 53 gpm of make up water from the Production Wellfield. Upon closure, the water level is expected to recover to pre-mining conditions.	The alternative would have no impact, or equal long-term impact, as the Proposed Action. The impact on the City of Vale water supply has not been assessed.
Noise	Noise-generating sources associated with the Proposed Action include the crushing and screening plant, the Process Plant, equipment, and vehicles. The onsite water supply is not expected to generate additional noise.	The noise from the two pumps stations in Alternative 2 may have an increased impact as compared to the Proposed Action Supplying water from the City of Vale is not expected to generate additional noise.

Table B-1
Alternative Analysis: Water Supply

Parameter	Proposed Action	Alternative 2: Municipal Water Supply
Socioeconomic Conditions	The Proposed Action would employ approximately 100 people for 8 years Calico would implement a local-hire-preference policy, resulting in beneficial impacts to the surrounding communities.	The Socioeconomic conditions would be the same as the Proposed Action.
State or federally listed Threatened or Endangered Species an Habitat, and State Sensitive Species and Habitat	No species found in the area are listed under the federal Endangered Species Act. However, several species that are listed as threatened, endangered, or sensitive by the State of Oregon are present in the area, including the Ferruginous hawk (Buteo regalis), Western burrowing owl (Athene cunicularia hypugaea), Greater sage-grouse (Centrocercus urophasianus), Swainson's hawk (Buteo swainsoni), White-tailed jack rabbit (Lepus townsendii), Pygmy Rabbit (Brachylagus idahoensis), Townsend's big-eared bat (Corynorhinus townsendii), Spotted bat (Euderma maculatum), and Fringed myotis (Myotis thysanodes). A number of these species are also listed as "BLM Sensitive." The golden eagle is protected under the Bald and Golden Eagle Protection Act, and all migratory birds are protected by the Migratory Bird Treaty Act. Additionally, a number of areas are designated as sensitive habitat, including BLM Greater Sage-Grouse Habitat Management Areas.	Engineering controls would be implemented to mitigate impacts in the road ROW. The alternative would have no impact, or equal long-term impact, as the Proposed Action.
Surface water and groundwater	Surface water features in the Proposed Action would consist of ephemeral or intermittent drainages. During operations, surface water and stormwater would be managed through diversion channels and ditches constructed around the surface facilities, which would change the surface drainage patterns but would eventually discharge into the historic drainage patterns further downstream. During operations, groundwater would be extracted to allow for underground mining and from the Production Wellfield to provide makeup water for processing.	The alternative would have no impact, or equal long-term impact, as the Proposed Action. During operations, groundwater would be extracted from underground mining only, with makeup water provided from the City of Vale instead of the Production Wellfield. The impact of this on the water supply from the City of Vale was not assessed.

Table B-1
Alternative Analysis: Water Supply

Parameter	Proposed Action	Alternative 2: Municipal Water Supply
Vegetation	Vegetation in the survey area consists of desert-rangeland-type habitat where sagebrush and grasses are the dominant species and is consistent with desert area of the Great Basin. The Proposed Action would impact the following vegetation communities: Wyoming Big Sagebrush/Crested Wheatgrass, Crested Wheatgrass Seeding, Bluebunch Wheatgrass/Cheatgrass/Annual, Wyoming Big Sagebrush/Bluebunch Wheatgrass, and Burned Yellow Rabbitbrush/Bluebunch Wheatgrass.	Because the water line route will follow the existing road ROW, the alternative would have no impact, or equal long-term impact, as the Proposed Action..
Wildlife and Wildlife Habitat	Per the Wildlife Resource Baseline Report (EMS, 2019) identifies a number of wildlife species and habitat types. Habitat types include surface waterways (e.g., streams, springs, wetlands), riparian areas, big game habitat, bird habitat, reproduction and nursery areas, fish spawning areas, and wildlife movement and migration corridors. Wildlife species and habitats occurring within and adjacent to the wildlife survey area are consistent with desert area of the Great Basin and consist of desert-rangeland-type habitat where sagebrush and grasses are the dominant species.	Because the water line route will follow the existing road ROW, the alternative would have no impact, or equal long-term impact, as the Proposed Action.
Other Resources		

APPENDIX C

POWER SUPPLY ALTERNATIVES ANALYSIS

Table C-1
Alternative Analysis: Power

Parameter	Proposed Action	Alternative 3A:Buried Transmission Line	Alternative 3B: Onsite Power Supply
A power substation and distribution system	Line power from City of Vale, with two backup 60 hertz (Hz) diesel-powered generators Each of the two backup generators running approximately 500 hours per year	Line power from City of Vale, with two backup 60 Hz diesel-powered generators Each of the two backup generators running approximately 500 hours per year	Four 60 Hz diesel-powered generators and two backup 60 Hz diesel-powered generators Each of the four generators would operate at a maximum of 24 hours per day, or 8,640 hours per year, with each of the two backup generators running approximately 500 hours per year.
		Disturbed Area (Acres)	
Underground Mine / Open Pit	0.5	0.5	0.5
Tailings Storage Facility (TSF)	99.2	99.2	99.2
Waste Rock Storage Facility (WRSF)	8.4	8.4	8.4
Process Plant, Infrastructure and Ancillary Facilities	7.2	7.2	7.2
Roads	24.9	24.9	24.9
Yards and Laydown Areas	73.7	73.7	73.7
Growth Media Stockpiles	18.2	18.2	18.2
Water Supply	7.2	7.2	7.2
Power Supply	2.5	60.8	0.0
Stormwater Diversion	11.9	11.9	11.9
Other Areas	25.5	25.5	25.5
Quarry	42.9	42.9	42.9
Other Areas	25.5	25.5	25.5
Total Disturbed Area	322.1	380.4	319.6

Table C-1
Alternative Analysis: Power

Parameter	Proposed Action	Alternative 3A:Buried Transmission Line	Alternative 3B: Onsite Power Supply
EVALUATION CRITERIA			
Air Quality	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. 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.	The fugitive dust and emissions would have no impact, or equal long-term impacts, to the Proposed Action.	The fugitive dust emissions would be the same as the Proposed Action. However, the onsite generators would increase the quantity of air emissions as compared to the line power.

Table C-1
Alternative Analysis: Power

Parameter	Proposed Action	Alternative 3A:Buried Transmission Line	Alternative 3B: Onsite Power Supply
Archeological Resources	Poles/overhead structures would be located to avoid archaeological resource locations.	This alternative includes a 20.1-mile buried conduit/cable within the existing road ROW and along the Mine access road. Engineering controls would be implemented to mitigate impacts to affect one NRHP-eligible prehistoric archaeological resource and twelve resources with a NRHP status of Unevaluated and would need additional evaluation, testing, or both. One of these resources is a multicomponent resource, meaning it has prehistoric and historical components.	Engineering controls would be implemented to mitigate impacts along the road ROW. This alternative would have the same , or equal long-term impacts, to the Proposed Action.
Cultural/Historical Resources	Poles/overhead structures would be located to avoid cultural/historic resource locations.	This alternative has the potential to affect three cultural/historical resources with Unevaluated NRHP status. One of these resources is a multicomponent resource, meaning it is both an archaeological resource and a cultural/historical resource. Additional evaluation, testing, or both, is needed to determine the NRHP status of these resources.	No waterline construction would be performed in the road ROW. This alternative would have the same , or equal long-term impacts, to the Proposed Action.

Table C-1
Alternative Analysis: Power

Parameter	Proposed Action	Alternative 3A:Buried Transmission Line	Alternative 3B: Onsite Power Supply
Existing Land Use and Land Use Designation	The Land Use Study Area is zoned Exclusive Range Use (ERU) and Exclusive Farm Use (EFU) in the Malheur County Code (MCC). Mining and accessory infrastructure proposed as part of the Proposed Action is an allowed use of BLM-administered land in and near the Land Use Study Area if the Proposed Action can be developed in a manner that protects other sensitive resources, per the Southeastern Oregon Resource Management Plan (SEORMP) energy and mineral resource objectives. The Malheur Planning Commission issued a Conditional Use Permit (CUP) on May 23, 2019.	The existing land use and land use designation would be the same as the Proposed Action.	The existing land use and land use designation would be the same as the Proposed Action.
Fish, Fish Habitat and Aquatic Biology	Poles/overhead structures would be located to avoid being placed in streams or river crossings.	During the construction of the buried conduit/cable, engineering controls would be implemented to minimize impacts to fish, fish habitat and aquatic biology. This alternative would have the same , or equal long-term impacts, to the Proposed Action.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.
Geology and Geologic Hazards	Poles/overhead structures would be located to avoid hazards.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.

Table C-1
Alternative Analysis: Power

Parameter	Proposed Action	Alternative 3A:Buried Transmission Line	Alternative 3B: Onsite Power Supply
Noise	Noise-generating sources associated with the Proposed Action include the crushing and screening plant, the Process Plant, equipment, and vehicles. The Transmission line is not expected to generate additional noise.	The buried transmission line would have the least amount of noise.	The onsite power generation will generate additional noise as compared to the Proposed Action.
Socioeconomic Conditions	The Proposed Action would employ approximately 100 people for 8 years Calico would implement a local-hire-preference policy, resulting in beneficial impacts to the surrounding communities.	The Socioeconomic conditions would be the same as the Proposed Action.	The impacts would be the same as the Proposed Action.

Table C-1
Alternative Analysis: Power

Parameter	Proposed Action	Alternative 3A:Buried Transmission Line	Alternative 3B: Onsite Power Supply
State or federally listed Threatened or Endangered Species an Habitat, and State Sensitive Species and Habitat	No species found in the area are listed under the federal Endangered Species Act. However, several species that are listed as threatened, endangered, or sensitive by the State of Oregon are present in the area, including the Ferruginous hawk (Buteo regalis), Western burrowing owl (Athene cunicularia hypugaea), Greater sage-grouse (Centrocercus urophasianus), Swainson's hawk (Buteo swainsoni), White-tailed jack rabbit (Lepus townsendii), Pygmy Rabbit (Brachylagus idahoensis), Townsend's big-eared bat (Corynorhinus townsendii), Spotted bat (Euderma maculatum), and Fringed myotis (Myotis thysanodes). A number of these species are also listed as "BLM Sensitive." The golden eagle is protected under the Bald and Golden Eagle Protection Act, and all migratory birds are protected by the Migratory Bird Treaty Act. Additionally, a number of areas are designated as sensitive habitat, including BLM Greater Sage-Grouse Habitat Management Areas. There may be some short term impacts	Engineering controls would be implemented to mitigate impacts in the road ROW. The alternative may have short term impacts	The alternative would have the least impact
Surface water and groundwater	Poles/overhead structures would be located to avoid surface water and groundwater.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.

Table C-1
Alternative Analysis: Power

Parameter	Proposed Action	Alternative 3A:Buried Transmission Line	Alternative 3B: Onsite Power Supply
Vegetation	Poles/overhead structures would be located to minimize impacts to vegetation.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.
Wildlife and Wildlife Habitat	Poles/overhead structures would provide minimum disturbance, and features included to discourage nesting. There may be some short term impacts	There may be some short term impacts	The alternative would have the least impact
Other Resources			

APPENDIX D

RECLAMATION ALTERNATIVES ANALYSIS

Table D-1
Alternative Analysis: Reclamation

Parameter	Proposed Action	Alt 4:Leave Infrastructure
Mine	Plug	Plug
TSF	Reclaimed	Reclaimed
Waste Rock Storage Facility	The waste rock in the TWRSF will either be used underground for backfill during operations, or will be transferred to the TSF at the end of operations. The TWRSF lining system will be cut and removed, including the leakage collection and leakage detection system and disposed of offsite.	The waste rock in the TWRSF will either be used underground for backfill during operations, or will be transferred to the TSF at the end of operations. The TWRSF lining system will be cut and removed, including the leakage collection and leakage detection system and disposed of offsite.
Processing Plant	Demolished/removed	Keep building
Quarry	Reclaimed	Reclaimed
Run-of-Mine (ROM) ore stockpile	Reclaimed	Reclaimed
Pond	Reclaimed	Reclaimed
Water Supply	Demolished/removed	Keep wells/waterline
Power substation and distribution system	Removed	Keep transmission line
Access and haul roads	Reclaimed	Keep roads
Ancillary facilities	Demolished/removed	Keep buildings
	Reclaimed Area (Acres)	
Underground Mine / Open Pit	0.5	0.5
Tailings Storage Facility (TSF)	99.2	99.2
Waste Rock Storage Facility (WRSF)	8.4	8.4
Process Plant, Infrastructure and Ancillary Facilities	7.2	0
Roads	24.9	0
Yards and Laydown Areas	73.7	0
Growth Media Stockpiles	18.2	18.2
Water Supply	7.2	0
Power Supply	0	0
Stormwater Diversion	11.9	11.9
Other Areas	25.5	25.5
Quarry	42.9	42.9
Total Area	0	0
Total Disturbed Area	319.6	206.6

Table D-1
Alternative Analysis: Reclamation

Parameter	Proposed Action	Alt 4:Leave Infrastructure
	EVALUATION CRITERIA	
Air Quality	As part of the reclamation plan, disturbed areas will be seeded with an interim seed mix to minimize fugitive dust emissions from surfaces without vegetation, where appropriate. With the limited access allowed post reclamation, air emissions are expected to be minimal.	As part of the reclamation plan, disturbed areas will be seeded with an interim seed mix to minimize fugitive dust emissions from surfaces without vegetation, where appropriate. With allowing access to area, there will be increased emissions from mobile sources such as vehicular traffic and potentially post-reclamation commercial industries.
Archeological Resources	Provided reclamation activities remain with the perimeter fence limits, there would be no additional impacts.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.
Cultural/Historical Resources	Provided reclamation activities remain with the perimeter fence limits, there would be no additional impacts.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.
Existing Land Use and Land Use Designation	The proposed post-mining land uses for the Proposed Action is livestock grazing or range land, wildlife habitat and recreational land, with opportunities to consider mineral exploration and development when feasible.	The existing land use would not be consistent with an increased emphasis on industrial development.
Fish, Fish Habitat and Aquatic Biology	A review of existing information from Oregon Department of Fish and Wildlife (ODFW) indicated that fish are unlikely to occur within the Aquatic Resources Study Area partially due to a fish barrier downstream at Rye Field Reservoir, and the ephemeral nature of the drainages in the Aquatic Resources Study Area. Therefore no impacts are expected.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.
Geology and Geologic Hazards	The impacts to geology and geologic hazards would be the same as the Proposed Action. The Proposed Action would extract approximately 3 Mst of ore and 0.2 Mst of waste rock. In all the areas where mining and processing will take place, suitable topsoil will be stripped and stockpiled for reclamation. Upon closure, the waste rock will be placed underground and the TSF reclaimed.	This alternative would have the same , or equal long-term impacts, to the Proposed Action.

Table D-1
Alternative Analysis: Reclamation

Parameter	Proposed Action	Alt 4:Leave Infrastructure
Noise	Upon reclamation of the Project, noise is expected to be similar to pre mining conditions as access will be removed to the Project area.	With allowing access to the reclaimed area, there will elevated noise from pre-mining conditions, due to vehicular traffic, and potentially post-reclamation industries. However, the magnitude of noise impacts are difficult to assess without defining the post reclamation activities.
Socioeconomic Conditions	Upon reclamation of the Project, the land would be returned to the post mining land use and the mine would no longer need the workforce. However, many of the skills gained from the Proposed Action could be applied to other businesses in the area.	Many of the skills gained from the Proposed Action could be applied to other businesses in the area. As the site infrastructure would be retained (i.e., power, water, roads and certain buildings), other businesses may be attracted to this area.
State or federally listed Threatened or Endangered Species an Habitat, and State Sensitive Species and Habitat	No species found in the area are listed under the federal Endangered Species Act. However, several species that are listed as threatened, endangered, or sensitive by the State of Oregon are present in the area, including the Ferruginous hawk (Buteo regalis), Western burrowing owl (Athene cunicularia hypugaea), Greater sage-grouse (Centrocercus urophasianus), Swainson’s hawk (Buteo swainsoni), White-tailed jack rabbit (Lepus townsendii), Pygmy Rabbit (Brachylagus idahoensis), Townsend’s big-eared bat (Corynorhinus townsendii), Spotted bat (Euderma maculatum), and Fringed myotis (Myotis thysanodes). A number of these species are also listed as “BLM Sensitive.” The golden eagle is protected under the Bald and Golden Eagle Protection Act, and all migratory birds are protected by the Migratory Bird Treaty Act. Additionally, a number of areas are designated as sensitive habitat, including BLM Greater Sage-Grouse Habitat Management Areas.	As a result of leaving infrastructure in place, there will less area reclaimed and increased traffic due to the access and commercial development. Therefore this alternative would result in increased impacts to listed and sensitive species when compared to the Proposed Action.

Table D-1
Alternative Analysis: Reclamation

Parameter	Proposed Action	Alt 4:Leave Infrastructure
Surface water and groundwater	At reclamation, the facilities would be reclaimed and historical drainage patterns re-established as practical. Groundwater in the area of the underground mine and production wells would be allowed to return to pre-mining conditions.	At reclamation, the facilities would be reclaimed and historical drainage patterns re-established as practical. Keeping the roads would require maintaining the culverts installed. However, they would follow the historic drainage patterns. Groundwater in the area of the underground mine would be allowed to return to pre-mining conditions. However, the water table in the area of the productions wells would need to be assessed, depending on the needs of the post-mining commercial needs.
Vegetation	Vegetation in the survey area consists of desert-rangeland-type habitat where sagebrush and grasses are the dominant species and is consistent with desert area of the Great Basin. The Proposed Action would impact the following vegetation communities: Wyoming Big Sagebrush/Crested Wheatgrass, Crested Wheatgrass Seeding, Bluebunch Wheatgrass/Cheatgrass/Annual, Wyoming Big Sagebrush/Bluebunch Wheatgrass, and Burned Yellow Rabbitbrush/Bluebunch Wheatgrass.	A result of leaving the infrastructure in place would be that the area used for infrastructure would remain unavailable for native vegetation. Therefore, this alternative would result in increased impacts to vegetative communities when compared to the Proposed Action.
Wildlife and Wildlife Habitat	The site reclamation would allow for wildlife to return to the area	A result of leaving the infrastructure in place would be that the area used for infrastructure would remain unavailable for wildlife. Therefore, this alternative would result in increased impacts to wildlife and wildlife habitat when compared to the Proposed Action.
Other Resources		

APPENDIX E

GOLDER 2019 TECHNICAL MEMORANDUM

TECHNICAL MEMORANDUM

DATE September 13, 2019 1663241_043_TM_Rev1

TO Ms. Nancy Wolverson
Calico Resources USA Corp.

CC

FROM Golder Associates Inc. **EMAIL Chris_MacMahon@golder.com**

GRASSY MOUNTAIN PROJECT – TAILINGS STORAGE FACILITY

TAILINGS STORAGE FACILITY LOCATION OPTIONS ANALYSIS

Calico Resources USA Corp (Calico) retained Golder Associates Inc. (Golder) to prepare an options analysis to identify a preferred location for the tailings storage facility (TSF) at the Grassy Mountain Project located in Malheur County in southeastern Oregon. The request stems from discussions during the December 18, 2018 meeting in The Dalles, Oregon, where representatives for the Oregon Department of Environmental Quality (ODEQ) and Department of Geology and Mineral Industries (DOGAMI) requested that the original siting and trade-off study be revised and expanded to include all five (5) option locations that had been previously presented by past owners of the Project. At the request of the ODEQ and DOGAMI, the five option locations evaluated in this analysis include the three options presented in the 2015 Preliminary Economic Assessment (PEA), the current proposed TSF location, and an option for a TSF located on Bishop's property. A qualitative discussion is also presented on the best practicable technologies for tailings storage in semi-arid, relatively-low seismicity areas similar to the Grassy Mountain Project.

This technical memorandum presents a brief description of each layout and a comparison of the five locations.

1.0 INTRODUCTION

In late 2016, Golder prepared a trade-off study to evaluate two potential TSF locations. Option 1, located east of the underground portal, was one of three locations presented in the 2015 PEA. Golder determined that the other two locations presented in the 2015 PEA were unfavorable due to project economics, property restrictions, and/or long-term stormwater management. The second location evaluated in Golder's 2016 study was identified during Golder's August 2016 site visit. This second location, referred to as Option 2, was located immediately northwest of the proposed mine portal. A comparison of Options 1 and 2 was presented in Golder's original 2016 trade-off study. The intent of the original trade-off study, summarized for the ODEQ in a letter dated October 2018, was to provide sufficient information for Calico to evaluate the two potential TSF locations and select a preferred concept for further design and evaluation.

This letter is intended to supersede Golder's original 2016 trade-off study by presenting a comparison of five TSF location options, the two presented in the original study in addition to the locations requested by the ODEQ and DOGAMI. Section 2.0 also includes a brief discussion on the decision to utilize conventional slurry tailings at the Grassy Mountain Project.

2.0 TAILINGS MANAGEMENT OPTION ANALYSIS

Golder has been providing engineering and design support services for the Grassy Mountain Project since August 2016. Engineering support included a review of past data and evaluation of various tailings management options to provide Calico with a recommendation regarding tailings management at the site.

Tailings are the term used in the mining industry for mineral waste created from grinded and milling ore for precious metal removal. The milling reduces the ore to a material with a particle-size distribution typical of a silt and fine sand, and the remaining “barren” minerals (tailings) exist in the form of a slurry after metal removal. The tailings are then sent to permanent storage in a repository which is ultimately reclaimed and closed for environmental stability. Based on the information presented in the Plan of Operations prepared in July 2015 by RTR Resource Management, Inc., the produced mill tailings would be dewatered to produce a thickened tailings or “paste.” The plan stated that a total of 3.2 million tons of tailings would be produced with approximately 70% (2.6 million tons) of the tailings stored in the a TSF. The remaining 30% would be placed as backfill in the mine workings.

During the project review in 2016 with Calico and Mine Development Associates (MDA) regarding the pre-feasibility level design of the TSF, different levels of pre-disposal dewatering technologies were considered including:

- Conventional tailings slurry (25 to 60% solids, by weight, w/w); a pumpable slurry
- Filtered tailings (75-85% solids w/w); vacuum or pressure filtration removes water to create the consistency of a solid material
- Paste or high-density thickened tailings (50-80% solids w/w); paste tailings are dewatered to a non-segregating but pumpable slurry that typically has minor bleed water after placement

The conventional slurry and high-density slurry is typically pumped to a lined storage facility behind an earth-fill or rock-fill dam where the tailings drain and form a solid; the drained water is recycled in the milling and processing circuit.

The filtered and paste tailings options would require the construction of additional infrastructure to mechanically dewater the tailings prior to storage. Storage of the filtered and paste tailings is similar to conventional slurry in that those options would still require the following components and/or attributes, similar to the TSF presented in the 2018 PFS Design Report:

- A large above-ground waste disposal area
- Construction of a continuous dual containment lining system in accordance with the OAR Division 43
- Geotechnical and stability risks that would drive the design
- Stormwater management and construction of diversions structures to prevent run-on of stormwater into the storage facility
- Closure and reclamation planning and design

During the project kick-off meeting in August 2016, and subsequent discussions with the Design Team, it was determined that mechanically dewatering tailings to a paste or filtered condition prior to permanent disposal provided a negligible benefit to the project and that the design for the Grassy Mountain Project would incorporate tailings stored in a conventional slurry TSF. Due to the relatively small quantity of tailings and short life of mine, it was judged that the high cost of producing dewatered tailings was detrimental to the project's economic feasibility; it would be cost prohibitive to construct and operate a filtration dewatering system. Additionally, mechanical dewatering of the tailings would likely create net excess water scenario that would require water treatment prior to discharge.

Golder also evaluated the use of paste backfill at a conceptual level and determined that the construction and operation of a paste backfill plant would also be cost prohibitive. In accordance to the Oregon Administrative Rules (OAR), the process water used in the paste backfill would likely require water treatment prior to being placed within the underground workings. Since conventional tailings are not suitable for structural backfill in the underground mine workings, it was decided that all mill tailings would be stored above ground in the TSF. Accordingly, the TSF locations and layouts evaluated in this option analysis were designed to contain 100% of the produced tailings; approximately 3.2 million dry short tons.

3.0 BASIS OF DESIGN

A conservative basis of design was used to develop conceptual facility layouts. The basis of design is based on Golder's interpretation of the OAR for Chemical Mining (Division 43) and Dam Safety (Division 20), information provided by Calico and the Design Team, information obtained during the completion of the PFS level design through engineering analyses, and geotechnical characterization of the site through site subsurface investigations and geotechnical laboratory testing, as well as Golder's experience designing and construction TSFs in similar conditions that include climate, seismicity, permitting, and operating philosophy.

Existing topography was considered in order to minimize the quantity of earthwork required to build the TSF to the greatest extent possible. Existing topography was generated from 2-ft contours provided by Calico for the area immediately surrounding Option 2, and from USGS 7.5-minute digital elevation models in UTM11 NAD83 coordinate system for all other options. Table 1 presents the design criteria for the conceptual design of the 5 TSF location options:

Table 1: Design Criteria

Parameter	Value
Capacity	3.2 million tons
Life of Mine	13 years
Average Tailings Deposition Rate	248,346 tons/year (680 tons/day)
Settled Tailings Density	70 pcf*
Dam Construction Method	Staged Downstream Construction
Dam Crest Width	50 ft minimum
Dam Embankment Slopes	3H:1V (horizontal to vertical)
Slope of Tailings Surface	Conceptual – no slope assumed
Freeboard Above Tailings Beach	2 feet against dam embankment

In addition to the above parameters, the following key factors were considered when comparing options:

- Human and environmental safety and protection
- Location of existing drainages
- Geotechnical and slope stability risks for the dam
- Operational risks created by steep terrain
- Closure requirements
- Availability and location of construction material borrow areas
- Tailings transport and distribution system routing
- Surface water management and diversion
- Process water management/reclaim system location and routing

The assumptions presented herein for the design of the proposed layouts are sufficient and applicable for site selection.

4.0 TSF LOCATION OPTION ANALYSIS

The TSF location options analysis included an evaluation of the following 5 locations presented on Figure 1:

- Option 1 – TSF located east of the proposed underground portal (included in the 2015 PEA)
- Option 2 – TSF located northwest of the underground portal
- Option 3 – TSF located southwest of the underground portal (Included in the 2015 PEA)
- Option 4 – TSF located south and further west of the underground portal in a separate ephemeral drainage than the other options (included in the 2015 PEA)
- Option 5 – TSF located on Bishop’s property about 3 miles southwest of the underground portal

Table 2 below presents a summary of the general site characteristics and conceptual level volumetrics for each option.

Table 2: Site Characteristics Summary

Parameter		Option 1	Option 2	Option 3	Option 4	Option 5
Embankment Volume (cy)		2,226,000	913,000	3,003,400	1,642,100	2,690,000
Stage 1 Starter Dam Maximum Height (ft)		107	53	116	92	70
Ultimate Embankment Maximum Height (ft)		145	83	160	100	105
Disturbance Area (sf)		2,700,000	4,126,000	2,779,000	3,303,000	3,302,000
Tailings Rate of Rise (ft/yr)	Year 1	40	37	42	31	28
	Year 2	13	7	13	8	8
	Years 3, 4	9	5	9	6	7
	Year 5+	5	3	7	3	5
Groundwater Depth (ft)*		85-125	90-165	50-220	80-265	260-295
Tailings Surface Elevation	Min.	3,740	3,546	3,631	3,611	3,412
	Max	3,852	3,616	3,750	3,670	3,498
Process Facility Elevation (ft)		3,715	3,715	3,715	3,715	3,715
Within Project Boundary		Yes	Yes	Yes	Yes	No

* - Groundwater elevations were approximated using the 2017 Q4 Grassy Mountain Groundwater Elevation Contour map presented in the *Groundwater Resources Baseline Data Report, Grassy Mountain Gold Project,* dated February 19, 2019, prepared by SPF Water Engineering, LLC.

Preparation of the impoundment area for all options would be similar, and would include stripping and stockpiling of topsoil, and preparation of the subgrade for the lined areas and dam footprint(s). Therefore, site preparation is not addressed in detail in this study. The following sections summarize the proposed layouts, key features, advantages, disadvantages, and risks of the options.

4.1 TSF Option Comparison

Golder prepared a ranking matrix that evaluates Options 1 through 5 to consolidate the advantages and disadvantages of each option to support the selection of a preferred option. The ranking matrix focused on attributes falling into two categories, Technical Criteria and Human Safety and Environmental Protection.

The Technical Criteria considered were:

- Volume of earthworks material (Embankment Fill)
- Ease of construction
- Complexity and reliability of stormwater management
- Efficiency of pumping and piping of the tailings to the TSF and return water back to the mill
- Tailings rate of rise (lower rate if rise allows for increased solidification of tailings and increased water for re-use in milling/processing circuit)

The key factors evaluated for Human Safety and Environmental Protection were:

- Disturbance area (impact to environment)

- Zero discharge facility (potential to impact ground water)
- Geotechnical stability of the facility (safety and environmental risks to downstream receptors)
- Public access around Project site (impact to public access)
- TSF location within Project boundary
- Post-closure reclamation (potential to affect long-term post-closure use and reliability)

Each attribute listed above was assigned a percentage weighting factor based on Golder's judgement of the importance of each attribute to developing a successful project. For each attribute the options were scored from 1 to 5 depending on favorability, with 5 being the most favorable. The total score for each of the main categories was calculated by multiplying the weighting factor (percentage) by the score (1 to 5) for each attribute and adding them together, resulting in total scores ranging between 1 and 5. Each of the main categories received a weighting factor as well with a greater emphasis being placed on Human Safety and Environmental Protection (60%) versus Technical Criteria (40%). The highest overall score was selected as the preferred option.

The ranking matrix is presented in Attachment A.

4.1.1 Technical Criteria

The following subsections present brief summaries comparing the technical criteria of each option.

4.1.1.1 Volume of Earthworks Material (Embankment Fill)

A lower volume of embankment fill results in lower energy consumption during construction and lower cost. The volume of embankment fill required varies greatly between the options due to the differences in the native topography at each of the locations. Option 2 has the lowest required embankment fill volume as a result of being located within a broad valley allowing it to utilize a larger surface area for tailings storage. This also allows Option 2 to predominantly utilize the natural topography to retain the tailings on the east, south and west sides requiring minimal embankment fill in these areas. Option 2 has the lowest starter dam and lowest ultimate embankment heights of 60 and 85 feet, respectively. The other options are constructed in steeper terrain requiring more embankment fill and maximum embankments heights ranging between 105 and 160 feet to achieve the desired storage capacity.

4.1.1.2 Ease of Construction

Ease of construction was evaluated by considering the distance from the embankment fill borrow source and the native terrain at each potential location. This analysis assumed that all embankment fill will be sourced from the basalt borrow located near the eastern edge of the Project boundary as shown on Figure 1.

Options 1 through 4 are all located within one mile of the borrow. Option 1 is located nearest to the borrow, partially overlapping it on the eastern edge, would require an additional borrow area to be identified. Option 5 is located southwest of the borrow with an approximate haulage distance of 4 miles between the borrow and the embankment. This additional haul distance would significantly affect the construction costs, potentially requiring an additional borrow area to be identified closure to the TSF.

The flatter terrain of the Options 2 and 4 provides the most favorable topography for site preparation and composite lining system installation. The basin areas within Options 2 and 4 would require minimal regrading and allow for the use of smooth geomembrane. Options 1, 3 and 5, are located in narrower valleys, or adjacent to steep native topography with slopes up to 2H:1V. Any existing slope steeper than 2.5H:1V would need to be graded to 2.5H:1V or flatter and potentially require the use of textured geomembrane to allow for safe installation of the proposed composite liner system. This additional earthwork would increase both the duration and costs of construction.

4.1.1.3 Stormwater Management

Stormwater management is a critical component to the proper operation of a TSF. The intent of the design for the Grassy Mountain TSF is to be a zero-discharge facility, meaning that once water has entered the process circuit it will remain in the circuit or be lost through evaporation. Maintaining a zero-discharge facility is aided by diverting as much stormwater as possible from areas tributary to the TSF around the TSF to prevent adding additional water to the process circuit.

None of the options are located at the head of a natural drainage where little to no stormwater diversion would be required; therefore, stormwater will be collected and diverted around the TSF sites using stormwater channels to maintain the integrity of all TSF options. Golder considered the existing topography and size of upstream tributary area when evaluating the stormwater management at each location. Stormwater diversion channels are typically more reliable and easily constructed on flatter slopes. Steeper slopes will require additional earthwork and will limit access with conventional construction equipment. For this reason, it will be most difficult to construct stormwater diversion around Option 1. Options 3 and 5 have small tributary areas upstream of the TSF so the total quantity of stormwater runoff will be less, requiring less stormwater management than the other Options. Options 2 and 4 were both rated the same, with average ratings, as both locations have native slopes surrounding the TSF that are relatively flat. This allows stormwater generated from the upstream ephemeral drainages tributary to the TSF locations to be easily routed around the TSF. The large tributary area south of the TSF for Option 2 was not considered detrimental to the project since it can be easily diverted into an existing drainage west of the TSF.

4.1.1.4 Pumping and Piping

The pumping and piping rating for each location was developed considering the elevation of the tailings deposition system, the elevation of the process facility and the proximity of the TSF to the process facilities (length of piping). A lower elevation difference and shorter pipeline result in higher energy efficiency and lower cost.

Options 2 and 3 are the preferred locations when taking into consideration the close proximity to the process facilities and the fact that both locations may allow for gravity distribution of tailings during portions of the operation (higher energy efficiency). Of the two, Option 2 was rated higher due to having a greater elevation drop between the process facilities and the tailings deposition system, potentially decreasing pumping efforts during operation. Additionally, having the TSF located at an elevation lower than the process facility may allow for the emergency overflow from the process facility to gravity drain to the TSF and eliminate the need for a separate containment facility. Option 4, while located lower in elevation than the process facility, would require two reclaim ponds to manage underdrain flows, so it was rated less favorable than Options 2 and 3.

Options 1 and 5 were rated the lowest in favorability for either being higher in elevation than the process facility or for the long distance between the process facility (Option 1) and TSF (Option 5). Both options would require increased energy and larger pumps for tailings delivery.

4.1.1.5 Tailings Rate of Rise

The tailings rate of rise drives the rate of consolidation of the tailings, affecting the settled density of the tailings during operation, the quantity of water that can be re-used during operation, and the long-term settlement of the tailings after operation (affecting the time to closure). A lower rate of rise will provide:

- greater consolidation for the tailings, increasing the overall settled density and potentially reducing the size of the dam and TSF,
- increased reclaim water return from the TSF back to the mill/process plant to lessen the need for make-up water (higher water re-use during operation), and
- reducing the volume of entrained water in the tailings at the end of operation, thereby reducing long-term water management and speeding reclamation and closure.

The rate of rise of the tailings is related to the geometry of the basin; a larger and flatter basin will have a lower rate of rise. In Year 1, the rate of rise of the 5 TSF options ranged between 28 and 42 feet, with the rate of rise dropping each year as the area of deposition within the impoundment increases. Due to the steep terrain associated with the Options 1 and 3 sites, those facilities would experience the greatest rate of rise. Options 2, 4 and 5 have similar rates of rise over the life of the facility, with Option 2 having the overall lowest rate of rise. This is to be expected since the Option 2 basin is the largest of the 5 options.

4.1.2 Human Safety and Environmental Protection Criteria

The following subsections present brief summaries comparing the human safety and environmental protection criteria of each option.

4.1.2.1 Disturbance Area

The disturbance area considered in this evaluation included both the embankment footprint and the lined area of the TSFs. The options would likely have disturbance areas outside of the TSF to accommodate access and for construction staging and accommodate the installation of the tailings delivery and reclaim water pipelines. However, for this study, the footprint of each TSF was considered suitable for comparison at the conceptual design level. Smaller disturbance areas generally correspond with the taller embankments and faster rates of rise of the tailings, so the disturbance area is often considered in conjunction with the technical criteria to strike a balance that meets the design criteria.

The total lined disturbance areas ranged between 2,700,000 square feet (62 acres) for Option 5 to 4,126,000 square feet (95 acres) for Option 2.

4.1.2.2 Potential Impact to Surface and Ground water

The Grassy Mountain TSF will be designed as a zero-discharge facility. However, if the facility were to leak or overtop, there is the potential that the process water could impact the surface and ground water. The Surface Water Baseline Report prepared by SPF Water Engineering found that, "*there are no perennial surface water features located within the immediate vicinity of the proposed mine and process areas*." The nearest perennial surface water body is the Negro Canyon Creek located just over two miles northwest of the project boundary. Due to the distance to the nearest surface water body, all options were considered to have low potential impact to surface water.

The potential impact to ground water was evaluated by examining depth to ground water at each option location. The range of ground water depths are presented in Table 2, and range between 50 feet below Option 3 (shallowest) and between 260 and 295 feet beneath Option 5 (deepest). Deeper ground water is more favorable as it provides an increased barrier to flow and a larger vadose zone often provides increased attenuation capacity to remove metals. Groundwater elevations were approximated using the 2017 Q4 Grassy Mountain Groundwater Elevation Contour map presented in the report prepared by SPF Water Engineering, LLC, dated February 19, 2019, and titled *Groundwater Resources Baseline Data Report, Grassy Mountain Gold Project*.

4.1.2.3 Geotechnical Risks

The Grassy Mountain TSF will utilize downstream construction so each of the options considered was conceptually designed using that methodology. This construction method is considered the most conservative (safest) with respect to geotechnical risks when compared with other methods currently used for TSF construction. The geotechnical risk factors for this analysis were applied by considering the ultimate maximum height and the known subsurface foundation conditions. A greater height is generally considered to have a greater geotechnical risk; however, that factor must be paired with subsurface conditions to determine if a facility poses a serious geotechnical risk. As summarized in Table 1, the ultimate maximum height ranges between 85 feet for Option 2 (lowest) and 160 feet for Option 3 (highest).

Historic drill holes located near or beneath the Options 1 through 4 sites encountered natural clay deposits. Clay materials can have low strengths and are susceptible to consolidation settlements when loaded. The subsurface conditions at these locations would need to be thoroughly characterized when designing a TSF. No information for the subsurface beneath Option 5 was available when this analysis was completed. Therefore, Option 5 was assigned a geotechnical risk rating of 3 for this analysis.

4.1.2.4 Impact to Public Access

The county road leading to the Grassy Mountain Project is a public road, so any required re-routing of this road was considered to be less favorable. Options 2, 4, and 5 would all require a re-routing of portions of the county road. Options 1 and 3 are both located east of the county road and would not require any re-routing.

4.1.2.5 Located Within Project Boundary

Options 1 through 4 are all located completely within the existing project boundary. Option 5 is located approximately 2 miles west of the project boundary on private land (Bishop's Property). For the safety of the public and security, it was considered most favorable to have the TSF located within the existing project boundary. This keeps all mining activities in close proximity where it will be easier to restrict public access to the mining operation.

4.1.2.6 Reclamation and Closure

Reclamation and closure risk ratings were developed by considering the effect of long term draindown of the tailings, long-term consolidation settlement of the tailings, tailings surface area (closure area) and stormwater management.

Options 2, 4 and 5 have similar rates of rise, that are slower than Option 1 and 5. The slower rates of rise will allow for:

- shorter duration of long-term drain down water management,

- shorter drying period of the tailings surface allowing placement of a closure cover earlier in the closure period,
- A shorter post-operation settlement period for the tailings surface that will shorten the post-operation management period prior to reclamation.

The TSFs with the greatest rate of rise and tailings thickness, Options 1 and 3, will experience longer post-operation water management delaying the final closure of the TSF.

With respect to closure cover area, Option 3 has the smallest total area while Option 2 has the largest. Option 2 will have the largest capital cost for construction of the final closure cover however some of these costs will be offset by the savings in operating and management costs by allowing for installation of the closure cover more quickly after the active mining has ceased.

Stormwater management was factored into the post closure reclamation risk rating by evaluating the contributing area upstream of the TSF and the potential for maintenance of the stormwater diversion channels into closure. Options 3 and 5 would be the most favorable for long-term stormwater management due to small contributing areas and relatively flat slopes where the perimeter stormwater diversions would be constructed. During closure, Options 2 and 4 will have to manage larger stormwater flows around or over the closed facility. Option 1 is considered the worst of the options from a stormwater management perspective due to the steep surrounding slopes and relatively large upstream tributary area.

5.0 CONCLUSION

Option 2 received the best overall ranking in addition to having the best total ranking for both Technical Criteria and Human Safety and Environmental Protection. Option 2 is the only option located in a broad valley which offers significant benefits over the other alternatives including:

- The lowest volume of embankment fill material due to the large impoundment area and existing topography that only requires embankments along the north and west sides;
- Construction in the broad valley close to the borrow will allow for relatively short haul distances and limited grading within the basin to accommodate the installation of the composite lining system;
- Option 2 is located lower in elevation and close to the proposed process facilities which will decrease the pumping and piping requirements compared to the other options;
- A low tailings rate of rise, which has numerous benefits including greater consolidation, increased reclaim water return to the process circuit and a reduced long-term water management period during closure.

Additional testing on the tailings since this completion of this study indicate that settled tailings densities will be higher than 70 pcf, however that will not affect Golder’s recommendation for Option 2 as the preferred location for the TSF. An increase in tailings density will allow for a smaller impoundment, better consolidation of the tailings and an increase in reclaim water that can be used in the process circuit.

6.0 CLOSING

Golder is pleased to present this technical memorandum summary of the options analysis completed for the TSF location at the Grassy Mountain Project. If you have any questions or comments regarding the information presented herein, please contact the undersigned at (775) 828-9604.

Sincerely,

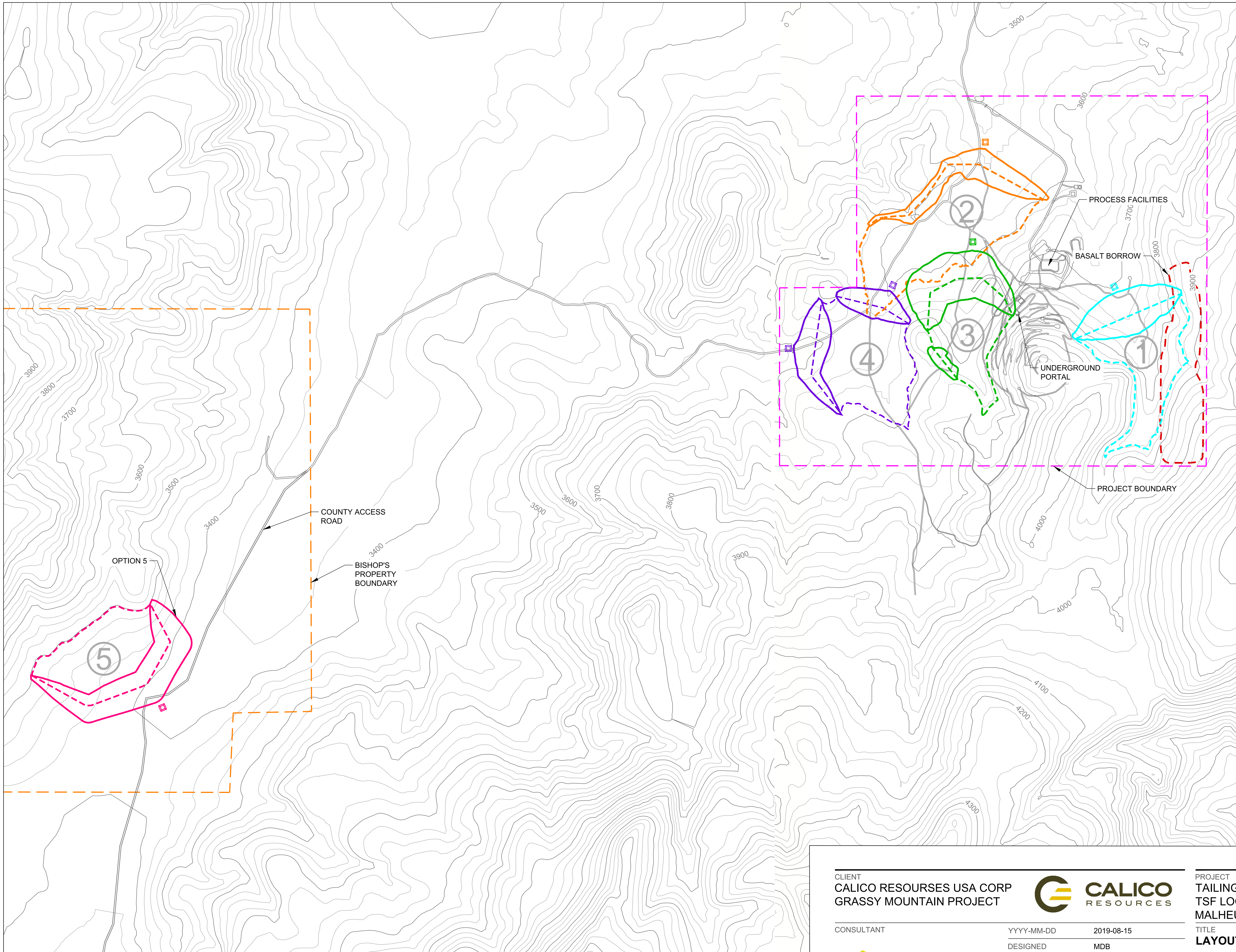
Christopher MacMahon, PE
Senior Engineer, Associate

Russ Browne
Practice Leader, Principal

MDB/CJM/RAB/kg

https://golderassociates.sharepoint.com/sites/17031g/1663241 grassy mountain tsf/500_reporting/520_letters/534_tm trade-off study summary for deq/revised for consolidated permit/final/1663241_043_tm_rev1.docx

Figures



LEGEND

- 3630 — EXISTING GROUND TOPOGRAPHY (20 FT CONTOURS) (NOTE 1)
- PROJECT BOUNDARY
- BISHOP'S PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF BASALT BORROW
- LIMIT OF OPTION 1 IMPOUNDED TAILINGS
- LIMIT OF OPTION 1 EMBANKMENT
- LIMIT OF OPTION 2 IMPOUNDED TAILINGS
- LIMIT OF OPTION 2 EMBANKMENT
- LIMIT OF OPTION 3 IMPOUNDED TAILINGS
- LIMIT OF OPTION 3 EMBANKMENT
- LIMIT OF OPTION 4 IMPOUNDED TAILINGS
- LIMIT OF OPTION 4 EMBANKMENT
- LIMIT OF OPTION 5 IMPOUNDED TAILINGS
- LIMIT OF OPTION 5 EMBANKMENT

NOTES

1. EXISTING TOPOGRAPHY PRESENTED WAS DEVELOPED USING SHAPE AND DEM FILES DOWNLOADED FROM THE USGS WEBSITE TITLED "ned10m43117f4.shx" AND "Grassy Mountain.dem". ELEVATIONS SHOWN ARE IN FEET.

N

0 800 1600
1" = 800' FEET

CLIENT
CALICO RESOURSES USA CORP
GRASSY MOUNTAIN PROJECT

CALICO RESOURCES

CONSULTANT

GOLDER

YYYY-MM-DD	2019-08-15
DESIGNED	MDB
PREPARED	NAS
REVIEWED	CJM
APPROVED	RAB

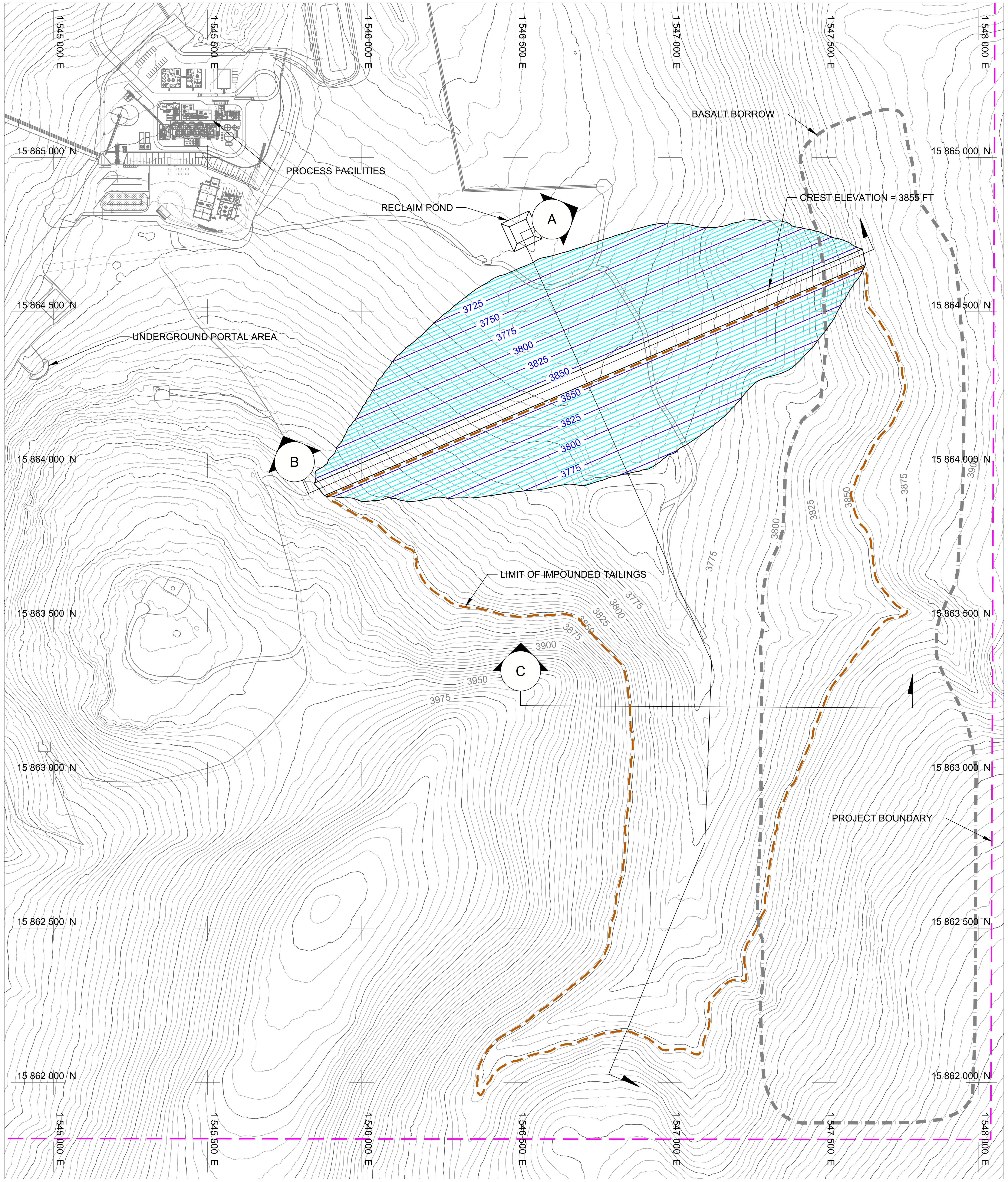
PROJECT
TAILINGS STORAGE FACILITY
TSF LOCATION ALTERNATIVE ANALYSIS
MALHEUR COUNTY, OREGON

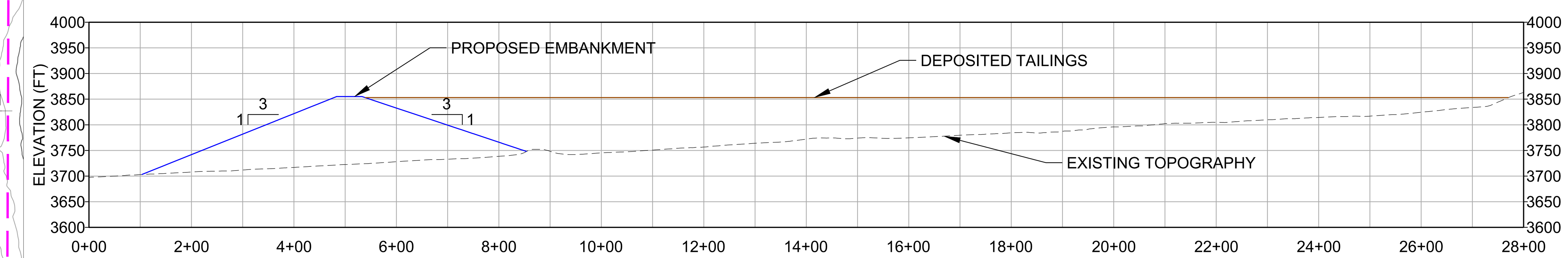
TITLE
LAYOUT OF ALL OPTIONS

PROJECT NO.	REV.	FIGURE
1663241	0	1

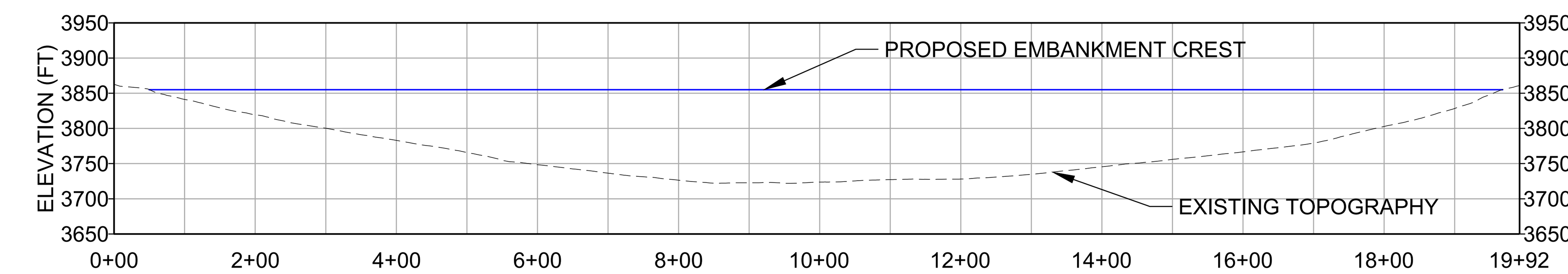
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Xref .\.\.\.\.\.\02_DATA\GRASSY_MOUNTAIN_TSF\01_DWG\XREF\LOGO.dwg





SCALE 1"=200' A SECTION THROUGH OPTION 1 TSF



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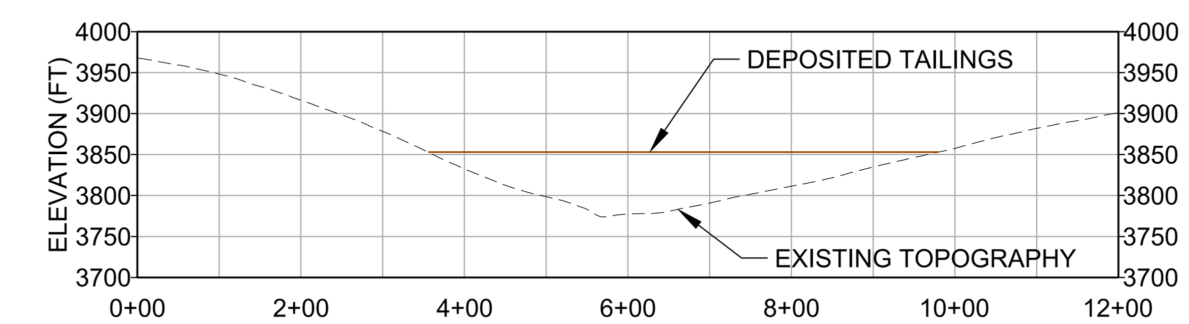

SCALE 1"=200' C SECTION THROUGH TAILINGS BASIN

LEGEND

- 3630 EXISTING GROUND TOPOGRAPHY
- 3630 PROPOSED TAILINGS DAM GRADING
- LIMIT OF IMPOUNDED TAILINGS
- PROJECT BOUNDARY

REFERENCE

EXISTING TOPOGRAPHY PROVIDED BY CALICO RECOURSES USA CORP IN ELECTRONIC FILE TITLED "contours_2ft_expanded_project_area.zip" ON MARCH 29, 2017.

ELEVATIONS SHOWN ARE IN FEET A.S.L.

0 200 400
1" = 200' FEET

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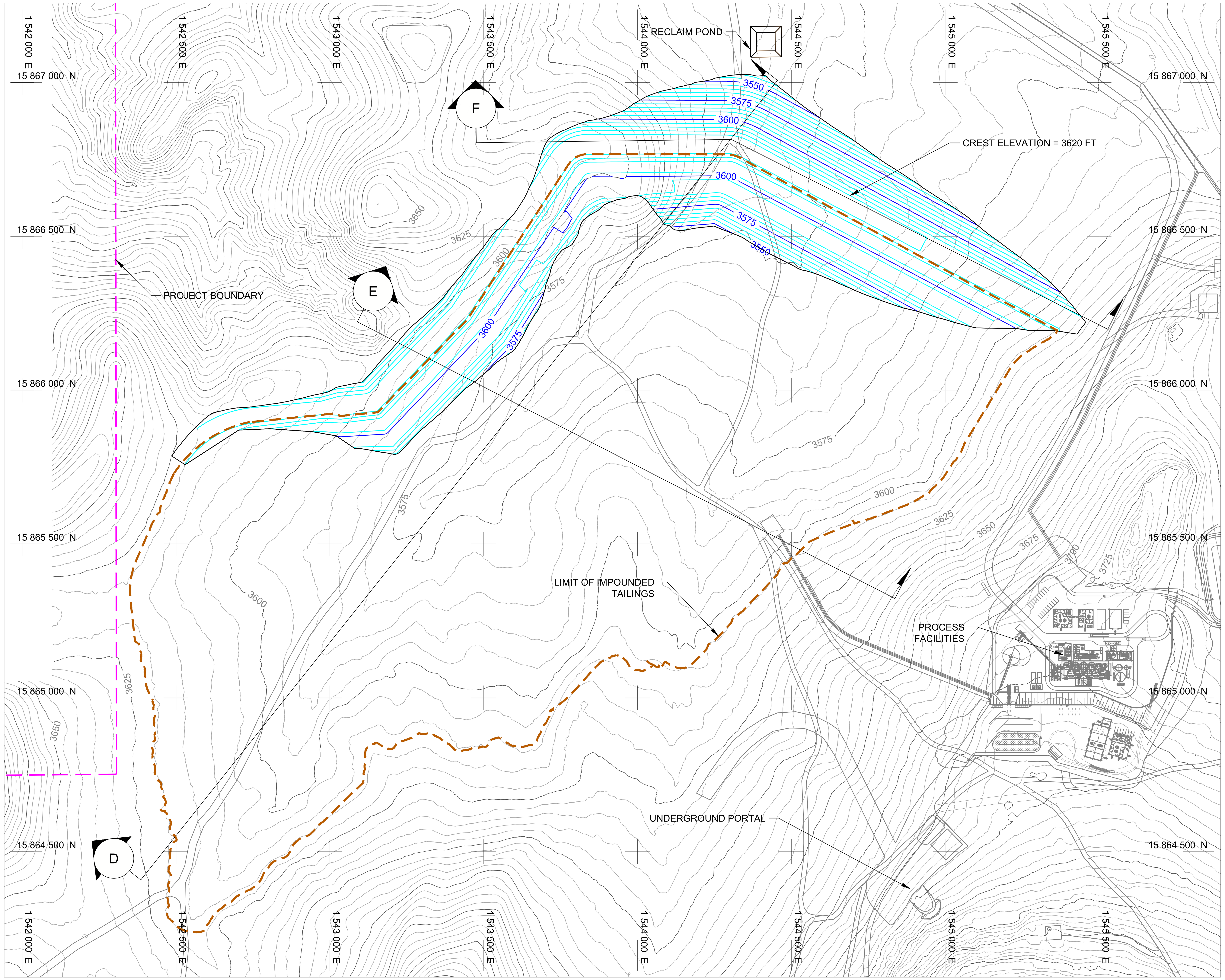
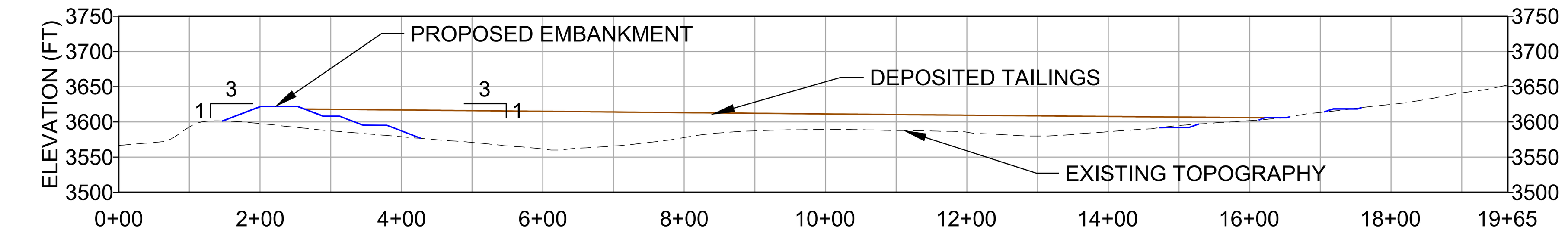
PROJECT
TAILINGS STORAGE FACILITY
TSF LOCATION ALTERNATIVE ANALYSIS
MALHEUR COUNTY, OREGON

TITLE
LAYOUT AND SECTIONS
OPTION 1

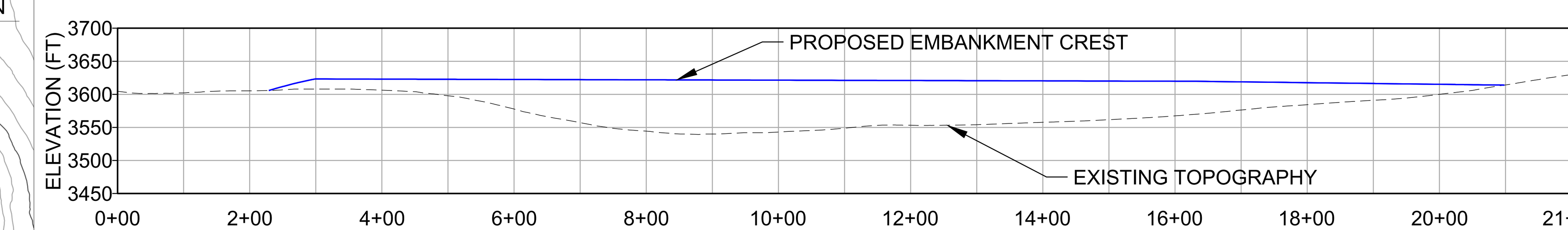
PROJECT NO. 1663241 REV. 0 FIGURE 2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D





SCALE 1"=200' E SECTION THROUGH TAILINGS BASIN



SCALE 1"=200' F OPTION 2 EMBANKMENT PROFILE

LEGEND

3630	EXISTING GROUND TOPOGRAPHY
3630	PROPOSED TAILINGS DAM GRADING
	LIMIT OF IMPOUNDED TAILINGS
	PROJECT BOUNDARY

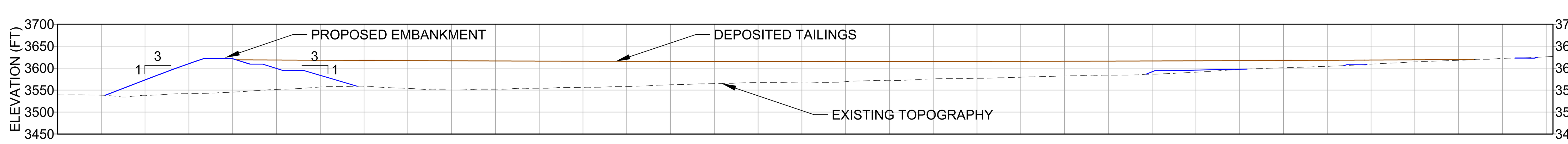
REFERENCE

EXISTING TOPOGRAPHY PROVIDED BY CALICO RECOURSES USA CORP IN ELECTRONIC FILE TITLED "contours_2ft_expanded_project_area.zip" ON MARCH 29, 2017.

ELEVATIONS SHOWN ARE IN FEET A.S.L.

0 200 400

1" = 200' FEET



SCALE 1"=200' D SECTION THROUGH OPTION 2 TSF

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PROJECT

TAILINGS STORAGE FACILITY
TSF LOCATION ALTERNATIVE ANALYSIS
MALHEUR COUNTY, OREGON

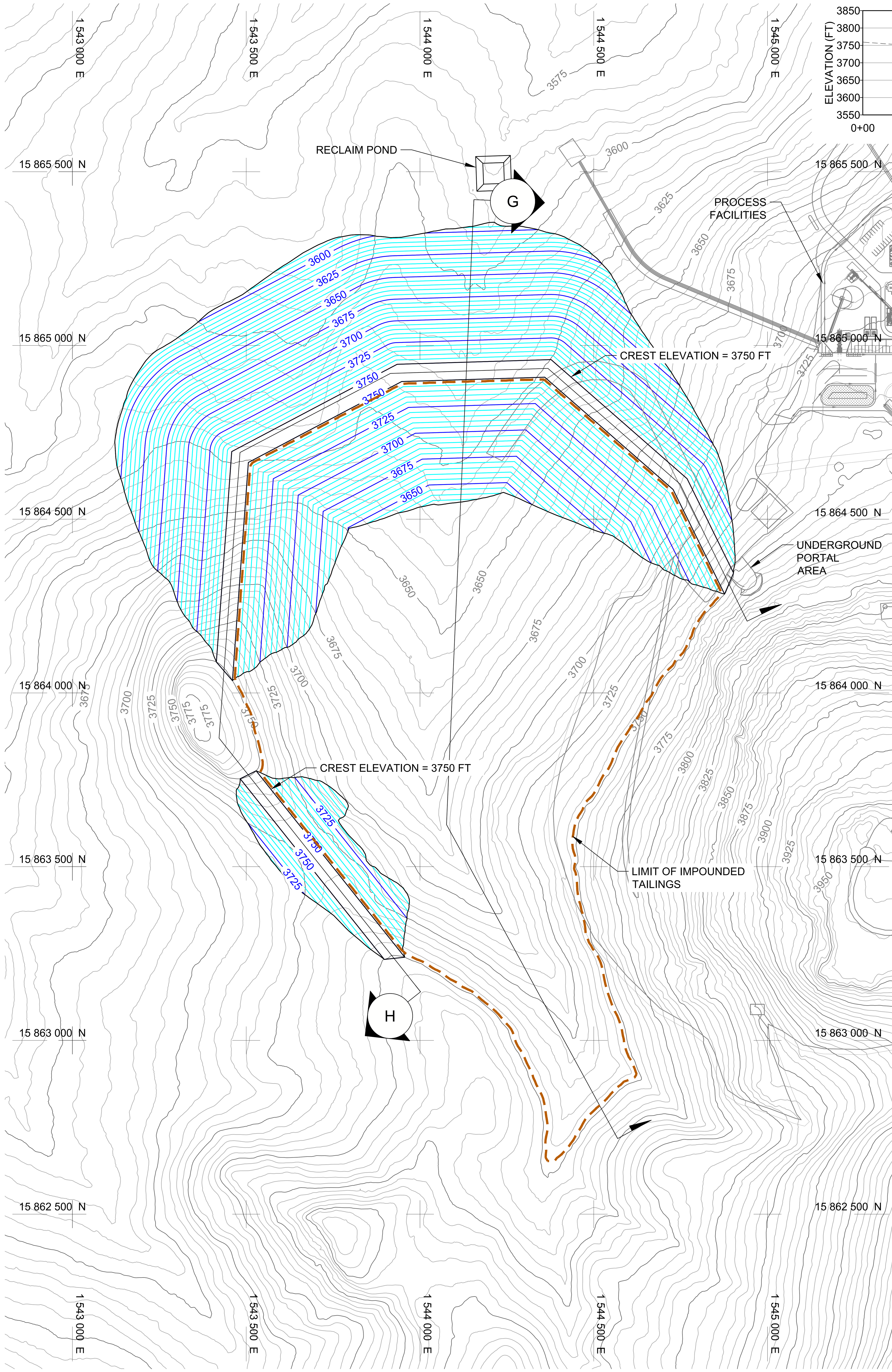
TITLE

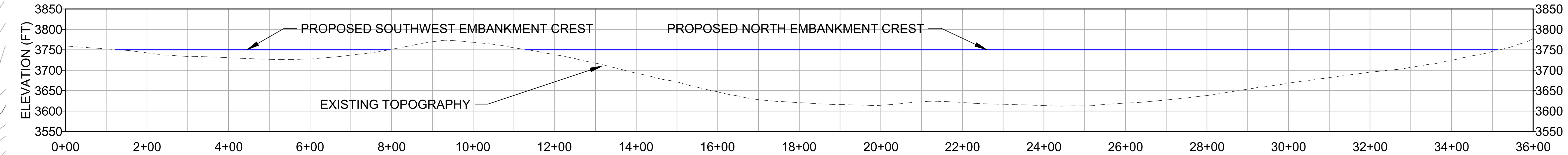
LAYOUT AND SECTIONS

OPTION 2

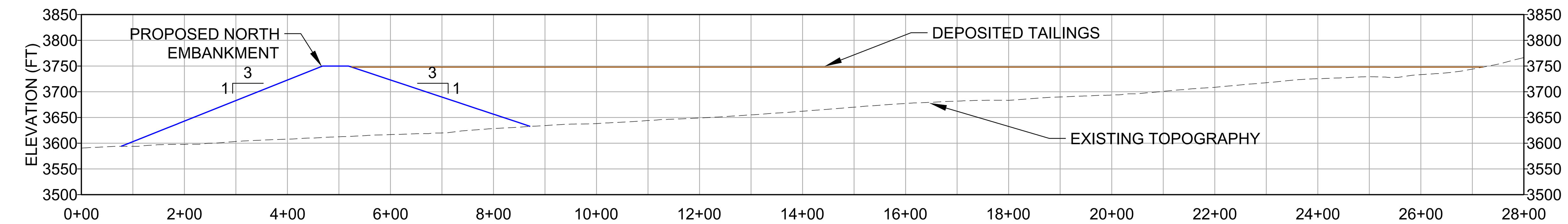
PROJECT NO.	REV.	FIGURE
1663241	0	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D





SCALE 1" = 200' G OPTION 3 EMBANKMENT PROFILE



SCALE 1" = 200' H SECTION THROUGH OPTION 3 TSF

LEGEND

3630 EXISTING GROUND TOPOGRAPHY

3630 PROPOSED TAILINGS DAM GRADING

LIMIT OF IMPOUNDED TAILINGS

REFERENCE

EXISTING TOPOGRAPHY PROVIDED BY CALICO RECOURSES USA CORP IN ELECTRONIC FILE TITLED "contours_2ft_expanded_project_area.zip" ON MARCH 29, 2017.

N

0 200 400

1" = 200' FEET

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GRASSY MOUNTAIN PROJECT

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PROJECT

TAILINGS STORAGE FACILITY
TSF LOCATION ALTERNATIVE ANALYSIS
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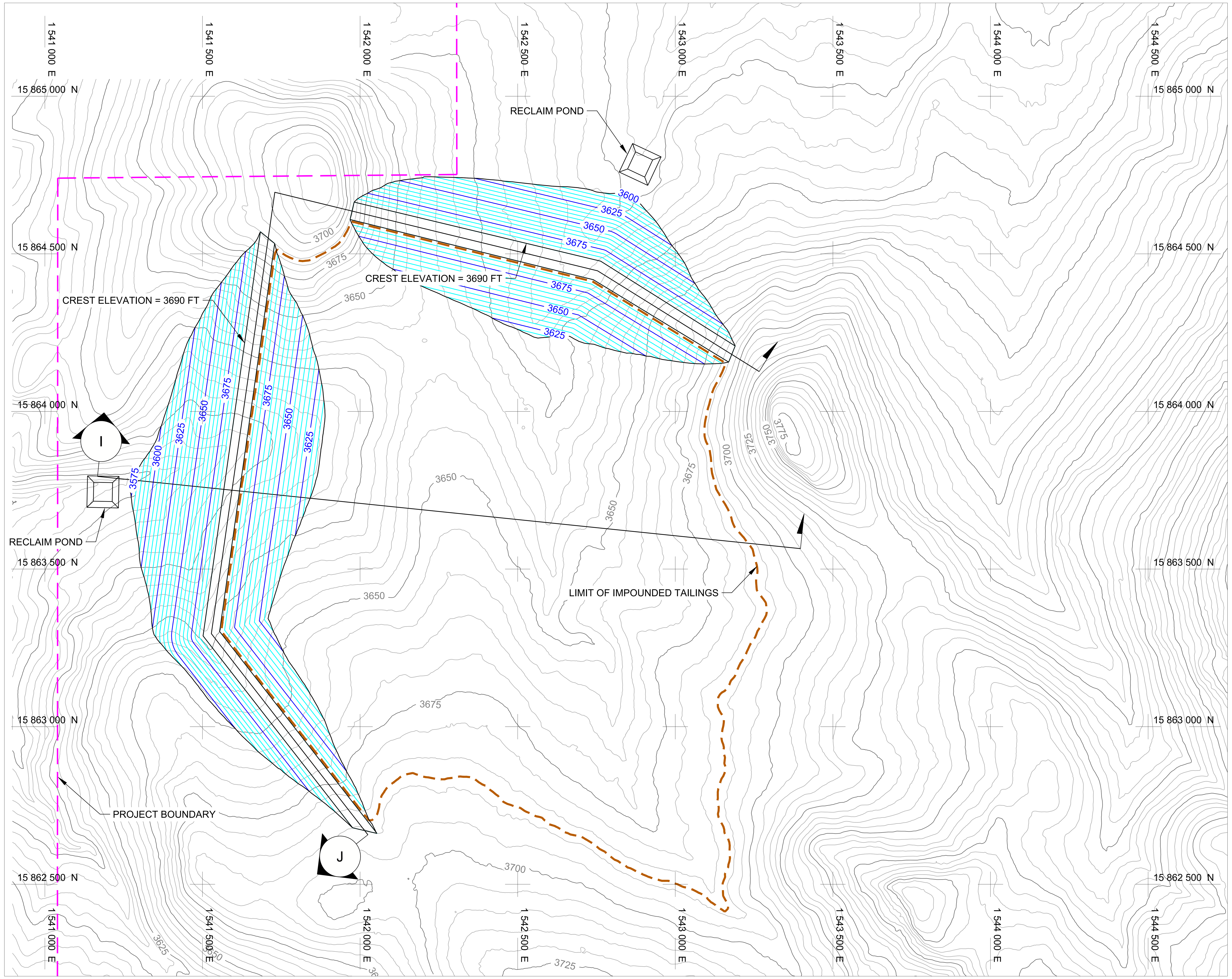
REVIEWED	CJM
APPROVED	RAB

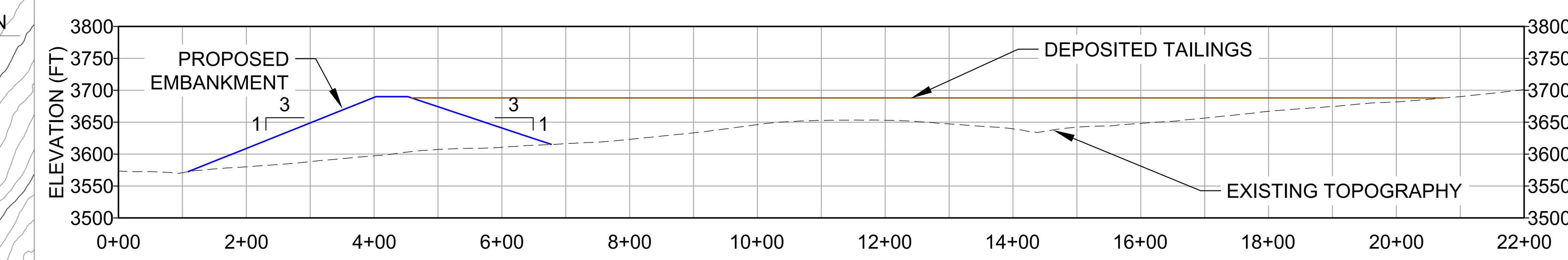
TITLE

LAYOUT AND SECTIONS

OPTION 3

PROJECT NO.	REV.	FIGURE
1663241	0	4



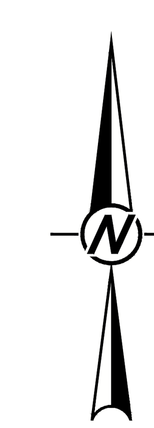


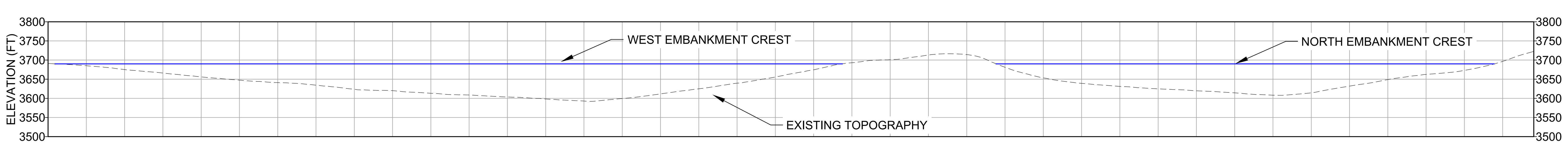
SCALE 1"=200' I SECTION THROUGH OPTION 4 TSF

LEGEND

3630	EXISTING GROUND TOPOGRAPHY
3630	PROPOSED TAILINGS DAM GRADING
	LIMIT OF IMPOUNDED TAILINGS
	PROJECT BOUNDARY

REFERENCE
EXISTING TOPOGRAPHY PROVIDED BY CALICO RECOURSES USA CORP IN ELECTRONIC FILE TITLED "contours_2ft_expanded_project_area.zip" ON MARCH 29, 2017.





SCALE 1"=200' J OPTION 4 EMBANKMENT PROFILE

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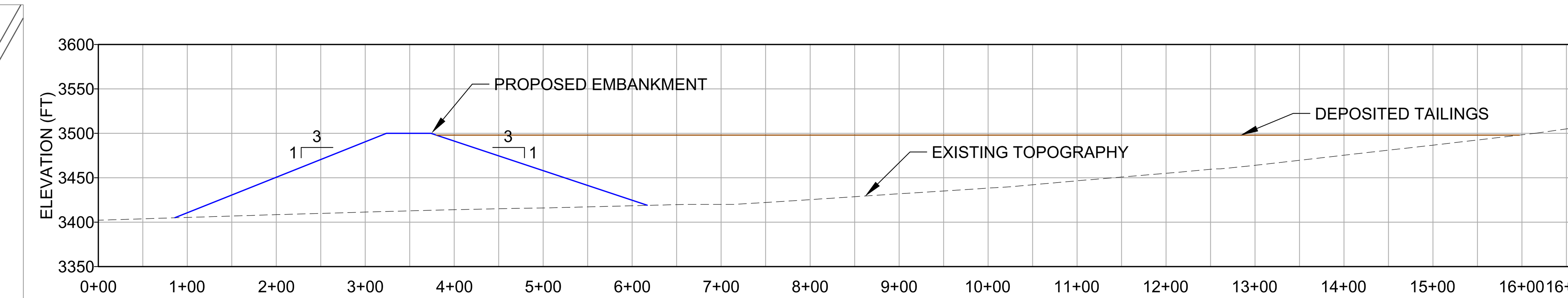
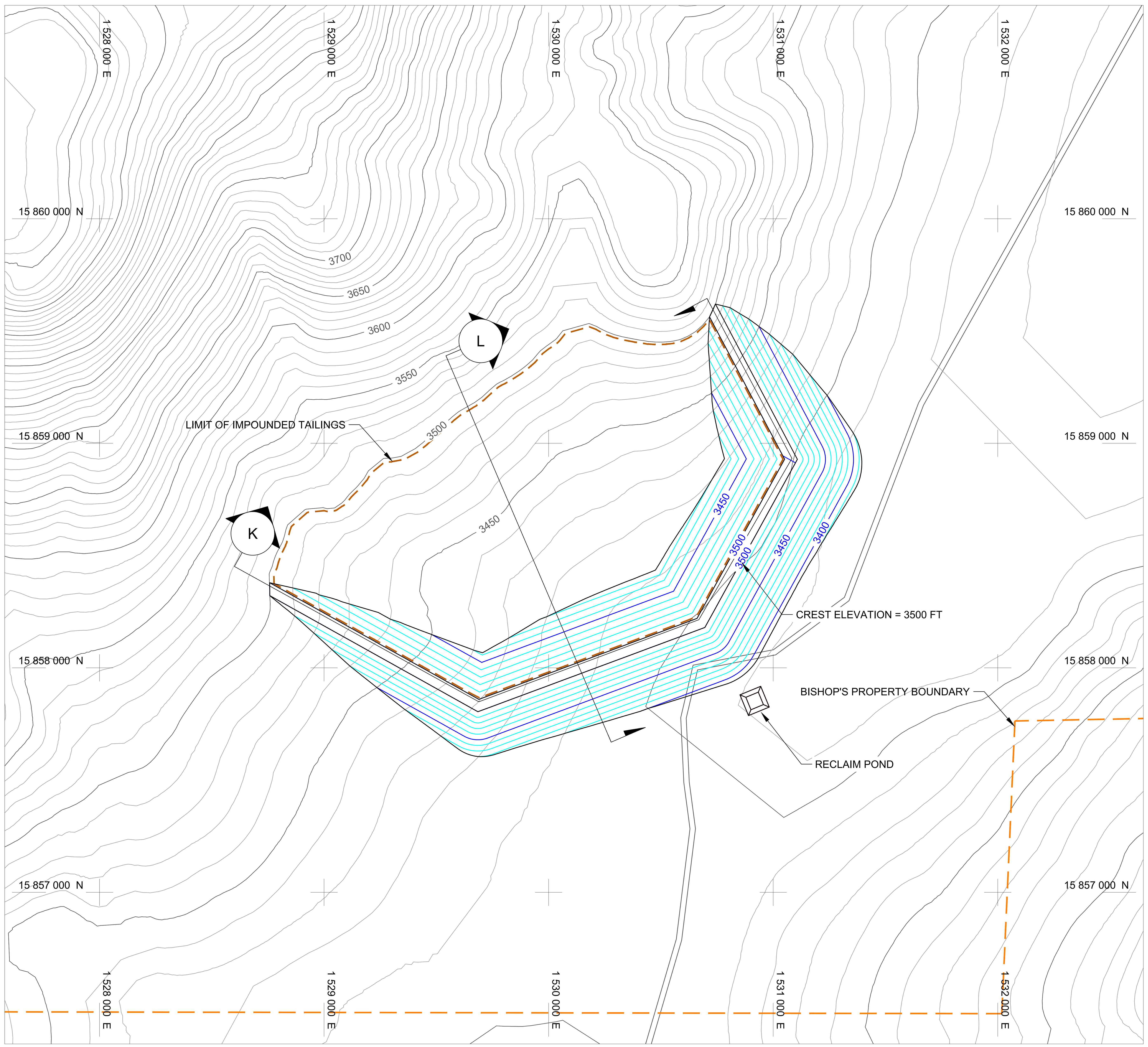
TITLE
LAYOUT AND SECTIONS
OPTION 4

PROJECT NO.	REV.	FIGURE
1663241	0	5

SCALE 1"=80' K OPTION 5 EMBANKMENT PROFILE



SCALE 1"=120' L SECTION THROUGH OPTION 5 TSF



LEGEND

- 3630 EXISTING GROUND TOPOGRAPHY
- 3630 PROPOSED TAILINGS DAM GRADING
- LIMIT OF IMPOUNDED TAILINGS
- BISHOP'S PROPERTY BOUNDARY

REFERENCE

EXISTING TOPOGRAPHY PROVIDED BY USGS IN ELECTRONIC SHAPE FILE TITLED "ned10m43117f4.shx". ELEVATIONS SHOWN ARE IN FEET.

0 300 600
1" = 300' FEET

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TITLE
LAYOUT AND SECTIONS
OPTION 5

PROJECT NO.	REV.	FIGURE
1663241	0	6

Attachment A
Ranking Matrix

Grassy Mountain Project - TSF Siting Alternatives Ranking Matrix

Aspect Under Consideration (Rated 1 to 5, 1 - Less Favorable and 5 - Most Favorable)	Weighting Factor	Option 1		Option 2		Option 3		Option 4		Option 5	
		Score	Product	Score	Product	Score	Product	Score	Product	Score	Product
Technical Criteria	**40%**										
Volume of Earthworks (Embankment Fill)	15%	3	0.45	5	0.75	1	0.15	4	0.60	2	0.30
Ease of Construction	15%	4	0.60	5	0.75	3	0.45	2	0.30	1	0.15
Stormwater Management	30%	1	0.3	3	0.9	4	1.2	3	0.9	5	1.5
Pumping and Piping	15%	3	0.45	5	0.75	4	0.60	2	0.30	2	0.30
Tailings Rate of Rise	25%	2	0.5	5	1.25	1	0.25	4	1	3	0.75
TOTAL	100%		2.30		4.40		2.65		3.10		3.00
Human Safety and Environmental Protection	**60%**										
Distrurbance Area	10%	5	0.50	1	0.10	4	0.40	2	0.20	3	0.30
Potential Impact to Surface and Groundwater	20%	3	0.60	4	0.80	1	0.20	2	0.40	5	1.00
Geotechnical Risks	20%	2	0.40	3	0.60	2	0.40	3	0.60	3	0.60
Impact to Public Access	5%	5	0.25	3	0.15	5	0.25	3	0.15	3	0.15
Located Within Project Boundary	20%	5	1.00	5	1.00	5	1.00	5	1.00	1	0.20
Reclamation and Closure	25%	1	0.25	4	1.00	4	1.00	2	0.50	5	1.25
TOTAL	100%		3.00		3.65		3.25		2.85		3.50
OVERALL	**100%**		**2.72**		**3.95**		**3.01**		**2.95**		**3.30**