Stibnite Gold Project

2021 Modified Mine Plan Alternatives Report

Prepared by:
USDA Forest Service
Payette National Forest

for:
Payette and Boise National Forests

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List of Acronyms

AADT	annual average daily traffic
AC	alternating current
amsl	above mean sea level
ANFO	Ammonium Nitrate and Fuel Oil
AP	AP 34477 (dialkyl dithiophosphate)
APLIC	Avian Power Line Interaction Committee
ASAOC	Administrative Settlement Agreement and Order on Consent
ATV	all-terrain vehicle
BCY	bank cubic yard
BM	ball mill
BMP	Best Management Practice
BNF	Boise National Forest
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIL	carbon-in-leach
CIP	carbon-in-pulp
CMP	Conceptual Mitigation Plan
CR	County Road
CWA	Clean Water Act

DA	Department of the Army
DRSF	development rock storage facility
East Fork SFSR	East Fork South Fork Salmon River
EDF	environmental design feature
EMMP	Environmental Monitoring and Management Plan
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCRNRW	Frank Church Rive of No Return Wilderness
FMP	Fisheries and Aquatic Resources Mitigation Plan
FOMP	Fishway Operations and Management Plan
Forest Service	U.S. Forest Service
FR	Forest Road
FSH	Forest Service Handbook
FSM	Forest Service Manual
GCL	geosynthetic clay liner
GMS	Growth Media Stockpile
gpm	gallons per minute
HAC	hot arsenic cure
HDR	HDR Engineering Inc.
HV	heavy vehicle
ICMI	International Cyanide Management Institute
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
IDWR	Idaho Department of Water Resources
IPCo	Idaho Power Company
IPDES	Idaho Pollution Discharge Elimination System
IRA	Inventoried Roadless Area
IRMA	Initiative for Responsible Mining Assurance
ITD	Idaho Transportation Department
kg	kilogram
kV	kilovolt
LS	limestone
LV	light vehicle
MBR	membrane bioreactor
MGSP	Multi-Sector General Permit
MMP	Modified Mine Plan
MW	megawatt
NEPA	National Environmental Policy Act
NFS	National Forest System
NOAA	National Oceanic and Atmospheric Administration
OSV	over-snow vehicle
PA	programmatic agreement
Perpetua	Perpetua Resources Idaho Inc.
POD	Plan of Development
PNF	Payette National Forest

RCRA	Resource Conservation and Recovery Act
Rio ASE	Rio Applied Science and Engineering
ROW	Right-of-Way
SAG	semi-autogenous grinding
SGLF	Stibnite Gold Logistics Facility
SGP	Stibnite Gold Project
SH	State highway
SODA	spent ore disposal area
SPCC	Spill Prevention, Control and Countermeasure
TEPC	Threatened, Endangered, Proposed or Candidate
TSF	Tailings Storage Facility
TSRC	Total Soil Resource Commitment
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Services
UTV	utility terrain vehicle
WAD	weak acid dissociable
WOTUS	waters of the United States
WTP	water treatment plant

1.0 Introduction

The United States (U.S.) Department of Agriculture Forest Service (Forest Service) received the Stibnite Gold Project (SGP) Plan of Restoration and Operations, (Midas Gold Idaho, Inc. 2016) for review and approval in accordance with regulations at 36 Code of Federal Regulations (CFR) 228 Subpart A for the proposed SGP in central Idaho. A revised Plan, also known as ModPRO,[1] was submitted to the Forest Service in 2019 (Brown and Caldwell 2019). A further modified Plan, also known as ModPRO2,[2] was then submitted in October of 2021 (Perpetua 2021a). Midas Gold changed their name to Perpetua Resources Idaho Inc. (Perpetua[3]) in February 2021.

The SGP would consist of mine operations, including an open pit hard rock mine and associated processing facilities, located within Valley County in central Idaho on federal, state, and private lands. The SGP would produce gold and silver doré, and antimony concentrate, for commercial sale by Perpetua. The SGP would have a life (construction, operation, closure, and reclamation), not including post-reclamation monitoring, of approximately 20 years, with active mining and ore processing occurring over approximately 15 years.

The SGP Operations Area Boundary, associated access roads, and off-site facilities are located in Valley County, Idaho. The Operations Area Boundary is situated approximately 98 miles by air and 146 miles by road northeast of Boise; approximately 44 air miles and 68 miles by road northeast of Cascade; and approximately 10 air miles and 14 miles by road east of the village of Yellow Pine, Idaho. Activities described in the 2021 Modified Mine Plan (MMP) would occur within approximately 820 acres of private lands (including approximately 560 acres of patented mining claims owned or controlled by Perpetua), approximately 2,307 acres of National Forest System (NFS) lands, 12.5 acres of federal land administered by the Bureau of Reclamation, and 62 acres of public lands administered by the State of Idaho.

This alternatives report outlines the descriptions of the 2021 MMP, Johnson Creek Route Alternative, and the No Action Alternative. This report provides a detailed description of these alternatives to be referenced in the resource specialists' reports.

1.1 Key Permits Necessary to Implement the Plan of Operations

To implement the 2021 MMP and associated activities, Perpetua would need to obtain (or renew) permits and authorizations. **Table 1.1-1** lists the permits, approvals, and regulations that likely apply and compliance with these requirements can be inferred to be included in the proposed action and action alternatives. This list is not exhaustive and additional approvals, permits, and authorizing actions could be necessary as the project develops.

[1] Associated project documents may reference the Revised Plan as the ModPRO.

[2] Associated project documents may reference the Modified Plan as the ModPRO2.

[3] Documents provided by Perpetua prior to the February 2021 name change will still be cited and referenced as Midas Gold.

Table 1.1-1 Key Permits, Approvals, and Regulation Compliance Likely Required

Agency	Permit or Authorization
U.S. Forest Service	• Approved Plan of Operations • New Special Use Permit for extension of the transmission line (Payette National Forest) • Revised SUP for the upgrade of transmission line 328 (Boise National Forest) • Timber Sale Permit(s) and Contract(s)
USACE Regulatory Division	• Department of the Army authorization pursuant to Clean Water Act (CWA) Section 404
U.S. Environmental Protection Agency	• CWA Section 404 Permit Review • Spill Prevention Control and Countermeasures Plan (SPCC)
U.S. Fish and Wildlife Service	• Incidental Take Permit pursuant to Section 7 of the Endangered Species Act • Protection of migratory birds under the Migratory Bird Treaty Act • Protection of bald and golden eagles under the Bald and Golden Eagle Protection Act
U.S. Department of Transportation	• Hazardous Materials Transportation Permit
U.S. Bureau of Reclamation	• Modification to 1955 authorization for upgrade of transmission line 328 within existing easement
National Oceanic and Atmospheric Administration National Marine Fisheries Service	• Incidental Take Permit pursuant to Section 7 of the Endangered Species Act
Mine Safety and Health Administration	• Issue a mine identification number • Legal Identity Report • Approval of Ground Control Plan • Approval of Mine Health and Safety Training Plan
Federal Communications Commission	• Radio Authorizations
Treasury Department (Bureau of Alcohol, Tobacco, Firearms and Explosives)	• Explosive User Permit • Explosives Manufacturing Permit (ANFO)
State Historic Preservation Officer	• Section 106 Consultation under the National Historic Preservation Act
Idaho Department of Lands	• Mine and Reclamation Plan Permit under the Mined Land Reclamation Act • Compliance with Best Management Practices for Mining in Idaho • Right-of-way for the transmission line that crosses state lands
Idaho Department of Water Resources	• Stream Channel Alteration Permits • Water Well Drilling Permits • Mine Tailings Impoundment Certificate of Approval • Water Right Permits • Water Dam Rules

Agency	Permit or Authorization
Idaho Department of Environmental Quality	• Air Quality Permit to Construct under Rules for the Control of Air Pollution in Idaho • Section 401 Certification under the CWA • Application for Point of Compliance under the Ground Water Quality Rule • Compliance with the Rules for Ore Processing by Cyanidation • Compliance with the Idaho Rules for Public Drinking Water Systems • Compliance with the Water Quality Standards • Compliance with the Solid Waste Management Rules • Compliance with the Rules and Standards for Hazardous Waste • Compliance with the Individual/Subsurface Sewage Disposal Rules • Compliance with the Wastewater Rules • Compliance with the Recycled Water Rules • Stormwater General National Pollutant Discharge Elimination System Permit(s) (construction or multi-sector) • Wastewater Discharge Permit under Idaho Pollutant Discharge Elimination System Rules
Idaho Department of Transportation	• Authorization for Warm Lake Road/SH 55 intersection modifications
State Fire Marshal	• Compliance with the International Fire Code
Office of Emergency Management	• Tier II Reporting under the Emergency Planning and Community Right to Know Act (EPCRA) • TRI Reporting under the EPCRA and Pollution Prevention Act
Valley County	• Conditional Use Permit • Building Permits • Compliance with Valley County Liquefied Petroleum Gas Systems Ordinance • Compliance with Valley County Public Road Easement Stipulations • Road maintenance agreements

Table Source: Perpetua 2021a

2.0 Alternatives, Including the Proposed Action

2.1 Introduction

This section describes the action proposed by Perpetua in its 2021 MMP submitted in October 2021 (Perpetua 2021a), an additional alternative utilizing another access route, and the No Action Alternative.

2.2 Development of Alternatives

2.2.1 Regulatory Setting for Alternatives Development

Alternatives were developed by the Forest Service and the United States Army Corps of Engineers (USACE), with input from other cooperating agencies, guided by National Environmental Policy Act (NEPA), CWA, and U.S. Department of Agriculture Forest Service regulations (40 CFR 1502.14, 40 CFR 230, and 36 CFR 220.5, respectively), Forest Service Region 4 guidance, and the Forest Service Handbook (FSH). The Organic Administration Act, and Forest Service regulations at 36 CFR 228 Subpart A, governing mineral development on NFS lands also provided guidance regarding alternatives development.

2.2.2 Alternatives Overview

As described below, there are two action alternatives and the No Action Alternative. In general terms, these alternatives are:

No Action Alternative – The No Action Alternative provides an environmental baseline for comparison of the action alternatives. Under the No Action Alternative, the mining, ore processing, and related activities under the action alternatives, including removal of legacy materials, would not take place. However, existing, and approved activities (i.e., approved exploration activities and associated reclamation obligations) would continue and Perpetua would not be precluded from subsequently submitting another plan of operations for consideration and evaluation pursuant to the General Mining Law of 1872.

2021 MMP – The 2021 MMP is based upon Perpetua's Modified Plan of Operations submitted in October 2021 for the SGP. For access, the 2021 MMP would utilize Warm Lake Road, Johnson Creek Road, and Stibnite Road (comprising the Johnson Creek Route) during construction of the Burntlog Route, then utilize the Burntlog Route for the last year of construction of the mine site through operations and reclamation.

Johnson Creek Route Alternative – The Johnson Creek Route Alternative was developed by the Forest Service and the cooperating agencies to evaluate potential reductions from access related effects. The mining portion of this alternative would be the same as the 2021 MMP. Therefore, the primary focus of the Johnson Creek Route Alternative is consideration of using an existing route, that would require improvements, for mine access during operations and reclamation instead of a route that under the 2021 MMP requires new road construction in and through Inventoried Roadless Areas (IRA).

2.2.3 Components Common to and Primary Differences Between the Action Alternatives

The following mine components would be common to the action alternatives:

- Mine pit locations, areal extents, and mining and backfilling methods
- Transportation management on existing and proposed roads
- Pit dewatering, surface water management, and water treatment
- Ore processing
- Lime generation
- Tailings Storage Facility (TSF) construction and operation
- TSF Buttress construction methods
- Water supply needs and uses
- Management of mine impacted water and stormwater runoff
- Electrical transmission lines
- Stibnite Gold Logistics Facility (SGLF)
- A road maintenance facility
- Surface and underground exploration
- Stibnite Gold Project worker housing facility

These mine components are described under the 2021 MMP and would remain the same under the Johnson Creek Route Alternative. **Table 2.2-1** provides a summary of the differences between the action alternatives. Because **Table 2.2-1** describes primary differences, not all the components listed above are included in the table.

Table 2.2-1 Primary Differences Between the Action Alternatives

SGP Phase	Component/ Subcomponent	2021 MMP	Johnson Creek Route Alternative
All Phases	SGP timeline	• Construction: Approximately3 years. • Operations: Approximately 15 years. • Exploration: Approximately 17 years (during construction and operations). • Reclamation: Approximately 5 years (except for the TSF which would require an additional 9 years for tailings dewatering and consolidation). • Closure/Post-Closure Water Treatment: Approximately through Mine Year 40. • Environmental Monitoring: As long as needed.	Same as 2021 MMP except: Construction: • Approximately 5 years (upgrading the existing Johnson Creek and Stibnite Roads to provide permanent mine access).
All Phases	Access Roads	Construction/Operations: • Warm lake road from State Highway (SH) 55 to Johnson Creek Route intersection (34 miles). • Johnson Creek Route for SGP access during early construction with minor improvements within the road prism. • Burntlog Route (38 miles) for SGP access during last year of construction, mining and ore processing operations, and closure and reclamation. Includes improvements of existing segments (23 miles) and road construction for new segments (15 miles). • Up to eight borrow areas developed along Burntlog Route for materials needed for road improvements and maintenance. • Access route around the Yellow Pine pit for public access. Closure and Reclamation: • New sections of Burntlog Route to be reclaimed after the closure and reclamation period.	• Warm lake road from SH 55 to Johnson Creek Route intersection (34 miles). • Johnson Creek Route (39 miles: Johnson Creek Road 25 miles, Stibnite Road 14 miles) upgraded and used for access throughout life of mine (LOM) instead of the Burntlog Route. • Access route around the Yellow Pine pit for public access, employee access, and deliveries of supplies and equipment to the processing, warehouse, worker housing facility, and administration areas. • No improvements or construction of new segments for Burntlog Route. • Up to seven borrow sources developed along the Johnson Creek Route for materials needed for road improvements and maintenance. Closure and Reclamation: • Improved Johnson Creek and Stibnite roads would not be reclaimed to pre-existing conditions.

SGP Phase	Component/ Subcomponent	2021 MMP	Johnson Creek Route Alternative
All Phases	Public Access	Construction: • Temporary groomed over-snow vehicle (OSV) trail on the west side of Johnson Creek from Trout Creek to Landmark while Burntlog Route is constructed (8 miles). • OSV trail on west side of Johnson Creek from Wapiti Meadows to Trout Creek campground closed during construction (9 miles). • OSV trail from Warm Lake to Landmark closed during construction through operations (8.5 miles). • Cabin Creek Road Groomed OSV trail (11 miles). • Public roads remain open through the SGP with temporary closures as needed to accommodate construction. Operations: • Groomed OSV trail moves from west side of Johnson Creek Road to Johnson Creek Road from Landmark to Wapiti Meadows (16.7 miles). • Stibnite Road (County Road [CR] 50-412) / Thunder Mountain Road (FR 50375) closed through the SGP. • Seasonal public access through the Operations Area Boundary provided by constructing new road through Yellow Pine pit and below mine haul road to link Stibnite Road (FR 50412) to Thunder Mountain Road (FR 50375). • Public access allowed on Burntlog Route to Thunder Mountain Road (FR 50375). Closure and Reclamation: • New road constructed over the Yellow Pine Backfill (backfilled Yellow Pine pit) connecting Stibnite Road (FR 50412) to Thunder Mountain Road (FR 50375).	Construction and Operations: Same as 2021 MMP except: • OSV trail on the west side of Johnson Creek from Wapiti Meadows to Trout Creek campground would be closed from construction through mine closure (9 miles). • Groomed OSV trail on the west side of Johnson Creek from Trout Creek to Landmark lasting from construction through mine closure. Closure and Reclamation: Same as 2021 MMP.

SGP Phase	Component/ Subcomponent	2021 MMP	Johnson Creek Route Alternative
Operations	Utilities – Transmission Lines	• Upgrade approximately63 miles of the existing 12.5 kilovolt (kV) and 69 kV transmission lines. • New approximate 9-mile, 138 kV line would be constructed from the Johnson Creek substation to a new substation at the mine site. • Upgrade the substations located at Oxbow Dam, Horse Flat, McCall, Lake Fork, and Warm Lake. • Reroute approximately 5.4 miles of transmission line to avoid the Thunder Mountain Estates subdivision. • Reroute approximately 0.9 miles of transmission line between Cascade and Donnelly to use an old railroad grade on private property. • Installation of approximately 3 miles of new underground distribution line along Johnson Creek Road from the Johnson Creek substation south to Wapiti Meadows.	Same as 2021 MMP.
Operations	Utilities - Communication Towers and Repeater Sites	• One cell tower located north of the Hangar Flats pit. • Locations along Burntlog Route for very high frequency (VHF) repeater sites. • Use existing access roads to repeater site locations along Burntlog Route. • Communication site at the SGLF. • Upgrades to existing communication site.	Same as 2021 MMP except: • Cell tower sites constructed and maintained using helicopter (instead of constructing access roads) for sites within IRAs managed for Backcountry/Restoration. • Locations along Johnson Creek route for repeater sites.
Operations	Off-site Maintenance Facility	• SGLF located along Warm Lake Road. • Burntlog Maintenance Facility located at one of the borrow source locations 4.4 miles east of the junction of Johnson Creek Road and Warm Lake Road along the proposed Burntlog Route.	• SGLF same as 2021 MMP • Landmark Maintenance Facility located at junction of Warm Lake Road at Johnson Creek Road.
Closure and Reclamation	Access road segments	• Removal and reclamation of new road segments constructed for Burntlog Route. • Return of previously existing road segments to pre-construction width and condition.	• No removal or reclamation of pre-existing access routes.

Table Source: Perpetua 2021a

2.3 No Action Alternative

Under the No Action Alternative, the Plan would not be approved and no mining, ore processing, or related activities would occur, including removal of legacy materials (i.e., spent ore disposal area [SODA] and Hecla heap leach) included in the Plan. Previously approved activities (i.e., approved exploration activities and associated reclamation obligations) would continue. In a reasonably foreseeable future action, certain legacy and existing mining impacts would be remediated as directed in the 2021 Administrative Settlement Agreement and Order on Consent (ASAOC), including installation of stream diversion ditches designed to avoid contact of water with sources of contamination and removal of approximately 325,000 tons of development rock and tailings that are currently impacting water quality. These remedial actions would occur under all alternatives considered in this analysis. Under the No Action Alternative, Perpetua would not be precluded from subsequently submitting another plan of operations pursuant to the General Mining Law of 1872 to the Forest Service for subsequent evaluation.

2.4 2021 MMP

2.4.1 Overview

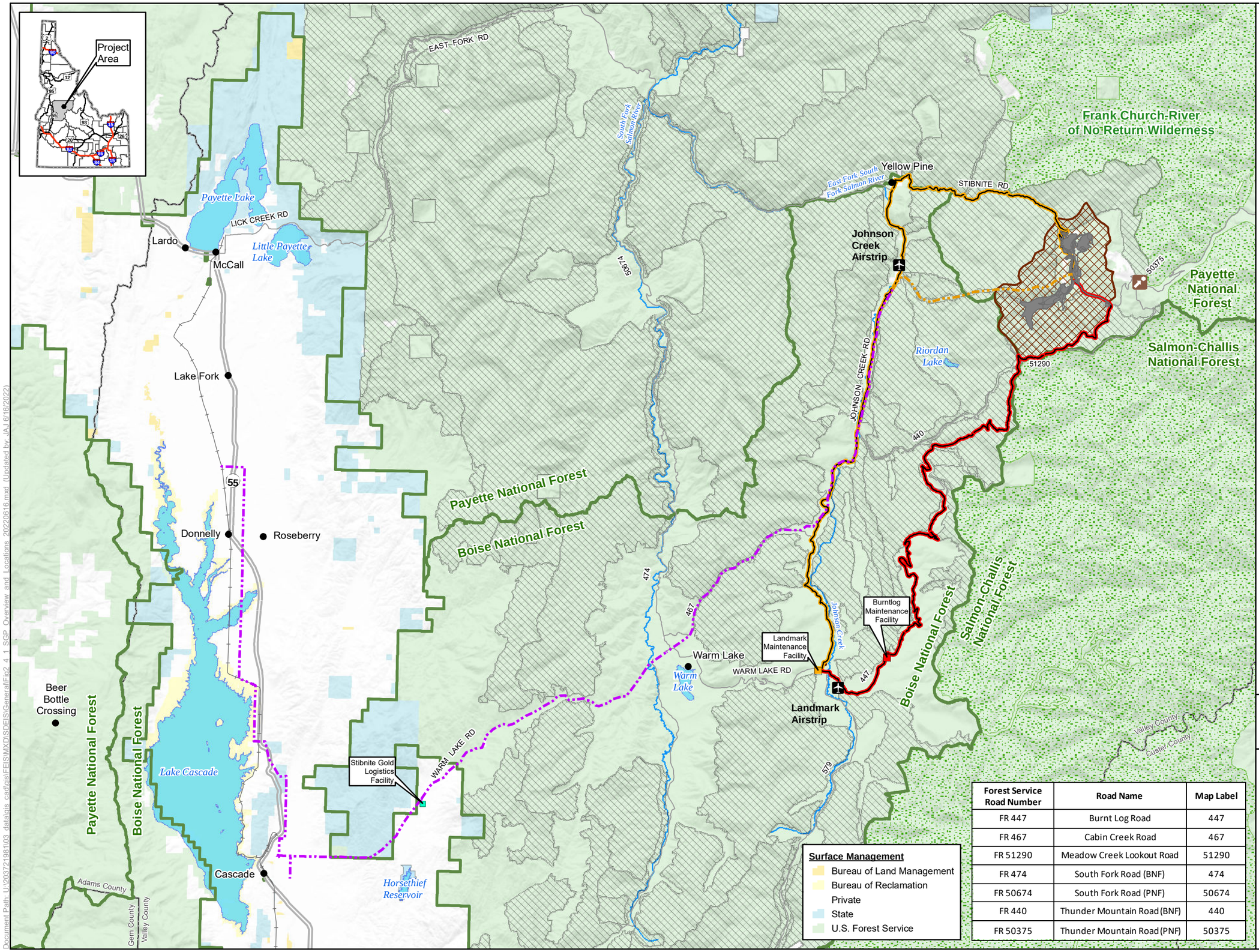
The 2021 MMP, the revised Proposed Action, is based on Perpetua's 2021 Refined Proposed Action ModPRO2 (Perpetua 2021a). Mine operations would occur on patented mining claims owned or controlled by Perpetua and on unpatented mining claims and other areas of federal public lands comprised of NFS lands that are administered by the PNF. Supporting infrastructure corridors (access and transmission line) are located on the BNF, Bureau of Reclamation, and non-federal lands.

Perpetua proposes to develop a mine operation that produces gold and silver doré, and antimony concentrates from ore deposits associated with their mining claims in the SGP area. The estimated recoverable mineral resource consists of:

- 4.2 million ounces of gold
- 1.7 million ounces of silver
- 115 million pounds of antimony

Development of the mineral resource would include construction of access and haul roads; construction of supporting infrastructure; open pit mining; ore processing; placement of tailings in a TSF; and placement of development rock. New access to the SGP would be provided by the proposed Burntlog Route, which would be a combination of widening the existing Burnt Log Road (FR 447) and Meadow Creek Lookout Road (FR 51290) and constructing new connecting road segments of approximately 15 miles (**Figure 2.4-1**). Development of the Burntlog Route would entail 340.9 acres of new cut and fill activity (including borrow sources) along existing and newly constructed roadways.

To provide electric power for the SGP, an existing powerline would be upgraded and a new transmission line from a new Johnson Creek substation to the mine would be constructed. Additional off-site support facilities to be constructed along access corridors include the SGLF and the Burntlog Access Route Maintenance Facility. The SGLF would house administrative offices, the assay laboratory, and a warehouse while the maintenance facility would be the headquarters for road maintenance and snow removal (see **Section 2.4.4.9**) The proposed facilities and access roads are shown on **Figure 2.4-1** and **Figure 2.4-2**. The Operations Area Boundary shown on **Figures 2.4-1** and **2.4-2** is the boundary within which Perpetua would control public access.



LEGEND

Project Components
- SGP Features
- Operations Area Boundary

Access Roads and Trail System
- Burntlog Route *
- Johnson Creek Route

Utilities
- Upgraded Transmission Line
- New Transmission Line

Offsite Facilities
- Burntlog Maintenance Facility *
- Landmark Maintenance Facility **
- Stibnite Gold Logistics Facility

Other Features
- U.S. Forest Service
- Wilderness
- IRA and/or Forest Plan Special Area
- County
- City/Town
- Monumental Summit
- Airport/Landing Strip
- Railroad
- Highway
- Road
- Stream/River
- Lake/Reservoir

Surface Management
- Bureau of Land Management
- Bureau of Reclamation
- Private
- State
- U.S. Forest Service

Forest Service Road Number	Road Name	Map Label
FR 447	Burnt Log Road	447
FR 467	Cabin Creek Road	467
FR 51290	Meadow Creek Lookout Road	51290
FR 474	South Fork Road (BNF)	474
FR 50674	South Fork Road (PNF)	50674
FR 440	Thunder Mountain Road (BNF)	440
FR 50375	Thunder Mountain Road (PNF)	50375

* Associated with 2021 MMP only
** Associated with Johnson Creek Route Alternative only
Note:
The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road.

0 2 4 Miles
1 inch = 4 miles when printed at 11x17

Figure 2.4-1
SGP Overview and Location
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS The National Map: 3D Elevation Program. USGS Earth Resources Observation & Science (EROS) Center: GMTED2010. Data refreshed March, 2021. Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

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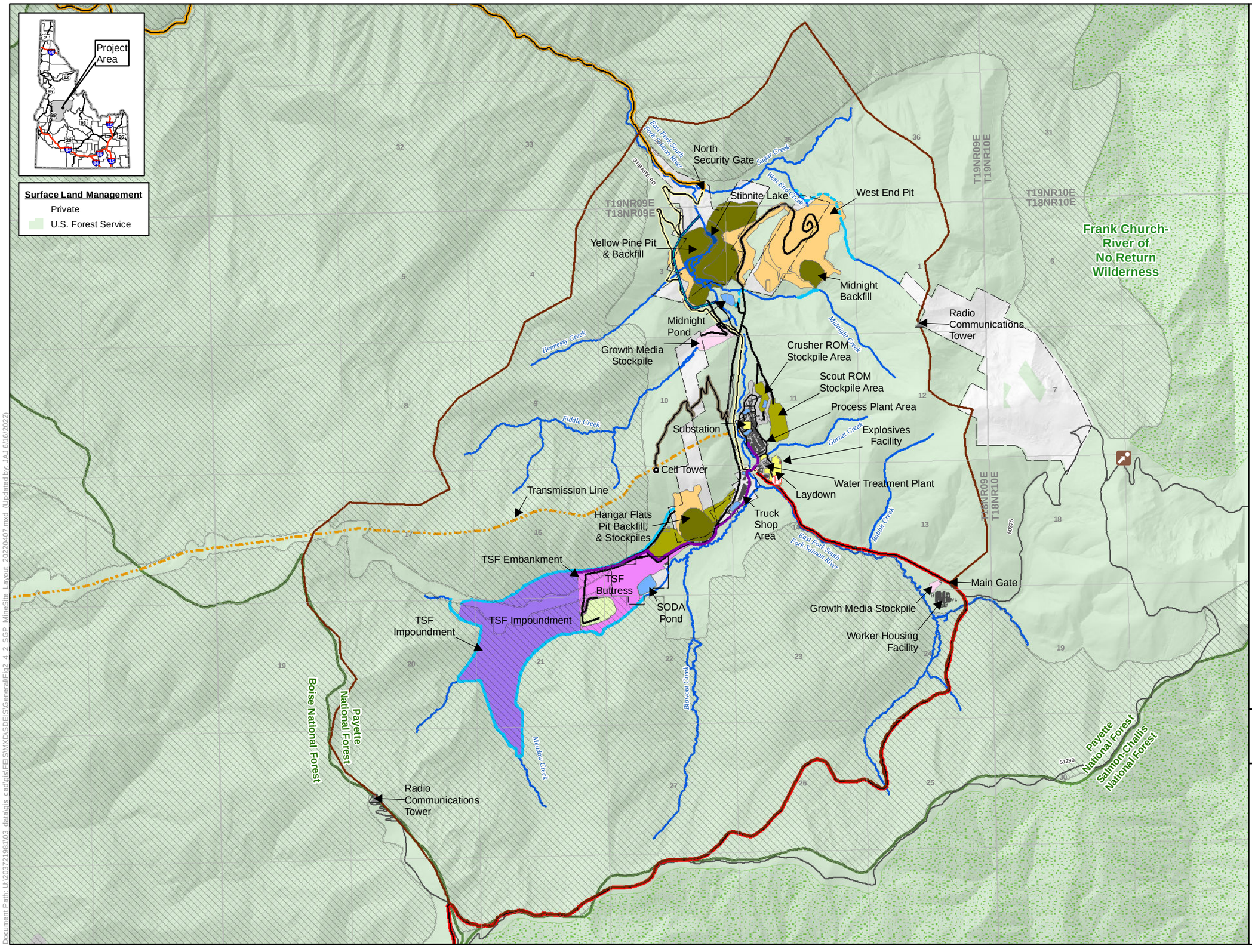

Figure 2.4-2
Mine Site Layout
Stibnite Gold Project
Stibnite, ID

Base Layer: Hillshade derived from LiDAR supplied by Midas Gold
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

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The components of the 2021 MMP are described in the following sections in terms of overall land management and affected areas, and project phases: construction; operations; exploration; and closure and reclamation, including post-closure monitoring.

2.4.2 Land Management and Affected Areas

Table 2.4-1 provides a summary of land management or ownership by estimated SGP component for the maximum affected area proposed and also includes acreages of new disturbance and re-disturbance by SGP component and ownership.

2.4.3 Phases and Timeline

The actions proposed under the 2021 MMP would take place over a period of approximately20 to 25 years, not including the long-term, post-closure environmental monitoring or potential long-term water treatment. The phases of the SGP are described in subsequent sections and include: (1) Construction (approximately 3 years; Mine years -3 through -1); (2) Mining and Ore Processing Operations (approximately 15 years; Mine years 1 through 15)); (3) Surface and Underground Exploration (approximately 17 years, beginning during construction and continuing concurrent with operations; Mine years -2 through 15); and (4) Closure and Reclamation (Mine year 16+). Most activities in the Closure and Reclamation period would be completed within five years. However, closure water management and water treatment are expected to continue for as long as 25 years (Mine years 16 through 40). The environmental monitoring phase would continue for as long as needed to demonstrate that the site has been fully reclaimed. **Figure 2.4-3** provides an illustration of the timing of construction and operations activities and the initiation of the closure phase.

2.4.4 Site Preparation, Access, and Infrastructure

2.4.4.1 Overview

Implementing the 2021 MMP would require construction of surface facilities, haul roads, and water management features. Supporting infrastructure would include transmission lines, substations, communication sites, and access roads. Additionally, removal of some features from past mining activities (legacy mining features) would be initiated during the construction phase. Perpetua would install 15 to 20 temporary trailers on private lands adjacent to the existing exploration camp (located in the proposed ore processing area) to accommodate construction crews; these temporary trailers would be used during site preparation and early construction until the worker housing facility is constructed.

Prior to site preparation and construction of surface facilities, vegetation would be removed from operating areas. Trees, deadwood, shrubs, and slash would be removed, and any remaining vegetation would be grubbed using a bulldozer. The resulting material would be chipped and stockpiled for use as mulch or blended to create a growth media additive. After vegetation removal, growth media would be salvaged and stockpiled. Stockpiles would be stabilized and seeded.

The existing potable water supply system at the exploration camp would be used and expanded for the construction camp. The existing system would be supplemented with deliveries of potable water, if needed. Supplemental water sources (i.e., water deliveries) would be used by personnel in remote construction areas. Sanitation during construction would be provided through the existing sewage treatment system adjacent to the exploration camp. In addition, portable sanitary facilities would be located throughout the SGP and at remote construction areas.

Table 2.4-1 Land Management and Acreage by Component for the 2021 MMP

Component		Perpetua Private	Other Private	Payette National Forest	Boise National Forest	Salmon-Challis National Forest[4]	Bureau of Reclamation	Idaho Department of Lands	Totals
Mine Site	New Disturbance	48.2	0	767.9 + 65[2]	0	0	0	0	881.1
	Re-disturbance	456.7	0	402.3	0	0	0	0	859.0
Off-site Facilities	New Disturbance	24.3	0	0	4.5	0	0	0	28.8
	Re-disturbance	0	0	0	0	0	0	0	0
Access Roads	New Disturbance	0	0	81.6	253.8	5.5	0	0	340.9
	Re-disturbance	1.9	4.5	26.9	102.5	8.7	0	0	144.5
Utilities[1]	New Disturbance	2.9	105.9	61.4	221.8	0	3.5	26.0	421.5
	Re-disturbance	1	174	19.4	350.6	0	9	36.1	590.1
Disturbance Totals	Total New Disturbance	75.4	105.9	910.9 + 65[2]	480.1	5.5	3.5	26.0	1672.3
	Total Re-disturbance	459.6	178.5	448.6	453.1	8.7	9	36.1	1593.6
Total New and Re-Disturbance		535.0	284.4	1424.5	933.2	14.2	12.5	62.1	3265.9[3]

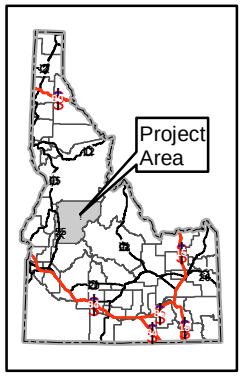
Table Source: Perpetua 2021a

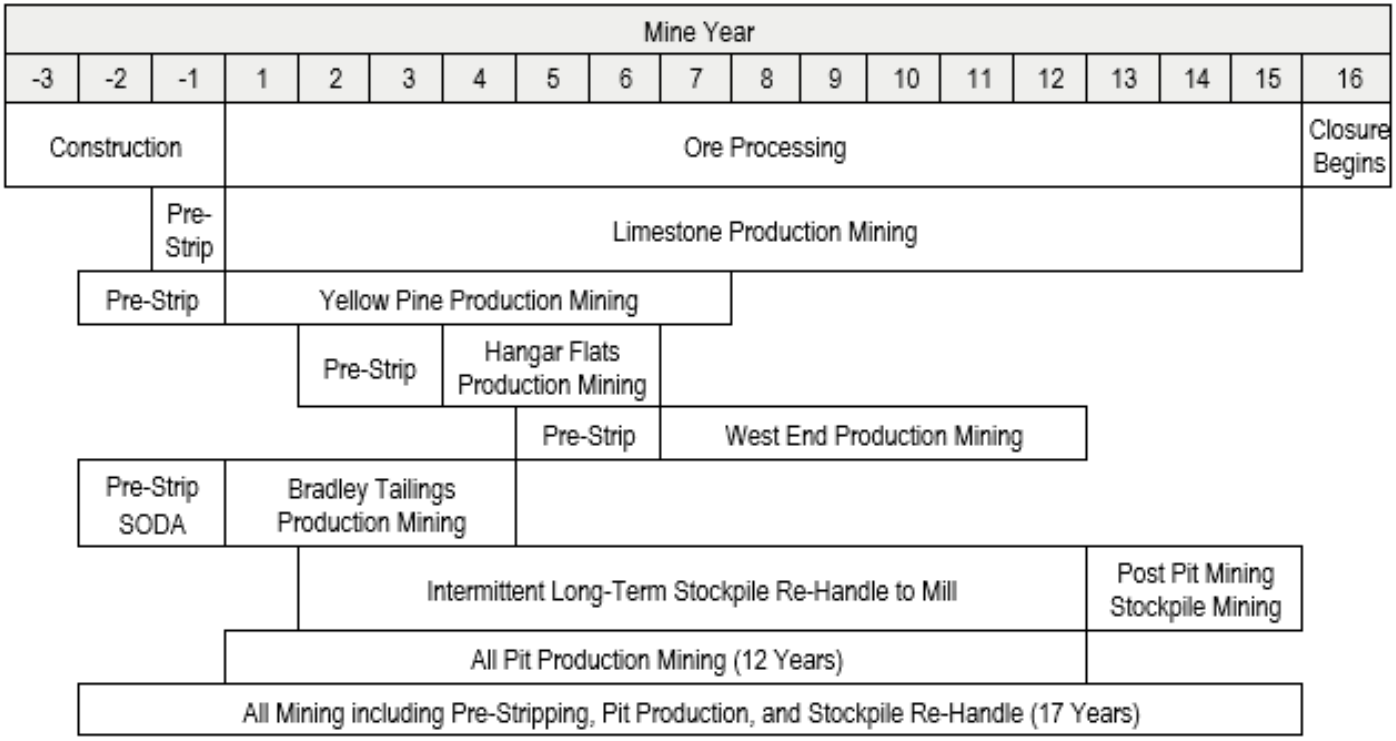
[1] Utilities affected areas include both existing utility corridors and access routes, and new utility corridors and access routes. Some existing utility access routes would be upgraded.

[2] Approximately 65 affected acres associated with temporary surface exploration pads and roads (SGP component) have an unknown land ownership because the exact locations of these exploration areas are not yet known. The surface exploration areas are included in the PNF SGP.

[3] Items, subtotals, and totals may not add up to grand total due to rounding.

[4] Approximately 14 acres of land is administered by the PNF but is within the boundary of the Salmon Challis National Forest.





Construction Phase (Mine Year -3 through -1):
Facility construction
Road construction
Pre-stripping

Operation Phase (Mine Years 1 through 15):
Ore processing
Limestone production mining
Yellow Pine production mining
Pre-stripping for Hangar Flats
Hangar Flats production
Pre-stripping for West End
West End production
Bradley tailing production
Stockpile re-handling

Reclamation and Closure Phase (Mine Years 16 through 20):
Reclamation of facilities

Post Closure Water Treatment and Monitoring Phase (Mine Years 16 through 40):
Site monitoring with collection and treatment of tailings consolidation water

Figure 2.4-3
Phases and Timeline

Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021a

Construction of the Burntlog Route would occur from both ends of the route at the same time on a seasonal basis (May to November), but construction could occur outside of this time period if conditions allow. The southern portion workforce would be housed in three temporary trailer camps located within construction borrow sources or staging areas (**Figure 2.4-2**). The northern portion workforce would be housed at the temporary trailer construction camp at the SGP. Some construction workers could be housed in Cascade, Idaho.

Pre-construction water management activities would include best management practices to reduce erosion and sediment delivery to streams. These water management features could include sedimentation ponds; run-on water diversion ditches, trenches, and/or berms; runoff water collection ditches; silt fence; water bars; culverts; energy dissipation structures; terraces; and other features specified in construction permits.

In the second and third years of construction, mine contact water would be generated by stormwater runoff at the West End Pit, Yellow Pine Pit, TSF embankment, legacy Hecla heap leach, and the SODA, but would be contained as described in **Section 2.4.5.10**.

2.4.4.2 Growth Media Stockpiles

Suitable growth media within the area proposed for operations would be salvaged following vegetation clearing and moved to growth media stockpiles (GMS) either within the Fiddle Valley or at the Worker Housing Facility. Other short-term GMSs would be located within the footprint of the TSF. Growth media from the new construction of the Burntlog Route would be stockpiled in the borrow source areas used for construction and widening of the route and in windrows along the edges of fill slopes. GMSs would be stabilized, seeded, and mulched to protect the stockpile from wind and water erosion.

To achieve the reclamation success criteria and offset the growth media deficits, 1.5 million bank cubic yards (BCY) of unconsolidated overburden (chiefly alluvial and glacial materials from Yellow Pine pit) would be stored in the Fiddle GMS to allow use as cover material for reclamation of the TSF, TSF Buttress, and Hangar Flats pit backfill.

2.4.4.3 Access Roads

Warm Lake Road

Warm Lake Road (CR 10-579) is a two-lane (one lane each direction), asphalt-paved roadway with lane markings open year-round to all vehicles from Idaho State Highway (SH) 55 to Warm Lake. The road starts in Cascade at an intersection with SH 55, which is a major north-south transportation corridor. This intersection would be used by all mine-related traffic through all phases of the SGP. The Warm Lake Road continues eastward for approximately 35 miles, ending at Johnson Creek Road (CR 10-413) at Landmark. Warm Lake Road is under the jurisdiction of Valley County. Currently, Valley County does not maintain Warm Lake Road in winter beyond Warm Lake Lodge. With adequate snowpack, an 8-mile segment of the Warm Lake Road route east of Warm Lake Lodge is used as an OSV route, allowing access into Landmark and points beyond.

SGP would need year-round passenger and delivery truck access from the onset of construction through the life of the mine. The Warm Lake Road is suitable for this use in its current condition. Wintertime maintenance east of Warm Lake Lodge would be conducted by Perpetua to ensure safe, year-round access to the sole route of ingress/egress to the SGP for all mine support traffic. This would include snow removal and road sanding, as appropriate, to maintain a safe driving surface. Commitments for wintertime maintenance of Warm Lake Road would be documented in a Road Maintenance Agreement with Valley County.

Perpetua wintertime maintenance and use of Warm Lake Road would result in two changes to current traffic conditions:

a) Warm Lake Road east of Warm Lake Lodge would not be available as a recreational OSV route from the start of construction through reclamation of the SGP. To replace this recreational use, a dedicated alternative OSV route would be established from the Warm Lake area to Landmark via the Cabin Creek/Trout Creek drainages and adjacent to the Johnson Creek Road. Establishing this replacement OSV route would minimize the interactions between SGP traffic and recreational traffic in the winter. The proposed OSV route is illustrated in **Figure 2.4-4**.

b) Expanded wintertime public vehicle access on Warm Lake Road east of Warm Lake Lodge would commingle SGP and public travel.

Changes to the SH 55 and Warm Lake Road intersection would improve access for large trucks carrying equipment and supplies to the SGP and would facilitate turns from SH 55 onto Warm Lake Road and from Warm Lake Road back onto SH 55. Any changes proposed to the intersection would need to be approved and implemented by the Idaho Transportation Department (ITD). Recommended changes to the intersection include: the addition of left and right turning lanes (Parametrix 2018); an intersection modification to accommodate larger trucks; potential relocation of two power poles (HDR Engineering, Inc. [HDR] 2017); and a modification to the westbound approach at Warm Lake Road to improve the view of traffic coming from the north.

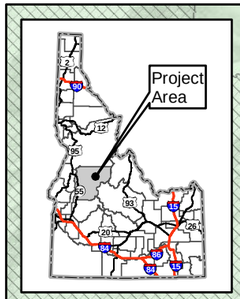
Johnson Creek Route

During the initial construction period of the Burntlog Route (approximately 2 to 3 years), mine-related traffic would access the SGP from SH 55, north of the city of Cascade, via Warm Lake Road for approximately 34 miles, then north on Johnson Creek Road (CR 10-413) for approximately 25 miles to the village of Yellow Pine, and from Yellow Pine east approximately 14 miles to the SGP via the Stibnite Road (CR 50-412). The portion of the route that includes Johnson Creek Road and Stibnite Road is known as the Johnson Creek Route. This route is primarily situated topographically adjacent to the valley bottom, paralleling Johnson Creek and then the East Fork SFSR.

Johnson Creek Road is a county maintained, native surface road that is open to vehicles with seasonal restrictions due to snow. During the winter, Valley County plows approximately 10 miles of Johnson Creek Road from Yellow Pine south to Wapiti Meadow Ranch and grooms the remaining 17 miles of Johnson Creek Road from Wapiti Meadow Ranch to Warm Lake Road at Landmark for OSV use. Valley County does not plow Warm Lake Road from Warm Lake to Landmark; this section is a designated groomed OSV route.

The Stibnite Road portion of the route is also a county-maintained native surface road, open to all vehicles with seasonal restrictions due to snow. This road is plowed in the winter by Perpetua through an agreement with Valley County. Stibnite Road connects to Thunder Mountain Road on the southeastern portion of the Stibnite site and currently provides public access through the site.

Minor surface improvements (such as ditch and culvert repair, adding gravel, winter snow removal, resurfacing if required, and summer dust suppression) would occur on the Johnson Creek Route under the 2021 MMP to reduce sediment runoff and dust generation. However, there would be no road alignment modification or widening of these existing roads along the Johnson Creek Route. The road varies in elevation from approximately 4,750 to 6,700 feet amsl with an average grade of 1.5 to 2 percent with occasional local segments with grade up to approximately 8 percent.



Payette National Forest

Boise National Forest

Wapiti Meadows

Riordan Lake

JOHNSON CREEK RD

440

Trout Creek Campground

467

South Fork Salmon River

474

467

488

Knox Ranch Parking Area

CR 579

Groomer Storage

Warm Lake

WARM LAKE ROAD

474

Warm Lake

WARM LAKE RD

Johnson Creek

413

Landmark

579

447

Boise National Forest

Salmon-Challis National Forest

Surface Management
- Private
- U.S. Forest Service

LEGEND

Over Snow Vehicle Routes
- Cabin Creek Road OSV trail
- Cabin Creek to Johnson Creek OSV trail connector
- Johnson Creek Road OSV trail
- Parking area to USFS Warm Lake Project Camp OSV trail
- Trout Creek Campground north to Wapiti Meadows OSV trail*
- Warm Lake area OSV connector
- Warm Lake to Landmark OSV trail
- OSV Parking Area

Other Features
- U.S. Forest Service
- Wilderness
- IRA and/or Forest Plan Special Area
- County
- City/Town
- Campground
- Airport/Landing Strip
- Railroad
- Highway
- Road
- Stream/River
- Lake/Reservoir

OSV Route	Length (mi)
Trout Creek Campground north to Wapiti Meadow s OSV trail	8.85
Johnson Creek Road OSV trail (*OSV Access during Construction*)	8.14
Johnson Creek Road OSV trail (*OSV Access during Operations*)	7.80
Parking area to USFS Warm Lake Project Camp OSV trail	1.88
Cabin Creek Road OSV trail	10.82
Cabin Creek to Johnson Creek OSV trail connector	0.82
Warm Lake area OSV connector	0.39
Warm Lake area to Landmark OSV trail (Existing)	8.49

* Trout Creek Campground north to Wapiti Meadows would be closed for the duration of construction through closure and reclamation under the Johnson Creek Route Alternative.

0 0.75 1.5 Miles

1 inch = 1.5 miles when printed at 11x17

N

Figure 2.4-4
OSV Routes
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS The National Map: 3D Elevation Program. USGS Earth Resources Observation & Science (EROS) Center: GMTED2010. Data refreshed March, 2021. Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

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Portions of Johnson Creek Road (i.e., Landmark to Wapiti Meadows) are currently used as a groomed OSV trail during winter and use of the Johnson Creek Route by mine-related construction traffic would conflict with this existing groomed OSV trail. Thus, while the Burntlog Route (described below) is under construction, a temporary 16-foot-wide groomed OSV trail adjacent to Johnson Creek Road between the proposed Cabin Creek Groomed OSV Route and Landmark would be constructed (**Section 2.4.4.4** and **Figure 2.4-4**). However, the OSV tail from Trout Creek Campground to Wapiti Meadows would be closed until construction of the Burntlog Route is complete; once mine traffic moves to that route, then the OSV route would return to Johnson Creek Road and would reconnect Landmark with Wapiti Meadows.

Perpetua has an existing agreement with Valley County for maintenance of Johnson Creek and Stibnite roads, including performing maintenance measures to repair segments that have deteriorated. Appropriate revisions to the road maintenance agreement would be established for use of the Johnson Creek Route as a construction route and to ensure year-round access in accordance with Valley County's public road easement stipulations. Once construction of the Burntlog Route has been completed (2-3 years), the Johnson Creek Route would no longer be used by mine-related traffic.

Burntlog Route

The Burntlog Route would connect the eastern end of Warm Lake Road (at Landmark) to the SGP (to the northeast) by widening and improving approximately 23 miles of existing roads, including the full length of the existing Burnt Log Road (FR 447) and segments of Meadow Creek Lookout Road (FR 51290) and Thunder Mountain Road (FR 50375). The three road segments would be connected with two new road segments totaling approximately 15 miles. Burnt Log Road is currently a native surface road that is open year-round to all vehicles with seasonal restrictions due to snow. The last 0.25 to 0.5 mile of the existing road is closed and motorized traffic prohibited. Meadow Creek Lookout Road is a native surface road, open year-round to all vehicles. The Burntlog Route is primarily situated topographically on mid-slopes and ridgeline.

Improvements on the existing roads that comprise the Burntlog Route include:

- Straightening tight corners to allow for improved safety and traffic visibility;
- Maintaining grades of less than 10 percent in all practicable locations;
- Placing sub-base material and surfacing with gravel;
- Application of a road binding agent in localized segments to increase stability and reduce sediment runoff;
- Widening the existing road surface (currently approximately 12 feet wide) to a 20-foot-wide travel way (approximately 26 feet including shoulders); and
- Installing side-ditching, culverts, guardrails, and bridges, where necessary, with design features to provide fish passage and limit potential sediment delivery to streams.

Figure 2.4-5 shows the proposed Burntlog Route, which includes the proposed new road construction. A segment of new road construction for the Burntlog Route would be located on the south side of the Riordan Creek drainage and cross Riordan Creek north of Black Lake. The approximately 5.3-mile road segment would have 12 stream crossings, three of which cross perennial streams. The elevation of this road segment is approximately 8,000 to 8,600 feet and the average grade of this road segment would be 5

to 6 percent. After construction is completed, public use would be allowed on Burntlog Route when other public access roads are blocked by mine operations.

The connection segment between the end of Burnt Log Road and Meadow Creek Lookout Road is approximately 11 miles and would cross Trapper Creek 0.5 miles east of the intersection of Trapper Creek Road (FR 440) and FR 440A and continue northeast towards Black Lake and on to the Meadow Creek Lookout Road. The second connector between the Meadow Creek Lookout Road and Thunder Mountain Road would be approximately 4 miles and links up with Thunder Mountain Road approximately 2 miles south of the SGP. Minor surface improvements (e.g., blading) would occur on the existing Thunder Mountain Road and Meadow Creek Lookout Road to provide a safe road surface for transportation of construction equipment required to build the Burntlog Route. There would be no road alignment modification or widening of the existing roads.

Primary SGP access would shift from the Johnson Creek Route to the Burntlog Route near the end of the construction phase. The Burntlog Route may be authorized under either 36 CFR 251 as a special use (if it meets the regulatory criteria) or under 36 CFR 228A as a part of a plan of operations. The Burntlog Route would avoid environmental and human health and safety risks associated with the Johnson Creek Route which passes through identified areas for avalanches, landslides, and floods. This route would provide another route for SGP ingress/egress, would decrease SGP and public traffic interaction with Yellow Pine and Johnson Creek area residents; and would decrease the potential for spill risk adjacent to fish-bearing streams. Upon completion, the Burntlog Route would serve as an alternative public access route to the Thunder Mountain area for the life of the mine until it is decommissioned following mine reclamation and closure.

Burntlog Route Borrow Sources, Staging Areas, and Construction Camps

Up to eight borrow sites would be established along the Burntlog Route (**Figure 2.4-5**) to meet construction and ongoing maintenance throughout the life of the mine and to support decommissioning following mine closure. Additionally, those same eight borrow areas would be utilized for staging of equipment and supplies. Three construction camps would be located within the disturbance created by borrow sources or staging areas. The construction camps would be for trailer parking. Each trailer would need to be equipped with fresh water and sanitary waste storage.

2.4.4.4 Public Access

During construction of the SGP and completion of the Burntlog Route, to the degree practicable, the public would continue to have access on forest roads currently available to the public (**Figure 2.4-1**). However, current public access through the SGP on Stibnite Road would be restricted for a period of approximately one year while a new through-site public access road is constructed. A new 4-mile long, 12-foot-wide gravel road would be constructed to provide public access from Stibnite Road (FR 50412) to Thunder Mountain Road through the SGP (**Figure 2.4-2**). The road would be constructed on a widened bench on the west side within the Yellow Pine pit, then head south of the Yellow Pine pit, where this road would utilize an underpass to cross under a SGP haul road and continue southward, parallel to and on the east side of the mine haul road on a partially revegetated portion of a former haul road (**Figure 2.4-2**). Southwest of the ore processing area, the public access road would connect with Thunder Mountain Road and continue toward the worker housing facility, exiting the SGP to the southeast.

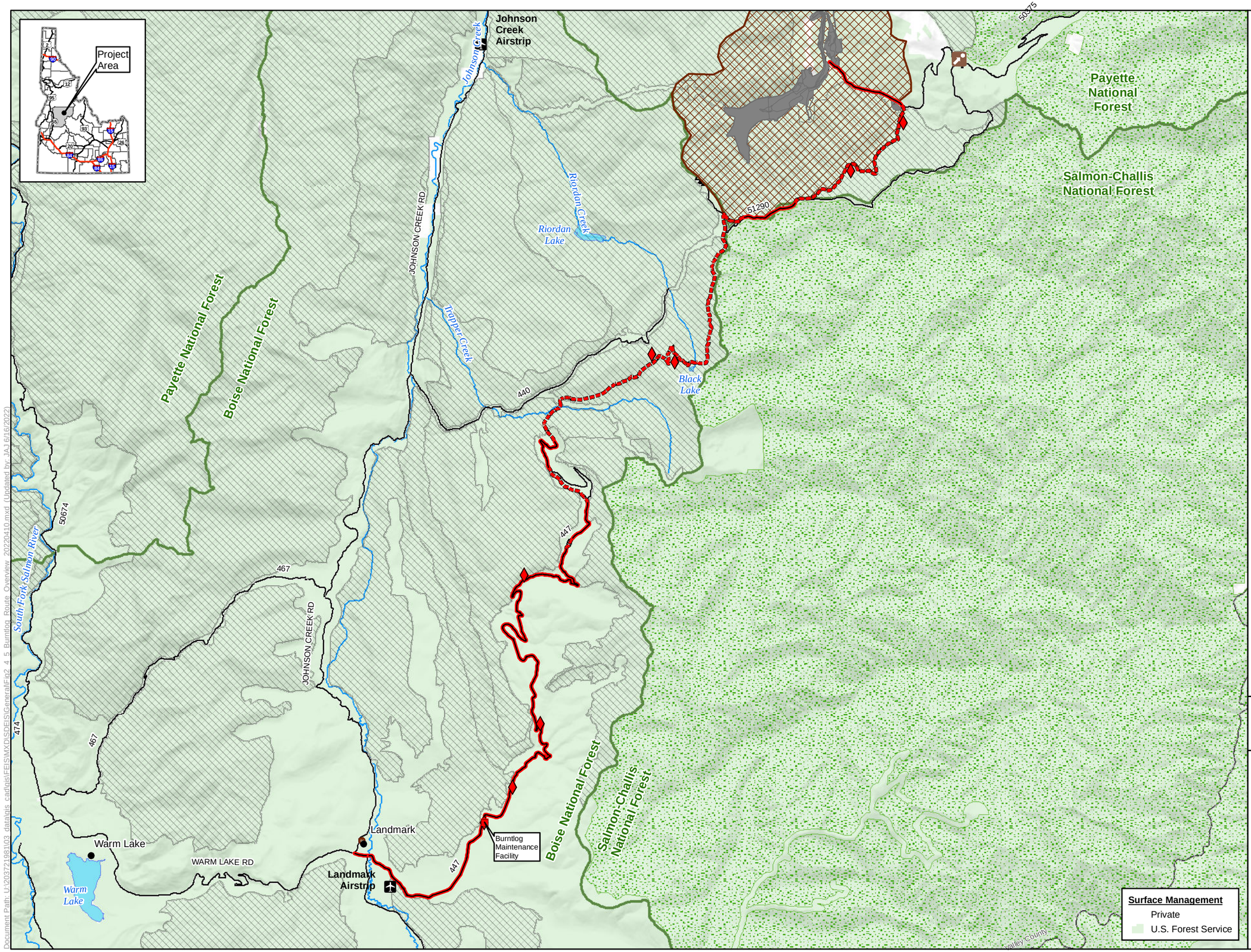

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Figure 2.4-5
Burntlog Route
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS The National Map: 3D Elevation Program. USGS Earth Resources Observation & Science (EROS) Center: GMTED2010. Data refreshed March, 2021. Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

During operations, the public access road through the SGP would provide seasonal use, open to all vehicles; access would not be provided in winter when impassable (current county maintenance standards) and signs would inform the public of seasonal and temporary closures. Vehicles passing through the SGP would be required to check-in with mine personnel at the North or South SGP entry points and would receive a safety briefing and would also be required to check-out with SGP personnel upon exiting the SGP. For safety purposes, public access would be separated from other SGP roads by berms, security fencing, and the underpass to allow the public road to pass beneath the mine haul road. No stopping or deviating from the public access road would be allowed. Perpetua would restrict SGP access to any vehicles due to concerns related to public or employee health and safety, such as during road construction and maintenance, blasting, highwall scaling, mining in the immediate area of the road, and similar operations.

Public access would continue along Johnson Creek Road and Burnt Log Road. Total closures of half-day to multiple days could occur during construction work on Stibnite Road between the village of Yellow Pine and the SGP, part of Thunder Mountain Road, and Burnt Log Road.

Public use of Burntlog Route would provide motorized access to Meadow Creek Lookout Road (FR 51290) and Monumental Summit. Other routes available for public use are shown on **Figure 2.4-1.**

Public access by foot via existing trails or on roads would be restricted within the Operations Area Boundary shown on **Figure 2.4-2**. Security personnel, fencing (including wildlife exclusion fencing), and signs would restrict public access to vehicular traffic on the designated public access roadway inside the Operations Area Boundary.

Cabin Creek Road Groomed OSV Trail

Due to year-round access to the SGP along the Burntlog Route, an existing, approximately 8-mile-long groomed OSV trail from Warm Lake to Landmark would be closed for the life of the SGP. To replace this recreational use, a dedicated alternative OSV route would be established from Warm Lake area to Landmark via the Cabin Creek/Trout Creek drainages and Johnson Creek Road (**Figure 2.4-4**).

Near Warm Lake, an approximately 2-acre parking area would be established west of South Fork Road on FR 474B. A new 3.2-mile groomer access trail would be established from the parking area to the Forest Service Warm Lake Project Camp south of Paradise Valley Road (FR 488) where the groomer would be stored. An approximate 0.1-mile segment would be groomed from the intersection of Paradise Valley Road and FR 488A to Warm Lake Road. The Cabin Creek Road (FR 467) portion of the groomed OSV trail would extend approximately 13 miles to the Trout Creek Campground on Johnson Creek Road. Portions of Cabin Creek Road would require stream crossing improvements, localized road widening, and surface grading to support the OSV route grooming equipment.

Johnson Creek Groomed OSV Trail

From Trout Creek Campground to Landmark, an approximately 8-mile temporary groomed OSV trail would be created and maintained on NFS lands adjacent to the west side of Johnson Creek Road (CR 10-413). Portions of the temporary groomed OSV trail would be established using a snowplow wing attachment requiring some vegetation and tree removal to allow for safe snowplowing. In areas where topography and vegetation prevent using the wing attachment to establish the groomed OSV trail, sections would merge with Johnson Creek Road. During construction, the OSV route would include an additional 0.34 of a mile segment east along the Warm Lake Road; once construction of the Burntlog Route is complete, that segment would not be available for safety issues related to mine traffic (**Figure 2.4-4**).

Warm Lake Area OSV Connection

A 16-foot-wide groomed OSV trail would be created and maintained north of Warm Lake Road to connect the southern end of the Cabin Creek Road OSV trail to the Warm Lake Road (FR 579). It would also provide access to North Shoreline Drive (FR 489) from the Cabin Creek Road OSV trail. This 0.3-mile route would be used throughout construction and operations and would require the removal of some vegetation and trees.

Temporary OSV Closure Trout Creek Campground to Wapiti Meadows

OSV access would be temporarily halted between Trout Creek Campground and Wapiti Meadows (about 9 miles north of Trout Creek Campground on Johnson Creek Road; **Figure 2.4-4**) for approximately 2 to 3 years during construction of the Burntlog Route. Once construction of the Burntlog Route has been completed, the Johnson Creek Route would no longer be used by mine-related traffic and the OSV route would be returned to the unplowed Johnson Creek Road and extended northward to provide approximately 17 miles of groomed OSV access between Landmark and Wapiti Meadows. Resumption of OSV access between Trout Creek Campground and Wapiti Meadows would occur following construction of the Burntlog Route.

2.4.4.5 Traffic

Traffic associated with SGP construction would occur year-round, depending upon road and weather conditions. Construction-related traffic and material hauling would be most concentrated from May through November, and personnel would be transported primarily using buses and vans. The total estimated annual average daily traffic (AADT) for construction activities driving from SH 55 to the SGLF and between the SGLF and the SGP is listed in **Table 2.4-2**. Supplies and deliveries for the SGP during construction would access the SGLF using SH 55 to Warm Lake Road and would use SH 55 through Cascade and other communities along SH 55 south of Cascade including Banks and Horseshoe Bend.

Table 2.4-2 Project Construction and Operations SGP Traffic

Phase	Route	Transport Type	AADT
Construction	SH 55 to SGLF	HV	30
Construction	SH 55 to SGLF	LV	169
Total			199
Construction	SGLF to SGP	HV	45
Construction	SGLF to SGP	LV	20
Total			65
Operations	SH 55 to SGLF	HV	25
Operations	SH 55 to SGLF	LV	131
Total			156
Operations	SGLF to SGP	HV	33
Operations	SGLF to SGP	LV	17
Total			50
Reclamation and Closure	SH 55 to SGP	HV	15
Reclamation and Closure	SH 55 to SGP	LV	12
Total			27

AADT – annual average daily traffic; HV – heavy vehicle; LV – light vehicle
SGLF to SGP - Stibnite Gold Logistics Facility to Stibnite Gold Project
SH 55 to SGLF – State Highway 55 to Stibnite Gold Logistics Facility

The estimated annual average traffic to the SGLF and from the SGLF to the SGP during mining and ore processing operations is also provided in **Table 2.4-2**. Supplies and deliveries for the SGP during operations would access the SGLF using SH 55 to Warm Lake Road. Approximately two-thirds of all mine-related traffic would originate south of Warm Lake Road and would use SH 55 through Cascade and other communities along SH 55 south of Cascade including Banks and Horseshoe Bend. Approximately one-third of all mine-related traffic originating north of Warm Lake Road would use SH 55 through the communities of Donnelly, Lake Fork, and McCall. Through McCall, mine-related traffic would generally use Deinhard Lane and Boydstun Street. Employees would be encouraged to use company provided shuttle buses as transport to the SGLF from towns along SH 55.

2.4.4.6 Water Use and Water Treatment During Construction

During construction, mine-impacted water would be generated and would require treatment before being discharged to receiving streams. Water treatment plants would be modular, vendor-supplied equipment package skids placed on improved pads with covers and freeze protection for sensitive piping and equipment. Peak capacity on-site for construction water treatment requirements is expected to be 300 gpm with average flows of 18 gpm and 128 gpm during the first and second years of mine site construction, respectively. Water treatment plant residuals would be sent to the TSF for disposal.

2.4.4.7 Transmission Line Upgrades

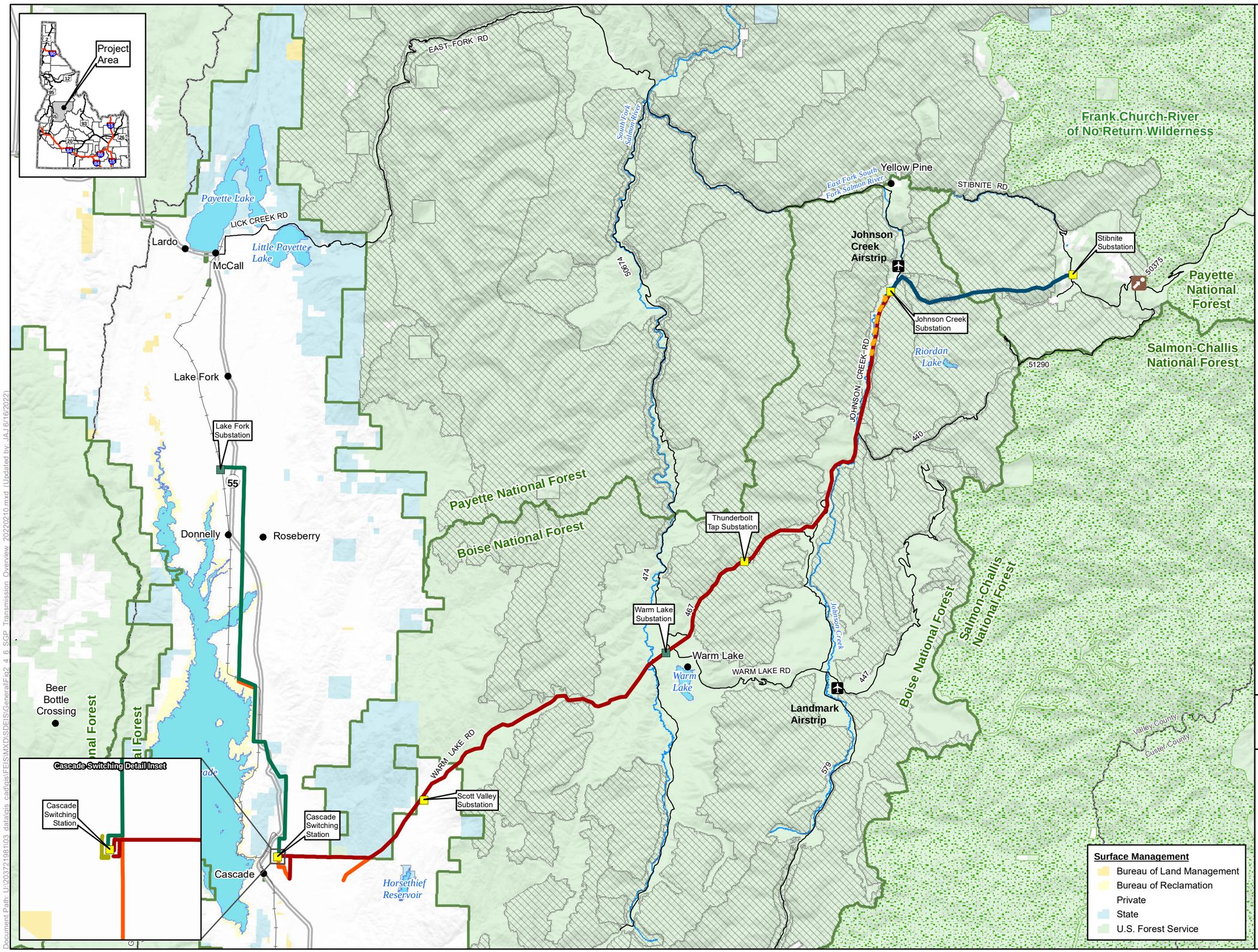
In order to serve Perpetua's 60-megawatt (MW) load requirement for the SGP, Idaho Power Company (IPCo) would rebuild or construct 72.8-miles of transmission line and associated facilities (**Figure 2.4-6**). The existing Cascade to Warm Lake 69-kV transmission line, and much of the Lake Fork to Cascade and the Warm Lake to Yellow Pine 69-kilovolt (kV) transmission lines, would be rebuilt to 138-kV clearances and capacity. A new Johnson Creek Substation would be constructed and a new 9.1-mile, 138-kV transmission line would be built between the new Johnson Creek Substation and the new Stibnite Substation at the SGP. The existing single-phase distribution line between the proposed Johnson Creek Substation and the village of Yellow Pine would remain intact. A new single-phase underground distribution line, within the existing road ROW, would be built along Johnson Creek Road between the Johnson Creek Substation and Wapiti Meadows to the south. The existing 69-kV transmission line between the Cascade Dam and the Cascade Substation would remain unchanged except for tying the two lines into the new Cascade Switching Station. A new 69-kV line would be constructed to connect the Cascade Switching Station to the existing grid to the south.

Changes to the existing IPCo system for SGP operations would include:

- Upgrade approximately 59.1 miles of the existing 12.5-kV and 69-kV transmission lines between the Lake Fork and Johnson Creek substations to 138-kV service. The ROW would be 50 to 100 feet (depending on slope aspect) and existing transmission line support structures would be replaced with taller structures.

- A new approximate 9.1-mile, 138-kV line would be constructed from the Johnson Creek substation to a new substation at the SGP, partially within a former transmission line ROW. The ROW for the new transmission line would be approximately 100 feet wide. At the SGP, transformers would reduce the voltage from 138-kV to 34.9-kV for distribution to facilities through overhead distribution lines or underground conduits.

- Upgrade the substations located at Oxbow Dam, Horse Flat, McCall, Lake Fork, and Warm Lake (**Figure 2.4-6**).



LEGEND

Project Components *

- New Substation **
- Existing Substation **

Transmission Sections

- Cascade Switching to Johnson Creek (Rebuild)
- Cascade to Cascade Switching (New)
- Johnson Creek to Stibnite (New)
- Lake Fork to Cascade Switching (Rebuild)
- Johnson Creek to Wapiti Meadows (Underground, New)
- Transmission Sections to be Removed

Other Features

- U.S. Forest Service
- Wilderness
- IRA and/or Forest Plan Special Area
- County
- City/Town
- Monumental Summit
- Airport/Landing Strip
- Railroad
- Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components associated with all Alternatives

** Substation locations are approximate

Note:
The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road.

0 2 4 Miles

1 inch = 4 miles when printed at 11x17

Figure 2.4-6
SGP Transmission Line Overview
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS The National Map: 3D Elevation Program. USGS Earth Resources Observation & Science (EROS) Center: GMTED2010. Data refreshed March, 2021. Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

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- A new substation (Johnson Creek substation) approximately 0.7 mile south of the Johnson Creek airstrip on NFS lands would be built to provide low voltage distribution to Yellow Pine and electricity to the SGP (**Figure 2.4-6**).
- New construction of the Scott Valley and Thunderbolt Tap substations, a new switching substation near Cascade (Cascade switching station), and the removal of the existing Scott Valley substation.
- Reroute approximately 5.4 miles of transmission line to avoid the Thunder Mountain Estates subdivision. The reroute would parallel Warm Lake Road for approximately 2.4 miles before crossing onto NFS and Idaho Department of Lands (IDL) land for approximately 1.7 miles. The portion crossing IDL property would require a ROW easement. An additional 1 mile of 69-kV transmission line would be required along Thunder City Road linking the existing transmission line out of Emmett to the reroute. Approximately 2.7 miles of transmission line would no longer be required and would be removed.
- Reroute approximately 0.9 miles of transmission line to approximately 600 feet north of its current location between Cascade and Donnelly to use an old railroad grade on private property and the existing transmission line would be removed.
- Install approximately 3 miles of new underground distribution power along Johnson Creek Road from the Johnson Creek substation south to Wapiti Meadows.

The transmission line extends across lands managed by the BNF, PNF, Bureau of Reclamation, IDL, and private lands (**Figure 2.4-6**). **Table 2.4-3** summarizes the transmission line segments by land ownership crossed.

Table 2.4-3 Transmission Line Segment Summary by Land Ownership (miles)

Line Segment	Total Miles[1]	Bureau of Reclamation		Forest Service		Private		State or Local	
		Miles	%	Miles	%	Miles	%	Miles	%
Lake Fork to Cascade Switching Station	20.0	1.2	6.0%	--	--	16.6	83.0%	2.2	11.0%
Cascade to Cascade Switching Station Tie	0.1	--	--	--	--	0.1	100.0%	--	--
Cascade Switching Station to Johnson Creek	43.6	--	--	31.5	72.2%	6.6	15.1%	5.5	12.6%
Johnson Creek to Stibnite	9.1	--	--	8.7	95.6%	0.4	4.4%	--	--
Transmission Line Total	72.8	1.2	1.6%	40.2	55.2%	23.7	32.6%	7.7	10.4%
Johnson Creek to Wapiti Meadows Distribution (underground)	3.1	--	--	2.6	83.9%	0.5	16.1%	--	--

Source: Land ownership derived from parcel data (Valley County 2019).

[1] Totals may not sum correctly due to rounding.

Both temporary and permanent disturbances would be required for the construction of the transmission line and substations. While existing structure locations would be used when possible, the removal and installation of new structures would require temporary disturbance. Where possible, single-pole structures would be installed rather than H-frame structures to minimize the structure disturbance footprint. **Table 2.4-4** lists areas permanently disturbed for each transmission line structure type.

Table 2.4-4 Land Permanently Disturbed for Transmission Line Structures

Structure Type	Area Required Permanently
Single Pole Tangent Structure	16 square feet, 4-foot by 4-foot base
Single Pole Guyed Structure	28 square feet, 4-foot by 4-foot base, 3 x multi-helix screw anchors
H-Frame Tangent Structure	64 square feet, 16-foot by 4-foot base
H-Frame Guyed Structure	156 square feet, 37-foot by 4-foot base Up to 500 square feet, for up to 10, 5-foot by 10-foot down guy wire plate anchors

Each transmission line structure site needs a construction space large enough to remove the existing structure, excavate structure foundation holes, and install new structure poles and any guys and anchors. Temporary disturbance is based on a 100-foot by 60-foot pad for each structure location. Some temporary disturbance areas would be 100-foot by 100-foot pads. Lands affected during construction by line segment and substations and the land status are listed in **Table 2.4-5**.

Lands required permanently for Project operations by route segment and land status are listed in **Table 2.4-6**.

Table 2.4-5 Land Affected During Construction by Line Segment/Project Component and Land Status (acres)

Line Segment/Project Component	Bureau of Reclamation	U.S. Forest Service	Private	State or Local	Total[1]
Lake Fork to Cascade Switching Station					
Access, Existing (Minor Improvements, 0-50%)	--	--	12.2	1.6	13.8
Access, Existing (Major Improvements, 50-100%)	--	--	0.9	6.5	7.4
Access, New (Bladed)	--	--	0.1	0.8	0.9
Access, New (Overland Travel)	1.1	--	24.4	1.1	26.7
Access, Temporary (Overland Travel)	1.6	--	<0.1	--	1.6
Pulling-Tensioning Sites	1.2	--	9.1	1.0	11.3
Staging Areas	--	--	--	--	--
Structures	1.7	--	36.2	3.7	41.6
Structures (Remove Existing)	1.5	--	<0.1	--	1.6
Lake Forest to Cascade Switching Station – Total[1]	7.1	--	82.9	14.7	104.9

Line Segment/Project Component	Bureau of Reclamation	U.S. Forest Service	Private	State or Local	Total[1]
Cascade Switching Station to Cascade Substations					
Access, Existing (Minor Improvements, 0-50%)	--	--	--	--	--
Access, Existing (Major Improvements, 50-100%)	--	--	--	--	--
Access, New (Bladed)	--	--	--	--	--
Access, New (Overland Travel)	--	--	0.1	--	0.1
Pulling-Tensioning Sites	--	--	0.2	--	0.2
Staging Areas	--	--	--	--	--
Structures	--	--	0.5	--	0.5
Cascade Switching Station to Cascade Substations – Total[1]	--	--	0.8	--	0.8
Cascade Switching Station to Johnson Creek					
Access, Existing (Minor Improvements, 0-50%)	--	55.0	2.0	0.3	57.3
Access, Existing (Major Improvements, 50-100%)	--	65.7	4.4	7.5	77.5
Access, New (Bladed)	--	2.8	0.7	1.2	4.7
Access, New (Overland Travel)	--	0.9	7.7	1.4	10.0
Access, Temporary (Minor Improvements, 0-50%)	--	--	1.6	0.2	1.7
Access, Temporary (Overland Travel)	--	--	2.0	--	2.0
Pulling-Tensioning Sites	--	17.3	4.4	3.1	24.7
Staging Areas	--	17.3	9.9	--	27.1
Structures	--	31.7	12.3	6.4	50.4
Structures, (Remove Existing)	--	--	4.7	<0.1	4.8
Substation, Cascade Switching Station	--	--	2.6	--	2.6
Substation, Johnson Creek	--	1.1	--	--	1.1
Substation (Scott Valley), Stibnite Gold Logistics Facility	--	---	0.9	--	0.9
Substation, Thunderbolt Drop Substation	--	0.1	--	--	0.1
Substation, Warm Lake	--	0.3	--	--	0.3
Cascade Switching Station to Johnson Creek – Total[1]	--	192.2	53.2	20.1	265.2

Line Segment/Project Component	Bureau of Reclamation	U.S. Forest Service	Private	State or Local	Total[1]
Johnson Creek to Stibnite					
Access, Existing (Minor Improvements, 0-50%)	--	10.9	1.1	--	12.0
Access, Existing (Major Improvements, 50-100%)	--	36.5	1.2	--	37.6
Access, New (Bladed)	--	15.3	0.6	--	15.9
Access, New (Overland Travel)	--	--	--	--	--
Pulling-Tensioning Sites	--	6.5	0.5	--	7.0
Staging Areas	--	9.7	9.2	--	18.9
Structures	--	8.7	0.9	--	9.7
Johnson Creek to Stibnite – Total[1]	--	87.6	13.5	--	101.1
Total for all Line Segments/Project Components					
Access, Existing (Minor Improvements, 0-50%)	--	65.9	15.3	1.9	83.2
Access, Existing (Major Improvements, 50-100%)	--	102.1	6.4	14.0	122.6
Access, New (Bladed)	--	18.1	1.4	2.0	21.5
Access, New (Overland Travel)	1.1	0.9	32.3	2.6	36.8
Access, Temporary (Minor Improvements, 0-50%)	--	--	1.6	0.2	1.7
Access, Temporary (Overland Travel)	1.6	--	2.0	--	3.6
Pulling-Tensioning Sites	1.2	23.8	14.1	4.1	43.2
Staging Areas	--	27.0	19.0	--	46.0
Structures	1.7	40.4	52.0	10.1	99.9
Structures (Remove Existing)	1.5	--	4.7	<0.1	6.3
Substation, Cascade Switching Station	--	--	2.6	--	2.6
Substation, Johnson Creek	--	1.1	--	--	1.1
Substation (Scott Valley), Stibnite Gold Logistics Facility	--	--	0.9	--	0.9
Substation, Thunderbolt Drop Substation	--	0.1	--	--	0.1
Substation, Warm Lake	--	0.3	--	--	0.3
Proposed Lines/Project Component - Total	7.1	279.7	152.3	34.9	469.8

Source: Land ownership derived from parcel data (Valley County 2019).

[1] Totals may not sum correctly due to rounding.

Table 2.4-6 Land Permanently Disturbed During Operations by Line Segment/Project Component and Land Status (acres)

Line Segment/Project Component	Bureau of Reclamation	U.S. Forest Service	Private	State or Local	Total[1]
Lake Forest to Cascade Switching Station					
Access, Existing (Minor Improvements, 0-50%)	--	--	7.1	1.0	8.0
Access, Existing (Major Improvements, 50-100%)	--	--	0.4	3.1	3.4
Access, New (Bladed)	--	--	0.1	0.3	0.4
Access, (Overland Travel)	1.0	--	21.4	1.0	23.3
Structures	<0.1	--	0.1	<0.1	0.1
Lake Forest to Cascade – Total[1]	1.0	--	29.1	5.4	35.2
Cascade Switching Station to Cascade Substations					
Access, Existing (Minor Improvements, 0-50%)	--	--	--	--	--
Access, Existing (Major Improvements, 50-100%)	--	--	--	--	--
Access, New (Bladed)	--	--	--	--	--
Access, New (Overland Travel)	--	--	0.1	--	0.1
Structures	--	--	<0.1	--	<0.1
Lake Forest to Cascade – Total[1]	--	--	0.1	--	0.1
Cascade Switching Station to Johnson Creek					
Access, Existing (Minor Improvements, 0-50%)	--	32.1	1.2	0.2	33.4
Access, Existing (Major Improvements, 50-100%)	--	30.4	2.0	3.4	35.8
Access, New (Bladed)	--	1.0	0.2	0.5	1.7
Access, New (Overland Travel)	--	0.8	6.8	1.2	8.8
Structures	--	0.4	0.1	0.1	0.5
Substation, Cascade SwitchingStation	--	--	2.6	--	2.6
Substation, Johnson Creek	--	0.4	--	--	0.4
Substation (Scott Valley), Stibnite Gold Logistics Facility	--	--	0.9	--	0.9
Substations, Thunderbolt Drop Substation	--	0.1	--	--	0.1
Substation, Warm Lake	--	0.3	--	--	0.3
Cascade to Johnson Creek – Total[1]	--	65.5	13.8	5.4	84.5

Line Segment/Project Component	Bureau of Reclamation	U.S. Forest Service	Private	State or Local	Total[1]
Johnson Creek to Stibnite					
Access, Existing (Minor Improvements, 0-50%)	--	6.4	0.6	--	7.0
Access, Existing (Major Improvements, 50-100%)	--	17.0	0.5	--	17.6
Access, New (Bladed)	--	6.0	0.2	--	6.3
Access, New (Overland Travel)	--	--	--	--	--
Structures	--	0.1	<0.1	--	<0.1
Johnson Creek to Stibnite – Total[1]	--	29.5	1.3	--	30.9
Proposed Route (Total)					
Access, Existing (Minor Improvements, 0-50%)	--	38.4	8.9	1.1	48.5
Access, Existing (Major Improvements, 50-100%)	--	47.5	2.9	6.5	56.8
Access, New (Bladed)	--	7.1	0.5	0.8	8.4
Access, New (Overland Travel)	1.0	0.8	28.2	2.2	32.2
Structures	<0.1	0.5	0.1	0.1	0.8
Substation, Cascade SwitchingStation	--	--	2.6	--	2.6
Substation, Johnson Creek	--	0.4	--	--	0.4
Substation (Scott Valley), Stibnite Gold Logistics Facility	--	--	0.9	--	0.9
Substation, Thunderbolt Drop Substation	--	0.1	--	--	0.1
Substation, Warm Lake	--	0.3	--	--	0.3
Proposed Lines/Project Component – Total[1]	1.0	95.1	44.1	10.7	151.0

Source: Land ownership derived from parcel data (Valley County 2019).

[1] Totals may not sum correctly due to rounding.

Transmission Line Structures

The transmission line structures would use standardized IPCo structure types, including single-pole and H-frame structures in a variety of configurations. Distribution underbuild is a construction method where the distribution voltage circuit is constructed underneath the transmission circuit to reduce the number of power poles. Single-pole structures would be used in areas where distribution underbuild is present, shorter structure spans are needed, smaller corridors are used, or a limited structural footprint is required. Typical spans for single-pole structures would be approximately300 feet in length. H-frame structures typically comprise two poles and would be used for areas where longer spans, increased structural capacity, or mountainous terrain is encountered. Typical spans for H-frame structures would be approximately 600 feet in length. Structure heights would vary between 45 and 80 feet depending upon structure type and terrain. However, structure heights greater than 80 feet could be required in isolated instances.

The estimated number of each type of structure by line segment is available in the Plan of Development for Electrical Transmission, Stibnite Gold Project (Perpetua 2021b).

Foundations

Structure foundations would include direct embedded wood poles. Angle structures and dead-end structures could require the excavation and placement of guy anchors to complete the structure installation, if needed. In locations where guy anchors would not be feasible and designed steel poles would be necessary, structures would be supported by drilled pier caisson foundations.

Conductors

Electrical transmission and distribution lines use metallic conductors to allow the flow of current which are designed in a manner that balances current flow, strength, and sagging characteristics. Alternating current (AC) transmission lines use three phases for each transmission circuit. IPCo standards require a minimum ground clearance of 24.5 feet for all new construction of 138-kV transmission lines. Additionally, the transmission lines would include fiber-optic cables and 3/8-inch steel overhead ground wire.

Overhead Ground Wire and Electrodes

Overhead ground wires are required to provide a transmission system with protection from the adverse effects of lightning. The shielding of the transmission system would be provided by an optical ground wire,which is a steel-coated, fiber-optic cable that provides the same levels of system protection as steel overhead ground wire, but also includes a core of fiber-optic cables used for communications.

Distribution Underbuild

Distribution underbuild (the lower voltage line) would be co-located on the transmission line structures under the primary 138-kV voltage (the higher voltage line).

Distribution underbuild is usually the last remaining conductor to be installed after the transmission conductors, overhead ground wire, and optical ground wire are finished.

Grounding

Grounding a transmission line is required to operate and maintain the facility safely. The grounding process is achieved by electrically connecting structure hardware to a ground rod buried within the earth. This electrical connection of hardware allows the safe flow of current and does not allow the build-up of voltage that could cause a mechanical failure or safety concern.

An electrical effects study is required to determine the methods and equipment needed to safely mitigate the site-specific current flows through these adjacent facilities.Typically, all metallic structures within the ROW would be grounded, including buildings, fences, and pipelines. If the electrical effects study determines that structures outside of the ROW require grounding, mitigation measures to safely ground those facilities would be required.

Other Nonelectrical Hardware

For utilities where avian protection and aircraft warnings are required, non-electrical hardware may be installed on the line. This hardware or marking could include bird flight diverters, marker balls, tower lighting, or tower painting. Structures would be marked or protected from avian intersect using the guidelines and methodologies detailed in the Avian Power Line Interaction Committee (APLIC) recommendations. Any Federal Aviation Administration (FAA) requirements would be in accordance with

the FAA Circular 70/7460 document, which details the operational requirements for structures exceeding a safe operational elevation in relation to air space.

Access Roads

In addition to the transmission line work detailed above, the existing road network used to access these structures may require maintenance/improvements to allow construction equipment safe access into the power line corridor. While the existing road network proximate to the transmission line ROW would be used to the maximum extent possible, some new service roads (roads used solely by Perpetua or IPCo to access Project facilities) could be needed to reach structure locations without existing access.

Additionally, overland service routes would be required from the existing access road to reach structure locations without current access. These overland service routes would not require blade work (i.e., recontouring). A 14-foot-wide ROW is being requested for the existing/proposed roads outside of the power line corridor ROW to accommodate construction and maintenance equipment. For FR 467, a 16-foot-wide ROW is being requested to accommodate OSV.

During construction, the new section of transmission line between the Johnson Creek substation and the SGP would require major improvements to Horse Heaven Road (FR 416W), NFS Trail 233 (no name), and approximately 4 miles of new spur roads would be constructed. Minor upgrades to Cabin Creek Road (FR 50467) would also be required.

Road maintenance requirements prior to construction would vary depending on the type of road, level of use, and condition of the road. However, maintenance generally would consist of clearing vegetation and rocks, as well as repairing cut and fill slope failures, as necessary, to allow for a 14- foot-wide road surface. In most cases, the roads would be left as close to an undeveloped nature (i.e., two-track road) as possible without creating environmental degradation (e.g., erosion or rutting from poor water drainage). Equipment to perform the required road maintenance would include hand tools (e.g., chainsaws), track driven machines (bulldozers and graders) and crew- haul vehicles (such as 4-wheel-drive pickups and/or off-highway vehicles [OHV; includes all terrain vehicles (ATVs), utility task vehicles (UTVs) and side-by-sides]). Roads would be opened/cleared for use by trucks transporting materials, excavators, drill rigs, bucket trucks, pickup trucks, and crew-haul vehicles. Specific actions, such as installing water bars and dips to control erosion and stormwater, would be implemented to reduce construction impacts and would follow standard designs.

Access road construction and disturbance can typically be summarized into five types of access roads:

- **Existing (No Improvement)** – These existing roads provide access to structures and would not require improvement. Minor maintenance activities such as pruning of vegetation for construction vehicle access and applying water to the road to reduce dust may be required.

- **Existing (Minor Improvement)** – These existing roads provide access to structures and should not require significant improvement to utilize for construction. Existing road widths typically vary from 14-foot-wide access roads to 24-foot-wide gravel roads with 14 feet being the minimum needed to accommodate construction traffic. Minor maintenance activities such as applying water to the road to reduce dust and improve workability of the soil for blading and compaction, and blading may be required during and after construction to support construction traffic and return the road to a preconstruction condition.

- **Existing (Major Improvement)** – These existing roads provide access to the structures and may require major reconstruction work. These roads appear to be in questionable condition and would

likely require major reconstruction to support construction traffic. Existing road widths may be as narrow as 8 feet for primitive two-track roads that need reconstruction to widen the driving surface to 14 feet, with curve widening and turnouts added to accommodate construction traffic. Overall disturbance width is estimated to be an average of 20 feet, which includes cut/fill slopes and other impacts associated with reconstruction. Maintenance activities such as applying water to the road, to reduce dust and improve workability of the soil, and blading may be required during and after construction to support construction traffic. Aggregate/crushed rock placement may be required to maintain the existing road.

- **New (Overland Travel)** –These roads traverse existing agricultural fields or open areas and are not expected to require grading work to support construction traffic. No permanent road construction is anticipated on these routes, and any earthwork or aggregate imported would be reclaimed after construction. Temporary driving surface is estimated to be 14 feet to accommodate construction traffic. Sections of road that cross wet fields or wetlands may have temporary matting installed to provide a stable surface to support construction equipment without disturbing the ground. Minor work such as grade smoothing at ditches or large rock removal may be required to provide a drivable surface.

- **New (Bladed)** – New bladed roads are typically required where the existing ground has a significant cross slope or traverses terrain that needs to be bladed smooth. Construction of the road prism would require excavation and placement of fill material to provide a stable driving surface. The driving surface is constructed to a minimum width of 14 feet and includes curve widening and turnouts to accommodate construction traffic. Overall disturbance width is estimated to be an average of 35 feet, which includes cut/fill slopes and other impacts associated with construction. Earthwork quantities are typically balanced for each road by adjusting the grade to balance material being cut versus filled. Surfacing rock is not typically placed on these roads unless required by stakeholders or needed to support construction traffic.

Table 2.4-7 provides a summary of miles of access roads by route segment and land status.

Table 2.4-7 Miles of Access Roads by Line Segment and Land Ownership

Line Segment/Access Type	Bureau of Reclamation	Forest Service	Private	State or Local	Total[1]
Lake Fork to Cascade Switching Station					
Access, Existing (No Improvements)	--	--	0.2	<0.1	0.2
Access, Existing (Minor Improvements, 0-50%)	--	--	4.2	0.6	4.7
Access, Existing (Major Improvements, 50-100%)	--	--	0.2	1.8	2.0
Access, New (Bladed)	--	--	<0.1	0.2	0.2
Access, New (Overland Travel)	0.6	--	12.6	0.6	13.7
Access, Temporary (Overland Travel)	0.8	--	<0.1	--	0.8
Lake Fork to Cascade Switching Station – Total[1]	1.4	--	17.3	3.1	21.8

Line Segment/Access Type	Bureau of Reclamation	Forest Service	Private	State or Local	Total[1]
Cascade to Cascade Switching Station Tie					
Access, Existing (No Improvements)	--	--	--	--	--
Access, Existing (Minor Improvements, 0-50%)	--	--	--	--	--
Access, Existing (Major Improvements, 50-100%)	--	--	--	--	--
Access, New (Bladed)	--	--	--	--	--
Access, New (Overland Travel)	--	--	<0.1	--	<0.1
Cascade to Cascade Switching Station Tie – Total[1]	--	--	<0.1	--	<0.1
Cascade Switching Station to Johnson Creek					
Access, Existing (No Improvements)	--	5.1	4.2	4.6	13.9
Access, Existing (Minor Improvements, 0-50%)	--	18.9	0.7	0.1	19.7
Access, Existing (Major Improvements, 50-100%)	--	17.8	1.1	2.0	20.9
Access, New (Bladed)	--	0.6	0.1	0.3	1.0
Access, New (Overland Travel)	--	0.4	4.0	0.7	5.1
Access, Temporary (Minor Improvements, 0-50%)	--	--	0.5	0.1	0.6
Access, Temporary (Overland Travel)	--	--	1.0	--	1.0
Cascade Switching Station to Johnson Creek – Total[1]	--	42.8	11.6	7.7	62.1
Johnson Creek to Stibnite					
Access, Existing (No Improvements)	--	<0.1	0.7	--	0.7
Access, Existing (Minor Improvements, 0-50%)	--	3.7	0.4	--	4.1
Access, Existing (Major Improvements, 50-100%)	--	10.1	0.3	--	10.3
Access, New (Bladed)	--	3.5	0.1	--	3.7
Access, New (Overland Travel)	--	--	--	--	--
Johnson Creek to Stibnite – Total[1]	--	17.3	1.5	--	18.9

Line Segment/Access Type	Bureau of Reclamation	Forest Service	Private	State or Local	Total[1]
Total for all Line Segments					
Access, Existing (No Improvements)	--	5.1	5.2	4.6	14.9
Access, Existing (Minor Improvements, 0-50%)	--	22.6	5.2	0.6	28.5
Access, Existing (Major Improvements, 50-100%)	--	27.9	1.7	3.8	33.3
Access, New (Bladed)	--	4.1	0.3	0.4	4.8
Access, New (Overland Travel)	0.6	0.4	16.6	1.3	18.9
Access, Temporary (Minor Improvements, 0-50%)	--	--	0.5	0.1	0.6
Access, Temporary (Overland Travel)	0.8	--	1.0	--	1.8
Proposed Line Segment – Total[1]	1.4	60.2	30.5	10.7	102.8

Source: Land ownership derived from parcel data (Valley County 2019).

[1] Totals may not sum correctly due to rounding.

Substations

IPCo determined there would be a need to increase the 230/138-kV transformer capacities at the Oxbow and Horse Flat substations to support the SGP load. A 20 megavolt amps reactive capacitor bank would also need to be installed at the McCall Substation for voltage support under abnormal (element out of service) conditions. A new 138/69-kV switching substation would be required to be located near Cascade. Several smaller substations along the transmission line from Cascade to Yellow Pine would also need to be upgraded from 69-kV to 138-kV. A 138-kV metering substation would be placed in the Johnson Creek area to feed the village of Yellow Pine and serve as a metering point for the Stibnite 138-kV line. The substations would be operated and maintained by IPCo. **Table 2.4-6** provides the area that is needed, by land status, for each of the substations.

Additional details regarding the upgrades needed to existing substations and the construction of new substations are available in the Electrical Transmission POD (Perpetua 2021b).

Periodic inspections of the transmission lines and supporting structures would be required and conducted as described below. Depending on the results of the inspection, maintenance work may be scheduled for immediate follow up (e.g., in the case of imminent failure or safety issues) or follow up in subsequent year(s) (e.g., issues that need to be repaired but do not cause an imminent problem). The activities presented below are considered routine Operation and Maintenance activities. Subject to specific terms, conditions, and stipulations of the ROW grant and reporting requirements contained herein, these activities may be conducted by IPCo as necessary and without prior notification to the Forest Service:

- Routine air patrols to inspect for structural and conductor defects, conductor clearance problems, and hazardous trees. These are typically conducted from a helicopter, and personnel include a pilot and line patrolmen.

- Routine ground patrols to inspect structural and conductor components. A vast majority of such inspections would require either a pickup truck or OHV. Patrols may rely on direct line of-sight and/or binoculars. Patrols are typically conducted in the spring and fall.
- Climbing surveys to inspect hardware or make repairs. Personnel access these structures by pickup, OHV, or on foot.
- Line and structure inspections may also be conducted using unmanned aerial vehicles.
- Structure or conductor maintenance from a bucket truck. Routine cyclical vegetation clearing to trim or remove tall shrubs and trees to prevent encroachment into the minimum vegetation clearance distance consistent with IPCo standards.
- During all vegetation clearing activities, IPCo would ensure there is no disturbance of the soil surface that would create an added risk of erosion, the promotion of the establishment or expansion of invasive species (including noxious weeds), damage to cultural resources, sensitive species, or Endangered Species Act (ESA) listed species.
- Removal of hazard trees within, or adjacent to, the ROW that pose a risk of falling into conductors or structures and causing outages or fires. Wood pole inspection and treatment to retard rotting and structural degradation.
- Routine inspection and maintenance of authorized service and access roads (length and width and alignment of road remains the same), such as blading the road to maintain the surface condition and drainage, removing minor physical barriers (i.e., rocks and debris), replacing culverts or rock crossing, and rehabilitating after major disturbances requiring heavy equipment (such as slumping). Heavy equipment would travel and maneuver on existing service and access roads.
- Vegetation removal on service roads to allow the necessary clearance for access and provide for worker safety. Removal is conducted by hand crews using chain saws or by mechanical means. Plants that would not interfere with the safe operation of vehicles and equipment would be left in place.
- Installation of bird protection devices, bird perch discouragers, and relocation or removal of bird nests. Under the authority of the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, or Idaho Code, the appropriate permits would be acquired from the USFWS and/or Idaho Department of Fish and Game, prior to relocation or removal of nests.
- Reduction of fuel loads around wood poles in fire-prone areas by (1) removal of vegetation within a 20-foot radius and/or treatment with herbicide from the approved Forest Service list by a certified applicator, and in accordance with the Pesticide Use Permit, or (2) application of fire-retardant coating to the base of wood poles. If herbicide is used, IPCo would report to the Forest Service the amount used for Forest Service's herbicide application yearly report.
- In-kind structure replacement (such as replacing a cross-arm, replacing an insulator, replacing a single wood pole with a single wood or steel pole). A bucket truck and/or other rubber- tired vehicles may be located on or off a road.
- Non-cyclical vegetation clearing to remove saplings or larger trees in the ROW consistent with IPCo standards.

- Structure or conductor maintenance in which earth must be moved, such as for the creation of a landing pad for construction or maintenance equipment.
- Follow-up restoration activities, such as seeding, noxious-weed control, and erosion control. To minimize the potential for wildland fires to damage structures, reseeding activities would not occur within a 20-foot radius around structures.
- Conductor replacement, which requires the use of several types of trucks and equipment and grading to create a safe work area to hang and pull the conductor into place.

Substation maintenance activities would include equipment testing, preventative repair, and procedures for providing continual service and maintaining electrical service. Typical substation maintenance does not require ground-disturbing activity, although ground disturbance could be required to replace damaged equipment, oil containment facilities, or other miscellaneous items.

2.4.4.8 Communication Towers and Repeater Sites

Perpetua installed a microwave relay communications tower in 2013, on private land to the east of the SGP, for communications. The existing communications tower would be upgraded by anchoring the existing tower pad; extending the tower 20 feet in height; upgrading the antenna by adding a dish or second antenna; and installing new high frequency radios capable of increasing bandwidth to 1,000 megabits per second. The existing microwave relay tower is shown on **Figure 2.4-1**.

The existing two-way radio system would need to be expanded at the SGP and along the Burntlog Route to allow rapid communication between equipment operators and ground personnel, and to allow broadcast of emergency messages. The two-way radio system would be supported by a series of repeaters placed on public and private land.

A series of VHF radio repeaters would be placed along the Burntlog Route as needed. The VHF repeaters would be placed near the existing Meadow Creek Lookout and Thunderbolt Lookout communication sites, the new Burntlog Maintenance Facility, and on private parcels at the SGP, as needed. The 10-foot-tall towers on 3-foot by 3-foot concrete pads would be supported by solar panels, support hardware, and a backup battery case. Given their location at existing or proposed facilities, no additional disturbance for equipment installation or access would be required for their construction or maintenance. Each site would be accessed annually (at a minimum) or as required for maintenance. No additional disturbance for equipment installation or access would be required.

A cell tower also would be installed to facilitate area communications. The proposed cell tower would be approximately 60 feet tall and would include surface disturbance of approximately 30 feet by 60 feet (0.04 acre) and utilizing an existing access road. The cell tower location would be near the proposed transmission line alignment upslope of the Hangar Flats pit (**Figure 2.4-1**).

2.4.4.9 Off-site Facilities

Perpetua would require off-site facilities to support mine-related activities. Administrative offices, a transportation hub, and warehousing and assay laboratory would be located at the proposed SGLF, while road maintenance and snow removal activities would be supported from the proposed Burntlog Maintenance Facility.

Stibnite Gold Logistics Facility (SGLF)

The SGLF would be located along Warm Lake Road on private land (approximately 7 miles northeast of Cascade), with access to SH 55 (**Figure 2.4-1**). The SGLF would require approximately 25 acres of disturbance to accommodate employee parking, an assay laboratory building, a core sampling logging storage facility, warehouses, laydown yards, equipment inspection areas, a truck scale, and an administration building for Perpetua personnel (**Figure 2.4-7**). The facility would be surrounded by a security fence. One point of ingress/egress would access office parking and the mine personnel card-entry gate, while another ingress/egress would access the truck yard via a guard shack. The parking and assembly area would accommodate approximately 250 light vehicles for employees using bus or van pooling to the SGP. Perpetua would mandate the use of busing and vans for employee and contractor transportation to the SGP.

Perpetua would require supply truck drivers to check in at the SGLF and direct them to either proceed to the SGP or unload at the warehouse for temporary storage and consolidation of their load. A truck scale would be located at the SGLF to verify loads going into or out of the warehouse area. The check-in process would include general safety and road readiness inspection of incoming trucks and equipment being transported to SGP. Heavy equipment transport vehicles would be inspected for items such as presence of weeds, excessive soil on earth moving equipment, safety equipment, installed and maintained engine brake muffling systems, and general safety checks of equipment.

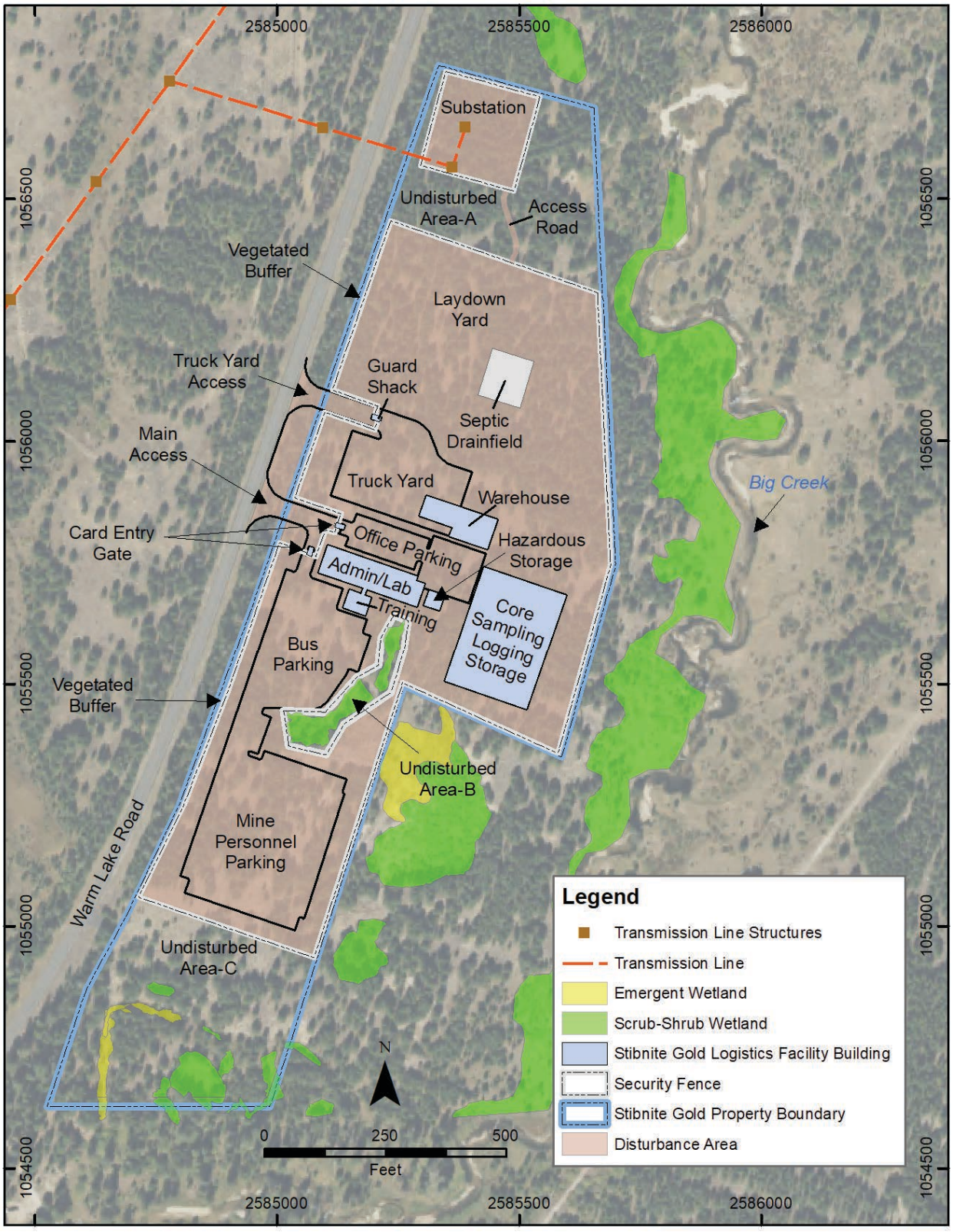
In addition, the Scott Valley substation would be located within the property boundary north of the SGLF, surrounded by a separate security fence.

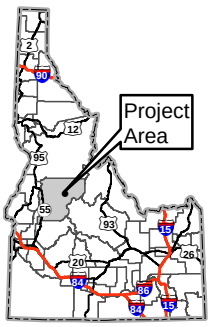
The SGLF would require a domestic groundwater well to service the facility. This well and associated water right would require permitting through the Idaho Department of Water Resources (IDWR).

Burntlog Maintenance Facility

The Burntlog Maintenance Facility would be located on NFS land within a previously disturbed borrow source site 4.4 miles east of the junction of Johnson Creek Road and Warm Lake Road (**Figure 2.4-1**) and would be accessed via the Burntlog Route with two points of ingress/egress. The facility footprint would be approximately 3.5 acres and would not be fenced. The facility would include three main buildings: a 7,000-square-foot maintenance building; a 7,000-square-foot aggregates storage building; and a 4,050-square-foot equipment shelter (**Figure 2.4-8**). It would also contain a fuel station, electric generator, propane tank, outdoor storage area, and worker sleeping quarters. It would house sanding/snowplowing trucks, snow blowers, road graders, and support equipment in the equipment shelter or maintenance buildings. The Burntlog Maintenance Facility would require a domestic groundwater well to service the facility. This well and associated water right would require permitting through the IDWR.

This facility would include a double-contained fuel storage area housing three above-ground 2,500-gallon fuel tanks for on-road diesel, off-road diesel, and unleaded gasoline. Additionally, a 1,000-gallon used oil tank would be located inside the maintenance facility and a 1,000-gallon propane tank would be located at the facility for heating.



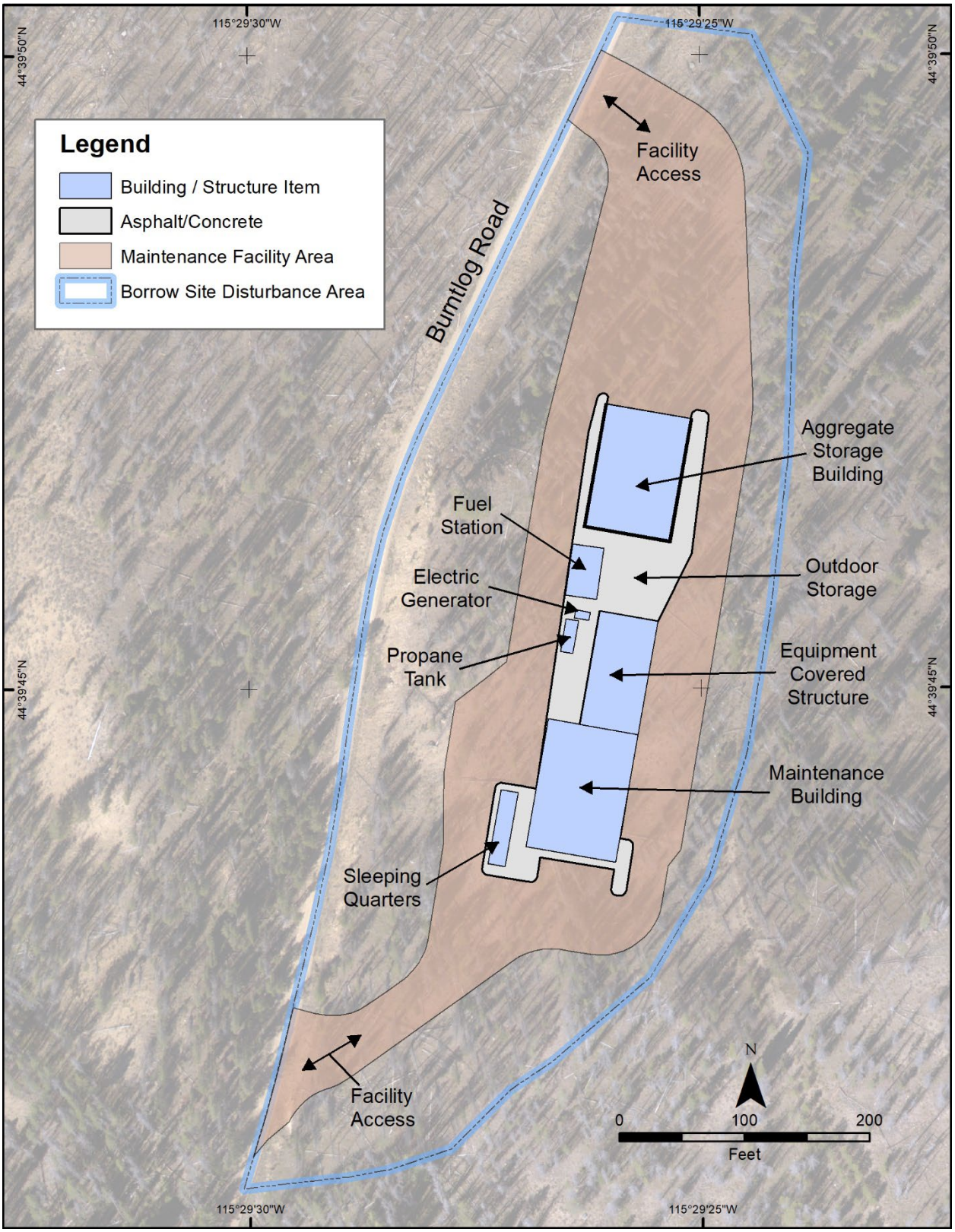


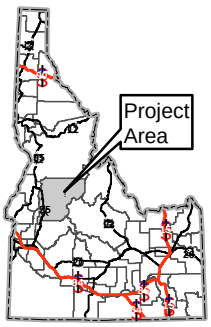
(See Figure 2.4-1 for location of Stibnite Gold Logistics Facility.)

Figure 2.4-7
Stibnite Gold Logistics Facility

Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021a





(See Figure 2.4-1 for the Burntlog Maintenance Facility location.)

Figure 2.4-8
Burntlog Maintenance Facility

Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021a

Additional features of this facility could include covered stockpiles of coarse sand and gravel for winter sanding activities; temporary or emergency on-site housing for road maintenance crews during periods of heavy snow removal needs and other winter maintenance activities; and communications equipment including a tower. This facility could also serve to support snowmobile trail grooming and grooming equipment storage as needed.

2.4.5 Mine Operations

The SGP would consist of mining three primary mineral deposits and the re-mining of historical tailings using conventional open pit shovel and truck mining methods. Ore from three open pits (Yellow Pine, Hangar Flats, and West End pits) would be sent to either the crusher, located near the processing plant, or one of several ore stockpiles in various locations within the Operations Area Boundary (**Figure 2.4-2**; M3 2021). Pre-stripping, or removing the overlying soil and rock (i.e., development rock) to access the mineral deposit, would commence during the construction phase in Mine Year -2. Ore removal and processing would begin in Mine Year 1 (operations phase) and continue year-round for approximately 15 years. Mine operations would occur in the area of two historical open pit mined areas (Yellow Pine and West End) and one new open pit (Hangar Flats) that includes former underground mining and mineral processing facilities.

In general, ore mined from the three open pits would be hauled directly to the primary crusher area; however, during extended periods when the ore tonnage or ore type from the pits exceed the availability of the ore processing plant, the ore would be stockpiled and processed at a future time. Development rock (also commonly referred to as waste rock) would be hauled to the TSF embankment or placed in one of four destinations: the TSF Buttress or the Yellow Pine, Hangar Flats, and West End open pits once they are mined out.

2.4.5.1 Open Pits

Figure 2.4-2 shows the location and extent of the three pits to be mined. A general sequence for mining, assuming 15 years of mine operations as shown on **Figure 2.4-3**, would be as follows:

- Yellow Pine pit – Mine Years 1 through 7
- Hangar Flats pit – Mine Years 4 through 7
- West End pit – Mine Years 7 through 12
- Stockpile mining – Mine Years 12 through 15

The Yellow Pine pit would be in the northern portion of the SGP, in the same general location as a historical open pit mining area. The pit would be expanded to include a shallower mining area to the northeast previously mined as the Homestake pit. The East Fork SFSR currently flows through the legacy Yellow Pine pit, forming a small pit lake (Yellow Pine pit lake), when the East Fork SFSR flowed into the pit after it was abandoned in the 1950s.

The West End pit would be in the northeast portion of the SGP, east of and at a higher elevation than the Yellow Pine pit, generally situated between Sugar Creek to the north and Midnight Creek to the south. The West End pit would be in the same general location as historical open pit mining where multiple open pits, mine benches, waste rock dumps, and areas of deep backfill exist. The existing Stibnite pit is within the southern portion of the West End pit, and once expanded would be known as the Midnight pit.

The Hangar Flats pit would be in the central portion of the SGP, generally encompassing steep south and southeast facing slopes and the adjacent Meadow Creek valley floor at the toe of these slopes. Historical mining activity in this area was primarily underground but the proposed pit also would encompass the site of the former Bradley mill and smelter, the Hecla heap leach, and Stibnite Mine Inc. leach pads.

Table 2.4-8 provides a summary of characteristics for each pit.

Table 2.4-8 Summary of Characteristics for Mine Pits

Characteristic	Yellow Pine Pit	West End Pit	Hangar Flats Pit
Acreage	222	185	66
Bottom Elevation (feet amsl)	5,360	6,180	6,080
Depth (feet) below existing ground surface	720	440	460
Highwall Height Above Valley Bottom (feet)	600 for western highwall 900 for eastern highwall	1,000 highwalls	800 for northwestern highwall
Approximate Tonnage Mined (in million tons)	163	198	31
Disposal of Development Rock	TSF embankment, TSF Buttress, Yellow Pine backfill	Yellow Pine backfill, TSF Buttress, Hangar Flats backfill, TSF embankment, Midnight backfill	TSF embankment, TSF Buttress, Yellow Pine backfill

Table Source: Perpetua 2021a

amsl = above mean sea level

Partial dewatering of the open pits would occur prior to and concurrent to renewed SGP mining. Shallow alluvial and deeper bedrock wells would be drilled adjacent to the pits to intercept and pump groundwater before it flows into the pits. During mine operations, groundwater seepage and in-pit surface water runoff would be collected for reuse in the ore processing plant or treated and discharged, according to whether there was a water deficit or surplus at a given time. Additional details on pit water management can be found in **Section 2.4.5.10**.

2.4.5.2 Drilling and Blasting

Drilling and blasting would be used to break ore and development rock in the mine pits (see M3 2021 for additional details). Following drilling, explosives would be used to break rock into fragments that are suitable for loading into equipment. An Explosives and Blasting Management Plan would be prepared as part of the final mine plan. Explosives storage, transport, handling, and use would comply with applicable Department of Homeland Security, Bureau of Alcohol, Tobacco, Firearms and Explosives, Department of Transportation, and Mine Safety and Health Administration regulations.

2.4.5.3 Rock Loading and Haulage

Rock loading and haulage would use a development fleet and a production mining fleet. Mine development excavation required to establish haul truck access roads, access limestone, and pre-strip pits prior to production mining would use a fleet of medium sized excavators, wheel loaders, and 45-ton articulated trucks. This development fleet would also be used to salvage growth media and support

reclamation activities. Production mining would use a conventional diesel truck and shovel fleet consisting of two 28-cubic yard hydraulic shovels, approximately sixteen 150-ton haul trucks, and one 28-cubic yard wheel loader. The wheel loader would be used primarily to load haul trucks during shovel maintenance and to load stockpiled ore as needed. The ore would be hauled directly to the primary crusher or the run-of-mine ore stockpile at the ore processing facilities.

2.4.5.4 Ore Management

Ore from the open pits would be hauled to and placed directly into the ore processing plant, except during periods when the amount or type exceeds the availability of the ore processing plant, the excess ore would be stockpiled. Seven long-term ore stockpiles and one short-term stockpile would be used to manage the excess ore (**Figure 2.4-2**). The long-term ore stockpiles would be located on and near the TSF Buttress and Hangar Flats pit and the short-term stockpiles would be located near the crusher.

Highest-grade ore would be sent directly to the crusher, or to the short-term stockpile area near the crusher where it would likely be processed within a few days. Lower-grade ore would be sent to the long-term ore stockpiles where it would remain for months or longer. Some of the ore sent to the low-grade ore stockpiles would be re-handled during active mine operations, and some would be re-handled and processed once open pit mining has ceased. If metal prices do not support processing of some of the long-term stockpiles, the stockpiled material would be covered as part of TSF Buttress closure activities (**Section 2.4.7**).

Three long-term ore stockpiles would be on the TSF Buttress on the north side of the valley. Two stockpiles would be adjacent to the Hangar Flats pit and extended onto the pit footprint after it is backfilled. A stockpile within the West End pit footprint would temporarily store ore mined during West End Road development and pre-stripping. Ore storage in long-term stockpiles peaks in Year 11 with approximately 19 million tons.

2.4.5.5 Development Rock Production and Storage

Development rock from the three open pits would be sent to five different permanent destinations over the mine life including the TSF embankment and rind fills; the TSF Buttress; the mined-out Yellow Pine open pit; the mined-out Hangar Flats open pit; and the Midnight area within the mined-out West End open pit. In addition to these five areas, other destinations would receive development rock from the three open pits including a temporary ore stockpile base within the West End open pit, a foundation for stockpiling growth medium and recovered seed bank material, a reclamation materials stockpile located on the TSF Buttress, and miscellaneous projects such as road fills and ore stockpile foundations. The development rock production rate would vary throughout the life of the mine because the cut-off grades demarcating ores from development rock would vary due to fluctuating economic conditions. At individual open pits, the determination between ore and development rock is initially based on the mine plan and the delineation of the ore and development rock as determined through production mapping and analysis of blast hole cuttings in the grade control program. Approximately 280 million tons of development rock from active mining areas would be used to construct the TSF embankment and buttress, and placed in the mined-out pits, as described in **Table 2.4-9**.

After the main portion of the Yellow Pine pit has been mined and mining commences in the northern portion of the pit, development rock would be end-dumped into the Yellow Pine pit as backfill. The dumped development rock would not be mechanically compacted, except as it nears the final reclaimed surface elevation of the backfilled area.

Table 2.4-9 Development Rock Management Summary

Characteristic	TSF Buttress[1]	Hangar Flats Backfill[1]	Midnight Backfill	Yellow Pine Backfill	TSF Embankment[3]
Location	Meadow Creek valley southwest of Hangar Flats pit	Backfill into Hangar Flats pit	Backfill into south portion of West End pit north of Midnight Creek	Backfill into the Yellow Pine pit	In the Meadow Creek drainage west of the Hangar Flats pit backfill
Source	Hangar Flats pit, Yellow Pine pit, and West End pit	Yellow Pine pit and West End pit	West End pit	West End pit, Yellow Pine pit, and Hangar Flats pit	Hangar Flats pit, Yellow Pine pit, West End pit, historical SODA, and Hecla heap leach legacy materials
Million Tons[2]	81	18	7	113	61
Acres	120	41	18	180	88
Height (feet)	460	460	320	740	Initial embankment: 245 Final embankment: 460
Steepest Surface Grade (Horizontal: Vertical)	Overall 3:1	Varies from 5:1 to 2.5:1	3:1 north (pit) side 2:1 south side matching undisturbed slope	Varies from 5:1 to approximately 2.5:1	2:1 inter-bench (upstream) 2:1 overall (downstream) TSF slopes would meet IDWR and engineering standards, reviewed by IDWR in order to obtain Approval for Construction

Table Source: Perpetua 2021a

[1]The TSF Buttress was formerly referred to as the Hangar Flats Development Rock Storage Facility. To be consistent with the naming convention used for the other backfilled pits, the 2021 MMP uses the term Hangar Flats pit backfill for the backfilled Hangar Flats pit.

[2]Limited amounts of development rock would be used to construct haul roads and pad areas for site facilities. In addition, some development rock may be crushed and screened for use as road surfacing material and/or concrete aggregate. The Development Rock Management Plan (Perpetua 2021c) specifies testing to determine which development rock can be used for these applications.

[3]The source of development rock for TSF construction includes material from the SODA and the Hecla heap leach facility.

The upper lifts of the backfill would be placed by direct dumping and compaction. The final backfill would be covered with a geosynthetic liner and soil/rock cover, and the East Fork SFSR and Stibnite Lake would be established across the backfill in a geosynthetic-lined stream/floodplain corridor. The inclusion of the lined Stibnite Lake on the Yellow Pine pit backfill would help buffer temperature extremes in the East Fork SFSR and replace the fish habitat of the existing Yellow Pine pit lake. The 16-million-gallon lake feature was designed based on results of lake temperature modeling to reduce diurnal temperature fluctuations while increasing average temperatures in effluent stream flow (see also Forest Service 2022, Brown and Caldwell 2021a, Rio ASE 2021). Development rock to backfill the Yellow Pine pit would be sourced predominantly from the West End pit, with minor quantities originating from the Yellow Pine and Hangar Flats pits.

Once mining ceases at the Hangar Flats pit, development rock to backfill the Hangar Flats pit would be sourced predominantly from the West End pit. The Midnight pit, a portion of the West End pit in the southeast corner of the pit near Midnight Creek, would be backfilled concurrent to mining the West End pit, with development rock from the West End pit, once mining in the area to be backfilled is completed.

In addition to the permanent development rock storage described above, a temporary development rock storage facility (DRSF) would be constructed within the West End pit during road construction and pre-stripping activities. This temporary DRSF would contain approximately 2.5 million tons and serve as the base for the West End In-Pit stockpile. The purpose of this DRSF is to reduce the need for mixing the smaller development haul truck traffic with production haul truck traffic for safety purposes, and to provide a base for stockpiling ore encountered during road development and pre-stripping within the West End pit. Since this is a temporary DRSF entirely within the footprint of the West End pit, it would be rehandled during regular mine operations at the West End pit and relocated to other facilities for permanent development rock storage.

Perpetua has conducted geotechnical investigations supporting the design of the backfills including the Hangar Flats backfill abutting the TSF embankment in Meadow Creek.

Surface water and groundwater management for facilities that permanently store development rock are discussed in **Section 2.4.5.10**, Surface Water and Groundwater Management. A Development Rock Management Plan, which describes procedures and methods for active management of development rock that is produced and stored across the SGP during operations, has been provided (Brown and Caldwell 2021b).

2.4.5.6 Spent Ore and Legacy Tailings Removal in Meadow Creek Valley

The Meadow Creek Valley contains legacy materials created from historical mining activities. Legacy materials include development rock, spent ore in the unlined SODA, the Bradley Mill Tailings, and run-of-mine and crushed ore in the historical lined heap leach pads. An Environmental Legacy Management Plan (Perpetua 2021d) describes procedures and methods for active management of legacy materials encountered during construction and mining operations. While the TSF is being built and expanded, Perpetua would remove and reuse as construction material the 7.5 million tons of spent ore within the SODA and other areas (Hecla and Stibnite Mine Inc. leach pads). Physical and chemical testing of the legacy material would determine if the material were suitable for construction uses and determine the final placement of the material. During the first four years or so of ore processing operations, Perpetua would remove and reprocess the three million tons of Bradley tailings underlying the SODA. The legacy tailings would be mixed with water and then pumped to the ore processing facility. The temporary water addition and pumping facility would be an enclosed, heated structure located within the limits of the SODA.

If other legacy materials are encountered during construction they would be removed and hauled off site to an appropriate disposal facility, placed in the TSF, used as pit backfill or construction material, or left in place, depending on testing to determine physical and chemical suitability. Legacy development rock not used for TSF construction purposes or reprocessed would be placed in pit backfills or used for the TSF Buttress.

2.4.5.7 Ore Processing

During operations, approximately 115 million tons of ore would be mined from the three proposed pits and processed at the mill facilities during the approximately 15-year process facility operation. At full operation, targeted ore production would range from 20,000 to 25,000 tons per day, which would be transported to the processing facility to separate the gold, silver, and antimony from the ore. Additional details on ore processing can be found in section 17 of SGP's updated feasibility study (M3 2021).

Ore feed for processing would be sourced from either the open pits, Bradley tailings, the SODA, the short-term stockpiles, or long-term stockpiles. Typically, ore would be hauled directly from the pits to the primary crusher whenever the mill is capable of receiving the ore based on grade and metallurgy. If the ore requires short-term stockpiling due to process constraints or haul truck congestion at the primary crusher, it would likely be placed in the short-term stockpile. Ore that is lower value than other ore available at the time of pit mining would be placed in long-term stockpiles.

Ore would be hauled to the crusher, either directly from one of the three open pits or from the ore stockpiles and would be crushed and ground to reduce the size of the rock to separate the gold, silver, and antimony-bearing minerals from the host rock. The ore processing flow sheet is shown on **Figure 2.4-9**. The ore processing facility and associated support infrastructure are shown on **Figure 2.4-2**.

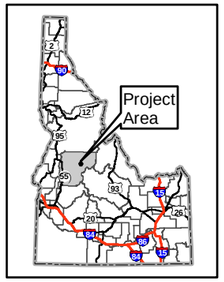
The ore processing area would be designed to provide for containment of ore processing materials, chemicals, wastes, and surface runoff. Potentially hazardous chemicals and wastes would be stored within buildings or areas with both primary and secondary containment. Surface runoff within the ore processing area would be directed to a contact water pond for collection. Any leaks or spills escaping both primary and secondary containment would flow to the contact water pond for collection and would not discharge off site.

The processing would result in production of an antimony mineral concentrate, gold- and silver-rich doré, tailings, and other waste products. Tailings disposal is discussed in **Section 2.4.5.1**, Tailings Storage Facility.

Crushing and Grinding

Mined ore would be hauled to the crusher and typically direct-dumped into the jaw crusher or stockpiled at the uncovered run-of-mine stockpile area near the crusher. Stockpiled ore would be loaded into the crusher dump pocket, based on crusher availability, using a loader. Surface water runoff from the run-of-mine ore stockpile area would be captured and directed to a pond and be used in the ore processing facility (**Section 2.4.5.10**).

Following crushing, the crushed ore would be transported via conveyor to a dome-shaped, covered stockpile. Dust emission controls would reduce dust from crushing, conveying, and stockpiling. Apron feeders below the crushed ore stockpile would convey the ore to a semi-autogenous grinding mill followed by a ball mill for additional size reduction of the ore. Grinding would occur within an enclosed building to reduce noise levels and facilitate maintenance of the milling equipment. Grinding with process water would reduce the ore to the size of fine sand in a water slurry for further processing.



ROM STOCKPILE
GRIZZLY SCREEN
APRON FEEDER
DRIBBLE CONVEYOR
VIBRATING GRIZZLY
PEBBLE CRUSHER
PRIMARY CRUSHER
COARSE ORE STOCKPILE
RECLAIM FEEDER
SAG MILL FEED CONVEYOR
SAG MILL
TROMMEL OVERSIZE BARREL
BALL MILL
HISTORICAL TAILINGS
CYCLONE FEED PUMP BOX
CYCLONE CLUSTER
TRASH SCREEN
Sb ROUGHER FLOTATION CELL (4)
Sb CLEANER COLUMN
Sb CLEANER SCAVENGER FLOTATION CELL (4)
Sb ROUGHER CONDITIONING TANK
GOLD ROUGHER FLOTATION CELL (8)
GOLD 1ST CLEANER FLOTATION CELL (4)
GOLD CLEANER SCAVENGER FLOTATION CELL (4)
Sb CONCENTRATE THICKENER
GOLD ROUGHER CONDITIONING TANK
GOLD CONCENTRATE THICKENER
FILTER PRESS
Sb CONCENTRATE STORAGE TANK
Sb DRYING & BAGGING
FILTER OPTION
GOLD CONCENTRATE
PROCESS WATER TANK
AUTOCLAVE FEED TRASH SCREEN
ON-SITE LIMESTONE PRODUCTION
TO ATM
GAS CLEANING
AUTOCLAVE
AUTOCLAVE FEED TANK
COOLING WATER
OXYGEN
FLASH VESSEL (2)
GOLD CONCENTRATE SURGE TANK
LIMESTONE
SLURRY NEUTRALIZATION TANK
COOLING TOWERS
LIME
SLURRY NEUTRALIZATION TANKS (3)
TAILING THICKENER
NaCN
LIME
SULFIDE LEACH TANK (2)
SULFIDE CIP TANK (7)
SULFIDE CIP SAFETY SCREEN
SULFIDE DETOX TANK (2)
OXIDE LEACH TANK (4)
LOADED OXIDE CIP CARBON SCREEN
OXIDE CIP TANK (6)
OXIDE CIP SAFETY SCREEN
OXIDE DETOX TANK (2)
TAILING POND
ELECTROWINNING FEED TANK
ELECTROWINNING CELLS
ELECTROWINNING SLUDGE FILTER
LOADED CARBON DEWATERING SCREEN
DISTRIBUTION BOX
ACID WASH COLUMN
ELUTION VESSEL
FINE CARBON
CARBON SIZING SCREEN
CARBON REGENERATION
RETORT
MERCURY VESSEL
DORÉ
NaOH
NaCN
ACID
BARREN ELUATE TANK
HEAT EXCHANGER
SYMBOLS
MAIN PROCESS FLOW
AUXILIARY FLOW
INTERMITTENT FLOW
EQUIPMENT PACKAGE
FUTURE

Figure 2.4-9
Overall Process Flow Diagram
Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021

On-site Lime Generation

Ground limestone and lime are needed for pH adjustment in the SGP ore processing plant. Rather than trucking these materials to site from an off-site source, a limestone bed in the West End pit is of suitable quality and quantity to satisfy the life-of-mine SGP requirements for lime. Over the life of the mine, approximately 130,000 to 318,000 tons of limestone would be mined annually, averaging approximately 240,000 tons per year. Approximately 25 to 30 percent of the limestone mined annually would be crushed and run through an on-site lime kiln to produce metallurgical lime powder, with the remainder (70 to 75 percent) would be crushed and stockpiled for direct use as limestone. Both ore and limestone would be temporarily stored at the run-of-mine stockpile area.

The on-site lime generation would require additional equipment, which would be placed within the ore processing area. This equipment would include: limestone crusher and conveyor, propane-fired kiln (200 tons per day output capacity), kiln combustion air system including preheat heat exchanger, propane storage tank plus vaporizer, air compressor, receivers, and dryers for plant air and instrument air at kiln area, roll crusher for kiln product discharge, conveyors for moving feed and product materials, off-gas fume filter for kiln discharge, dust collector kiln feed bin, storage bin for kiln feed material; and storage bin for lime products. The limestone crusher, screens, conveyors, and feed bins would not be enclosed. Dust would be controlled in a similar manner to the ore crushing and conveying process through the use of water sprays and/or bag house dust collectors.

Antimony Flotation

Two flotation circuits would be utilized; one circuit produces an antimony concentrate, and the other produces a gold-rich sulfide concentrate. Ore high in antimony would be processed by the antimony circuit to produce an antimony concentrate (M3 2021). Following grinding, the ground ore slurry would be mixed with lime and small amounts of sodium cyanide or equivalent to inhibit flotation of the gold-bearing minerals (pyrite and arsenopyrite). Lead nitrate or equivalent would be added and then a sulfur- and phosphate-bearing organic chemical. These chemicals make the stibnite mineral particles hydrophobic where the particles then attach to air bubbles and float to the surface in the stibnite flotation tanks. The gold-bearing mineral particles which do not adhere to the bubbles in the stibnite flotation tanks would drop to the bottom of the flotation tanks and be routed to the subsequent gold flotation circuit for further processing. The antimony flotation facility would have interior curbing high enough to contain 110 percent of the volume of the largest tank.

The stibnite-laden bubbles form a froth and would be collected from the top of the stibnite flotation tanks. The stibnite concentrate froth would be subjected to one or two additional flotation steps to further clean the concentrate. The resultant antimony-rich concentrate would be finally thickened and filtered. The final antimony concentrate would be placed in 2-ton supersack containers ready for shipment off site for further refining.

Antimony Concentrate Transport

The antimony concentrate would contain approximately 55 to 60 percent antimony by weight. The remaining balance, 40 to 45 percent by weight, of the concentrate includes sulfur and common minerals with trace amounts of gold, silver, and mercury. As described in the Transportation Management Plan (Perpetua 2021e) for transportation of antimony concentrate, Perpetua would load the sealed 2-ton super sacks containing the concentrate into a shipping container at the processing facility. Perpetua would load the concentrate by forklift and hooked lifting racks to safely move the super sacks, which are equipped with lifting straps, into fully enclosed shipping containers for the full course of their transport from the SGP site to their final destination. The supersacks and shipping container would provide primary and

secondary containment for the antimony concentrate (Perpetua 2021e). The concentrate would be trucked via SH 55 to a commercial truck, train, barge, ship loading facility depending on the refinery location. An estimated one to two truckloads of antimony concentrate would be hauled off site each day. It is assumed that the concentrate, when sold, would be shipped to facilities outside of the U.S. for smelting and refining because there are currently no smelters in the U.S. with capacity for refining the antimony concentrate.

Gold and Silver Flotation

Low-antimony mill feed would be processed in the gold flotation circuit only, bypassing the antimony circuit (M3 2021). Gold and silver flotation is a process similar to that described for stibnite flotation, and would be housed in the same building, but using different chemicals to float pyrite and arsenopyrite, the minerals that contain the gold and silver. The flotation building would have interior curbing high enough to contain 110 percent of the volume of the largest tank. The flotation froth, with particles containing gold and silver, would be collected and pumped to the gold concentrate thickener to further separate the gold/silver mineral particles from the process water which would be recycled. The particles from gold flotation that do not float would become the tailings slurry. The gold and silver concentrations of the tailings would be regularly monitored and, if the concentrations are high enough to warrant further processing, they would be sent to the leaching circuit; otherwise, the tailings would be thickened to recycle additional process water and then routed to the TSF as described below.

Oxidation and Neutralization

An autoclave system would be used to oxidize the sulfide minerals comprising the gold and silver concentrate to make the particles more amenable to leaching. Before the gold concentrate is pumped into the autoclave, it would be mixed with appropriate amounts of ground limestone to maintain a constant free acid level of approximately 10 grams per liter in the autoclave. This value was established through bench and pilot-scale metallurgical testing to promote the formation of stable, crystalline arsenic compounds in the autoclave. Oxygen would be injected into the autoclave to promote the oxidation reaction, and the temperature in the autoclave would be maintained at approximately 220 degrees Celsius. Water would be injected into the autoclave as needed to control the temperature. After pressure oxidation, the acidic slurry containing gold and silver would be neutralized using slurried lime and other chemicals and cooled in two forced draft cooling towers. The neutralized slurry would then be sent to the leach circuit for recovery of gold and silver from the slurry.

When increasing arsenic levels are observed, the oxidized slurry would be treated with hot arsenic cure (HAC) prior to neutralization. Metallurgical tests showed that this process promotes formation of the stable crystalline form of the arsenic precipitate enhancing environmental stability of arsenic.

The autoclave system would be housed in a steel frame building set on concrete foundations, with interior curbing to provide secondary containment. Air emissions from the pressure oxidation facility would be captured in a series of air pollution controls, and the material collected would be disposed of as a solid waste or a hazardous waste depending on the waste characterization.

Gold and Silver Leaching and Carbon Adsorption

The gold and silver leaching component of the recovery process would be designed and operated consistent with the International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold which is described in **Section 3.7.3** (Perpetua 2021a). Gold and silver leaching and carbon adsorption would occur in a steel frame building set on concrete foundations, with secondary containment of 110 percent of the volume of the largest tank and could include audible alarms,

interlock systems, and/or sumps, as spill control measures (Initiative for Responsible Mining Assurance 2018).

The leaching to recover gold and silver from the gold and silver concentrate slurry would occur in large carbon-in-pulp (CIP) tanks which would be fully contained to capture, retain, and recycle process solutions. Sodium cyanide would be added to the tanks containing the neutralized solution to form a gold-silver-cyanide complex and activated carbon would then be added to the tanks to promote the adsorption of the gold-silver-cyanide complex onto the carbon (**Figure 2.4-9**). The pH of the slurry in the leach circuit would be closely managed at an elevated level to maintain the cyanide in a stable soluble form.

The loaded carbon with gold-silver-cyanide complex attached would then be collected on screens and sent to the carbon stripping circuit. Inside sealed tanks, the carbon with the gold-silver-cyanide complex would be washed with an acid solution to remove impurities, rinsed with fresh water, and stripped of the gold using a hot alkaline elution solution. The resulting gold and silver-bearing elution solution would be piped to the electrowinning and refinery area.

The acid solution used during carbon stripping would be reused until it loses its effectiveness. The solution would be neutralized and sent to the tailings thickener for pumping to the TSF. Air emissions from the leaching facility would be captured in a series of air pollution controls, and the material collected would be disposed of as a solid waste or a hazardous waste depending on characterization of the waste.

Gold and Silver Electrowinning and Refining

The gold and silver electrowinning and refinery facility would be a closed-circuit system with 110 percent containment of the largest vessel. The elution solution pumped into electrowinning cells which would electrolytically precipitate the precious metals into a solid sludge that would be removed from the elution solution with a filter. The solid precipitate would then be heated in a retort system to drive off and collect any contained mercury. The gold and silver precipitate from the retort would then be mixed with flux and then placed into an induction furnace and heated. The molten material from the induction furnace, consisting of gold and silver metal and slag, would be poured into molds to cool. The slag would be recycled within the mill circuit and the doré gold/silver bars would be shipped off site to refineries for further processing and refining.

Air emissions from the induction furnace and retort would be treated in a series of emission controls. Mercury metal would be securely stored prior to shipment to a certified hazardous waste disposal facility.

Tailings Neutralization Circuit

Cyanide-bearing process slurry from the carbon-in-leach (CIL) circuit would be neutralized within the ore processing plant to less than approximately 10 milligrams per liter weak acid dissociable cyanide before being pumped to the TSF. Residual cyanide in the slurry would be treated using a sulfur dioxide and air system to oxidize cyanide to form cyanate. After neutralization, tailings would be routed to one or more tailings thickeners, to partially dewater the tailings before they are pumped to the TSF. The process water separated from the thickened tailings slurry would be recycled within the ore processing facility. The neutralized and thickened tailings slurry would be pumped to the TSF.

Tailings Pipeline Maintenance Pond

Lined tailings pipeline maintenance ponds would be located at the truck shop and at the ore processing facility, to which tailings slurry from the tailings pipeline between the mill and the TSF or and process water from the tailings reclaim pipeline could drain by gravity during maintenance shutdowns or if there were a leak in either pipeline. The ponds would typically be empty except during maintenance or

unforeseen problems with the tailings or reclaim water pipelines, pumping system, or TSF. The ponds are designed to contain the contents of the pipelines and the runoff from the pond and open-trench portions of the lined pipeline corridor from a 100-year, 24-hour storm event plus snowmelt.

2.4.5.8 Tailings Storage Facility

The TSF would be located on NFS lands within the Meadow Creek valley (**Figure 2.4-2**). The TSF, its embankment, and associated water diversions would occupy approximately 423 acres at final buildout with approximately 405 acres of new disturbance. Perpetua has conducted geotechnical and geophysical investigations to support the design of the TSF and associated buttresses. The TSF at the end of operations would be capable of holding approximately 120 million tons of tailings, the operational water pool, and precipitation falling within the TSF and contributing watershed up to the 24-hour Probable Maximum Precipitation event of 11.74 inches of rainfall. Additional details on ore processing can be found in section 18 of SGP's updated feasibility study (M3 2021).

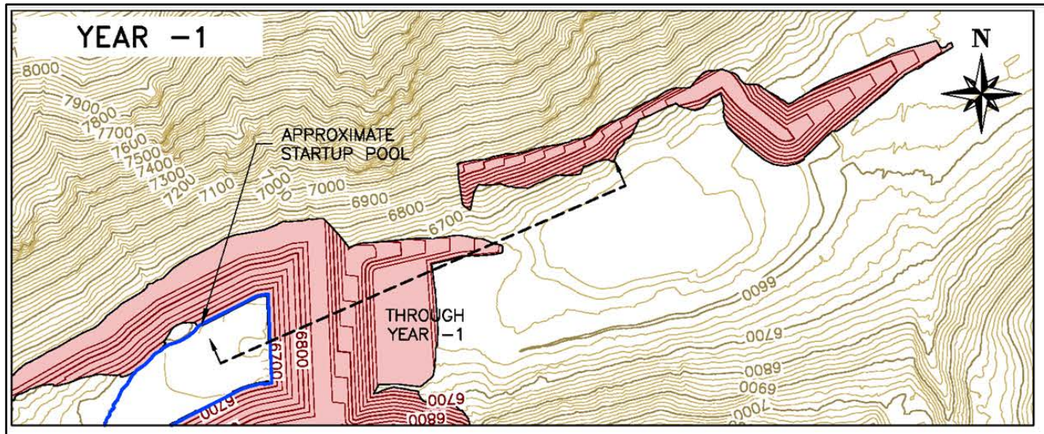
The TSF would consist of a rockfill embankment, a fully lined impoundment, and appurtenant water management features. The TSF Buttress located immediately downstream of, and abutting against, the TSF embankment would substantially enhance embankment stability.

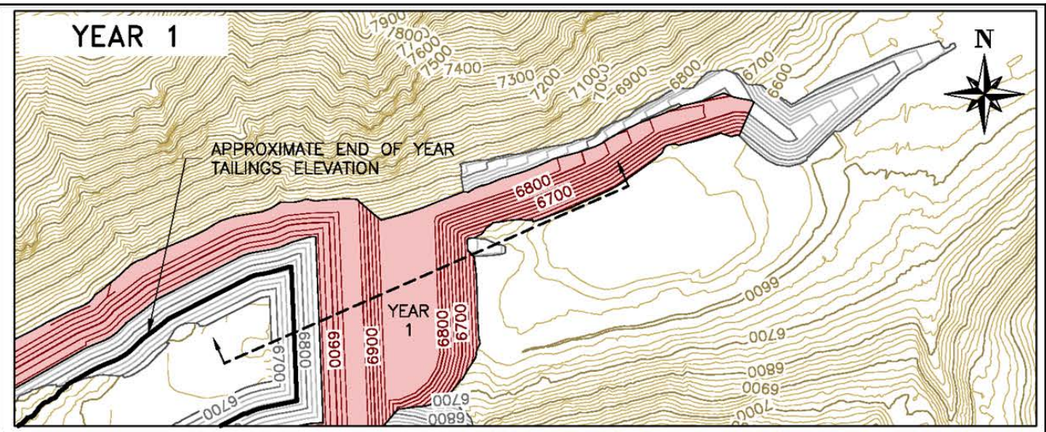
Design criteria were established based on the facility size and risk using applicable dam safety and water quality regulations and industry best practice for the TSF embankment on a stand-alone basis; the addition of the buttress substantially increases the safety factor for the design to about double the minimum requirements. The upstream face of the TSF embankment and the Meadow Creek valley where the TSF impoundment would be located would be fully lined to minimize leakage. The TSF would be surrounded by an 8-foot high, chain-link fence designed to keep wildlife, such as deer and elk, from entering the impoundment area.

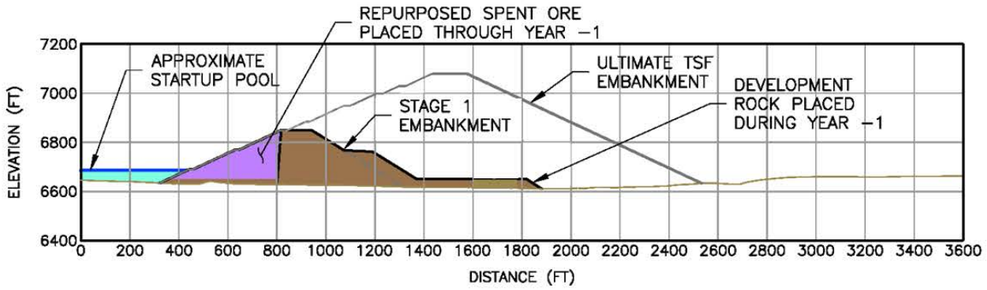
The TSF includes an engineered, rockfill starter embankment. Historical development rock (i.e., waste rock), spent ore from the historical SODA and heap leach areas, and development rock from mine pits would be used for the TSF embankment construction. The TSF Buttress would be built by first constructing a ramp along the north side of the valley to access the crest of the TSF embankment and upper portions of the buttress (**Figure 2.4-10**). Historical spent ores from the SODA and Hecla heap leach would be placed as bedding on the upstream face of the embankment or impoundment fill prior to placement of the liner to minimize interaction with infiltrating surface water. The starter embankment would be constructed to an elevation of 6,850 feet (or 245 feet above the existing ground surface). The TSF Buttress would then be constructed upwards to further access TSF embankment lifts while the base expands down the valley (eastward) as historical spent ore and legacy tailings are removed from the valley bottom. Engineered fill would be placed against steep slopes within the impoundment to flatten and smooth slopes to facilitate liner placement. This method of construction would allow for controlled material placement across the valley from the ramp north of the valley to the south side. The TSF Buttress would provide additional short- and long-term geotechnical stability. The final embankment height would be 475 feet at a crest elevation of 7,080 feet (**Figure 2.4-11**).

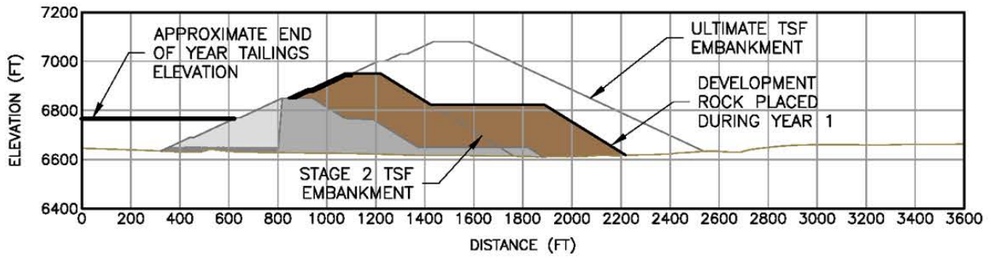
TSF Underdrain System

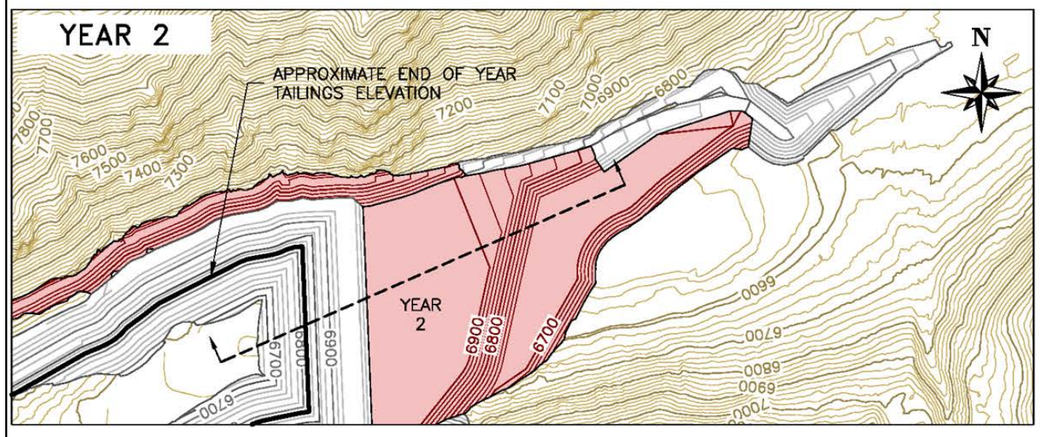
The TSF would have an underdrain groundwater collection and conveyance system located beneath the liner. Prior to construction, the area would be evaluated for springs and seeps. Evaluations would consist of visually identifying intermittent wet areas (seeps), areas with flowing water (springs), or areas supporting increased plant growth when compared to surrounding areas (see section 18 of M3 2021 for additional detail).

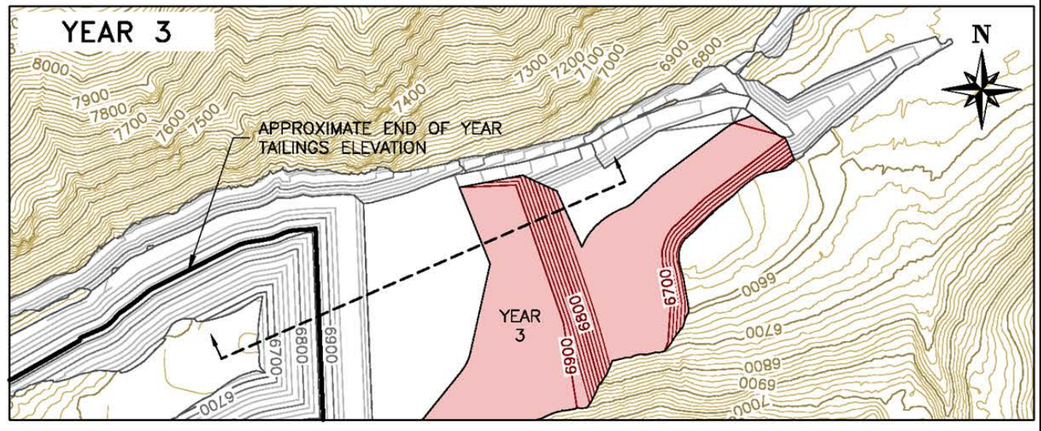


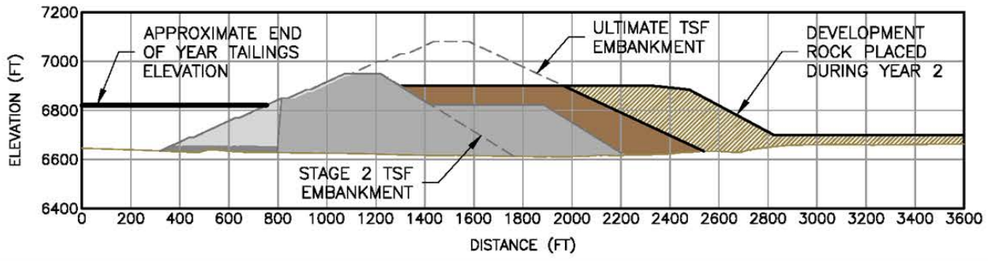












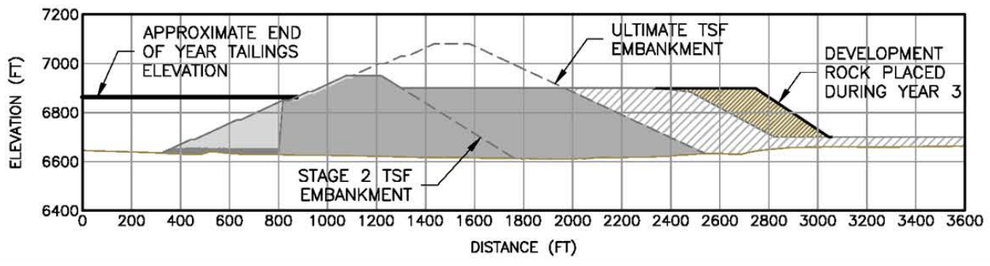
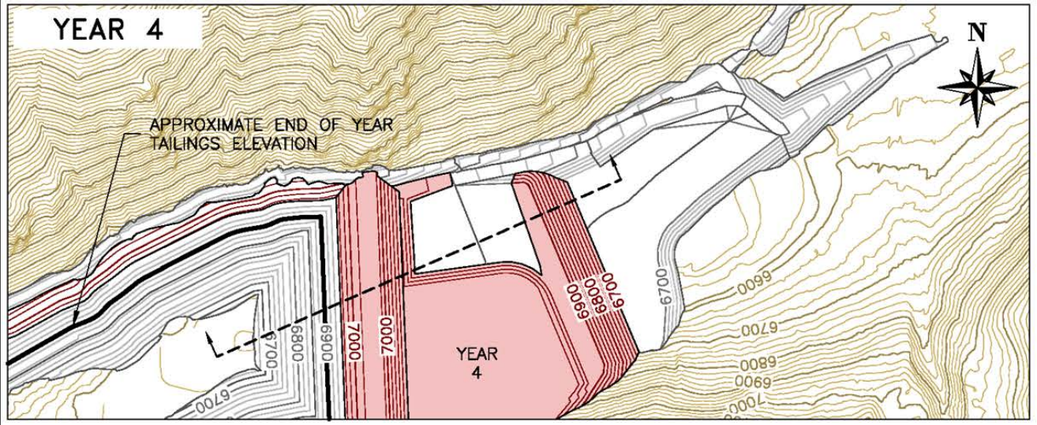
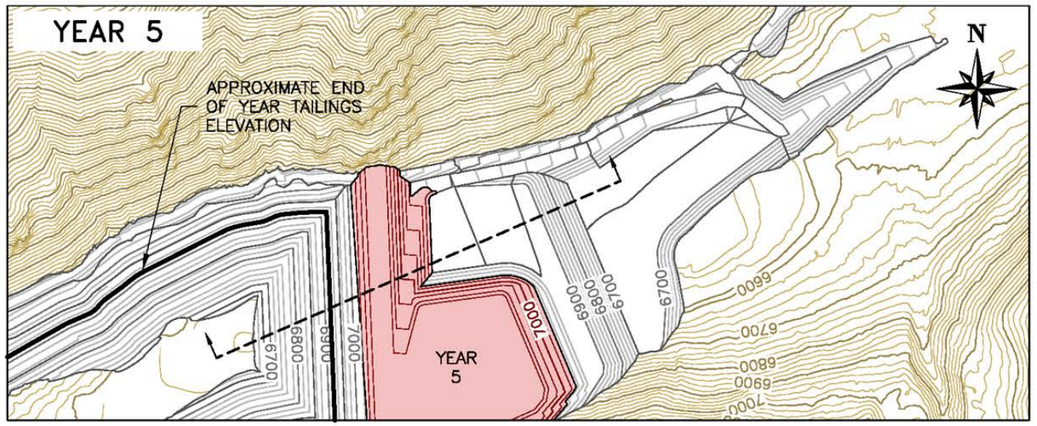
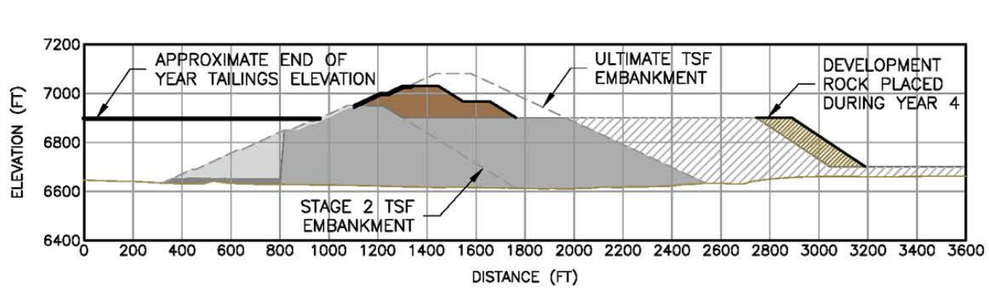


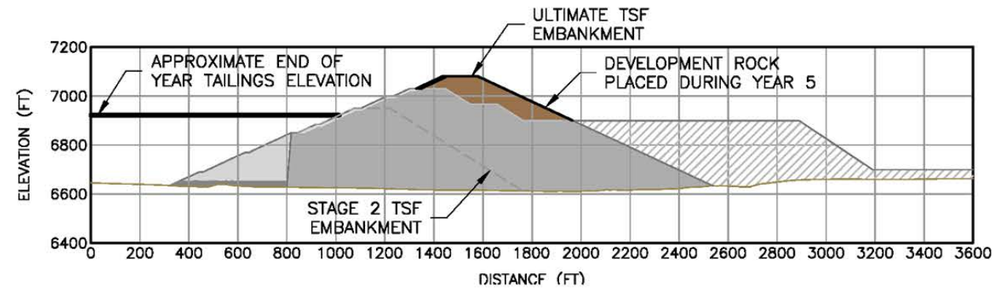
Figure 2.4-10
TSF and TSF Buttress Cross-Sections, Years -1 to 3
Stibnite Gold Project
Stibnite, ID

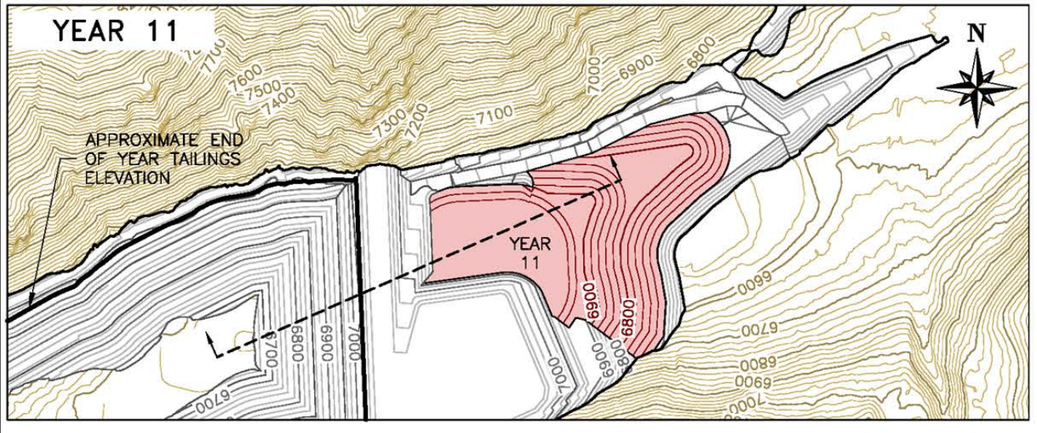
Data Sources: (Perpetua 2021a)

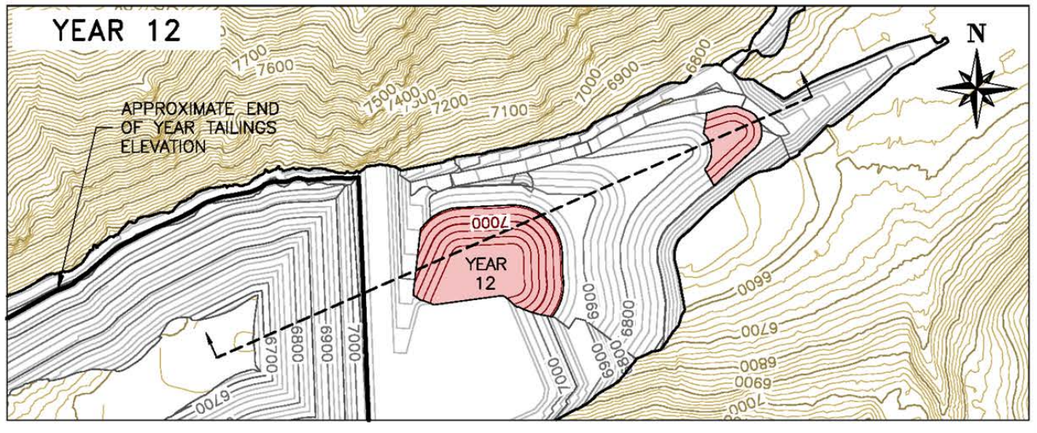


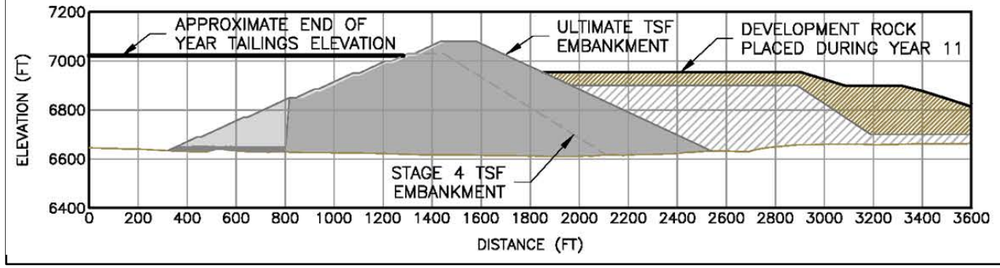












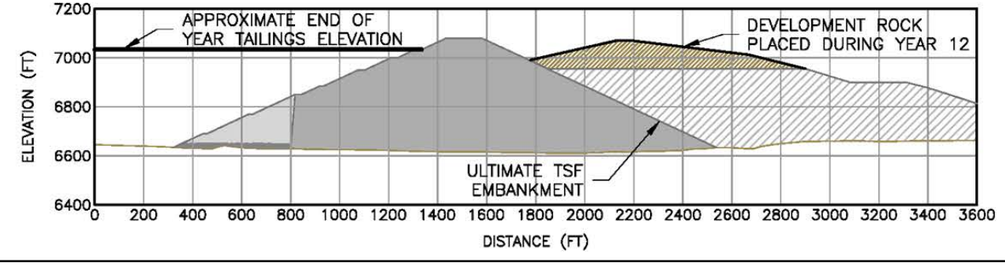


Figure 2.4-11
TSF and TSF Buttress Cross-Sections, Years 4 to 12
Stibnite Gold Project
Stibnite, ID

Data Sources: (Perpetua 2021a)

Groundwater underdrains would be a series of parallel drains with branching laterals, instead of a single valley bottom drain, due to the broad u-shaped nature of the Meadow Creek valley (**Figure 2.4-15**). Pipes would transition from perforated (able to collect groundwater) to solid-wall (for conveyance only) as they exit their respective collection areas (impoundment and embankment) and flow underneath the buttress to the outlet. Underdrain flows would be collected in a sump downstream of the toe of the buttress, monitored for water quality, then either discharged to surface water through a permitted Idaho Pollution Discharge Elimination System (IPDES) discharge, or pumped to the ore processing facility or a contact water pond for either treatment and discharge or use as makeup water for the mill process. The TSF liner system would then be installed in the TSF impoundment area over the underdrain system.

Underdrains would be installed beneath the TSF Buttress to ensure that groundwater does not saturate the base of that fill and potentially lead to water quality impacts or geotechnical instability; however, little if any flow is expected in the buttress underdrains owing to lower observed groundwater levels beneath the buttress. Underdrain collection sumps and downgradient monitoring wells would be used for TSF leak detection.

TSF Liner System

Due to water quality regulations and the presence of dissolved metals (chiefly arsenic and antimony, with trace mercury) and residual cyanide in the tailings pore water and supernatant pool, the TSF impoundment (including the upstream embankment face) would be composite-lined with geosynthetic materials to prevent seepage of process water or transport of tailings out of the facility. A network of geosynthetic drains would be placed above portions of the geomembrane liner to reduce hydraulic head on the liner and excess pore pressure in the overlying tailings. The drains would report to a sump near the upstream embankment toe, and the water would be pumped out to the pool or reclaim system for reuse (M3 2021).

A composite liner consisting of a 60-mil, single-sided, textured, linear low-density polyethylene liner over a geosynthetic clay liner (GCL) would be employed to contain the tailings. Before placement of the liner within the TSF, the subgrade would be re-worked and compacted, or a minimum of 12 inches of buffer/liner bedding fill would be placed. Geosynthetic overliner drains would be placed above portions of the liner to reduce hydraulic head on the liner and pore pressure in the overlying tailings solids during operations. The drains would direct water that migrates through the tailings to a sump near the upstream toe of the embankment, and the water would then be pumped out to the tailings pool within the impoundment or the reclaim system for reuse in the mill.

Facilities that use cyanide in their mineral extraction process are required to obtain a permit from the Idaho Department of Environmental Quality (IDEQ) and follow the Rules for Ore Processing by Cyanidation (IDAPA 50.01.13). The IDEQ entered into rulemaking on the existing regulations to change the regulatory requirements from prescriptive requirements to performance-based requirements. A temporary Rule went into effect in October 2020, and the final rule was approved by the legislature in 2021. The liner system proposed for the SGP meets the requirements of the rule under which the Project's Cyanidation permit is expected to be issued.

TSF Management Support Facilities

Light vehicle roads and haul roads would provide access between the ore processing facility and the TSF, and the tailings delivery and reclaim water return pipelines would parallel the haul road. Secondary containment in the event of a pipeline break would consist of a geosynthetic wrap or an open geosynthetic lined trench. Further, the pipeline corridor would drain to one of two pipeline maintenance ponds – one at the truck shop and one at the ore processing facility. Electrically powered pumps would be located at the

ore processing facility to pump tailings to the TSF and reclaim pumps would be located at the TSF to return water to the ore processing facility for reuse.

TSF Water Management

Thickened tailings slurry would be pumped to the TSF (see section 18 of M3 2021 for additional details). The TSF would be designed and operated as a closed-circuit, zero-discharge facility meaning no tailings water would be discharged to the surface water or groundwater except in compliance with applicable permits and regulations. As the tailings consolidate, water collected in or falling on the surface of the TSF would form the supernatant pool on top of the tailings and be reclaimed for use in ore processing. Cyanide levels in the TSF reclaim water would be monitored throughout operations to ensure they remain in compliance with issued approvals and permits.

2.4.5.9 Mine Support Infrastructure

SGP infrastructure to support surface mining and ore processing operations would include the following:

- A one-story mine administration building that would be sided or painted and roofed in neutral colors.
- A maintenance workshop which would store materials and supplies as discussed in **Section 2.4.5.14**, Materials, Supplies, Chemical Reagents, and Wastes.
- A truck wash facility which would include an oil/water separation system and water treatment facilities to enable recycling of the wash water.
- A worker housing facility **(Figure 2.4-12**), which would be constructed on NFS lands adjacent to Thunder Mountain Road (FR 50375) and would accommodate up to 500 people. This facility would include dormitories, food service, and recreation facilities, along with the supporting infrastructure of power, water supply, and wastewater treatment plant. The SGP main gate and security building would be co-located with the worker housing facility.
- Haul roads to transport ore, development rock, and reclamation materials from mining or storage areas, and to transport vehicles to the maintenance workshop. A typical haul road travelway would be approximately 87 feet wide (81.1 feet of running surface and 5 feet of safety berm width). The haul roads would be built and maintained for year-round access and would be surfaced with gravel materials. Road maintenance activities would be conducted to manage fugitive dust emissions and maintain stormwater management features.
- Culverts would be installed where haul roads cross drainages or to direct stormwater to collection and retention structures. Culvert inlets and outlets would be lined with rock riprap, or equivalent, as needed to prevent erosion and protect water quality. Crossings of known fish-bearing streams would be constructed to support fish passage, with appropriately designed and constructed culverts or bridges.
- Service roads and paths that would provide an internal access system for employees and visitors to the site. The service roads would typically be 12 to 15 feet wide; some would be graveled or covered with rock aggregate, while others would be two-track roads. There would be no planned public use of the SGP service roads or trails. The path system would enable SGP pedestrian traffic to move safely throughout the SGP operating area. Service roads and paths would be located within the overall disturbance area defined for the SGP and existing roads would be used to the extent possible.

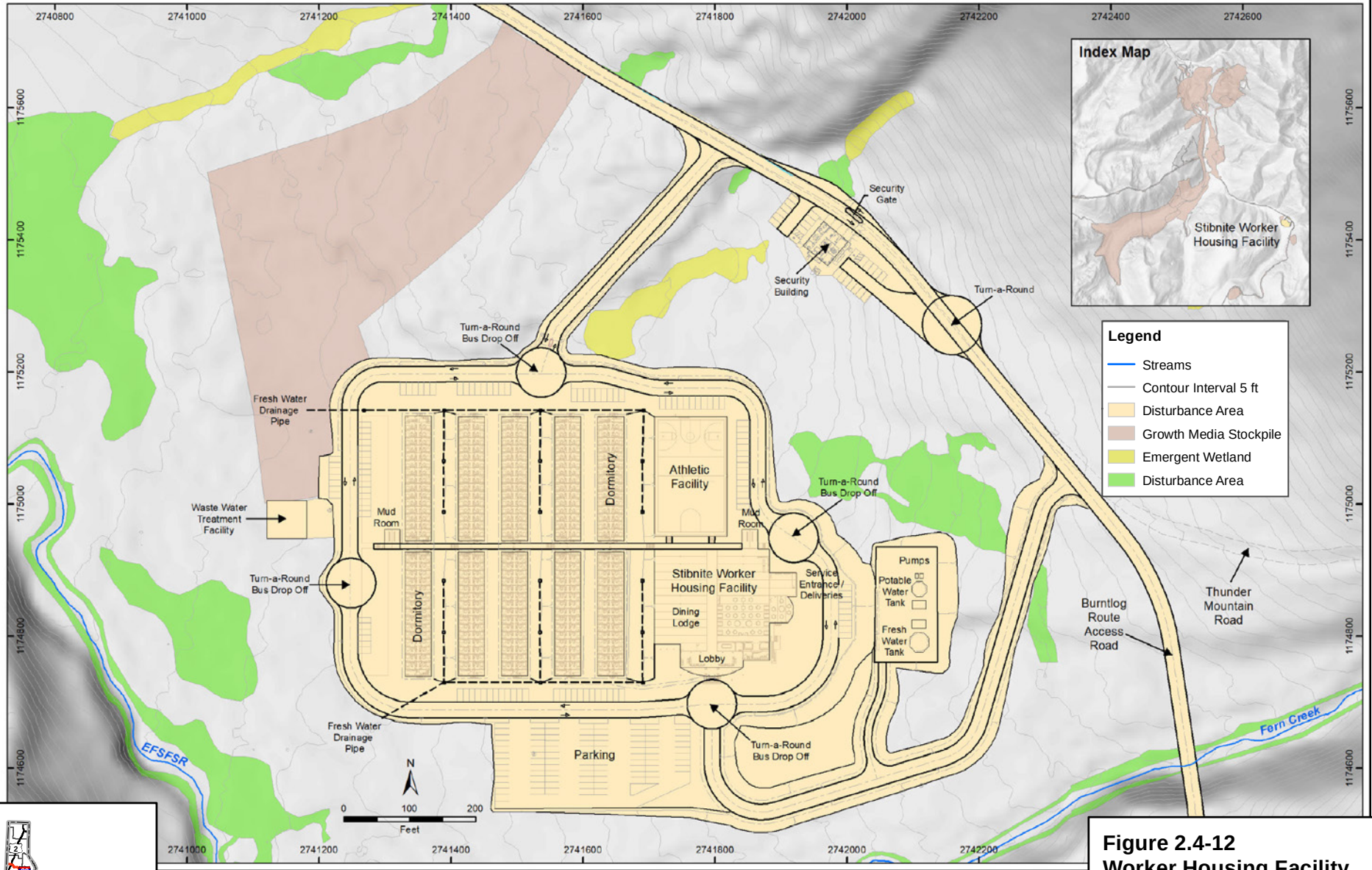


Figure 2.4-12
Worker Housing Facility
Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua

- Employee and visitor parking that would be maintained during construction and operations. During construction, the gravel parking areas would be located at the new worker housing facility, near the contractor/construction laydown areas, and at the Scout Portal. As operations are initiated, gravel parking areas would be maintained for buses, vans, and other miscellaneous vehicles for employees, contractors, vendors, and visitors at the new worker housing facility, at the shop area, and near the mine administration office.

2.4.5.10 Surface Water and Groundwater Management

Surface Water Management

To manage surface water at the SGP, existing streams that run through areas proposed for mining related disturbance would be diverted. Temporary diversions would be used within the SGP to keep non-contact water separated from contact water. Contact water is water that flows into or through disturbed areas and mining facilities and could have the potential to pick up increased levels of sediment, metals, and other possible contaminants which cannot be discharged into surface water and groundwater without proper treatment. Non-contact water is meteoric water that does not contact disturbed areas or mining facilities.

Stream Diversions around Mining Features

Existing streams would be temporarily diverted around SGP facilities, within constructed surface water channels. Diversion channel segments constructed in erodible materials would be lined with riprap to prevent erosion. Rock-cut channels would be constructed on steep slopes and in areas with shallow or at-surface bedrock, would have low erosion potential, and not require riprap lining. Certain channel segments constructed over fill or excavated in permeable materials would be lined with a geosynthetic liner to prevent seepage. A geotextile and/or transition layer of sand/gravel followed by riprap would be placed over the liner for erosion protection. Certain diversion sections would be piped as dictated by terrain or the need to limit warming of water.

During mine operations, summer low flows in perennial diversion channels around the TSF impoundment and buttress (Meadow Creek), Yellow Pine pit (Hennessy Creek), and West End pit (West End Creek) would be piped underground as an environmental design feature to maintain cold stream temperatures. Eight- to 12-inch-diameter pipes, sized to convey August baseflow, would be installed under the diversion channels in the riprap channel lining or under the adjacent access road to carry low flows. Stream flow would enter pipes through inlets at the same locations stream and tributary inflows would be diverted into the constructed channel. Some diversions, such as portions of Hennessy and West End Creeks, and the East Fork SFSR tunnel, would be entirely underground, in which case conduits would be larger and sized for high flows.

East Fork SFSR Temporary Diversion Tunnel

Currently, the East Fork SFSR flows into and through the Yellow Pine pit lake. The cascade at the inflow to the pit lake currently blocks upstream fish passage. A tunnel would be built to direct the East Fork SFSR around the west side of Yellow Pine pit to allow mining in the pit (**Figure 2.4-13**). The tunnel would be approximately 0.9 mile long and 15 feet high by 15 feet wide. The tunnel would include a fishway stream channel designed to provide for upstream and downstream passage of migratory and anadromous salmonid fish.

The tunnel would be designed so that fish could swim through its entire length in both directions (Brown and Caldwell, McMillen Jacobs and BioAnalysts 2021a). To encourage fish passage, low-energy lighting would be installed in the tunnel and set on timers to simulate daylight. A trash rack would be constructed near the upstream entrance to the tunnel to prevent large wood, boulders, and other debris from entering

the tunnel, and would be cleaned periodically. The spaces between the trash rack bars would be sized to allow passage of adult Chinook salmon. A surface water supply intake with fish screens would be installed upstream of the trash rack at a control weir to divert water from the East Fork SFSR for ore processing makeup when necessary.

A parallel roadway would be constructed in the tunnel to allow equipment and personnel access for monitoring, inspection, and maintenance. The accessway would function as a floodway for high flows, greater than the normal flow range within the fishway.

The tunnel fishway would incorporate concrete weirs, designed to produce hydraulic conditions that could be successfully navigated by fish (McMillen Jacobs 2018). The south portal (upstream end) of the tunnel would include a sediment collection and drop out area, a resting pool, trash rack, flow control weir, and picket panels. The north portal, located at the downstream end of the tunnel, would include an orientation pool for downstream migrating juvenile fish with an adult exclusion barrier to reduce potential predation, a separate adult fish holding/resting pool, rock weirs and a transition zone. Specific details on the north and south portals, plus the overall design, function, operation, and maintenance of the diversion tunnel are thoroughly described in the Fishway Operations and Management Plan (Brown and Caldwell, McMillen Jacobs, and BioAnalysts 2021a).

Midnight Creek

Midnight Creek is a first order, perennial, non-fish-bearing stream. The Midnight Creek stream diversion would reroute approximately 0.3 mile of the lower portion of Midnight Creek to the south, away from where it currently enters the Yellow Pine pit lake. The rerouted creek would be piped under haul roads so that it would enter the East Fork SFSR upstream of the proposed tunnel portal (**Figure 2.4-14**). The Midnight Creek diversion would manage flows in Midnight Creek during Yellow Pine pit operations and backfill activities until the newly developed East Fork SFSR alignment over the backfilled pit is complete and stabilized as described in **Section 2.4.7.4**.

Hennessy Creek

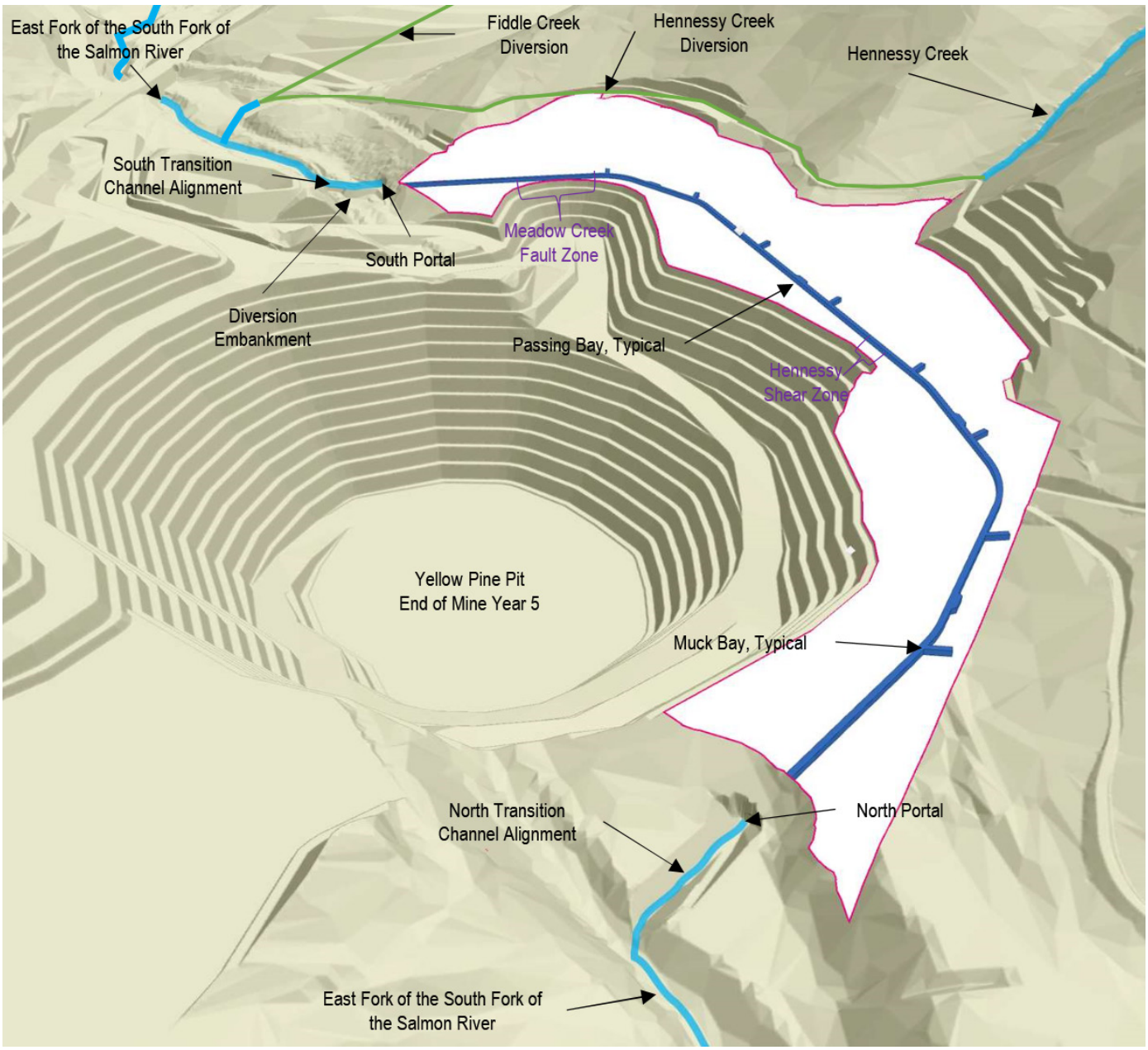
Hennessy Creek is a first order, perennial, non-fish-bearing stream. Hennessy Creek would be diverted south of Yellow Pine pit in a pipe along the public access road at the western edge of the pit (**Figure 2.4-13**). The diversion would include an impounding structure, overflow weir, and diversion cleanout basin. Diverted flows would be routed to Fiddle Creek downstream of the existing Stibnite Road culvert crossing, ultimately placing Hennessy Creek flows into the East Fork SFSR upstream of the south tunnel portal and disconnecting flow from the current unlined ditch passing alongside the Northwest Bradley dumps. Overflow, if any, would follow the existing stream channel into the Yellow Pine pit.

Fiddle Creek

Fiddle Creek is a second order, perennial, fish-bearing stream. Fiddle Creek would not be diverted. Rather, small stormwater diversions would route hillslope runoff around the Fiddle GMS and a culvert would route Fiddle Creek under the GMS, GMS access road, and public access road.

West End Creek

West End Creek is a first order, non-perennial, non-fish-bearing stream. The approximately 1.5-mile-long West End Creek stream diversion would reroute West End Creek around the north side of the legacy West End DRSF and cross the upper benches of the West End pit (**Figure 2.4-14**). The diversion would consist of a lined channel along the upper legacy DRSF, and a pipe in the segments along a steep hillside above the West End pit, within the pit, and along the steep hillside alongside the lower legacy DRSF down to the outlet at the existing stream channel. The lined channel portion would be designed to convey flows from a minimum 25-year storm event plus 2 feet of freeboard.



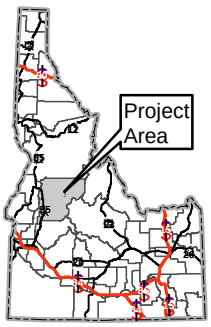


Figure 2.4-13
Cutaway View of Fish Passage Tunnel

Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021a

Perpetua Resources

-115°21'
-115°20'
-115°19'
-115°18'
44°56'
44°55'

Sugar Creek
EFSFSR
West End Pond
West End Pit
Yellow Pine Pit
West End Creek
Hennessy Creek
EFSFSR Diversion Tunnel
EFSFSR Fresh Water Intake
Midnight Pond
Midnight Creek
EFSFSR
North Plant Pond
Scout Pond
Central Plant Pond
Garnet Creek
Fiddle Creek

Legend

- Dewatering Well
- Tanks
- Pit Sump or Pump Station
- Tailings Pipeline
- Contact or Water Supply Pipeline
- Contact Water Pond
- Clean Water Diversion (ditches or pipes)
- Diversion Tunnel
- Stream

IPDES Outfalls

- Proposed Plant Site IPDES Construction/Operations Outfall

0 1,500 3,000
Feet

N

Mod Fig 2 Figure 2_4-14_SDEIS

Figure 2.4-14
2021 MMP Water Management Plan - East Fork SFSR below Meadow Creek
Stibnite Gold Project
Stibnite, ID

Data Sources: (Perpetua 2021a)

Perpetua Resources

-115°22'
-115°21'
-115°20'
-115°19'
44°54'
44°53'

North Truck Shop Pond
Hangar Flats Pit & Backfill
Mine-Impacted Water Treatment Plant
South Truck Shop Pond
Hangar Flats Stockpiles
TSF Buttress
Meadow Creek
EFSFSR
SODA Pond
Blowout Creek
Tailings Storage Facility
Closure Material Stockpile

Legend

- Dewatering Well
- Water Supply Well
- Tanks
- Surface Sumps
- Pit Sump or Pump Station
- Tailings Pipeline
- Contact or Water Supply Pipeline
- Underdrain
- Clean Water Diversion (ditches or pipes)
- Stream
- Contact Water Pond

IPDES Outfalls

- Proposed Alternative IPDES Construction/Operations Outfall
- Proposed Plant Site IPDES Construction/Operations Outfall
- Proposed TSF IPDES Post-Closure Outfall
- Proposed TSF Underdrain Internal IPDES Outfall
- Proposed TSFB IPDES Underdrain Outfall

0 1,500 3,000
Feet

N

Mod Pro 2 Figure 2.4.15 SDEIS

Figure 2.4-15
2021 MMP Water Management Plan - Meadow Creek
Stibnite Gold Project
Stibnite, ID

Data Sources: (Perpetua 2021a)

PAYETTE NATIONAL FOREST
FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

Garnet Creek

During construction, Garnet Creek would be re-routed downstream of the ore processing facility to a relocated confluence with the East Fork SFSR (**Figure 2.4-14**). Above the early restoration reach, Garnet Creek would be routed along the upper processing plant site access road in a riprap channel, then cross under the ore processing facility roads in culverts, with environmental design features to reduce sediment loading to the stream, and to protect water quality. At closure, this segment of Garnet Creek would be restored, along with created wetlands at the plant site.

Meadow Creek

Approximately 2 miles of Meadow Creek would be diverted around the south side of the TSF and TSF Buttress. The diversion would direct flows back into the existing SODA diversion upstream of the Hangar Flats pit (**Figure 2.4-15**). The new diversion would consist of a rock-cut channel in segments along the steep hillsides above the TSF and buttress, and an excavated channel in alluvium across tributary valley segments. Channel segments excavated in erodible or permeable materials would be lined with rock riprap and/or geosynthetic liner to prevent erosion and to minimize seepage where needed. The Meadow Creek diversion channel around the TSF and TSF Buttress would be designed to convey flows from a minimum 100-year storm event with 1 foot of freeboard.

The stream also would be diverted around the Hangar Flats pit. The Meadow Creek channel would be moved away from the pit to the south/southeast and reconstructed as a sinuous channel and floodplain to allow potential for spawning habitat and establishment of riparian habitat within the floodplain. A liner would be installed under the stream/floodplain corridor to minimize water seepage into the Hangar Flats pit or the pit dewatering well system, and to avoid potential pit wall instability or loss of stream habitat as a result of stream dewatering. The Meadow Creek diversion channel/floodplain corridor around the Hangar Flats pit would be designed to convey flows from a minimum 100-year storm event with 3 feet of freeboard; as a natural channel design, the stream channel itself would be designed for bankfull flows (1.5-year recurrence). This diversion would be permanent and incorporates design aspects to resemble natural channels not applied to temporary diversions of the other creeks. This permanent design accounts for channel migration, flooding, riparian development, and biological habitat.

Blowout Creek

Blowout Creek is a first order, perennial, fish-bearing stream. Blowout Creek (aka East Fork Meadow Creek) was impacted by the failure of a water storage dam in 1965 creating a steep actively eroding channel that conveys Blowout Creek. Perpetua proposes to stabilize and repair the failed area of Blowout Creek in the actively eroding chute and raise groundwater levels in the meadow upstream of the former dam site to restore wetland hydrology. A structure to control the grade of the creek would raise groundwater levels in the meadow and a coarse rock drain would address ongoing erosion of the channel side slopes that currently deliver sediment directly to the creek, while facilitating construction of a permanent surface channel. This would be an SGP environmental design feature and restoration effort, as the Blowout Creek chute and upper meadow are unrelated to and unaffected by the proposed mine features. The lower portion of the Blowout Creek alluvial fan would be an important borrow area for this and other restoration projects and is included in Project disturbance.

During construction and early mining, Perpetua would construct grade control and water retention features near the old reservoir water retention dam location to elevate the groundwater level and stream water surface sufficiently to restore wetland hydrology in the surrounding meadow. The retention structure would impound portions of the meadow channel, which would fill with sediment over time.

A coarse rock drain would be constructed within the chute downstream of the failed dam site to isolate the flow of Blowout Creek from the actively eroding chute side slopes and to prevent further erosion of the gully bottom, facilitating subsequent restoration of a surface channel on top of the drain. The rock drain would also provide area for the collection and retention of side-slope erosion material rather than allowing that material to potentially contribute sediment to Blowout Creek. As the rock drain fills with sediment, it would become closed off from the stream channel, most likely during the mine operating period.

The existing alluvial fan in lower Blowout Creek, located adjacent to Meadow Creek, would be removed, mostly during mine operations for borrow materials, and the area reclaimed. A surface diversion would be constructed at the margin of the lower alluvial fan to facilitate borrow excavation, and this stream reach subsequently restored.

Non-Contact Stormwater Diversions

Non-contact stormwater is meteoric water (i.e., precipitation) that does not contact tailings, open pits, the TSF, TSF Buttress, spent heap leached ore, and tailings from past mine operations, or any other mining related surfaces. Stormwater runoff from undisturbed areas upslope of mine features in the major drainages would be captured in stream diversion channels described above or in other channels that would direct runoff away from mine disturbed areas. Smaller-scale diversion channels or earthen berms would be used, where necessary, to divert stormwater around other mine infrastructure. Non-contact water would be managed with features to reduce erosion and sediment delivery to streams. Where sedimentation is a concern, non-contact water stormwater diversions would be routed to sediment catch basins where the water can evaporate, infiltrate, or discharge into the stream system after settling. Energy dissipation structures would be installed at the non-contact surface outfalls as needed.

Contact Water

Water that contacts mining disturbances and has the potential to impact water quality is termed contact water. Contact water includes, but is not limited to, runoff from mine facilities such as the TSF, TSF Buttress, stockpiles, mine pits, haul roads constructed of development rock, toe seepage of precipitation infiltrating through the stockpiles, and underground exploration water. Collection of contact water would begin during the first year of on-site construction and would continue throughout operations and the closure and reclamation phases. Contact water would be captured in channels and sumps and routed to the ore processing facility, contact water storage ponds, water treatment plant, or enhanced evaporation systems. In unusually high runoff periods collected water may be allowed to remain in the pits or the TSF temporarily, excess contact water from outside of the pits may be routed to mine pits for temporary storage. Contact water storage ponds would be lined to minimize leakage. Water in the contact water storage ponds could be pumped to the mill for use, treated and discharged in accordance with applicable requirements, or evaporated. Contact water in the mine pits would be directed to in-pit sumps in the lowest part of the pit and piped to the mill for use, to other contact water storage ponds, to water treatment or evaporation, or into trucks for spraying for dust control within open pits and on stockpiles or TSF Buttress. Any contact water beneficially used in the ore processing or for dust control or stored for more than 24 hours then treated and discharged would require water rights permitting through the IDWR prior to use.

Contact water which exceeds regulatory discharge standards set by IDEQ and that cannot be used during operations would be disposed through a variety of methods including forced evaporation using sprayers located within the TSF or other managed areas or treated and discharged. Water would be treated to meet

IPDES permit limits and treated water would then be discharged through IPDES permitted outfalls to the East Fork SFSR or Meadow Creek.

Runoff from haul roads and access roads outside of pits, ore stockpiles, or development rock storage areas may be of sufficiently good quality to be eligible for coverage under the Multi-Sector General Permit (MSGP) for Stormwater Associated with Industrial Activities. Eligibility would depend upon the materials used for road construction and would be determined through coordination with IDEQ with oversight by EPA. Runoff covered under the MSGP would be managed with a variety of environmental design features and conventional stormwater control measures to ensure the protection of surface water quality.

Surface Water Outfalls

The specific number and exact locations of outfalls would be determined via IPDES permitting through IDEQ. Approximate locations of the anticipated outfalls described below are shown on **Figure 2.4-14** and **Figure 2.4-15**. All outfalls would be required to meet water quality limits for specific constituents, and some outfalls may have discharge volume limits where the permit specifies a loading limit. Not all outfalls would necessarily be active or be permitted in the same permit cycle.

Two IPDES surface water outfalls would be used to discharge treated contact water from active mine pits, the TSF Buttress, pit dewatering, legacy mine materials disturbed by new mining activities, and the plant site and truck shop. One outfall located near the plant site would discharge to the East Fork SFSR. A second outfall, for treated water, would discharge to Meadow Creek upstream of Blowout Creek to augment streamflow during pit dewatering.

Water from the TSF and TSF Buttress underdrains may be discharged from two outfalls shown on **Figure 2.4-15**, depending on whether IPDES discharge limits are met without treatment of the underdrain water (otherwise, underdrain water would be routed to the plant site for use in processing, to the water treatment plant, or back to the TSF). Discharges from these two outfalls are expected to have a strong seasonal component, with some parts of the year seeing reduced flows, or even no discharge, as contact water is used for ore processing or other mine uses.

An outfall would be permitted on upper East Fork SFSR for the sanitary wastewater treatment facility at the worker housing facility. That outfall would be active through the operations period and during mine closure until the facility is decommissioned.

An additional outfall is expected to be permitted in a future IPDES permit renewal for closure and post-closure discharge of treated TSF process water. That outfall would be on Meadow Creek upstream of Blowout Creek near the TSF Buttress.

Additional permitted outfalls may be necessary during a portion of the operations period for contact water storage pond spillways that could discharge to surface water – although discharge would be very rare or non-existent, only occurring in the event of excessive precipitation or snowmelt. The need for additional outfalls associated with pond spillways and their location would be determined with IDEQ.

Each outfall would be permitted through IDEQ and would be required to be monitored, meet discharge limits, and regulate the rate of discharge.

Draining the Yellow Pine Pit Lake

Draining of the existing Yellow Pine pit lake would be initiated during construction. When the East Fork SFSR tunnel diversion is ready, stream flows would start being diverted into the tunnel during a period of low flow, most likely in the warmer months, and concurrent with salvaging fish from the pit lake and diverted sections of the East Fork SFSR. As the East Fork SFSR water is diverted into the tunnel, the decreased East Fork SFSR flow into the pit lake would be expected to cause some fish to out-migrate, thereby lessening the number of fish requiring salvage and creating better conditions for salvaging fish.

Once fish salvage has occurred in the East Fork SFSR from the tunnel diversion downstream to the pit lake and most of the East Fork SFSR flow is being diverted into the tunnel, fish salvage in the lake would commence and take approximately one week to complete. The pit lake would drain naturally down to the elevation of the outlet of the lake, where the existing rock sill would control the water level, though some leakage and slow lowering via groundwater outflows may occur beyond that level. No erosion or downcutting of the outlet rock sill would be expected because it has endured the full range of East Fork SFSR flows over decades and both inflow and outflow rates would be minimal during draining due to the river flow being diverted into the tunnel. The drain-down process would naturally convey lake water downstream to the East Fork SFSR.

After the natural drain down, water remaining in the pit lake or entering the pit from groundwater seepage or local stormwater runoff from pre-stripping operations on the highwalls above the pit lake would be managed as mine-impacted water. The water pumped from the pit lake would be used for construction purposes, transferred to the TSF (after it is lined and available) for future use in ore processing, or treated to meet permit limits before being discharged downstream in the East Fork SFSR via an IPDES permitted outfall.

Sediment remaining in the pit lake bottom would be removed beginning near the end of the final year of construction. Approximately 80 vertical feet of sediment lies on the pit bottom, and the pit walls are too steep to operate equipment without a ramp. Therefore, removal may be staged to coincide with successively lower benches as the pit is mined, and therefore may extend into the first year of operations. During this time, the pit would be used seasonally to capture and store contact water from the adjacent pit walls, and this water would be used or managed as stated above.

The sediment would be removed using an excavator or similar equipment and loaded into trucks and delivered to the TSF. Slurry/dredging methods are not anticipated but would be considered as part of adaptive management if the sediments are too wet to load and/or blend. The truck beds would have flashboards to minimize water leakage from the low-strength, saturated sediments. The loading area would drain back into the former pit lake, preventing off-site discharge of bleed water during loading. If necessary, wet material would be blended with loose dry material (e.g., development rock, etc.) from elsewhere on site to enable better loading, transport, and ultimate stability at the destination.

Groundwater Management

Groundwater would require management to allow mining in the pits and to direct seeps and springs from beneath mine facilities. Groundwater also would provide a portion of the water supply for the SGP. Water supply aspects of the mine operations are described in the Water Use and Water Balance subsection below. Any groundwater used within the SGP would require permitting through IDWR prior to use. Depending on final use or disposal of groundwater, wells drilled on the site could be permitted as domestic use, industrial use, or dewatering wells.

Pit Dewatering

Lowering the water table in and surrounding the Yellow Pine, Hangar Flats, and West End pits during operations would increase pit wall stability and provide dry working conditions in the pit bottoms. Development of the Yellow Pine and Hangar Flats pits would require partial dewatering of the alluvium of portions of the East Fork SFSR and Meadow Creek valleys, respectively, to limit groundwater inflow to the pits and maintain stability of the pit slopes. Once the West End pit is mined below the level of West End Creek, the West End pit also would require dewatering.

Dewatering would be accomplished by drilling a series of alluvial and deeper bedrock wells near the pit perimeters to intercept and pump groundwater before the water reaches each pit. Alluvial groundwater at the Yellow Pine and Hangar Flats pits would be managed using a series of vertical wells (**Figures 2.4-14** and **2.4-15**) The West End pit is primarily in bedrock with only a thin layer of alluvium in the vicinity of the pit and no alluvial dewatering is planned for that pit. Pumps would be installed in each well and would run as necessary to draw down the groundwater and facilitate mining and backfilling operations. Horizontal drain holes in pit walls may also be considered for depressurizing remnant high pore pressure areas.

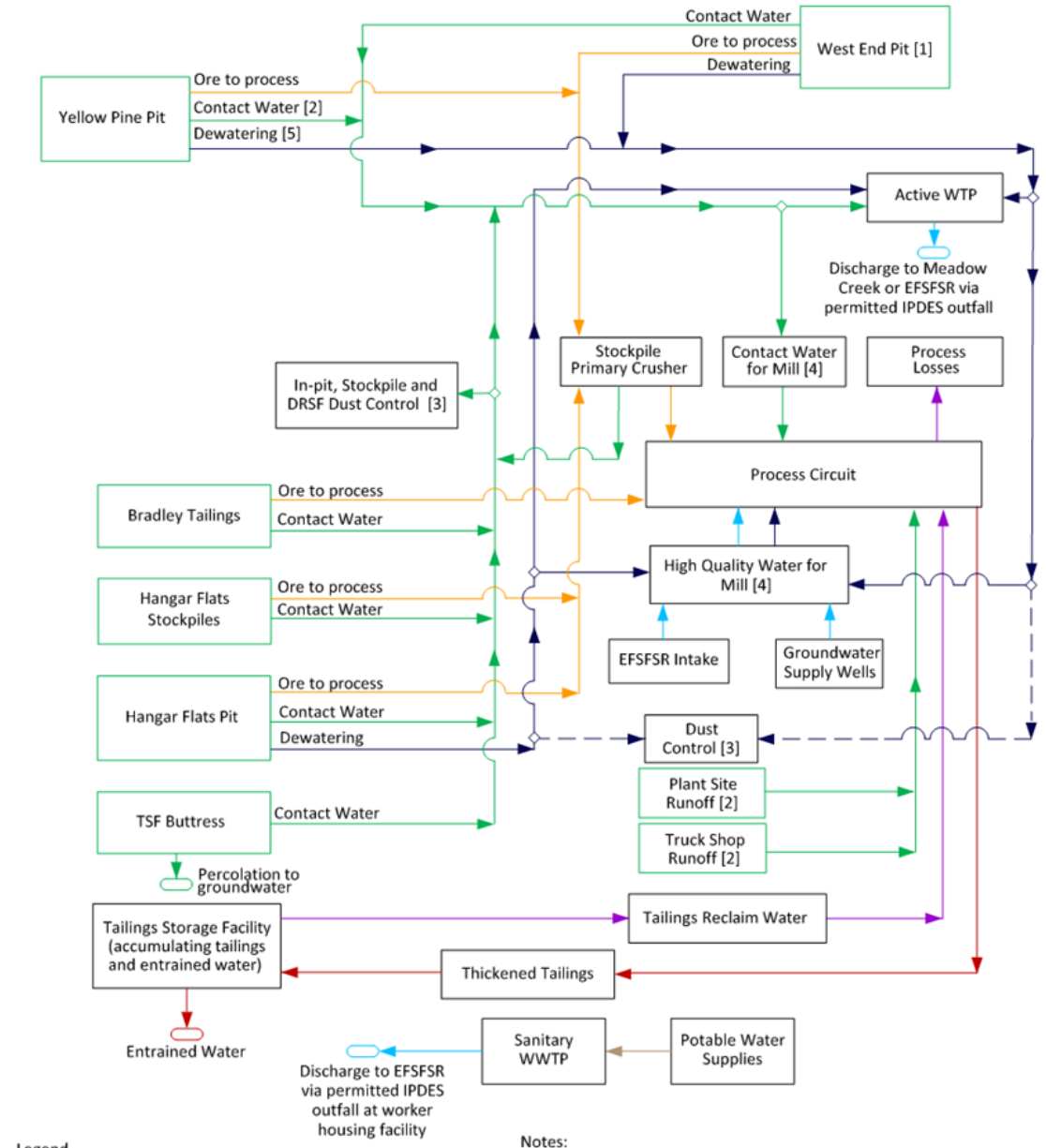
Groundwater pumped from pit dewatering would be considered to be contact water and would be managed through forced evaporation or active water treatment when the volume of pumped water exceeds the ore processing facility demand. Treated water would be discharged to either of two IPDES-permitted outfalls, either Meadow Creek or the outfall on the East Fork SFSR near the water treatment plant, depending on the need for streamflow support in Meadow Creek.

The pit dewatering wells would be permitted as industrial wells in conjunction with a water right application through IDWR.

Groundwater not captured by the pit dewatering, and entering the pits as highwall seepage, would be directed to an in-pit sump in the lowest part of the pit where it would combine with stormwater and snowmelt runoff (i.e., contact water) from precipitation falling within the pit. The water would be used for dust control within the pits, and as needed, pumped to the ore processing facility for use as makeup water. In-pit water that cannot be used would be disposed of through forced evaporation or routed to the water treatment plant then discharged to the East Fork SFSR or Meadow Creek via IPDES permitted surface outfalls.

Water Use and Water Balance

The water balance is an accounting of inflows, outflows, and storage for various components of the mining and ore processing system. Actual volumes for water balance inputs and outputs could vary seasonally and annually from the volumes estimated. A water balance flow diagram for the mining and ore processing operations phase is provided in **Figure 2.4-16** with components of the water balance described below.



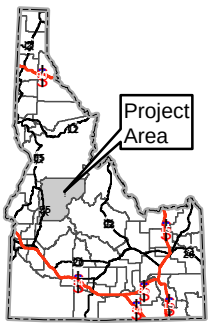


Figure 2.4-16
2021 MMP Water Balance Flow Diagram (Operations)

Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021a

Water Use and Supply

Sources of water are required for ore processing, surface and underground exploration, dust control, and potable use. Water for industrial and mining uses would be supplied from water pumped from the dewatering wells located around the Hangar Flats, Yellow Pine, and West End pits; industrial water supply wells; contact water storage ponds; a surface water supply intake on the East Fork SFSR; and process water recycled within the ore processing and tailings circuit. Dedicated wells would provide potable water for worker consumption and sanitary use. Projected water use for the SGP is described in **Table 2.4-10**.

Table 2.4-10 Estimated Gross Fresh and Recycled Water Usage

Component	Construction and Start-Up (gpm)[1]	Operations (gpm)[1]	Closure and Reclamation (gpm)[1]
Underground and surface exploration	50	50	0
Surface dust control (seasonal basis)	33	66	16.5
Ore processing including tailings storage	0	3,900	0
Potable or domestic use	26	12	4
Sub-Total Use	109	4,028	20.5
Contingency (10%)	11	403	2
Total Estimated Use	**120**	**4,431**	**22.5**

Table Source: Perpetua 2021a

[1] Values from Site-Wide Water Balance Modeling Report (Brown and Caldwell 2021c)

gpm – gallons per minute

As shown in **Table 2.4-10**, ore processing facility operations would represent approximately 97 percent of water use associated with the SGP. A separate wellfield of up to four wells would be developed in the East Fork SFSR drainage adjacent to the worker housing facility to provide potable water for the housing facility. The use of water from pit dewatering, contact water from precipitation runoff, surface water, and development of a separate wellfield for potable and supplemental industrial water at the worker housing facility would require permitting through the IDWR as new water rights or transfer of the place of use for one of Perpetua's existing water rights. Perpetua has submitted an application to IDWR for a total diversion of up to 9.6 cubic feet per second (cfs) (448.8 gpm/cfs) for use by the project.

Water for Ore Processing

Ore processing is the primary driver for water use. Water sources for ore processing include water from pit dewatering and water supply wells, contact water, East Fork SFSR surface water intake, and water recycled from the TSF. Outflows from ore processing include tailings slurry conveyed to the TSF and evaporative losses from various process components.

The majority of the water needed for ore processing would be recycled (reclaimed) from the TSF. Reclaim water would be pumped from the supernatant water pool at the TSF to the reclaim water tank at the ore processing facility. Makeup water would be supplied from pit dewatering in wells located around the Hangar Flats, Yellow Pine, and West End pits; water supply wells; contact water; and surface water intake in the East Fork SFSR. Water would be pumped from the pit dewatering wells to freshwater tanks near the ore processing facility site. These tank facilities also could supply water for exploration drilling, development drilling, road dust control, and emergency fire suppression.

The freshwater tanks could store approximately 360,000 gallons of water; 240,000 would be available for process uses, and the remaining 120,000 gallons would be maintained for fire suppression only.

Water at the TSF

Inflows to the TSF include tailings slurry and precipitation. The TSF would store tailings solids, water entrained with the tailings, and free water atop the tailings (supernatant pool). Stormwater falling directly on the TSF and water from the supernatant pool, that forms as the tailings consolidate, would be stored in the TSF and reclaimed for ore processing. Water infiltrating to the base of the TSF would be captured by the liner overdrains, enter a sump, and be pumped back to the supernatant pond. The volume of available reclaim water would be influenced by the ore processing volumes, precipitation, and evaporation. The reclaim water would be pumped from the TSF to the reclaim water tank located at the ore processing facility. During periods of site-wide water excess, reclaim can be curtailed and contact water could be used directly in ore processing to facilitate emptying the contact water ponds, while retaining water in the TSF for use in an upcoming dry season. Local stormwater and snowmelt runoff and the existing Meadow Creek would be routed around the TSF.

Water for Potable Use

Potable water would be needed for worker consumption and sanitary use. Groundwater would be the primary source of water for potable use at the SGP. An existing well located near the exploration camp in the East Fork SFSR drainage would be used to supply an independent water circuit, along with a separate wellfield in the East Fork SFSR drainage adjacent to the worker housing facility. Wells also would be drilled for potable and industrial or commercial water uses at the Burntlog Maintenance Facility and the SGLF. Perpetua has applied to IDWR for water rights for these wells.

Water Treatment

The project's water treatment requirements, objectives and methods are described in detail in the Stibnite Gold Project Water Management Plan (Brown and Caldwell 2021d) and summarized in this section. Three water types would require treatment over the life of the SGP: contact water from mine facilities, which includes dewatering water (construction through closure); process water from the TSF (closure); and sanitary wastewater (construction through early closure). During operations, treating and releasing contact water would generally be limited to periods when a significant amount of dewatering water is being produced, or seasonally in wet years. Outside of that time, much of the collected contact water could be put to beneficial use in the mill. Any groundwater put to beneficial use within the SGP mine area would require permitting through IDWR prior to use. During construction and at closure, absent a water demand for ore processing, less contact water would be consumed and proportionally more would be disposed of through evaporation or treatment and discharge. From construction through early closure, the camp and offices would produce sanitary wastewater needing treatment. Additional water treatment that could be required during post-closure is discussed in **Section 2.4.7.13**, Post-Closure Water Treatment. Permit discharge limits would be developed according to IDEQ and CWA requirements and the limits would be established by the IPDES permit issued by the IDEQ.

The sources proposed for operational water treatment by Perpetua include:

- Contact water from dewatering of the Yellow Pine, Hangar Flats, and West End pits;
- Stormwater runoff (including snowmelt) from the pits, TSF Buttress, Bradley tailings, SODA, Hecla heap leach, run-of-mine ore stockpile area, truck shop, and ore processing facility;
- Toe seepage from the TSF Buttress and long-term ore stockpiles; and

- Sanitary wastewater from the worker housing facility, truck shop, ore processing facility, and administrative buildings.

The conceptual water treatment system during operations would need to adhere to stringent surface water quality standards for arsenic and antimony. Thus, coupled with the timing of water treatment needs with respect to the mining sequence and dewatering excess, treatment methods and capacity would be phased. During construction and early in operations, a modular, mobile, two-stage iron coprecipitation system would be utilized. Early in operations, this system would be replaced by a two-stage iron coprecipitation system located near the ore processing facility. Residuals (sludge) from the water treatment during construction would be stored in a small impoundment in the TSF footprint. During operations and closure, the residuals would be stored in the TSF. Due to contact water runoff seasonality, reuse, and equalization storage (i.e., ponds), average treatment rates are often significantly less than nominal treatment capacity, except during the Hangar Flats pit dewatering when a substantial proportion of treated water would be from relatively constant dewatering flows.

This is met with a staged water treatment strategy. The construction time period is paired with 300 gpm of peak capacity from package iron coprecipitation plants. The first three years of operations would require 1,000 gpm of total treatment capacity, using an iron coprecipitation plant that would remain until closure. During peak simultaneous dewatering of the Yellow Pine pit and the Hangar Flats pit, an additional 1,000 gpm of modular water treatment capacity would be brought online for approximately three years, then treatment capacity would be scaled back to 1,000 gpm for the remainder of operations and early closure.

At closure, the closure water treatment plant would be constructed to accommodate treatment of water from the TSF which would include iron co-precipitation and the application of reverse osmosis membrane treatment. After mine closure and final reclamation of the TSF Buttress and pit backfill surfaces, contact water treatment would no longer be required; but process water treatment for the TSF (**Section 2.4.7.13**) would continue longer, through approximately year 40. The closure treatment plant would be located on private land at the TSF Buttress as the TSF would ultimately be the only remaining water source requiring treatment.

Enhanced evaporation, using snowmaker style misters located over the TSF, collection ponds, and/or pits, would supplement the treatment system, in particular to prevent surplus process water accumulation in the TSF and eliminate contact water inventory, if necessary.

2.4.5.11 Sanitary Waste Handling Facilities

Sanitary waste handling facilities would be present at SGP facilities and would be constructed and operated in accordance with Valley County, IDEQ, and Idaho Department of Health and Human Services standards. Sanitary wastewater would be treated using membrane bioreactor (MBR) or similar technology. Early in construction, the currently permitted MBR plant at the existing exploration camp would be used, and treated effluent reused for flushing toilets and urinals (as allowed by Perpetua's existing Reuse Permit M-228-02) or discharged to the existing drain field, while the worker housing facility and its associated treatment plant is under construction. During operations and closure, sanitary wastewater from the worker housing facility, ore processing facility, and administration buildings would be treated at a new MBR or similar plant and discharged to the East Fork SFSR via a permitted IDPES outfall. Vaults or portable toilets would be used at off-site facilities and remote locations on site (TSF, pits, maintenance facility etc.), and serviced as needed using vacuum trucks. Treatment residuals would be hauled off site to a permitted sanitary landfill. Vault/portable toilet wastewater would be hauled to the on-site sanitary wastewater treatment plant for treatment.

2.4.5.12 On-site Composting Facilities and Solid Waste Collection and Disposal

On-site composting facilities would be permitted by IDEQ with oversight by the local Health District. Small scale composting associated with organic materials generated at the worker housing facility may be incorporated within the centralized GMS in the Fiddle Valley. These composting facilities would be fenced. Any larger composting facilities deemed necessary to support growth media quality or quantity improvements would be located off site.

All construction and demolition waste generated at the SGP would be hauled off site for disposal at a permitted landfill; a landfill would not be constructed or maintained at the SGP. Solid waste from the worker housing facility, shops, and other work areas that cannot be composted or recycled would be collected in wildlife-resistant receptacles and hauled off site for disposal in a municipal waste landfill.

Material that meets the classification of a "hazardous waste" would be collected and stored, per the SGP Waste Management Plan at specially designed and operated secured satellite collection sites and a main storage site prior to shipment off-site to a Resource Conservation and Recovery Act (RCRA) certified hazardous waste disposal facility.

2.4.5.13 Mine Site Borrow Sources

Various types of earth and rock material would be used from borrow sources for construction, maintenance, closure, and reclamation activities. Most of these materials can be sourced at the SGP from existing development rock dumps, legacy spent heap leach ore, and from development rock removed as part of proposed surface mining and underground exploration activities. These materials would be subject to physical and chemical testing to determine suitability for use.

Native earth materials would be required for some applications. Specific areas within the SGP that have large quantities of high quality native alluvial and glacial granular borrow materials for use include:

- The alluvial and glacial soils in the Meadow Creek valley floor within the footprint of the TSF, TSF Buttress, and Hangar Flats pit;
- Sand, gravel, and cobbles in the lower Blowout Creek alluvial fan; and
- Glacial soils in the Fiddle Creek valley walls.

2.4.5.14 Materials, Supplies, Chemical Reagents, and Wastes

Numerous materials, supplies, and chemical reagents would be used, including fuel, explosives, and ore processing reagents for the SGP. A Spill Prevention, Control, and Countermeasures Plan (SPCC) would be developed to establish procedures for responding to accidental spills and releases of petroleum products. In addition, a Hazardous Materials Handling and Emergency Response Plan would be developed to address procedures for responding to accidental spills or releases of hazardous materials to minimize health risks and environmental effects.

Diesel Fuel, Gasoline, and Propane

Aboveground storage tanks at the SGP would be used for fuels and other fluids, including gasoline, diesel fuel, lubricants, coolants, hydraulic fluids, and propane. Approximately 200,000 gallons of diesel fuel, 10,000 gallons of gasoline, and 30,000 gallons of propane would be stored at the SGP in addition to a variety of materials, supplies, and reagents (**Table 2.4-11**). Storage management would be outlined in the SPCC Plan. The storage tank facility for gasoline, diesel fuel, and propane would be located near the

maintenance workshop with additional propane storage at the ore processing facility area, the underground portal area, and the worker housing facility.

Explosives Storage

Ammonium nitrate prill would be received in bulk in tanker trucks and transferred into storage silos. Other blasting supplies used for mine blasting operations would include blasting emulsion products, detonating cord, cast primers, and blasting caps. These products would be delivered in boxes or other approved containers on trucks. Components of bulk explosive material would be stored in separate and isolated containers, sized, and designed to meet Bureau of Alcohol, Tobacco, Firearms, and Explosives and Mine Safety and Health Administration requirements. Explosive magazines for detonating cord, cast primers, and blasting caps also would be in a separate, fenced, and gated site away from the diesel fuel oil storage tanks and the ammonium nitrate silos, and other mine surface facilities.

Miscellaneous Oils, Solvents, and Lubricants

Various oils including motor oils, lubricants, antifreeze, and solvents would be shipped to the SGP on trucks. These would be stored in approved containers located within, or directly adjacent to, the maintenance shop and contained within secondary containments to prevent spills into the environment. All used petroleum products, waste antifreeze, and used solvents would be collected in approved containers, transported off site, and disposed or recycled.

Miscellaneous Consumables

Lime would be produced on site and stored in silos at the ore processing facility. Silos would be equipped with air emission controls. Sodium cyanide would be transported as dry cyanide briquettes to the SGP. Nitric and sulfuric acid would be transported in tanks designed to prevent spills even in the event of rollovers. Nitric and sulfuric acids would be stored in specialized non-corrosive, polyethylene-lined tanks located within the ore processing facility and would have secondary containment.

Miscellaneous consumables would consist of various reagents used in the ore processing facility, along with wear parts for the crushing and grinding circuits. Liquids would be shipped to the SGP in tank trucks designed for spill prevention and escorted to the SGP by pilot cars manned and equipped to handle spills. All reagents would be transported and stored in suitable containers in designated reagent storage areas.

Waste Handling

Wastes anticipated to be generated at the SGP include fluorescent bulbs, batteries, and empty aerosol containers which would be managed in accordance with the appropriate regulatory standards. Materials that are not consumed would be recycled, to the extent practical, or disposed of in accordance with applicable regulations.

Used petroleum products would be stored on site in approved containers that would be separate from other trash and garbage products. Used petroleum products would be transported off site for recycling or disposal in an approved facility.

Other legacy materials could be encountered during construction and operations. If encountered, these materials would be characterized to determine potential for re-processing, reuse, or on-site or off-site disposal.

Table 2.4-11 Proposed Materials, Supplies, and Reagents

Common Name	Units	Annual Use	Delivery Form	Typical Vehicle Payload	On-site Storage Capacity	Storage Method	On Site Mine Uses	Estimated Deliveries per Year
Diesel Fuel	Gallons	5,800,000	Bulk liquid	10,000	200,000	Tanks	Mine Site	580
Lubricants	Gallons	296,000	Bulk liquid	3,000	30,000	Tanks, Totes, Drums	Truck Shop	99
Gasoline	Gallons	500,000	Bulk liquid	5,000	10,000	Tanks	Mine Site	100
Antifreeze	Gallons	40,000	Bulk liquid	3,000	4,000	Tanks, Totes, Drums	Truck Shop	13
Propane - Buildings	Gallons	560,000	Bulk liquid	6,000	30,000	Tanks	Buildings	93
Propane – Lime Plant	Gallons	1,463,000	Bulk liquid	11,000	30,000	Tanks	Lime Plant	133
Solvents	Gallons	1,000	Bulk liquid	200	1,000	Totes or Drums	Truck Shop	5
Tires	Each	246	Bulk solid	Variable	59	Laydown	Mining	47
Batteries	Units	Variable	Pallets	Variable	500 units	Pallets	Mining	25
Light Ballasts	Pounds	25	Pallets	Variable	1,000	Pallets	General Operations	5
Pesticides/ Insecticides	Pounds	250	Pallets	Variable	1,000	Pallets, drums	General Operations	1
Herbicides	Pounds	1,000	Pallets	Variable	2,000	Pallets, drums	Environmental	1
Fertilizer	Pounds	2,500	Pallets	Variable	5,000	Pallets, drums	Reclamation	1
Ammonium Nitrate	Tons	7,300	Bulk solid	24	200	Secured Silos	Open Pits - blasting	304
Explosives	Tons	100	Boxes	5	20	Secured Magazines	Open Pits - blasting	20
Grinding media, SAG Mill	Tons	4,449	Bulk solid	24	200	Bunkers and Bins	Mine Process Area	186
Grinding media, Ball Mill	Tons	3,566	Bulk solid	24	200	Bunkers and Bins	Mine Process Area	149
Grinding media, LS Ball Mill	Tons	34	Bulk solid	24	200	Bunkers and Bins	Mine Process Area	2
Primary crusher liners	Tons	62	Set	24	1 set	Laydown	Mine Process Area	3
Pebble crusher liners	Tons	84	Set	24	1 set	Laydown	Mine Process Area	4
SAG liners	Tons	801	Set	24	1 set	Laydown	Mine Process Area	34

Common Name	Units	Annual Use	Delivery Form	Typical Vehicle Payload	On-site Storage Capacity	Storage Method	On Site Mine Uses	Estimated Deliveries per Year
BM liners	Tons	1,424	Set	24	1 set	Laydown	Mine Process Area	60
LS primary crusher liners	Tons	9.16	Set	24	1 set	Laydown	Mine Process Area	1
LS secondary crusher liners	Tons	9.32	Set	24	1 set	Laydown	Mine Process Area	1
LS Ball mill liners	Tons	27.8	Set	24	1 set	Laydown	Mine Process Area	2
Lime Slaker liners	Tons	3.5	Set	24	1 set	Laydown	Mine Process Area	0.25
Sodium Cyanide	Tons	4,000	Bulk containers	24	300	Tanks, bins	Mine Process Area	167
Activated carbon	Tons	500	Super sack solid	22	100	Supersacks	Mine Process Area	23
Copper sulfate	Tons	1,250	Supersacks, 1,000 kg	22	100	supersacks	Mine Process Area	57
Lead nitrate	Tons	800	Supersacks, 1,000 kg	22	25	Supersacks	Mine Process Area	37
Aerophine 3418A	Gallons	10,500	Bulk liquid	200	400	Tanks	Mine Process Area	53
AP 3477	Gallons	60,000	Bulk Liquid	3,000	6,000	Tanks	Mine Process Area	20
Methyl isobutyl carbonyl	Gallons	120,000	Bulk liquid	3,000	6,000	Tanks	Mine Process Area	40
Flocculent (Unnamed)	Tons	300	Supersacks	22	50	Supersacks	Mine Process Area	14
Sodium metabisulfite	Tons	2,000	Supersacks	22	200	Supersacks	Mine Process Area	91
Potassium amyl xanthate	Tons	1,350	Bags in boxes	20	40	Stacked boxes	Mine Process Area	68
Sodium hydroxide	Tons	330	Supersacks	22	40	Supersacks	Mine Process Area	15
Nitric acid	Gallons	65,000	Bulk liquid	3,000	6,000	Tanks	Mine Process Area	22
Scale control reagents	Pounds	5,000	Drums or totes	1,000	1,000	Drums or totes	Mine Process Area	5
Sulfuric acid	Gallons	12,000	Bulk liquid	3,000	8,000	Tanks	Water Treatment	5
Hydrogen peroxide	Gallons	7,100	ISO totes	3,660	10,000	ISO totes	Mine Process Area	2
Sodium hypochlorite	Gallons	2,000	Totes	1,000	1,000	Totes	Water treatment	2
Magnesium chloride, 33%	Gallons	250,000	Bulk liquid	4,500	20,000	Tanks	Road surfaces	56

Common Name	Units	Annual Use	Delivery Form	Typical Vehicle Payload	On-site Storage Capacity	Storage Method	On Site Mine Uses	Estimated Deliveries per Year
Ferric Sulfate	Gallons	23,000	Bulk liquid	3,000	6,000	Tank	Water Treatment	17
Polymer	Gallons	1,000	Drums	200	3	Drums	Water treatment	5
Organic Sulfide	Gallons	4,000	Drums	200	3	Drums	Water treatment	5
Sodium Bisulfite	Tons	0.2	Drums	-	2	Drums	Water Treatment	1
Lime	Tons	150	Bulk Solids	24	30	Silo	Water Treatment	7
Sodium Carbonate	Tons	430	Bulk Solids	24	30	Silo	Water Treatment	18
Carbon Dioxide	Tons	14	Bulk Liquid	3	3	Tanks	Water Treatment	5
Microsand	Tons	6.58	Bags	-	7	Bags on pallets	Water treatment	1

Table Source: Perpetua 2021a

AP = AP 3477 is dialkyl dithiophosphate; a reagent used in the flotation circuit

BM = ball mill

ISO = International intermodal container that is manufactured according to the specifications outlined by the International Organization for Standardization (ISO)

kg = kilogram

LS = limestone

SAG = semi-autogenous grinding

2.4.5.15 Temporary Closure of Operations

No periods of temporary or seasonal closure are currently planned; however, a description of temporary closure is required for the SGP cyanidation permit. In the event of temporary suspension of mining activities, Perpetua would notify the Forest Service, USACE, IDEQ, IDWR, IDL, and Valley County in writing with as much advanced warning as possible of the temporary stop of mining activities. This notification would include reasons for the shutdown and the estimated timeframe for resuming production.

During any temporary shutdown, Perpetua would continue to implement operational and environmental maintenance and monitoring activities to meet permit stipulations and requirements for environmental protection. This would include the reclamation success monitoring.

Dewatering of the open pits may continue during temporary closure due to the negative effects that pit lake formation or highwall saturation would have on highwall stability and renewed mine operation. Since ore processing may not be occurring, excess water from the various facilities would need to be managed. The operational plans required by the Cyanidation Permit and other plans developed as part of IDEQ permits would also describe specific activities and provide details on how process water would be managed during a temporary closure.

A limited potential exists that unfinished facilities (such as haul roads, buttress, open pits, pit backfills, GMSs, etc.) would not have the same protective measures in place (e.g., stormwater collection systems or culverts) as would exist if the facility had been finished. Therefore, Perpetua would identify interim measures that would be taken to manage stormwater, sediment, dust, and other factors while the mining is temporarily stopped. Surface water diversion structures are all proposed to be installed prior to construction of the TSF, open pits, and the TSF Buttress; hence, surface water would be diverted around these facilities regardless of the stage of their completion.

Environmental reports would be submitted per previously agreed upon schedules. Regardless of the operating status of the mine, appropriate monitoring would continue until compliance with permanent regulatory closure requirements is attained, unless modified by the required regulatory authorities.

2.4.6 Surface and Underground Exploration

Surface and underground exploration including development drilling would occur to evaluate potential mineralized areas outside of the proposed mining areas. New surface and underground exploration activities would be conducted during construction and operations. Any additional future expansion of mining activities would require supplemental permitting and approvals, including additional evaluation under NEPA.

2.4.6.1 Surface Exploration

At any given time, disturbance associated with exploration activities conducted during construction and operations could include up to five acres of new temporary road disturbance and eight acres of drill pad disturbance on Forest lands at the SGP. Exploration sites would be reclaimed after completion of drilling. Disturbance resulting from surface exploration would total approximately 25 acres of roads and 40 acres of drill pads. Any jurisdictional stream crossings or impacts to jurisdictional wetlands could require additional Section 404 CWA permits beyond those required for development and operation of the mine operations.

The exploration roads and drill sites would be located, as practical, on historical disturbance to avoid any identified cultural resources, other sensitive areas such as wetlands or Riparian Conservation Areas

(RCAs), and potential impacts to habitat of ESA listed species. **Figure 2.4-17** shows the boundary of the area within which ongoing surface exploration during construction and operations would occur.

Drill pad sizes would vary depending on the type of drilling equipment, number of holes to be drilled from the pad, and depth of drill hole. Drill pad sizes may range from approximately 0.05 to 0.15 acre.

Sumps and/or portable tanks would be used at each drill pad to collect drill cuttings and to manage and circulate drilling fluids. Sumps would be fenced and constructed with at least one side having a shallow grade for wildlife egress. Sumps would be backfilled and reclaimed when no longer needed for drilling.

Depending on the location of the drill pad, a variety of drill rigs and equipment would be supported by helicopter or terrestrial vehicle. Some drill holes may exceed 1,500 feet, but the average drill-hole depth would be approximately 800 feet. Drill holes would be both vertical and angled. Drilling activities also may include water exploration, dewatering well installation, and monitoring well installation. Water and non-toxic drilling fluids would be used for all drilling.

Dewatering and monitoring wells would be abandoned with surface completions/seals and be capped consistent with IDAPA 37.03.09 – Well Construction Standards Rules. Pre-collared holes would only be associated with track or truck mounted drilling equipment.

Areas disturbed for exploration would be contoured to blend into surrounding terrain; water bars and surface water channels would be retained to handle flows through the area. Compacted areas would be de-compacted as necessary prior to fertilizing and seeding.

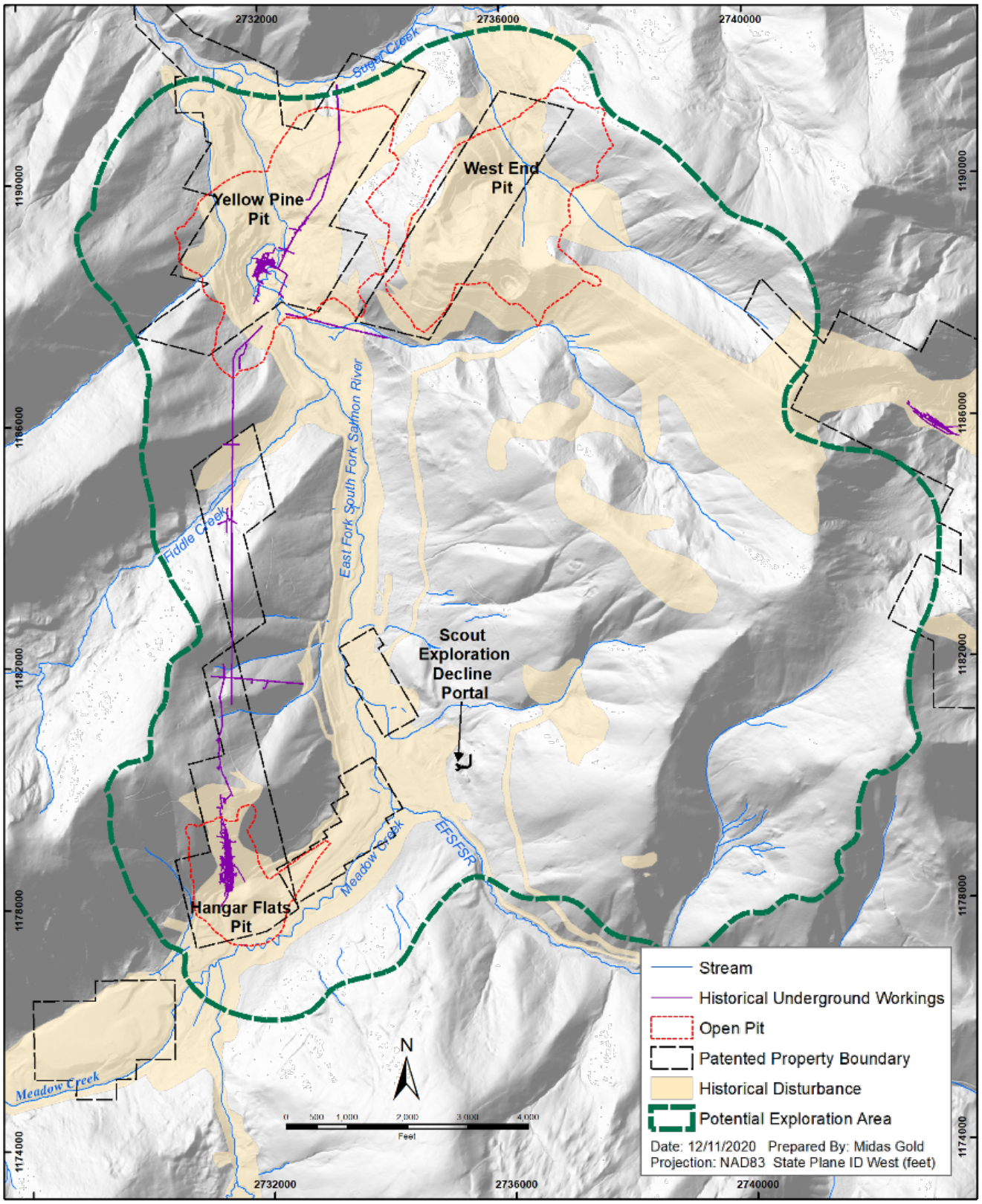
Previously approved activities (i.e., approved exploration activities and associated reclamation obligations) would continue as well.

2.4.6.2 Underground Exploration

Underground exploration activities could occur for the SGP throughout the life of the mine, such as the newly discovered Scout Prospect, a 1-mile, downward-sloping tunnel (a decline). The decline would be used to reach the subsurface mineralized zone known as the Scout Prospect. The decline would be accessed from a portal facility known as the Scout Portal, located south of the planned ore processing facility (**Figure 2.4-17**). Approximately 100,000 tons of rock would be excavated from the decline. Exploration drill holes would be installed at various locations in the decline. Selected drill cuttings or core would be removed from underground for testing.

To construct the portal facility, the hillside would be cut into to develop a flat vertical slope using conventional underground drill and blast operations with mechanized equipment. Explosives would be used in the underground development process to construct the decline. The underground development rock could be used for surface pad construction, hauled to the ore stockpile area, or hauled for storage in the TSF Buttress as appropriate.

Drilling is used in advance of the decline to ensure unexpected or unmanageable water pressures are not intersected. Water would be used in underground drilling or pumped from the collection point to the surface. Upon reaching the surface, this water would be piped to the ore processing facility to be used in the plant.



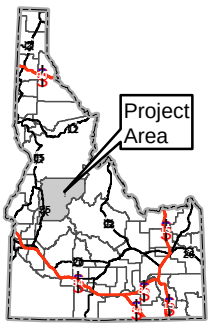


Figure 2.4-17
Surface Exploration Boundary

Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021a

2.4.7 Closure and Reclamation

2.4.7.1 Overview

Closure and reclamation at the site would include interim, concurrent, and final closure and reclamation. Details on reclamation activities to be implemented for the SGP, including appropriate seed mixes to be used are described in the Reclamation and Closure Plan Stibnite Gold Project (Tetra Tech 2021a). Interim reclamation is intended to provide shorter-term stabilization to prevent erosion of disturbed areas and stockpiles that would be more fully and permanently reclaimed later.

Concurrent reclamation is designed to provide permanent, low-maintenance achievement of final reclamation goals on completed portions of the site prior to the overall completion of mining activities throughout the SGP. Approximately 46 percent of the reclamation would be completed concurrent to mining and ore processing; remaining reclamation activities would be completed during closure.

Final closure and reclamation would involve removing all structures and facilities; reclamation of those areas that have not been concurrently reclaimed such as the TSF and some backfill surfaces; recontouring and improving drainages; creation of wetlands; reconstructing various stream channels; decommissioning of the East Fork SFSR diversion tunnel; growth media placement; planting and revegetation on disturbance areas; and reopening Stibnite Road (FR 50-412) through the SGP.

Final reclamation of certain facilities could continue beyond the five-year closure and reclamation period. The Burntlog Route would be needed until the TSF is fully reclaimed, after which the newly constructed portions of the road would be decommissioned and reclaimed, with the exception of removal of soil nail walls (concrete and bolted stabilizing walls), and the currently existing portions of the road would be returned to their prior use.

Surface water flow diversion of portions of Garnet Creek, Meadow Creek, Midnight Creek, and Hennessey Creek would be reclaimed and incorporated into constructed wetlands (i.e., Garnet Creek) or restored stream channels across the reclaimed TSF (i.e., Meadow Creek) or Yellow Pine pit backfill.

Closure and reclamation activities would be intended to achieve post-mining land uses of wildlife and fisheries habitat and dispersed recreation at the SGP. Dispersed recreation uses would be accessible by the reopening of Stibnite Road (FR 50412) through the backfilled Yellow Pine pit that would facilitate recreational traffic and access to Thunder Mountain. The proposed final reclaimed condition of the site is shown on **Figure 2.4-18**. Concurrent and final closure and reclamation for the SGP are described in greater detail in the following sections.

ASAOC activities as described under the No Action Alternative would occur concurrent with 2021 MMP activities.

2.4.7.2 Decommissioning, Demolition, and Disposal of Facilities

Perpetua would dismantle or demolish structures and facilities not necessary for post-closure water management (e.g., certain culverts and pipelines). The materials from the dismantling or demolition of structures and facilities would be salvaged or disposed of in permitted off-site landfills. All reagents, petroleum products, solvents, and other hazardous or toxic materials would be removed from the site for reuse or would be disposed of according to applicable state and federal regulations. Concrete foundations would be broken or fractured as required to prevent excessive water retention and covered in-place with a minimum of 2 feet of a combination of 1.5 feet of backfill and 0.5 feet growth media or would be broken up and buried in the TSF Buttress or pit backfill prior to installation of a geosynthetic liner cover.

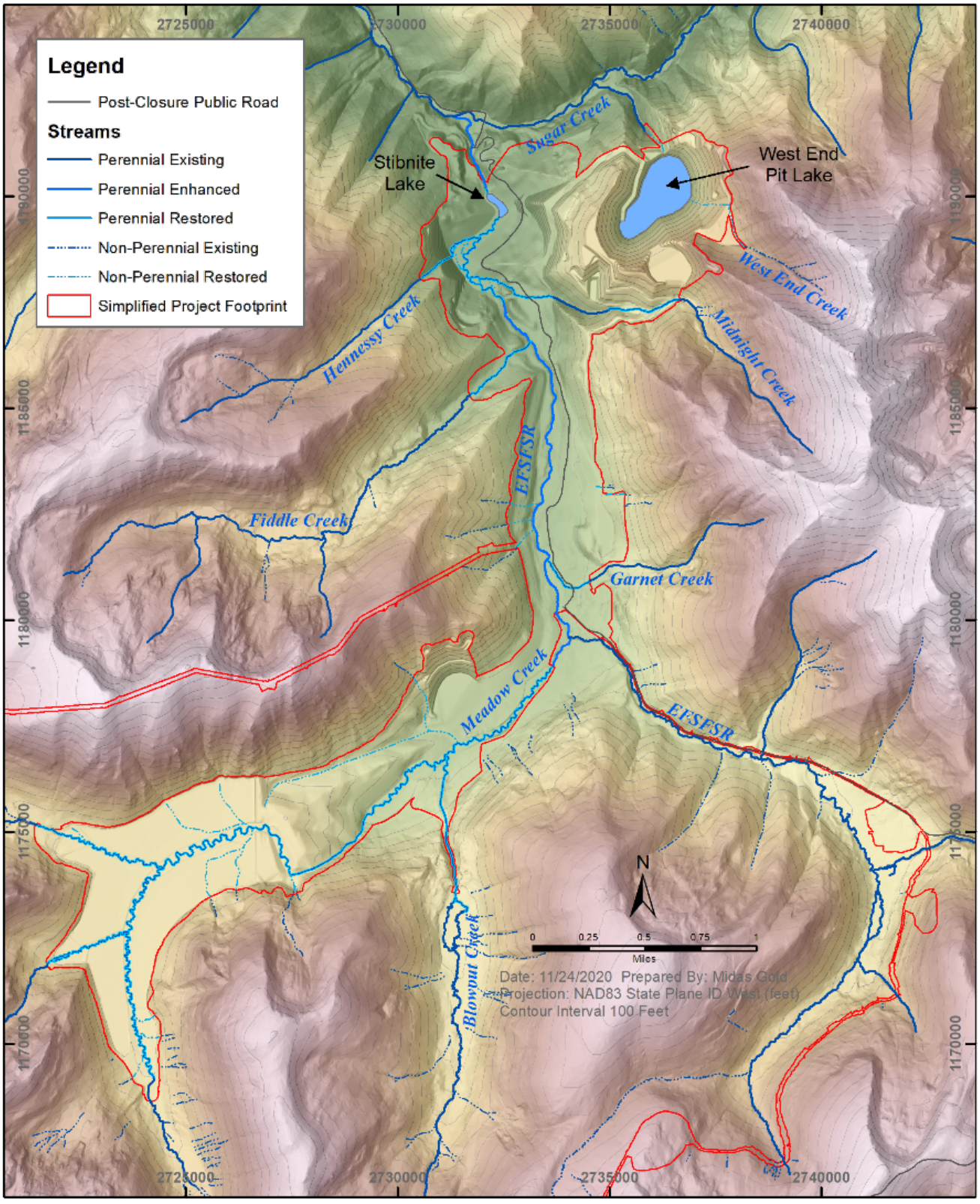
Soil/rock beneath fuel storage areas and chemical storage buildings would be tested for contamination and removed or disposed of appropriately if needed.

2.4.7.3 Underground Exploration and East Fork SFSR Tunnel

Perpetua would decommission and close underground facilities and underground support facilities, including the portals of the East Fork SFSR tunnel and Scout decline. To prevent future access to underground workings, the underground portals (i.e., East Fork SFSR tunnel and Scout decline) would be closed using concrete block bulkheads, rockfills, or a combination of rockfill and low-permeability foam. The downstream (north) East Fork SFSR portal and the Scout decline would be closed with bulkheads inside the portals (where overhead cover was at least 3 times the tunnel height) or backfilled with clean rockfill starting inside the portals and working outward, and up against the portal headwalls. Surface swales would be installed to direct surface water around the backfilled portal, and the exterior backfill, and surrounding disturbance would be graded to blend with adjacent topography, covered with growth media, and revegetated. At the East Fork SFSR upstream (south) portal, the control weir would be left in place, and the fishway weir notch raised with concrete, creating an approximately 4-foot-high sill to exclude river water or alluvial groundwater, and low-permeability geofoam or similar would be installed inside the portal after the initial backfill or bulkhead, to prevent water entry. Then, the portal area would be filled, regraded, and revegetated as described for the other openings.

2.4.7.4 Yellow Pine Pit

The majority of the Yellow Pine pit backfill material (90 percent) would be West End pit development rock. The balance of Yellow Pine pit backfill would include development rock from the Hangars Flat pit (5 percent) and the Yellow Pine pit (5 percent). Backfill would be placed in lifts not exceeding 100 feet in vertical height with the large equipment, to include selective placement of the top lifts by direct dumping to better control the type of rock that would be placed near the surface. This placement method also would limit subsidence of the backfill and the amount of regrading necessary prior to placement of growth media. This material would not be compacted beyond that which occurs during placement, subsequent routing of trucks, burial, and consolidation. Portions of the highwalls on the east and west sides of the pit would remain above the backfilled portion of the pit and would not be reclaimed. A sinuous channel would be constructed through the backfilled area for the reconstructed East Fork SFSR with an average valley gradient approximating the historical, pre-disturbance river gradient (Tetra Tech 2021b). A low permeability geosynthetic liner would be incorporated into the cover over the entire surface of the backfilled Yellow Pine pit, including the re-constructed channel floodplain corridor to reduce the infiltration of meteoric water into backfill material, which could dewater the restored stream channel and result in additional metal leaching from the underlying backfill. Above the geosynthetic liner in the stream corridor, a layer of relatively fine material would be placed to protect the stream liner from puncture, followed by coarse rock armor to protect from exposure via stream scour, followed by floodplain alluvium at a minimum thickness equal to the maximum estimated scour depth of the proposed stream channel. Growth media would then be placed and the area revegetated. The lined corridor would be wide enough to accommodate future channel migration, evolution, and over-bank flooding. The cover system outside the stream/floodplain corridor would be similar to that described for the TSF Buttress (**Section 2.4.7.6**). Portions of Hennessy and Midnight Creeks would be restored over the backfilled area along with the reconstructed East Fork SFSR.



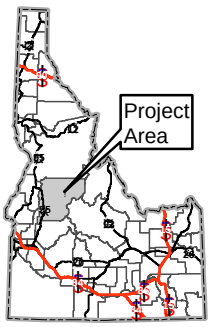


Figure 2.4-18
Post Closure and Reclamation Condition

Stibnite Gold Project
Stibnite, ID

Data Sources: Perpetua 2021a

Hennessy Creek would cascade over the approximately 275 feet tall west highwall of the Yellow Pine pit to a restored section of low-gradient channel on the western edge of the reconstructed East Fork SFSR floodplain before joining the restored East Fork SFSR channel. Midnight Creek would be restored across the southeastern portion of the reconstructed East Fork SFSR floodplain. After closure of the East Fork SFSR tunnel, backfilling of the Yellow Pine pit, and restoration of the East Fork SFSR and Hennessy Creek across the backfill, the Hennessy Creek diversion would be decommissioned and the area reclaimed, along with the adjacent operations-phase public access road.

To accommodate migrating fish, including Chinook salmon and bull trout, step pools would be established within the constructed East Fork SFSR channel. The vertical relief (drop) between successive pools would not exceed published fish passage criteria. Detailed hydrologic and hydraulic analyses would inform the overall channel and floodplain design and construction, with channel bankfull width approximately 25 to 30 feet, and average depth of approximately 2 feet. The lined Stibnite Lake, of similar size to the existing Yellow Pine pit lake, would be constructed within the lined corridor.

Access through the site to Thunder Mountain Road (FR 50375) would be reestablished with construction of an access road through the backfilled area, replacing the segments of the Stibnite Road (FR 50412) that were removed by mining.

2.4.7.5 West End Pit

West End Creek would be routed into the West End pit in a rock chute on the highwall adjacent to the upper legacy development rock dump, below which a pit lake would form in the main portion of the West End pit. The West End pit lake would fill gradually up to 400-feet-deep, and lake levels would fluctuate seasonally and with longer-term climate variations; however, the lake would not be expected to completely fill with water or spill due to the limited catchment area.

To account for model uncertainty, lake levels would be monitored after closure, as specified in the Environmental Monitoring and Management Plan (EMMP), and a threshold water level would be established, sufficient to contain the predicted runoff volume from a high-snowpack year without discharge. If water levels approach the threshold, either or both surface water diversion and water treatment could be implemented to prevent the lake from spilling. If needed, a temporary treatment unit would be mobilized to the site to treat and discharge the pit lake water until the lake level falls below the threshold discharge level, thus preventing untreated discharge in potential subsequent wet weather years and enabling gradual and predictable water treatment rather than treatment at higher but variable and uncertain peak spring runoff rates.

The Midnight pit, the approximately 6-acre, 100-foot-deep southeastern portion of the overall West End pit within the Midnight Creek catchment, would be backfilled during operations with approximately 6 million tons of development rock from the West End pit. The backfill would be placed to achieve a mounded final reclamation surface to promote drainage away from the West End pit and prevent formation of a pit lake within Midnight pit. Portions of the backfill would be covered with growth media and revegetated, and the remainder covered with talus like development rock to mimic a natural talus slope.

The floor of the sidehill pit southwest of the main West End pit would be graded to drain, covered with growth media, and revegetated. No backfilling would occur for the main West End pit. At closure, the remaining road into the pit and access to highwalls would be blocked with large boulders and/or earthen berms to deter motorized vehicle passage into the pit.

2.4.7.6 Tailings Storage Facility and TSF Buttress

Perpetua proposes to complete tailings reclamation approximately 9 years after ore processing operations cease. After tailings consolidate sufficiently to use heavy equipment on top of the tailings, starting approximately 3 to 5 years after the end of deposition, Perpetua would begin with placement of cover material, then construct wetlands and restore Meadow Creek and its tributaries within appropriately sized lined floodplain corridors, place growth media, and revegetate the area.

Once ore processing operations have ceased, Perpetua would begin removing the remaining supernatant water pool and ongoing accumulation of meteoric water and consolidation water through a combination of spray evaporators (similar to snowmaking misters) operated within the TSF boundary and an active water treatment that meets IPDES discharge limits, followed by discharge to the East Fork SFSR or Meadow Creek. Removal of the remaining supernatant water from the TSF would allow the surficial layers of the tailings to dry and gain strength, which would allow equipment to operate on the tailings surface for grading and the placement of the geosynthetic liner, overlain by unconsolidated overburden and growth media. Concave areas in the consolidated tailings surface would be filled to create suitable drainage conditions prior to liner and cover installation in the area designed to become restored stream channel. Cover placement and minor grading of tailings would occur, beginning within 3 to 5 years from the end of deposition, as portions of the TSF surface dry enough to allow equipment traffic, working inward from the facility perimeter. The cover material overlying the geosynthetic liner would be sourced from unconsolidated overburden or other appropriate material stored in a GMS on top of the adjacent TSF Buttress.

Perpetua would restore appropriately designed meandering stream channels (Meadow Creek and tributaries) within a stream and floodplain corridor across the top of the lined TSF surface (Rio Applied Science and Engineering [Rio ASE] 2021). Pools and riffles would be constructed within the channel. Measures to create aquatic habitat would include side channels, oxbows, boulder clusters, root wads, and large woody debris. This would allow for the post-closure development of riparian habitat, convey water off the facility, and minimize potential interaction of surface water with the underlying tailings. Given the nature of the surface of the TSF, the constructed channel would have a shallow gradient.

Detailed hydrologic and hydraulic analyses would inform the overall channel and floodplain design, which would necessitate the construction of defined channels ranging from approximately 5 to 15 feet in bankfull width, with average bankfull depth reaching approximately 2 feet. A connected floodplain up to 200 feet wide would convey higher flows during a 100-year flood event.

Consolidation of the tailings would continue after cover placement and surface reclamation, at gradually declining rates, until approximately mine year 40. To prevent tailings consolidation water from mixing with surface water on the cover, potentially leading to water quality impacts if discharged to streams, the consolidation water would be collected for treatment, using shallow wells and gravel or geosynthetic drains. Initially, collected flows would be routed to a water treatment plant (WTP) for treatment and discharge. Treatment would no longer be required after approximately mine year 40, at which time the treatment facility would be decommissioned and the WTP site reclaimed.

Final slopes of the TSF Buttress would be variable, to blend with the surrounding terrain to the extent practicable, produce a permanent and stable landform, provide access for future maintenance on the TSF and buttress, and provide for non-erosive drainage across the reclaimed face of the buttress. Upon completion of final grading of the TSF Buttress, a low permeability geosynthetic cover would be placed over the facility, which would be designed to limit infiltration through the underlying development rock. The geosynthetic liner would be overlain by an inert soil/rock layer (non-PAG/metal leaching

development rock, fill, or alluvium) and growth media and revegetated. Similar to that for the TSF, a channel and floodplain corridor would be established for Meadow Creek across the top of the lined buttress. The channel would have a low gradient and wide floodplain across the top of the buttress, then drop more steeply to the valley floor near the south abutment. The steep channel segment would consist of a boulder chute that would flow through multiple energy-dissipating basins (one mid-slope and one at the toe of the TSF Buttress) before being discharged to a restored Meadow Creek on the valley bottom.

2.4.7.7 Hangar Flats Pit

Hangar Flats pit would be backfilled up to the valley bottom elevation or slightly higher and no pit lake is anticipated. The already-established Meadow Creek diversion channel and floodplain corridor would be retained around Hangar Flats pit as the final configuration, and the segment of Meadow Creek between the toe of the TSF Buttress and the entrance to the Hangar Flats pit diversion would be restored along with adjacent riparian wetlands. At closure, the entire surface of the backfilled Hangar Flats pit would be covered with a low permeability geosynthetic liner overlain with seed bank material to establish wetlands. Non-perennial drainages in adjacent upland areas would be routed to facilitate development of the wetland hydrology. Meadow Creek downstream of the Hangar Flats pit diversion, to the confluence with the East Fork SFSR, would be enhanced during mine operations with large woody debris, boulder cluster habitat structures, and riparian plantings.

2.4.7.8 Transmission Line and Electrical Infrastructure

The Johnson Creek and Stibnite substations would not be decommissioned immediately during mine closure; the transmission line between these substations would remain to provide power for post-closure water treatment. Once there is no longer a need for active water treatment, Perpetua, in coordination with IPCo, would disassemble the approximately 9-mile transmission line between the Johnson Creek and Stibnite substations. The substations, switchgear, and power line would be removed would be removed. The transmission line ROW and associated access roads would be recontoured to match surrounding topography and revegetated. As part of revegetation, the transmission line structure pads and access roads would be scarified, and at least 6 inches of growth media and/or mulching would be applied. Revegetation would not be required on affected lands, or portions thereof, where planting is not practicable or reasonable because the soil is composed of excessive amounts of sand, gravel, shale, stone, or other material to such an extent to prohibit plant growth (IDAPA 20.02.02).

2.4.7.9 Burntlog Route

Once all final mine closure/reclamation work has been completed, Perpetua would reduce the 20-foot-wide travel way of 19.8 miles of Burntlog Road (FR 447), 1.3 miles of Meadow Creek Lookout Road (FR 51290), and 2 miles along Thunder Mountain Road (FR 375) of the Burntlog Route to their approximate pre-mining width. Returning this 23 miles of existing road to pre-mining condition would entail grading and/or scarification along the outside edges of the road followed by seeding with the species listed in the Reclamation and Closure Plan (Tetra Tech 2021a) or as approved by the Forest Service. Perpetua would remove ditches, cross drains, culverts, safety berms, mile markers, guardrails, and signs on roads if these features are no longer needed. These roads would retain the flatter grades and gentler curves constructed for mine operations.

The approximately 15 miles of Burntlog Route that was newly constructed for the SGP, connecting Burnt Log Road (FR 447) to Meadow Creek Lookout Road (FR 51290) and Thunder Mountain Road (FR 50375) would be fully decommissioned. The road would be decommissioned by pulling back and re-contouring road cuts to slopes that are similar to, but not necessarily matching, pre-project conditions, and that would be consistent with the surrounding terrain as practicable. Surface water diversions, cross

drains, culverts, safety berms, mile markers, guardrails, and signs would be removed. Soil nail walls, constructed of anchors bolted into the ground with a sprayed concrete surface, would remain to support slopes in areas with soft soils or weathered rock. Water bars or other erosion and sediment control structures, armored stream crossings, and stormwater crossings would be included where necessary. The reclaimed areas would be scarified, and 6 inches of growth media would be placed in upland areas, followed by seeding and certified weed-free mulching on slopes over 30 percent. Revegetation would not be required where planting is not practicable or reasonable due to excessive amounts of sand, gravel, shale, stone, or other material to such an extent to prohibit plant growth (IDAPA 20.02.02).

2.4.7.10 Post Closure Public Access

As mentioned in **Section 2.4.7.4**, a service road would be established over the backfilled Yellow Pine pit to allow public access through the reclaimed site and connect Stibnite Road (FR 50412) to Thunder Mountain Road (FR 50375) (**Figure 2.4-18**).

2.4.7.11 Off-site Facilities

Following mine closure and reclamation, the Burntlog Maintenance Facility buildings would be removed. The sewer system and septic tanks for the Burntlog Maintenance Facility would be decommissioned. All reagents, petroleum products, solvents, and other hazardous or toxic materials would be removed from the site and disposed of according to applicable state and federal regulations. Soil/rock beneath fuel storage areas and chemical storage buildings would be tested for contamination and treated if necessary. After demolition of the buildings and facilities, the site would be graded, and drainage restored.

Perpetua has identified a “light industry” post-mining land use for the SGLF in which the facility could be maintained by a third party for future use, meaning the facility, located on private land, would not be reclaimed. A new conditional use permit from Valley County would be required prior to use by any other entity. If there is no further use of the site after a two-year time frame, the structures would be removed and the site reclaimed (Valley County CUP No. 20-12 Stibnite Gold Project - Logistics Facility).

2.4.7.12 Contouring, Grading, Growth Media Placement, and Seeding

Except for the Hangar Flats pit highwall above the valley bottom, the West End pit, and a portion of the Yellow Pine pit highwall, Perpetua would contour and grade disturbed areas to blend into the surrounding topography and terrain. Compacted areas such as roads, ore stockpile areas, parking lots, fuel storage areas, and building sites would be prepared prior to placement of growth media and revegetation. Haul routes and access roads would be re-contoured to establish natural drainage patterns.

Growth media suitability criteria include USDA texture, percentage of organic matter, course fragment percentage and acidity (pH). Root zone material suitability guidelines include USDA texture, course fragment percentage, soil acidity (pH), electroconductivity, sodium adsorption ratio, NAG pH, bulk density and arsenic, antimony, and mercury levels. Perpetua would manufacture growth media material using screened fines from glacial till sources, available mulched vegetation, and off-site composted material from private lands. Off-site sources for composting feedstock materials would be in compliance with Forest Service requirements.

Planting, seeding, and mulching would be conducted in the fall and early winter to take advantage of snowpack and springtime moisture. Where cover crops are used in lieu of mulch, seeding would occur in the spring or fall followed by seeding of the permanent mixture. The forbs, grass species, seed amounts, and the trees and shrubs planned for planting on reclaimed areas are described in Tetra Tech (2021a) and would be approved by the Forest Service.

2.4.7.13 Post Closure Water Treatment

Evaluation of post-closure water treatment is ongoing. For the 2021 MMP, Perpetua has indicated that sources of water that could require treatment during closure and reclamation and through the post-closure period include TSF runoff and tailings consolidation water, plus any TSF Buttress toe seepage.

As previously described, consolidation water would be withdrawn from beneath the TSF geosynthetic cover using a combination of wells, wicks, and/or gravel drains, and routed to water treatment. Collected flows would be routed to the water treatment plant for treatment and discharge. Once it is determined that treatment is no longer required based upon agency approvals, the treatment facility would be decommissioned and the WTP site reclaimed. Water treatment would be provided during the reclamation and closure and post-closure phases until waters requiring treatment are no longer being generated. Life-of-mine water treatment of the TSF and other facilities is discussed in **Section 2.4.5.10**.

As described in **Section 2.4.7.5**, if spillage of surface water from the West End pit lake becomes imminent, a portable system would be brought to the site to treat and discharge pit lake water to maintain levels below the rim of the lake and prevent uncontrolled release of lake water.

2.4.7.14 Closure and Reclamation Financial Assurance

As part of the approval for the SGP, Perpetua would be required to post financial assurance to ensure that NFS lands and resources involved with the mine operation are reclaimed in accordance with the approved plan of operations and reclamation requirements (36 CFR 228.8 and 228.13). This financial assurance would provide adequate funding to allow the Forest Service to complete reclamation and post-closure operation, including continuation of any post-closure water treatment, maintenance activities, and necessary monitoring for as long as required to return the site to a stable and acceptable condition in the event Perpetua was unable to do so. The amount of financial assurance would be determined in collaboration with the Forest Service and would "address all Forest Service costs that would be incurred in taking over operations because of operator default" (Forest Service 2004). The financial assurance would be required in a readily available bond or other instrument payable to the Forest Service. To ensure the bond can be adjusted as needed to reflect actual costs and inflation, there would be provisions allowing for periodic adjustments in the final plan of operations prior to approval. Calculation of the initial bond amount would be completed following the Record of Decision when enough information is available to adequately and accurately perform the calculation. In addition to the Forest Service-required bond, mitigation under Section 404 of the CWA also requires financial assurance.

The IDL would require a bond as part of their permitting authority and IDEQ would require a bond for the cyanidation permit. The IDWR is the state agency responsible for design review and approval of the TSF. IDWR also would require a bond so that the TSF can be placed in a safe maintenance-free condition if abandoned by the owner.

2.4.7.15 Closure and Reclamation Traffic

Most closure and reclamation traffic would occur May through November. Mine traffic during closure and reclamation is anticipated to result in a total AADT of 27, with 15 being from heavy vehicles and 12 being from light vehicles.

2.4.8 Monitoring

Air emissions, groundwater, surface water, aquatic, and other environmental parameters would be monitored during mine construction, operation, closure, and post-closure as described and specified in the EMMP (Brown and Caldwell 2021e). Authorizations from federal and state agencies include monitoring

requirements for resources (e.g., air emissions, surface water, and groundwater) during mine construction, operation, closure and reclamation, and post-closure. Mitigation measures and monitoring actions would not be known fully until required permits have been issued.

Monitoring would be conducted following the completion of closure and reclamation of all facilities and disturbance areas to demonstrate compliance with permit requirements and to measure the success of reclamation and mitigation. Final monitoring requirements and timelines would be outlined in the final permit approval documents and the final EMMP.

The final EMMP would consist of multiple component plans, each of which would be finalized upon issuance of the related permit(s) and would contain monitoring and management requirements from each permit. In some cases, if environmental outcomes may be uncertain, the EMMP could include adaptive management planning which requires identification of performance measures, impact thresholds, and operational adjustment options, all intended to achieve and demonstrate compliance with applicable permitting and/or consistency with the environmental analysis.

2.4.8.1 Environmental Monitoring

The EMMP (Brown and Caldwell 2021e) provides an overview of the actual or anticipated monitoring and/or management requirements for each of the required regulatory permits and establishes Perpetua's commitments to environmental monitoring and management of mine facilities and environmental resources. The EMMP would allow Perpetua to monitor its operations and environmental commitments, document permit compliance, and reduce potential impacts to environmental resources. The EMMP describes the component monitoring and management plans that would be developed and used by Perpetua to manage water resources, manage and monitor mine facilities, and monitor environmental and cultural resources. The EMMP includes environmental tasks and lists environmental permits, licenses, authorizations, and corresponding obligations.

2.4.8.2 Reclamation Monitoring

Prior to reclamation monitoring and maintenance programs, the Forest Service and IDL would agree to specific quantitative and qualitative reclamation monitoring plans and standards.

Reclamation monitoring would begin during concurrent reclamation at SGP facilities. Quantitative and qualitative monitoring of reclamation success would begin the first growing season after concurrent or final reclamation is completed and would continue until success criteria are satisfied. The Reclamation and Closure Plan (Tetra Tech 2021a) presents the quantitative and qualitative reclamation monitoring that would be conducted and the performance standards that would be used (with Forest Service and IDL approval) to determine when maintenance activities are necessary, or reclamation is complete. These monitoring requirements are summarized below.

Erosion and Sediment Control Monitoring

Soil stability would be estimated for all reclaimed areas using qualitative descriptors. A reclamation specialist would observe each reclaimed area and assign qualitative descriptors. The observations would be completed twice annually for erosion control purposes, once in the spring and once in the fall; and after three years for performance monitoring purposes. For performance monitoring, the observations would be made at the same time the vegetation success observations are made. The monitoring results would be used to aid in determining the cause of any failures that are encountered and to locate problem areas before erosion becomes widespread enough to affect reclamation success.

Slope Stability Monitoring

Slope stability would be monitored during the erosion observations. Qualified staff would look for signs of slope movement, cut slope and rock face failures, and other indications of slope instability. The location and dimensions of significant surface cracks and fill slope bulges would be monitored. This information would be used to determine if surface cracks are the result of differential settling of fill material or slope instability. The appropriate regulatory agency would be notified, and corrective plans would be developed.

Reclamation Maintenance Procedures

If the performance of reclaimed areas is not satisfactory, appropriate maintenance activities would be implemented. Maintenance activities may include one or more of the following:

- Sediment removal from sediment basins, stormwater drainage channels, and diversions as necessary to maintain their design capacity;
- Diverting surface water away from reclaimed areas where erosion jeopardizes attainment of reclamation standards;
- Stabilizing rills, gullies, and other erosion features or slope failures that have exposed development rock;
- Noxious weed and invasive plant species control; and
- Re-seeding or re-applying reclamation treatments in areas where it is determined through monitoring and agency consultation that reclamation would not meet standards.

Annual Report

Perpetua would submit an annual report to the Forest Service and the other federal and state agencies that are responsible for issuing authorizations applicable to reclamation for the preceding calendar year. The annual report would contain descriptions of the reclamation activities completed during the previous year, a summary of areas reclaimed, a discussion of the results of the reclamation monitoring conducted, and corrective actions implemented.

2.4.9 Environmental Design Features

The SGP must comply with all laws and regulations that apply to the proposed activities (**Table 2.4-12**). Standards and guidelines in the BNF and PNF Land and Resource Management Plans (Forest Service 2003, 2010) that are designed to reduce or prevent undesirable impacts resulting from proposed management activities are incorporated into the action alternatives by reference. In addition, best management practices outlined in the Best Management Practices for Mining in Idaho (IDL 1992) would be implemented where appropriate and applicable for operations to minimize site disturbance from mining and drilling activities.

In the design of the 2021 MMP, Perpetua has already considered many of the potential environmental impacts that might be caused by the SGP. This has led to an internal evaluation of project design features and operational characteristics that may have the effect of reducing and/or eliminating potential environmental impacts of the SGP. Such project-specific measures intended by a proponent to inherently reduce and/or avoid potential environmental impacts of a proposed action are referred to as environmental "design features."

Based on the application of permits and regulatory compliance requirements to the project, regulatory requirements, standards and guidelines, best management practices, and likely permit conditions are listed in **Table 2.4-12**. The environmental design features (EDFs) beyond regulatory requirements that have been proposed and committed to by Perpetua are listed in **Table 2.4-13**. The impact analysis and environmental consequences takes these EDFs into consideration, such that the identified potential impacts of the SGP would be those that remain after their application. These EDFs would be applied to reduce and minimize impacts to resources from the SGP.

Table 2.4-12 Prominent Regulatory and Forest Plan Requirements

Description	Type	Reference	Resources Affected
The Proponent will prepare a dust mitigation plan with appropriate schedule or triggers for control deemed adequate by IDEQ to achieve the level of control of 93 percent of dust (as submitted in the proponent's draft application for Permit to Construct from IDEQ). Alternatively, the proponent could employ particulate matter or opacity monitors deemed adequate by IDEQ and the Forest Service and immediately apply water or chemical dust control when PM or opacity monitors reach levels within 10 percent of the threshold determined by IDEQ.	IDEQ Permit	IDEQ Permit to Construct	Air Quality, Wildlife, Vegetation, Wilderness
During project planning, affected tribe(s) shall be consulted regarding opportunities for restoration, enhancement, and maintenance of native plant communities that are of interest to tribe(s) when proposed activities may affect those plant communities.	FP Component	BNF and PNF: TRST04	Cultural Resources, Vegetation
When taking water from fish-bearing waters for road and facility construction and maintenance activities, intake hoses shall be screened with the most appropriate mesh size (generally 3/32 of an inch), or as determined through coordination with National Oceanic and Atmospheric Administration Fisheries and/or USFWS.	FP Component	BNF and PNF: FRST01 TEST32	Fish
Fish passage shall be provided at all proposed and reconstructed stream crossings of existing and potential fish-bearing streams.	FP Component	BNF and PNF: SWST08	Fish
Surface water withdrawal intake hoses would be situated so as to prevent generation of turbidity in bottom sediments during pumping.	Design Feature		Fish, Water Resources
Where settlement ponds, tailing dams, or impoundments are planned, each would be located, designed, constructed, and inspected under the supervision of a professional engineer.	FP Component	BNF and PNF: MIGU03	Geology and Geotechnical
Prohibit solid and sanitary waste facilities in RCAs. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in RCAs exists, then: a) Analyze waste material using the best conventional methods and analytic techniques to determine its chemical and physical stability characteristics. b) Locate and design waste facilities using the best conventional geochemical and geotechnical predictive tools to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, and such releases or instability would result in exceedance of established water quality standards or would degrade surface resources, prohibit such facilities in RCAs. c) Monitor waste and waste facilities to confirm predictions of	FP Component	BNF and PNF: MIST09	Geology and Geotechnical, Wetlands and Water Resources, Wildlife, Fish

Description	Type	Reference	Resources Affected
chemical and physical stability and make adjustments to operations as needed to avoid degrading effects to beneficial uses and native and desired non-native fish and their habitats. d) Reclaim and monitor waste facilities to ensure chemical and physical stability and revegetation to avoid degrading effects to beneficial uses and native and desired non-native fish and their habitats. e) Require reclamation bonds adequate to ensure long-term chemical and physical stability and successful revegetation of mine waste facilities.			
Transport hazardous materials on the Forest in accordance with 49 CFR 171 in order to reduce the risk of spills of toxic materials and fuels during transport through RCAs.	FP Component	BNF and PNF: SWGU11	Hazardous Materials, Fish, Health and Safety
A Spill Prevention, Containment, and Control Plan (SPCC) shall be prepared in accordance with 49 CFR parts 171 through 180, including packaging, transportation, incident reporting, and incident response. Include the following items within the SPCC Plan: • During off-loading of fuel from fuel vehicles or during refueling operations have a standard marine-type fuel containment boom (which would be of sufficient length for a worst-case discharge), spill prevention kit, and fire kit readily available on site. • Store two or more spill containment/response caches along each of the fuel delivery routes. • Spill response team will carry sufficient containment equipment for one full fuel tanker. • Include the Forest Service as a party to be notified in the event of a hazardous materials spill. • Intake pumps, engines, fuel storage, fuel containment site, and other equipment with fuel or lubricants would be inspected at each refueling and periodically between refueling for leakage or spillage. • Pilot and emergency spill response vehicles would carry appropriate containment and first aid equipment. • All fuel containers would be marked with contents, owner's name and contact information. • Material Safety and Data Sheets for all products would be posted and available on site with the SPCC plan. • Intake pumps would not be situated within the active stream/ditch channel and would be placed within containment vessels capable of holding 120 percent of the pump engine's fuel, engine oil and hydraulic fluid. The smallest practical pump and intake hose would be used. • Following large storm events, the intake pumps would be inspected to determine if stream flow has encroached into the pump area and if the pump needs to be moved so it remains above flowing water. • A spill prevention and clean-up kit would be placed at the intake pump site and would consist of absorbent pads and/or boom (which would be sufficient length for a worst-case discharge), drip pan, a shovel, and a fire extinguisher.	Regulatory Requirement and Design Features	49 CFR 171	Hazardous Materials, Health and Safety, Water Resources, Wetlands, Fish, Wildlife, Soils,

Description	Type	Reference	Resources Affected
• Spare fuel for the water intake pump would be stored in approved [29 CFR 1926.152(a)(1)] fuel storage containers placed into a secondary containment vessel capable of holding at least 120 percent of the volume of the fuel in the fuel container. • A copy of the SPCC plan would be kept at an appropriate on-site facility.			
Unless otherwise authorized, all garbage or refuse should be removed from National Forest System lands. This includes, but is not limited to, empty fuel and lubricant containers. Food and garbage would be stored either indoors, in vehicles, or if outside, in wildlife-proof containers. No garbage would be burned.	FP Component and Design Features	Design Feature developed for compliance with BNF and PNF: MIGU04	Hazardous Materials, Water Resources, Fish, Health and Safety, Wildlife
The operator shall comply with all applicable Federal and State fire laws and regulations and shall take all reasonable measures to prevent and suppress fires on the area of operations and shall require their employees, contractors and subcontractors to do likewise	Regulatory Requirement	36 CFR 228.11	
The operator shall comply with State of Idaho fire protection procedures (as outlined in IDAPA 20.04.01) and any local Valley County Fire District regulations and shall require their employees, contractors and subcontractors to do likewise	Regulatory Requirement	IDAPA 20.04.01	Health and Safety, Vegetation
Several fire-response kits would be spaced strategically around the project area and be inspected annually.	Design Feature		Health and Safety, Vegetation
On-site staff will maintain contact with Krassel District Ranger to ensure appropriate procedures are followed in the event of implementation of fire restrictions or woodland use restrictions (e.g., “Red Flag Warnings”).	Design Feature		Health and Safety, Vegetation
Damage to or loss of Forest System trails from mining activities should be repaired or mitigated by the appropriate party	FP Component	BNF: REGU22, REGU24 PNF: REGU23, REGU26	Recreation
Architectural designs would follow principles and concepts outlined in the Built Environment Image Guide (BEIG). Facilities identified as necessary should blend with the surrounding landscape character and the ROS setting. ROS descriptions in the BNF and PNF Forest Plans Appendix F should be used to help guide facility development and recreation activity management within each ROS class. When a structure or facility is created for other than public use, the materials, color, and location should be chosen to reduce visual contrast of the structure. Natural or neutral colors should be used in to help structures blend with the landscape. The use of natural or neutral colors and non-reflective surfaces would be considered for structures. An exception to this would be when the function of the structure is to be seen.	FP Component	BNF and PNF: FRGU13, SCGU13, SCGU14, SCGU15 BNF: REGU12, REGU15 PNF: REGU13, REGU16	Scenic Resources, Tribal Resources

Description	Type	Reference	Resources Affected
Reclamation cover material (e.g., growth media) used in places including but not limited to the TSF and TSF Buttress would be evaluated for contaminants prior to use during reclamation. Acceptable metal/contaminant concentrations and sampling and testing methodology would be documented in a sampling and analysis plan developed prior to reclamation.	Design Feature		Soil, Water, Public Safety
Topsoil and any brush removed would be stockpiled separate from fill material and used in reclamation.	Design Feature		Soils
Measures such as, but not limited to, segregating and stockpiling topsoil, implementing stormwater and sediment BMPs, backfilling, revegetation and concurrent reclamation would be conducted, where possible and practical, for areas where the soil has been exposed by ground-disturbing activities. These areas/sites include, but are not limited, to burrow sites, utility corridors, skid trails, firebreaks, temporary roads, cut and fill slopes, and areas where construction activities have occurred.	Design Feature	Design Feature developed for compliance with BNF and PNF: SWST03, SWGU05	Soils, Vegetation, Timber, Transportation and Access, Water, Wetlands, Fish
Applicable road obliteration for all roads proposed for obliteration including temporary roads and applicable sections of the Burntlog route (if selected) would be fully recontoured, including full bench constructed road segments. Road obliteration through recontouring is the reclamation of a road template through the following: 1. Deep decompaction (36”) of the inside half of the road surface; 2. excavation of road fill down to the natural ground level and place on top of the decompacted inside half of the road surface on the cut slope side of road; 3. Reestablish the natural slope profile; and 4. Vegetation clump planting. Decompaction**:** All compacted road surfaces that would be covered with excavated material, for example the inside half of the road surface, shall be decompacted to a depth of 36 inches or to a restrictive layer (bedrock). This is to promote water infiltration, breakup any potential landslide slip surface between the road surface and excavated and placed fill material and allow deep root vegetation establishment. Excavation: After decompaction of the roadway, the outside road fill material shall be excavated and placed on roadbed between the top of cut and natural ground, forming a slope approximating natural contours. No ditches, water traps, or berms shall remain. Finished product should blend in with the surrounding terrain. Soil-Vegetation Plug Transplanting: Excavate soil-vegetation plugs from adjacent natural and undisturbed ground having a minimum surface area of 9 sq. ft. to a depth beyond the vegetation rooting zone (plug size is dictated by excavator bucket size). The plug transplant shall be of sufficient depth that would maintain the root system and contain adequate soil to enhance favorable growth. Soil-vegetation plug transplanting would be done at a minimum rate of 15 plantings per 100 lineal feet evenly distributed along the width and length of the recontoured surface. The plugs would be transplanted to a depth even with the surrounding recontoured ground level. This work would be accomplished with an excavator.	Design Feature		Soils, Vegetation, Transportation and Access

Description	Type	Reference	Resources Affected
Surface Ground Cover: Ground cover across the entire recontoured or disturbed surface (this would include all scarified ground, de-compacted roads and skid trials), by order of priority, shall be achieved using a combination of clump planting, native mulch, coarse woody debris and certified weed free agriculture straw to reach a minimum of 50 percent to the maximum 80% coverage of the recontoured surface or disturbed area. Apply native seed mix, hydromulch or organic fertilizer. This order or priority shall be given to vegetation plug planting, native mulch, coarse woody debris, and straw. When applying coarse woody debris, use various size classes at levels similar to surrounding undisturbed ground and placed at various orientations. The desired result of road obliteration through recontouring is to restore slope contours the natural slope profile, improve soil productivity, improve soil-water infiltration, and reestablish ground water flow paths and hydrologic function.			
Road rutting from operations, outside the mine site, would be minimized by construction and maintenance of surface drainage structures, application of surfacing material, and by restricting road use when conditions are unacceptable due to moisture that is leading to the onset of rutting and concentrated turbid flow. (Note typical guidance is 'no use' if ruts deeper than 4" are created.) This design feature does not apply to the mine site.	Design Feature	Design Feature developed for compliance with BNF and PNF: SWST02 SWST03	Soils, Vegetation, Timber, Transportation and Access, Water, Wetlands, Fish
Handling of road waste material (e.g., slough, rocks) would avoid or minimize delivery of waste material to streams that would result in degradation of soil, water, riparian, and aquatic resources.	Design Feature	Design Feature developed for compliance with BNF and PNF: FRST05	Transportation and Access, Fish, Soils, Water Resources, Wildlife,
Commercial transport vehicles would be inspected at Knox or Landmark by the driver prior to accessing the Johnson Creek area.	Design Feature		Transportation and Access, Health and Safety
Road clearing and maintenance activities for roads under Forest Roads and Trail Act easement agreements would be coordinated with Valley County, as necessary.	Design Feature		Transportation and Access, Health and Safety
Mitigate degrading effects from locatable mine operations situated within RCAs by identifying reasonable locations for access, processing, and disposal facilities outside of RCAs, wherever possible.	FP Component	BNF and PNF: MIST04, LSST07, MIST08, FRGU05	Transportation and Access, Water Resources, Fish, Wetlands.
To minimize the degradation of watershed resource conditions, prior to expected water runoff, water management features would be constructed, installed, and/or maintained. Activities and features include, but are not limited to, water bars, rolling dips, seeding, grading, slump removal, barriers/berms, distribution of slash, and culvert/ditch cleaning in all applicable areas.	Design Feature	Design Feature developed for compliance with BNF and PNF: SWST01 and SWST04	Transportation and Access, Water Resources, Soils, Wetlands

Description	Type	Reference	Resources Affected
To accommodate floods, including associated bedload and debris, new culverts, replacement culverts, and other stream crossings would be designed to accommodate a 100-year flood recurrence interval unless site-specific analysis using calculated risk tools or another method, determines a more appropriate recurrence interval.	FP Component	BNF and PNF: FRST02	Transportation and Access, Water Resources, Soils, Wetlands, Fish
To minimize sediment runoff from the temporary roads and roadbeds, water management features would be constructed, installed, and/or maintained on authorized temporary roads and roadbeds, on completion of use, before expected water runoff, or before seasonal shutdown. Activities and features could include, but would not be limited to, water bars, silt fencing, certified weed-free wattles, and/or weed-free straw bales, rolling dips, seeding, grading, slump removal, barriers/berms, distribution of slash, and culvert/ditch cleaning. These features would be installed in strategic downslope areas and in RCAs, where and when appropriate.	Design Feature	Design Feature developed for compliance with BNF and PNF: SWGU06	Transportation and Access, Water Resources, Wetlands, Soils
Snow removal would be accomplished in accordance with the following standards of performance: • All debris, except snow and ice, that is removed from the road surface and ditches would be deposited away from stream channels at approved locations. • During snow removal operations, banks would not be undercut, and gravel or other surfacing material would not be bladed off the roadway surface. • Ditches and culverts would be kept functioning during and following plowing. Berms left on the shoulder of the road would be removed and/or drainage openings would be created and maintained. Drainage openings would be spaced to maintain satisfactory surface drainage without discharge on erodible fills. • Dozers would be used on an as-needed basis for plowing snow. The dozer operator would maintain an adequate snow floor over the gravel road surface. • Snow would not be totally removed to the gravel road surface. Appropriate snow floor depth would be maintained to protect the roadway. • Damage of roads from, or as a result of, snow removal would be repaired in a timely manner. • Culverts and stream crossings would be clearly marked before snow removal begins to avoid placing berm openings in locations that would allow runoff to enter drainages directly at the culverts or stream crossings. Excessive snow would not be plowed into locations that would impact operation of the culverts or prevent positive drainage from drainage areas. Some snow is necessary around culvert openings and in the bar ditches as this would insulate the ditch and culvert and would prevent the water in the ditch and culvert from freezing. • No ice and snow removal chemicals would be used on roads. • Traction material would be 3/8-inch diameter gravel or greater.	Design Feature		Transportation and Access, Water Resources, Wetlands, Fish

Description	Type	Reference	Resources Affected
If sensitive plants or their propagules are required to be collected, collection methods and other information will be under the direction of the Forest or Regional Botanist.	Design Feature	Design Feature developed for compliance with BNF and PNF: BTST02	Vegetation
For projects or activities that include application of insecticides, herbicides, fungicides, or rodenticides, degrading effects on sensitive plant species will be mitigated.	FP Component	BNF and PNF: BTST04	Vegetation
In revegetation and seeding projects in occupied TEPC plant habitat, a Forest botanist shall be consulted to ensure appropriate species are used.	FP Component	BNF and PNF: TEST09	Vegetation
When available and not cost-prohibitive, seeds and plants used for seedings and plantings in revegetation projects should originate from genetically local sources of native species. When project objectives justify the use of non-native plant materials, documentation explaining why non-natives are preferred should be part of the project planning process.	FP Component	BNF and PNF: BTGU03	Vegetation
Noxious weeds and undesirable non-native plants would be eradicated in the Operations Area boundary, within permitted use areas, and the cut/fill slopes of roads and trails used by mine and mine facility related traffic. Where it is not practical to eradicate existing infestations, infestations would be managed to prevent seed production and spread. In areas of existing extensive infestation, mitigation for noxious weed prevention would be incorporated into road layout, design, and project alternative evaluation.	Design Feature	Design Feature developed for compliance with BNF and PNF: FRGU02, TEST10	Vegetation
Clean borrow and gravel sources on Forest should be maintained as noxious weed free through an inspection and treatment program. Off-Forest inspections and treatments should be coordinated with county weed agents.	FP Component	BNF and PNF: NPGU02	Vegetation
Only certified noxious weed-free hay, straw, or feed is allowed on National Forest System lands.	FP Component	BNF and PNF: NPST01	Vegetation
All seed used on National Forest System lands will be certified to be free of seeds from noxious weeds listed on the current All States Noxious Weeds List.	FP Component	BNF and PNF: NPST02	Vegetation
Materials such as hay, straw, or mulch that are used for rehabilitation and reclamation activities shall be free of noxious weed seed and shall comply with the 1995 weed-free forage special order against use of non-certified hay, straw, or mulch. Materials that are not covered under a weed seed free certification, and that have the potential to contain noxious weed seed, shall be inspected and determined to be free of weed seed before purchase and use.	FP Component	BNF and PNF: NPST06	Vegetation
Source sites for gravel and borrow materials shall be inspected for noxious weeds before materials are processed, used, or transported from the source site into the project area or onto the National Forest.	FP Component	BNF and PNF: NPST07	Vegetation
Gravel or borrow material source sites with noxious weed species present shall not be used unless effective treatment or other mitigation measures are implemented.	FP Component	BNF and PNF: NPST08	Vegetation

Description	Type	Reference	Resources Affected
To prevent invasion/expansion of noxious weeds, the following provisions will be included in the plan of operating where land-disturbing activities are associated with the authorized land use): a) Re-vegetate areas, as designated by the Forest Service, where the soil has been exposed by ground-disturbing activity. Implement other measures, as designated by the Forest Service, to supplement the influence of re-vegetation in preventing the invasion or expansion of noxious weeds. Potential areas would include: construction and development sites, underground utility corridors, skid trails, landings, firebreaks, slides, slumps, temporary roads, cut and fill slopes, and travel ways of specified roads. b) Earth-disturbing equipment used on National Forest System lands--such as cats, graders, and front-loaders--shall be cleaned to remove all visible plant parts, soil, and material that may carry noxious weed seeds. Cleaning shall occur prior to entry onto the project area and again upon leaving the project area if the project area has noxious weed infestations. This also applies to fire suppression earth-disturbing equipment contracted after a WFSA/WFIP has been completed.	FP Component	BNF and PNF: NPST03	Vegetation
Integrated weed management shall be used to maintain or restore habitats for sensitive plants and other native species of concern where they are threatened by noxious weeds or non-native invasive plants. Specific measures to reduce the potential for spread and establishment of noxious weed infestations could include, but are not limited to, determining the presence, location, and amount of noxious weed infestations in the Operations Area, developing management strategies such as, methods and frequency for treating infestations, treatment procedures and restrictions, reporting requirements, and follow-up or monitoring requirements. Herbicide applications will be by or under the direct supervision of licensed Idaho professional herbicide applicators with Aquatic Pest Control certifications and will be consistent with the Boise NF Invasive Species Management Plan and Payette NF guidance.	FP Component and Design Features	Design Feature developed for compliance with BNF and PNF: NPST11	Vegetation
New facilities for storage of fuels and other toxicants would be located outside of occupied TEPC plant habitat.	FP Component	BNF and PNF: TEST11	Hazardous Materials, Water Resources, Fish, Health and Safety, Vegetation
Public firewood cutting and gathering along the Burntlog route, if that alternative is selected and the route is open to the public, would not be allowed.	Design Feature		Vegetation
Mitigate, through avoidance or minimization, management actions within known winter roosting sites of TEPC species if those actions would adversely affect the survival of wintering or roosting populations. During project planning, determine sites, periods, and appropriate mitigation measures to avoid or minimize effects.	FP Component	BNF and PNF: TEST13 WIST03	Wildlife

Description	Type	Reference	Resources Affected
Section 6 of IDL's Best Management Practices for Mining in Idaho (IDL 1992) would be observed, including if water is encountered in exploration holes, water zones would be sealed off during abandonment to prevent crossflow.	Regulatory Requirement	Section 6 of IDL's Best Management Practices for Mining in Idaho (IDL 1992)	Water Resources
The proponent would implement surface water quality baseline turbidity monitoring, as defined in the IDEQ permit clauses.	Design Feature		Water Resources, Fish
Do not authorize storage of fuels and other toxicants or refueling within RCAs unless there are no other alternatives. Storage of fuels and other toxicants or refueling sites within RCAs shall be approved by the responsible official and have an approved spill containment plan commensurate with the amount of fuel.	FP Component	BNF and PNF: SWST11	Water Resources, Fish, Wetlands, Hazardous Materials, Health and Safety
Dust abatement chemicals would be used in accordance with the applicable road maintenance Biological Assessment. Apply dust-abatement additives and stabilization chemicals (typically MgCl2, CaCl2, or lignin sulphonates) to avoid run-off of applied dust abatement solutions to streams. Spill containment equipment would be available during chemical dust abatement application. Where the road surface is within 25 feet (slope distance) of surface water, dust abatement would only be applied to a 10-foot swath down the centerline of the road. The rate and quantity of application would be regulated to insure all of the chemical is absorbed before leaving the road surface.	Design Feature		Water Resources, Fish, Wetlands, Air Quality, Transportation and Access
Drilling mud and hole plug products, if utilized, would conform to American Petroleum Institute guidelines for ensuring groundwater integrity.	Design Feature	American Petroleum Institute guidelines	Water Resources, Health and Safety, Hazardous Materials
Trees or snags that are felled in RCAs would be left unless determined not to be necessary for achieving soil, water, riparian, and aquatic desired conditions. Felled trees or snags left in RCAs would be left intact unless resource protection (e.g., the risk of insect infestation is unacceptable) or public safety requires bucking them into smaller pieces.	FP Component	BNF and PNF: SWST10	Water Resources, Soil, Fish, Vegetation
The proponent would monitor stormwater runoff and stormwater BMPs as per the Stormwater Pollution Prevention Plan (SWPPP). Stormwater monitoring, inspections, and reporting would be conducted in accordance with the IPDES Multi-Sector General PermitMSGP and the SWPPP.	Permitting Requirement	IPDES Multi-Sector General PermitMSGP and the SWPPP	Water Resources, Soils
All activities would be conducted in accordance with Idaho environmental anti-degradation policies, including IDEQ water quality regulations at IDAPA 58.01.02 and applicable federal regulations.	IDAPA 58.01.02		Water Resources, Wetlands, Fish

Description	Type	Reference	Resources Affected
If additional water rights are applied for, the Forest Service would be informed to determine if additional analysis or consultation is necessary prior to use.	Design Feature		Water Rights
Road reconstruction and/or upgrades to NFR 51290 (Meadow Creek Lookout Road) on the ridgeline dividing Meadow Creek from the Indian Creek drainage would be restricted to 30 feet either side of the centerline of the existing alignment to prevent potential for direct impacts to the FCRNRW.	Design Feature	Design Feature developed for compliance with BNF and PNF: LSST03, LSST05	Wilderness
Mitigate management actions within known winter roosting sites or hibernacula (bats) of Sensitive species if those actions would measurably reduce the survival of wintering or roosting populations. Sites, periods, and mitigation measures will be determined during project planning.	FP Component	BNF and PNF: WIST04	Wildlife
To mitigate impacts to known nesting or denning sites of MIS or Sensitive species, land clearing activities in areas where complete vegetation removal is necessary greater than 0.5 acres would not occur, to the extent possible, until after the bird breeding season (April 1 through July 30th) for migratory and resident birds. This design feature does not apply to the mine site, road construction or maintenance, hazard tree felling, or the power line upgrades and construction.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03	Wildlife
Potential water sources would be surveyed by the proponent, in coordination with the Forest Service, for Columbia spotted frog egg masses and other amphibians after ice melt and avoid disturbing any water sources with identified egg masses or other species. Exceptions: If egg masses are found at a water source essential for proposed activities, the egg masses would be relocated in coordination with the Forest Service wildlife biologist.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03, TEST12	Wildlife
The Forest Service wildlife biologist would be notified of any sightings of TEPC or Sensitive wildlife species, including, occupied sensitive species nests or dens encountered during implementation. If necessary to maintain key features of nesting/denning habitat or to avoid disruption of nesting/denning activities, prescribed activities would be modified in accordance with the Forest Service wildlife biologist.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03, TEST12	Wildlife
Where practicable, monitoring of high elevation habitats characteristic of wolverine denning habitat would be done in cooperation with State fish and game agencies.	Design Feature	Design Feature developed for compliance with BNF: WIGU17	Wildlife
To minimize adverse effects of lighting to TEPC, MIS, or Sensitive species, where necessary and in accordance with MSHA and OSHA, the proponent could utilize actions in line with, but not limited to, the below: • To the extent practicable, limit construction activities to the time between dawn and dusk. • Utilize, where possible, use down shielding or directional lighting such as 'Cobra' style lights rather than an omnidirectional light system. • While allowing for public and worker safety, utilize low intensity	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03, WIST04 TEST29	Wildlife

Description	Type	Reference	Resources Affected
energy saving lighting (e.g., low pressure sodium lamps). • If possible, minimize illumination of lighting on associated construction or operation structures by using motion sensors or heat sensors. • If possible, place light shields over outside lights, confining light to the immediate area. • Whisper Quiet light plants could be utilized used to mitigate visual impacts from night operations.			
Communication towers should not be sited in or near wetlands, or other known bird concentration or high use areas (e.g., riparian corridors), in known migratory or daily movement flyways. Towers should not be sited in areas with a high incidence of fog, mist, and low ceilings.	Design Feature		Wildlife
To minimize adverse effects of noise to TEPC, MIS, or Sensitive species, where necessary and in accordance with MSHA and OSHA, the proponent could utilize actions in line with, but not limited to, the below: • Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. • When practicable, pumps, generators, and engines would be turned off when not in use. • Temporary wooden structure could be erected around portions of the drill, pumps, and heaters, with acoustic absorbent panels. These temporary structures would not be put in place if they created safety issues related to exhaust vapor build-up. • When feasible, activities such as helicopter use and blasting, could be scheduled at the same time.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03, WIST04 TEST29	Wildlife, Scenic Resources, Noise, Wilderness
Design and implement projects within occupied habitats of Sensitive species to help prevent them from becoming listed. Use Forest Service-approved portions of Conservation Strategies and Agreements, as appropriate, in the management of Sensitive species habitat to keep management actions from contributing to a trend toward listing for these species.	FP Component	BNF and PNF: WIST02	Wildlife, Vegetation

Table 2.4-13 Proponent Proposed Design Features

Description	Resources Affected
Road maintenance activities would be conducted to manage fugitive dust emissions and maintain stormwater management features.	Air Quality
Following crushing, the crushed ore would report via conveyor to a dome-shaped, covered stockpile.	Air Quality
Dust emission controls would reduce dust from crushing, conveying, and stockpiling.	Air Quality
Dust would be controlled in a similar manner to the ore crushing and conveying process using water sprays and/or bag house dust collectors.	Air Quality
Air emissions from the leaching facility would be captured in a series of air pollution controls, and the material collected would be disposed of as a solid waste or a hazardous waste depending on characterization of the waste.	Air Quality

Description	Resources Affected
Air emissions from the induction furnace would be captured in a series of emission controls. Mercury from the induction furnace would be converted to a liquid metallic state, and then securely stored prior to shipment to a certified hazardous waste disposal facility.	Air Quality
Silos would be equipped with air emission controls except for Prill Silo.	Air Quality
All off-highway diesel engines would be EPA Tier IV or better.	Air Quality, Climate
Perpetua would encourage employees to use company provided shuttle buses as transport to the SGLF from towns along SH 55.	Air Quality, Health and Safety, Transportation and Access
Busing and/or vanpooling would be provided for Perpetua and contractor employees. The associated parking area would accommodate approximately 300 vehicles. To the degree practicable, Perpetua would mandate the use of busing and vans for employee and contractor transportation to the SGP and the worker housing facility.	Air Quality, Health and Safety, Transportation and Access
Proper dust control would be employed along transportation corridors and active mining areas using aquatic safe dust suppression chemicals and methods.	Air Quality, Water Resources, Fish, Wildlife
Perpetua would utilize "smart grid" technology to reduce energy consumption, such as auto dimming lights in offices.	Climate Change
Perpetua employees and contractors would be informed about relevant governmental regulations intended to protect cultural and historic resources.	Cultural
To protect fish residing in, using, or potentially using the Yellow Pine Pit lake (Chinook salmon, steelhead trout, bull trout, Westslope cutthrout trout, mountain whitefish), Perpetua has developed a Fish Salvage and Release Plan to isolate the lake from upstream movement into the lake and salvage and release fish. The Fish Salvage and Release Plan would be refined in coordination with federal, state, and tribal agencies. 1. Perpetua would, In consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (the Services), design, install, and operate a fish trap and one or two weirs designed to allow fish to leave the Yellow Pine pit lake but not allow fish to migrate upstream past the trap to ensure that the fewest number of individual Endangered Species Act (ESA)-listed fish species are present in the pit lake when the draining process begins. The timing for providing the upstream barrier to fish movement would be designed to minimize the number of fish in the Yellow Pine pit lake, particularly larger bull trout that dominate the fish assemblage in the lake. 2. Fish captured in the Yellow Pine pit lake would be immediately released downstream of the upstream fish movement barrier or in another location determined by the appropriate regulatory agencies. 3. The Yellow Pine pit lake would be partially drained to recover the remaining fish and relocate them prior to final draining of the pit lake.	Fish
A fishway has been designed and would be operated within the East Fork South Fork Salmon River (East Fork SFSR) tunnel to provide upstream and downstream volitional fish passage throughout mine operations. The East Fork SFSR diversion tunnel would be approximately 0.9 miles long and 15 feet high by 15 feet wide. The tunnel would include a parallel accessway to allow equipment and personnel access for monitoring, inspection, and maintenance. The accessway would function as a floodway for high flows, limiting the operating flow range within the fishway while river and thus total tunnel flows vary more widely.	Fish

Description	Resources Affected
As an alternative to the fishway in the East Fork SFSR tunnel Perpetua would provide adult passage by trap and haul if needed. Criteria may be put in place so that if any unusual or unexpected events occur that result in adverse impacts to fish during operations, fish passage through the fishway would be switched to trap and haul operations.	Fish
Low-energy lighting would be provided in the fishway to determine if it aids in fish passage and to provide light for tunnel and fishway inspections. The system would be configured so that it mimics the photoperiod of the region, run manually on a dimming system, or be completely turned off at the option of the operator.	Fish
Fish salvage and relocation operations would be conducted any time the facility needs repair within the fishway, potentially during sediment removal, and potentially when streamflows recede from the accessway.	Fish
Post mining, the East Fork SFSR stream channel would be reestablished across the backfilled Yellow Pine pit with a channel design that would provide for upstream and downstream fish passage.	Fish
Perpetua would reestablish fish passage through the existing box culvert on the East Fork SFSR just downstream of the confluence with Meadow Creek at the McCall-Stibnite Road (County Road [CR] CR 50-412) crossing.	Fish
Perpetua would improve fish passage conditions in the steep and woody debris-clogged portion of the East Fork SFSR stream channel just upstream from the confluence with Meadow Creek.	Fish
Perpetua would improve fish passage along the Burntlog Route within the SGP area by identifying and replacing existing collapsed, undersized, or otherwise degraded or poorly designed culverts at road crossings and committing appropriate resources to fix and improve these structures.	Fish
Perpetua would install side-ditching, culverts, guardrails, and bridges, where necessary along the Burntlog Route, with design features to provide fish passage and limit potential sediment delivery to streams.	Fish
Perpetua would employ blasting setback distances and other controlled blasting techniques following industry best management practices (modifying blasting variables including charge size, and vibration and overpressure monitoring) to minimize impacts to fish from blasting. Perpetua would follow up with monitoring in early stages of operation to evaluate effectiveness and refine blasting protocols in coordination with federal, state, and tribal agencies, if needed.	Fish
Dewatering would generally be conducted during low-flow periods to facilitate stream segment isolation and fish salvage. When practicable, dewatering also would be timed to avoid or minimize impacts during known spawning periods for Chinook salmon, steelhead, and bull trout.	Fish
To protect fish, Perpetua would develop a standard procedure for channel segment isolation, dewatering, fish salvage, and fish relocation to appropriate receiving streams during dewatering or maintenance of natural stream and diversion channels, based on the USFWS Recommended Fish Exclusion, Capture, Handling, and Electroshocking Protocols and Standards (USFWS 2012) and refined in coordination with federal, state, and tribal agencies.	Fish
The fishway operations and management plan (FOMP) defines the monitoring and evaluation plan elements and describes how the hydraulic conditions, fish use, and performance of the tunnel fishway would be measured and evaluated, and the design of the adaptive management component of the plan including the option of using trap and haul.	Fish
Access and SGP haul road crossings of fish bearing streams would be designed such that structures installed or constructed allow fish passage.	Fish and Wildlife

Description	Resources Affected
Perpetua would implement measures to limit stream baseflow effects during active operations, including a combination of lining key reaches of streams potentially impacted by pit dewatering, and infiltrating groundwater that is extracted for pit dewatering into infiltration basins. Maintain instream flows for fish species and other aquatic resources: flows within natural stream channels affected by SGP operations would be maintained to meet seasonally appropriate and stream-specific low-flow needs to the maximum extent practicable. Perpetua would continue to evaluate options and measures to further avoid and minimize the magnitude and duration of effects of the SGP through other measures in consultation with federal, state, and tribal agencies.	Fish, Water Resources
Following permanent cessation of mining activities at the Yellow Pine pit, Perpetua would backfill the pit and route the East Fork SFSR over the backfilled pit with a longer, lower-gradient channel with higher intrinsic potential for Chinook salmon and steelhead spawning and rearing than the channel that exists presently. The floodplain area along the constructed channel would include side-channels and other off-channel features and would be revegetated to restore wetland and riparian habitat providing long-term shade/cover favorable to fish.	Fish, Wetlands
The Meadow Creek channel would be routed over the final tailings storage facility (TSF) and TSF Buttress, resulting in a long, relatively flat surface and a short, steep face. On top of the TSF/TSF Buttress surface, Meadow Creek would be contained within a broad floodplain corridor bound laterally by erosion-resistant terraces and vertically by a subsurface armor layer over an impermeable stream liner.	Fish, Wetlands
Perpetua would stabilize and restore Blowout Creek. Blowout Creek wetland restoration would consist of restoring and enhancing palustrine aquatic bed (PAB), palustrine emergent (PEM), Palustrine scrub-scrub (PSS) wetlands that were impacted when a historical dam failed on Blowout Creek. Headcutting and shallow aquifer dewatering have impaired and reduced functions of the wetland vegetation classes. A grade control and groundwater cutoff structure is proposed to raise the water level in Blowout Creek as well as recharge the shallow groundwater system and reduce stream headcutting. A coarse rock drain would be constructed within the chute downstream of the failed dam to isolate the flow of Blowout Creek from the actively eroding chute side slopes and to prevent further erosion of the gully bottom, facilitating subsequent restoration of a surface channel on top of the drain. Perpetua would stabilize the steep, confined, erosive middle reach to address the significant fine sediment load currently produced from this reach and restore the downstream, relatively low-gradient reach.	Fish, Wetlands, Water Resources
Perpetua would lead annual site visits for USACE, EPA, Idaho Department of Fish and Game (IDFG), and other interested agency personnel as needed to facilitate agency review of mitigation areas if desired. Final reporting and data archival requirements would be subject to permit conditions; however, at a minimum, it is anticipated that monitoring reports would be prepared by Perpetua annually and submitted to USACE Walla Walla District, EPA, IDFG, IDL, NOAA Fisheries, USFWS, the Forest Service, and other interested agencies, SGP partners, and stakeholders.	Fish, Wetlands, Water Resources
Perpetua would repair and rehabilitate habitats adversely affected by historical mining impacts in the SGP area.	Fish, Wetlands, Water Resources
Minor surface improvements (e.g., ditch and culvert repair, adding gravel, winter snow removal, and summer dust suppression) would occur on the Yellow Pine Route to reduce sediment runoff and dust generation.	Fish, Wildlife, Water Resources
Perpetua would increase the ground limestone dosage to the pre-oxidized concentrate as it is fed into the autoclave to address the potential for creation of soluble arsenic. By decreasing the free acid levels (increasing the pH) in the autoclave by increasing the ground limestone dosage in the autoclave feed increases the quantity of crystalline (stable) arsenic compounds in the resultant slurry with a proportional decrease in the quantity of amorphous (unstable) arsenic compounds.	Hazardous Materials

Description	Resources Affected
Perpetua would monitor levels of soluble arsenic in the tailings. If soluble arsenic levels are higher than anticipated, Perpetua would treat the oxidized concentrate with hot arsenic cure (HAC) prior to neutralization.	Hazardous Materials
The ore processing area would be designed to provide for containment of ore processing materials, chemicals, wastes, and surface runoff. Potentially hazardous chemicals and wastes would be stored within buildings or areas with both primary and secondary containment. Surface runoff within the ore processing area would be directed to a contact water pond for collection. Leaks or spills escaping primary and secondary containment would flow to the contact water pond for collection and would not discharge off site.	Hazardous Materials
The processing circuit would be housed in a steel frame building set on concrete foundations with interior curbing to provide secondary containment; the interior curbing would be high enough to contain 110 percent of the volume of the largest tank.	Hazardous Materials
The gold and silver leaching circuit would be designed and operated consistent with the International Cyanide Management Institute (ICMI) Code (https://www.cyanidecode.org) and the Initiative for Responsible Mining Assurance (IRMA) Standard for Responsible Mining (https://responsiblemining.net/resources/). Accordingly, impermeable secondary containment for cyanide unloading, storage, mixing and process tanks shall be sized to hold a volume at least 110 percent of the largest tank within the containment and any piping draining back to the tank, with additional capacity for the design storm event, if applicable. Pipelines containing process water or process solution shall also use secondary containment in combination with audible alarms, interlock systems, and/or sumps as spill control measures.	Hazardous Materials
Cyanide-bearing solutions used in ore processing would be neutralized to approximately 10 milligrams per liter weak acid dissociable (WAD) cyanide before the material is pumped to the TSF. Residual cyanide would be treated using a sodium metabisulfite and air system to detoxify the cyanide by oxidation to form cyanate.	Hazardous Materials
Cyanide would be neutralized to levels protective of wildlife, and the TSF would be surrounded by an 8-foot high, chain-link fence designed to keep wildlife, such as deer and elk, from entering the impoundment area, to prevent either liner damage or wildlife drowning.	Hazardous Materials
Oils, solvents, and lubricants would be stored in approved containers located within, or directly adjacent to, the maintenance shop and contained within secondary containments to prevent spills into the environment. All used petroleum products, waste antifreeze, and used solvents would be collected in approved containers, transported off site, and disposed or recycled.	Hazardous Materials
Nitric and sulfuric acid would be transported in tanks designed to prevent spills even in the event of rollovers.	Hazardous Materials
Nitric and sulfuric acids would be stored in specialized non-corrosive, polyethylene-lined tanks located within the ore processing facility and would have secondary containment.	Hazardous Materials
Liquids would be shipped to the SGP in tank trucks designed for spill prevention and escorted to the SGP by pilot cars manned and equipped to handle spills.	Hazardous Materials
Other legacy materials may be encountered during construction and operations. If encountered, these materials would be characterized to determine potential for reprocessing, reuse, or disposal.	Hazardous Materials
Small scale composting associated with organic materials generated at the worker housing facility may be incorporated within the centralized GMS in the Fiddle valley.	Hazardous Materials
No materials meeting the definition of municipal or hazardous waste, nor any waste that could produce pollutants or contaminants that could travel off site would be placed in on-site landfill facilities.	Hazardous Materials
An Explosives and Blasting Management Plan would be prepared for the SGP. Explosives storage, transport, handling, and use would comply with applicable Department of Homeland Security, Bureau of Alcohol, Tobacco, Firearms and Explosives, and Mine Safety and Health Administration regulations.	Health and Safety

Description	Resources Affected
For safety and security reasons, no alcohol, firearms, or illegal drugs would be permitted on site.	Health and Safety
For safety and security reasons, public access into the mine area would be prevented by using fencing, gate locking, security personnel, and/or notice postings that prohibit unauthorized entry; no unauthorized vehicles or personnel would be permitted on the SGP.	Health and Safety
Personnel transporting, handling, or using any hazardous chemicals (including sodium cyanide) would be trained to ensure the safe use of such materials. Perpetua would design, construct, and manage facilities to conform to International Cyanide Management Institute code.	Health and Safety, Fish, Wildlife, Hazardous Materials
Fuel and other petroleum products at the site would be stored in above ground containment structures, with appropriate secondary containment measures.	Health and Safety, Fish, Wildlife, Hazardous Materials
Air emissions, groundwater, surface water, and aquatic parameters would be monitored during mine construction, operation, closure, and post-closure as specified in the final authorizations from the regulating agencies.	Monitoring
Monitoring would be conducted following the completion of closure and reclamation of all facilities and disturbance areas to demonstrate compliance with permit requirements and to measure the success of reclamation and mitigation.	Monitoring
The draft EMMP includes the following plans for monitoring aquatic resources: Stream and Wetlands Monitoring Plan and Fisheries and Aquatic Habitat Monitoring Plan.	Monitoring
The ore processing facility building would be enclosed.	Noise, Wildlife, Health and Safety
Appropriate sound dampening and muffling equipment would be utilized to minimize noise excursion from equipment and facilities. When possible, schedule high noise activities at the same time. Monitor and maintain equipment to reduce noise related impacts.	Noise, Wildlife, Health and Safety
When practicable, pumps, generators, and engines would be turned off when not in use to avoid unnecessary noise generation and reduce energy consumption.	Noise, Wildlife, Health and Safety
Electric line power would be utilized during operations to eliminate diesel generator noise, except in emergency situations when grid power is down or temporary use in remote areas where it is not practical to run power lines.	Noise, Wildlife, Health and Safety
An 8-mile temporary 16-foot-wide groomed OSV trail would be created adjacent to Johnson Creek Road between Landmark and Trout Creek Campground during construction of the Burntlog Route.	Recreation
A 16-foot-wide groomed OSV trail would be created south of Warm Lake Road to connect the southern end of Johnson Creek Road to the Landmark-Stanley Road. This 0.3-mile route would be used throughout construction and operations.	Recreation
During construction, approximately 13 miles of groomed OSV trail would be maintained along Cabin Creek Road (FR 467).	Recreation
Suitable surface coatings or exterior design features would be used on SGP buildings and other structures to reduce visual impacts.	Scenic Resources

Description	Resources Affected
Lighting would be managed within active mining areas to avoid unintended lighting of natural, wildlife usage areas. External lighting would be kept to the minimum required for safety and security purposes. Lights would be directed down toward the interior of the SGP and shielded, where appropriate.	Scenic Resources, Wildlife
Approximately 46% of the reclamation would be done concurrent to mining and ore processing; the remaining 54% would be accomplished during closure.	Soils, Reclamation
The Yellow Pine pit would be backfilled with West End pit development rock during operations.	Soils, Reclamation
A sinuous channel would be constructed through the backfilled area for the reconstructed East Fork SFSR with an average valley gradient approximating the original river gradient.	Soils, Reclamation
The backfill would be placed to achieve a mounded final reclamation surface to promote drainage away from the West End pit and prevent formation of a pit lake within Midnight pit.	Soils, Reclamation
The floor of the sidehill pit southwest of the main West End pit would be graded to drain, covered with growth media, and revegetated.	Soils, Reclamation
Perpetua would begin with placement of soil/rock cover material, then construct wetlands and restore Meadow Creek and its tributaries within appropriately sized lined floodplain corridors, place growth media, and revegetate the area.	Soils, Reclamation
Hangar Flats pit would be fully backfilled with development rock to the valley bottom elevation or slightly higher during mine operations. There would be no Hangar Flats pit lake.	Soils, Reclamation
Once all final mine closure/reclamation work has been completed, Perpetua would reduce the 20-foot-wide travel way of 19.8 miles of Burntlog Road (FR 447), 1.3 mile of Meadow Creek Lookout Road (FR 51290), and 2.0 miles along Thunder Mountain Road (FR 375) of Burntlog Route to their approximate pre-mining width.	Soils, Reclamation
The approximately 15 miles of Burntlog Route connecting to Meadow Creek Lookout Road (FR 51290) and Thunder Mountain Road (FR 50375) would be decommissioned.	Soils, Reclamation
Following mining and ore processing operations, unless they are taken over by a third-party for ongoing use and maintenance, the Burntlog Maintenance Facility buildings would be removed. The sewer system and septic tanks for the Landmark maintenance facility would be decommissioned. Soil/rock beneath fuel storage areas and chemical storage buildings would be tested for contamination. All reagents, petroleum products, solvents, and other hazardous or toxic materials would be removed from the site and disposed of according to applicable state and federal regulations. After demolition of the buildings and facilities, the site would be graded, and drainage restored.	Soils, Reclamation
Perpetua would manufacture growth media material using screened fines from glacial till sources mined from the Yellow Pine pit, available mulched vegetation, and off-site composted material.	Soils, Reclamation
Planting, seeding, and mulching would be conducted in the fall and early winter to take advantage of snowpack and springtime moisture. Where cover crops are used in lieu of mulch, seeding would occur in the spring or fall followed by seeding of the permanent mixture.	Soils, Reclamation
Reclamation monitoring would begin during concurrent reclamation at SGP facilities. Quantitative and qualitative monitoring of reclamation success would begin the first growing season after final reclamation is completed and would continue until success criteria are satisfied.	Soils, Reclamation
Soil stability would be estimated for all reclaimed areas using qualitative descriptors.	Soils, Reclamation
Slope stability would be monitored during the erosion inspections.	Soils, Reclamation

Description	Resources Affected
If the performance of reclaimed areas is not satisfactory, appropriate maintenance activities would be implemented. Maintenance activities may include one or more of the following: • Sediment removal from sediment basins, stormwater drainage channels, and diversions as necessary to maintain their design capacity; • Diverting surface water away from reclaimed areas where erosion jeopardizes attainment of reclamation standards; • Stabilizing rills, gullies, and other erosion features or slope failures that have exposed development rock; • Noxious weed and invasive plant species control; and, • Re-seeding or re-applying reclamation treatments in areas where it is determined through monitoring and agency consultation that reclamation would not meet standards.	Soils, Reclamation
Perpetua would submit an annual report to the Forest Service and the other federal and state agencies that are responsible for issuing authorizations applicable to reclamation for the preceding calendar year. The annual report would contain descriptions of the reclamation activities completed during the previous year, a summary of areas reclaimed, a discussion of the results of the reclamation monitoring conducted, and corrective actions implemented.	Soils, Reclamation
Post reclamation, a road would be established over the backfilled Yellow Pine pit to allow public access through the reclaimed site and connect Stibnite Road (FR 50412) to Thunder Mountain Road (FR 50375).	Transportation and Access
A new 12-foot-wide gravel road would be constructed to provide public access from Stibnite Road (FR 50412) to Thunder Mountain Road (FR 50375) through the SGP. During operations, the public access road would be used to travel through the SGP and would provide seasonal use, open to all vehicles. Vehicles passing through the SGP would be required to check-in with mine personnel at the North or South SGP entry points.	Transportation and Access, Health and Safety
Prior to site preparation and construction of surface facilities, vegetation would be removed from operating areas. Merchantable timber on NFS surface lands could be purchased from the Forest Service. Non-merchantable trees, deadwood, shrubs, and slash would be removed, and any remaining vegetation would be grubbed using a bulldozer. The resulting material would be saved for future use in reclamation activities. Specifically, the organic matter would be chipped and stockpiled for use as mulch or blended to create a growth media additive. After vegetation removal, growth media would be salvaged and stockpiled. Stockpiles would be stabilized, seeded, and mulched to protect the stockpiles from wind and water erosion.	Vegetation
Perpetua would inspect and remove vegetation material (including noxious weeds) from mechanical equipment and properly dispose to minimize the spread of unwanted vegetation.	Vegetation
Wood wastes and wood mulch are the two primary sources of compost. Food waste produced from on-site meal preparation and wastes may provide another source. Combined and properly managed during composting, these materials would provide a source of organic matter to be blended into substrate materials suitable for mitigation.	Vegetation
Perpetua would be responsible for noxious weed control within areas disturbed by SGP activities.	Vegetation, Wildlife
Develop and employ planting plans for wildlife benefits (cover, forage, etc.) using approved seed mixes.	Vegetation, Wildlife
Perpetua would use aquatic safe herbicides during vegetation management activities and noxious weed control. Adhere to chemical label restrictions, federal/state rules on usage. Use proper equipment for chemical application by trained personnel.	Vegetation, Fish
Perpetua or its designated contractor(s) would perform long-term maintenance as necessary, including maintaining and monitoring the Mitigation Area (including stream and wetlands) in perpetuity once the final performance standards are met or until such responsibility is relinquished to an appropriate third party (Forest Service, etc.) as approved by the USACE.	Vegetation, Wetlands

Description	Resources Affected
Perpetua would plant stream reclamation reaches and wetland reclamation areas with native plant species that are present in PAB, PEM, PSS, and palustrine forested wetlands and riparian areas along streams throughout the Mitigation Area.	Vegetation, Wetlands
To address stream temperature, riparian planting widths along restored and enhanced stream reaches would be 19 feet wide. Taller and denser vegetation such as spruce trees would be planted. Further, the creation of the lined Stibnite Lake, a feature similar in size to the present Yellow Pine pit lake, would replace the function of the existing Yellow Pine pit lake in buffering stream temperature extremes and reduce maximum stream temperatures in East Fork SFSR in and downstream of the SGP.	Vegetation, Wetlands, Surface Water, Reclamation
Pre-construction water management activities would include the installation of surface water management features and implementation of best management practices to reduce erosion and sediment delivery to streams. These water management features and best management practices could include sedimentation ponds; run-on water diversion ditches, trenches, and/or berms; runoff water collection ditches; silt fence; water bars; culverts; energy dissipation structures; terraces; and other features specified in construction permits.	Water Resources
Stormwater runoff from undisturbed areas upslope of mine features in the major drainages would be captured in the stream diversion channels described above or in other channels that would direct runoff away from disturbed areas. Smaller-scale diversion channels or earthen berms would be used, where necessary, to divert stormwater around other mine infrastructure.	Water Resources
Stormwater drains, ditches, and stream channels would be protected against erosion through a combination of adequate dimension, appropriate gradient, riprap, fabric- encapsulated soil lifts, or other stabilization materials. Diversions would be sized for a peak flow recurrence interval appropriate to the risk level of the facility, in recognition of other water management measures and fail-safes in place (excess flood storage and freeboard in the TSF, etc.), and in accordance with regulatory standards.	Water Resources
Existing streams that run through areas proposed for mining related disturbance would be diverted to prevent generation of contact water or commingling of contact and non-contact water, keeping clean water clean; and to prevent flooding of mine facilities by runoff generated off site.	Water Resources
Groundwater pumped from the dewatering wells would be considered to be contact water and would be managed through forced evaporation or active water treatment when the volume of pumped water exceeds the ore processing facility demand.	Water Resources
Channel segments constructed over fill or excavated in permeable materials would be constructed over a geosynthetic liner to reduce seepage. A transition layer of sand/gravel followed by riprap or similar would be placed over the liner for erosion protection.	Water Resources
Secondary containment for pipelines would consist of an open geosynthetic-lined trench, pipe-in-pipe, or backfilled geomembrane-wrapped trench, depending on location, and the pipeline corridor would drain to one of two pipeline maintenance ponds – one at the truck shop and one at the ore processing facility.	Water Resources
A lined tailings pipeline maintenance pond would be located at the ore processing facility, to which tailings and process water in the tailings distribution or water reclaim pipelines would drain by gravity during maintenance shutdowns or if there is a leak in either pipeline. The pond would typically be empty except during maintenance or unforeseen problems with the tailings pipeline, pumping system, or TSF. The pond is designed to contain the contents of the pipelines and the runoff from the pond and lined pipeline corridor from a 100-year, 24-hour storm event plus snowmelt.	Water Resources
Underdrain collection sumps and downgradient monitoring wells would be used for TSF leak detection.	Water Resources
Water treatment would continue until metal concentrations from each source have stabilized at levels that meet water quality standards for discharge.	Water Resources
A truck wash facility would include an oil/water separation system and water treatment facilities to enable reuse of the wash water.	Water Resources

Description	Resources Affected
During mine operations, summer low flows in perennial diversion channels around the TSF impoundment and buttress (Meadow Creek), Yellow Pine pit (Hennessy Creek and East Fork SFSR tunnel), and West End pit (West End Creek) would be piped underground as a mitigation measure to maintain cold stream temperatures.	Water Resources
Hennessy Creek flow would be disconnected from the current unlined ditch passing alongside the Northwest Bradley dumps.	Water Resources
A liner would be installed under the Meadow Creek stream/floodplain corridor to minimize water seepage into the Hangar Flats pit or the pit dewatering well system, and to avoid potential pit wall instability or loss of stream habitat as a result of stream dewatering.	Water Resources
The underdrain system would convey spring and seep flows beneath both facilities to a collection sump at the buttress toe where the flows would be monitored for water quality prior to release into the stream system or capture for use in the processing circuit or treatment prior to discharge, depending on water quality.	Water Resources
Crushed rock would be placed on SGP access roads as needed to provide a durable surface and limit sediment transport.	Water Resources, Fish, Soils
Road surfaces throughout the SGP would be stabilized and managed to minimize transport of sediment, dust, and other materials, especially near watercourses through appropriate road engineering, surface drainage, watering, and application of dust control binding agents (magnesium chloride, lignin sulfonate, etc.), roadside ditching, road-cut stabilization, road surface maintenance, appropriate speed limits, and by limiting traffic.	Water Resources, Fish, Soils
Runoff generated from direct precipitation on the TSF would be retained in the TSF water pool for reclaim to the ore processing circuit.	Water Resources, Fish, Wildlife, Wetlands
Riparian fringe and floodplain wetlands would be established on the broad, gently sloping floodplains on both sides of the reclaimed stream channels.	Wetlands
Valley margin wetlands would only be established where there is an upgradient water source sufficient to produce enough saturation and near surface water tables for wetland conditions.	Wetlands
Wetland reclamation would begin after the end of mine construction, with the first reclaimed wetlands occurring in the Blowout Creek drainage. Additional reclamation would occur in and after operational year 7 and continue through operational year 18.	Wetlands
Salvaged O and A horizon soils from wetland or hydric soils (seed bank materials over or in combination with mineral soils uplands and wetland subsoils (growth media) would be used to create wetland soil conditions.	Wetlands
During Burntlog Route and SGP haul road construction and use, Perpetua would install and maintain sediment control measures and devices, such as culverts, culvert inlet protection devices, ditching, silt fencing, straw wattles, straw bales, and sediment catch basins.	Wetlands, Fish, Wildlife
Cut and fill slopes along roads would be mulched, hydro-seeded or have durable rock inlay material to minimize the potential for sediment generation.	Wetlands, Fish, Wildlife
During winter road maintenance, Perpetua would remove snow from the Burntlog Route and haul roads at the SGP and the temporary construction access Yellow Pine Route. Perpetua would avoid disposal of snow in riparian areas, wetlands, or areas where snowmelt might cause road damage or erosion during spring melt. Care would also be taken to dispose of collected snow, which may contain sand or gravel, in a manner that avoids impacts to nearby streams and rivers.	Wetlands, Fish, Wildlife
Perpetua would use coarse sand (with less than 20% fines) for winter sanding of the main access road and SGP haul roads in combination with a fine to medium gravel as needed, (approximately 1/4 - 5/8-inch sizing).	Wetlands, Fish, Wildlife

Description	Resources Affected
Perpetua would salvage and preserve the growth media and seedbank materials of wetlands and riparian areas that would be impacted by the SGP. These salvaged soils, containing native seed banks, would be used to aid in establishment of wetland and riparian vegetation in the stream and wetland reclamation areas.	Wetlands, Vegetation
Soil would be amended with additional compost and other sources of organic matter necessary to successfully reclaim wetlands at the SGP.	Wetlands, Vegetation
Perpetua would maintain a recycling program at the SGP.	Wildlife
In order to reduce attractants, during construction and operations, trash and other miscellaneous inert (non-hazardous) garbage would be contained in on-site wildlife-resistant containers and hauled to the Valley County waste transfer station for disposal. Used oils, solvents, grease, and antifreeze would be handled separately from normal trash and garbage. Good housekeeping practices would include minimizing loose trash, odors, and access for wildlife to trash storage or disposal areas and prompt removal of trash.	Wildlife
Implement an Avian Protection Plan at the SGP for transmission lines, including designing power lines and poles to minimize potential bird mortalities due to electrocution. Develop procedures for managing nests of protected species on utility structures (if nests are built).	Wildlife
Construct and operate all overhead powerlines/transmission lines and related facilities in accordance with APLIC suggested practices (APLIC 2006).	Wildlife
Electric power structures to serve the SGP facilities would be designed and constructed to avoid raptor perching on structures for predation purposes and minimize the risk of their being electrocuted.	Wildlife
Perpetua would install a wildlife exclusion fence around the TSF, process facility areas, and related process ponds in order to reduce the potential for mortalities.	Wildlife
Perpetua would plan routine inspections of TSF facilities for wildlife use. If needed, Perpetua would implement measures to remove wildlife and install additional BMPs to reduce wildlife exposure to these areas.	Wildlife
If critical wildlife zones or corridors are identified, require restricted or seasonal access prior to construction or expansion activities - install physical barriers and/or signage identifying these areas and develop site-specific measures to minimize impacts.	Wildlife
Perpetua would implement an animal trapping and relocation plan, as necessary, for nuisance species for safety of staff, visitors, and animals.	Wildlife
Perpetua would install fences along and around the ore processing facilities, TSF, explosive storage areas, and composting/landfill, excluding pit perimeters and high walls.	Wildlife
Perpetua would install signs of known wildlife crossing and usage areas along access and SGP haul road corridors and all active facility areas. Locations are yet to be determined but signs would be installed to state the road name and mile markers where these corridors are known to exist. These would also be referenced in the training materials.	Wildlife
Perpetua would provide tiered training for awareness, sighting, operations and maintenance, and restoration. Cross training to include noxious weeds, maintenance needs, unsafe conditions, etc., as well as reporting mechanisms. All mine personnel and visitors would receive some level of training tiered appropriately based on where they are working, type of work activities, and reason for mine visit. Forms would be developed to document training and identify how often training needs to be refreshed. Fact sheets would be developed on known wildlife in the area including pictures, warnings, and what to do if encountered.	Wildlife

Description	Resources Affected
Perpetua would design and manage the TSF and associated facilities to reduce bird attraction. These include the following: 1. Surface area of the supernatant pond would be minimized to the extent practicable. 2. Install an 8-foot fence around the TSF facility to exclude wildlife from the facility. 3. Implement an avian mortality reporting system for the TSF and contact water ponds. 4. Use skirting to enclose open spaces as necessary beneath raised structures as practical. 5. Follow the International Cyanide Management Code to avoid features possibly attractive to wildlife, as feasible.	Wildlife
Erosion control techniques at the SGP would include mulching, wetland sodding; planting of vegetation to stabilize slopes; and use of silt fences, biofilters, brush mats, erosion control fabric, and/or fiber rolls along temporary swales, perimeter dikes, and stream banks. In addition, to minimize human disturbance, permanent signage would be posted around the perimeter of individual project sites to prohibit unauthorized foot traffic and the use of all-terrain vehicles and motorbikes, dumping, draining, and cutting and/or removal of plant materials.	Wildlife
Sumps would be constructed with at least one side having a shallow grade for wildlife egress. Sumps would be backfilled and reclaimed when no longer needed for drilling.	Wildlife
Mine site facilities would be monitored in accordance with the draft EMMP for the presence and potential mortality of birds, mammals, reptiles, and amphibians. Sightings of rare or sensitive wildlife, along with any wildlife mortalities, would be recorded and provided in periodic reports to the Forest Service, USFWS, and Idaho Department of Fish and Game.	Wildlife
Perpetua would provide mine personnel with mobile deterrents to avoid conflicts with wildlife – sprays, air horns, etc.	Wildlife
Perpetua would establish and post speed limits for the Burntlog Route, SGP haul roads, and light vehicle access roads on the SGP site. Slower speed limits would be posted at known wildlife crossings and along defined migratory corridors during migration season.	Wildlife, Health and Safety
There would be no hunting or discharge of firearms during construction and operations within the SGP area. The SGP site would be posted to prohibit hunting, and employees would be prohibited from carrying firearms on the SGP.	Wildlife, Health and Safety
Perpetua would employ vegetation maintenance for safety along roads, removal of hazard trees, and riparian conservation areas, etc. – coordinate such that wildlife protection and restoration are incorporated during maintenance.	Wildlife, Health and Safety

2.4.9.1 Agency Identified Mitigation

Once environmental impacts are identified and described, mitigation measures are considered. Mitigation measures required by the Forest Service would represent reasonable and effective means to reduce the impacts identified in the resource analysis or to reduce uncertainty regarding the forecasting of impacts into the future. If environmental impacts are inevitable, certain regulatory programs may require compensatory mitigation of the impacts. Any mitigation measures are in addition to the regulatory requirements (**Table 2.4-12**) and project design features (**Table 2.4-13**) accounted for in the impact analysis.

2.4.9.2 Stibnite Gold Mitigation Plan

The basis of the Perpetua's proposed EDFs are impact avoidance and minimization up front or as part of operations. The potential impacts of the SGP remaining after applying the avoidance and minimization measures were addressed by Perpetua on a resource-basis by further avoidance, minimization, and/or compensatory mitigation described in proponent-proposed specific resource mitigation plans. The following mitigation plans have been developed for the SGP:

- Stibnite Gold Environmental Monitoring Management Plan (Brown and Caldwell 2021e)
- Fisheries and Aquatic Resources Mitigation Plan (Brown and Caldwell, Rio Applied Science and Engineering, and BioAnalysts, Inc. 2021b);
- Fishway Operations and Management Plan (Brown and Caldwell, McMillen Jacobs Associates, and BioAnalysts 2021a); and
- Conceptual Stream and Wetland Mitigation Plan (Tetra Tech 2021b).

Below is a brief discussion of each of these accompanying resource-specific plans.

Following the Record of Decision, Perpetua would integrate all required Forest Service requirements and mitigation commitments into the current draft EMMP (Brown and Caldwell 2021e). This EMMP consists of a program framework and appendices containing component monitoring and management plans. Perpetua would use the EMMP to guide monitoring, document permit compliance, implement impact reduction procedures, and address adaptive management thresholds and responses where impacts and mitigation effectiveness carry substantial uncertainty.

Fisheries and Aquatic Resources Mitigation Plan

Perpetua's Fisheries and Aquatic Resources Mitigation Plan (FMP; Brown and Caldwell, McMillen Jacobs, and BioAnalysts 2021a) describes the measures that Perpetua has proposed to minimize adverse impacts on fisheries and aquatic resources, with particular attention to fish species listed as threatened under the Endangered Species Act: Columbia River bull trout (*Salvelinus confluentus*), Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*), and Snake River Basin steelhead (*Oncorhynchus mykiss*). The FMP also addresses westslope cutthroat trout *(Oncorhynchus clarki lewisi),* considered a sensitive species by the Forest Service and Idaho Department of Fish and Game, and other resident fish species.

The FMP actions would begin during construction and continue throughout mine operations and into closure and reclamation. It is focused on Chinook salmon, steelhead, bull trout, and Westslope cutthroat trout, but would also have benefits for other fish and aquatic species. The FMP includes water quality protection; fish protection, salvage, and relocation during diversions and dewatering activities; a process of protection and salvage for draining of the Yellow Pine pit; measures to avoid impacts during blasting; monitoring streamflow; restoring passage in stream channels with fish passage impediments; and monitoring of fish and aquatic biota. The FMP and its components continue to be refined in consultation with natural resource and regulatory agencies.

Fishway Operations and Management Plan

Perpetua has proposed a fishway for safe upstream and downstream passage of anadromous and migratory fish in the East Fork SFSR during construction and mine operations, to be part of the tunnel that diverts the East Fork SFSR around the Yellow Pine pit.

Perpetua's Fishway Operations and Management Plan (FOMP; Brown and Caldwell, McMillen Jacobs Associates, and BioAnalysts, Inc. 2021a) outlines the operation of the fishway and monitoring for effective fish passage as well as an adaptive approach to provide for fish trap and haul operations as an alternative, using the same facilities. Fish protection measures for the East Fork SFSR tunnel and Yellow Pine pit dewatering are outlined as well, such as a temporary fish barrier downstream of the Yellow Pine pit during tunnel construction, carefully sequenced dewatering of the Yellow Pine pit, and start of fishway operations (Brown and Caldwell, McMillen Jacobs, and BioAnalysts 2021b).

Measures to avoid and minimize impacts to fish habitat are detailed in the FMP and FOMP (Brown and Caldwell, Rio ASE, and BioAnalysts 2021b and Brown and Caldwell, McMillen Jacobs, and BioAnalysts 2021a). As listed above, these measures including the following:

- Water quality protection - measures designed on managing contact and non-contact water to maintain and improve water quality while supplying sufficient water for mining and ore processing. Diversions, ditches, and other mine facilities would be lined and/or water collected and treated to protect water quality. Riparian corridors would be restored and enhanced, and certain diversions piped, to reduce stream temperatures. Water treatment would continue during both operations and the post-closure phase.

- Fish protection, salvage, and relocation during dewatering and diversions - measures for screening or excluding of fish from diversion channels, water withdrawals, low-flow pipes, and the Yellow Pine pit dewatering to exclude and protect fish. Work windows have been developed based on fish periodicity to account for the different life stages of the targeted fish species. During diversions and dewatering activities in fish bearing streams, fish handling and salvage protection measures have been identified to safely isolate, collect, handle, and transport the fish.

- Trap and haul protocols at the fishway (if needed) - the primary goal is operating and maintaining the East Fork SFSR fishway during construction and operations and later in the mine life by restoring the East Fork SFSR stream channel over the backfilled Yellow Pine pit to provide permanent, volitional upstream and downstream fish passage and access to important stream habitats of the upper East Fork SFSR and portions of Meadow Creek. If fish aren't able to use the fishway during any period, trap and haul procedures have been developed to safely collect, handle, and move fish upstream of the fishway.

- Avoidance measures during blasting activities - measures to largely avoid or minimize the potential effects from blasting activities using appropriate setback distances from aquatic habitats to limit blast-related air overpressure and ground vibrations to harmless levels. Other additional blasting techniques can also be used to reduce these levels, and BMPs and site-specific modification of methods can further minimize or prevent damage to fish and the aquatic environment

- Monitoring streamflow - activities for maintaining, to the extent practicable, appropriate streamflows and streamflow monitoring in natural or restored channels where fish are present.

- Stream restoration and enhancement - design elements for stream restoration and enhancement based on natural channel design principles intended to restore permanent fish passage at Yellow Pine pit, improve fish habitat site-wide for spawning and rearing salmonids, and provide a net ecological benefit relative to current conditions.

- Restoring passage in stream channels - removing existing passage barriers within the mine site to allow for fish movement between streams and areas of the mine site where access is currently blocked or impeded within the SGP footprint as well as along the Burntlog Route.
- Monitoring fish and aquatic biota - provide the data necessary to evaluate how the various mitigation and protection measures are implemented, and to assess the status and trends and ongoing effectiveness. To address the potential for variances in the outcome of these measures, an adaptive management approach is outlined that would provide the mechanism to modify or adjust these measures or approaches in response to monitoring and evaluation as well as new information or technologies that may become available over the more than 20 years of construction, mining, reclamation, and restoration.

Conceptual Stream and Wetland Mitigation Plan

Construction of the SGP would permanently impact wetlands and other waters of the United States (WOTUS) subject to regulation under Section 404 of the CWA and requires a Department of the Army (DA) permit pursuant to Section 404. Perpetua's Conceptual Steam and Wetland Mitigation Plan (CMP, Tetra Tech 2021b) provides detailed descriptions of proposed restoration, establishment, enhancement, and/or preservation of aquatic resources to compensate for unavoidable impacts to WOTUS associated with activities that would be authorized by a DA permit. The CMP is conceptual because the actual final impacts of the SGP would not be known until an agency preferred alternative is identified and the USACE has determined all mitigation requirements. The conceptual mitigation plan does demonstrate the feasibility of achieving the amount and types of mitigation to offset the impacts in a manner consistent with the 2008 Mitigation Rule. The CMP provides detailed descriptions of proposed restoration, establishment, enhancement, and/or preservation of aquatic resources to compensate for unavoidable impacts to WOTUS associated with activities that would be authorized by a DA permit (Tetra Tech 2021b).

The CMP describes mitigation to address the requirements of the USACE and EPA under the Compensatory Mitigation for Losses of Aquatic Resources under CWA Section 404 (Final Rule). The CMP includes the 12 required elements of compensatory mitigation plans (33 CFR 332.4(c)/40 CFR 230.94(c)): objectives, maintenance plan, site selection, performance standards, site protection, monitoring requirements, baseline information, long-term management plan, determination of credits, adaptive management plan, mitigation work plan, and financial assurances.

The CMP would be revised through the final Environmental Impact Statement and with the USACE Regulatory Division—Walla Walla District, Boise Field Office, in compliance with the CWA Section 404/DA permit, stream and wetland delineations and jurisdictional determinations, development of the stream functional assessment for USACE-approved stream functional analysis, wetland and stream credits and debits determinations, and compliance with USACE's 404(b)(1) Guidelines (40 CFR Part 230).

2.5 Johnson Creek Route Alternative

2.5.1 Overview

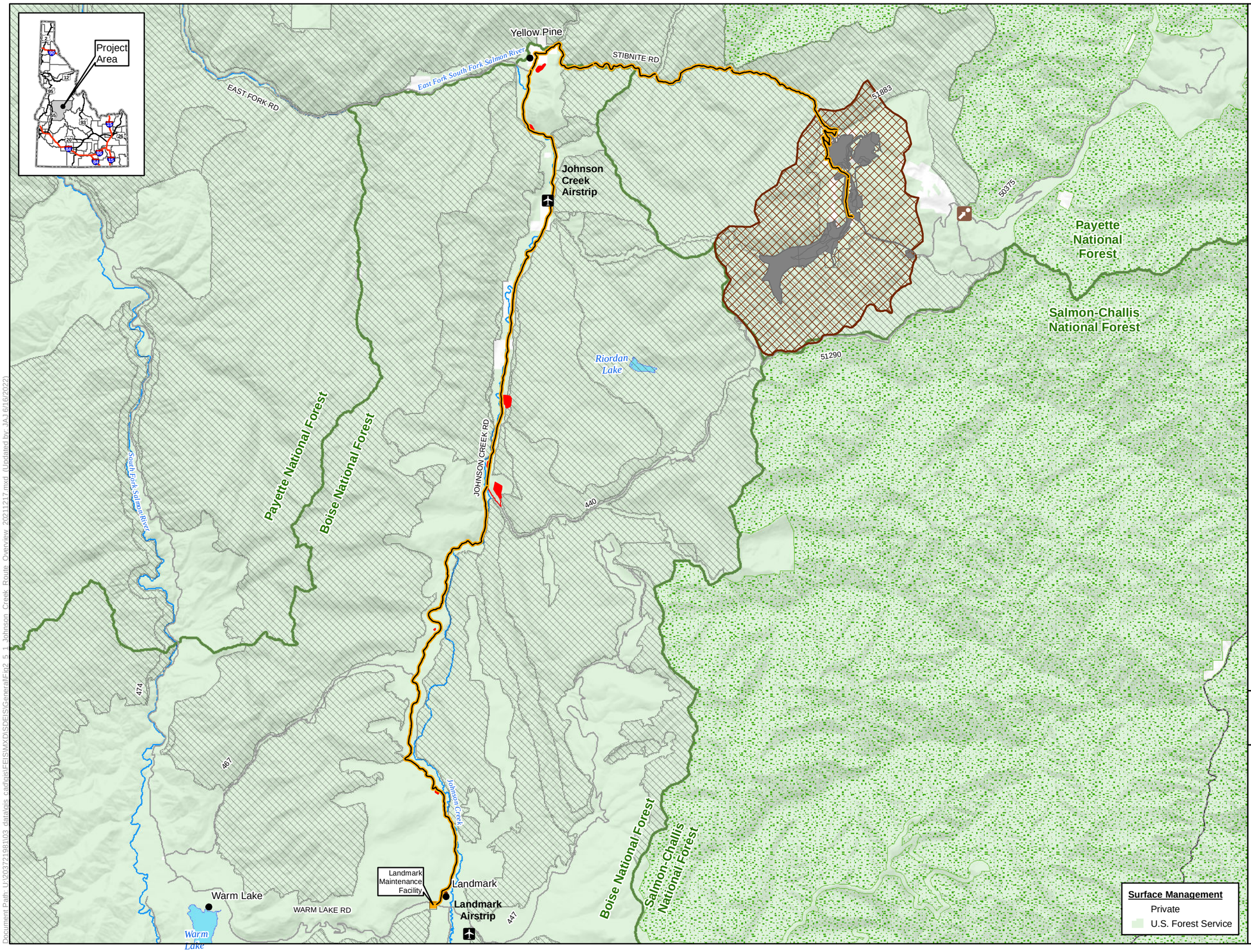
The Johnson Creek Route Alternative was developed to avoid or reduce certain impacts to IRAs, sensitive plant species, and wetlands. In this alternative the Burntlog Route would not be constructed and used for primary access to the SGP. The Johnson Creek Route would be used not only during initial SGP construction but would also be used during the operations and closure/reclamation phases of the SGP as well.

Development of the Johnson Creek Route would entail 216.6 acres of new cut and fill activity (including borrow sources) along existing roadways that follow segments of Johnson Creek and East Fork SFSR to make those roadways usable for mine access during its lifespan. Improvements to the Johnson Creek Route would include road widening and straightening, as well as drainage and bridge improvements to the Johnson Creek Road portion of the Johnson Creek Route. The Stibnite Road portion of the Johnson Creek Route would be improved by straightening curves, adding retaining walls, and installing culverts. It would approach the village of Yellow Pine at the junction of Johnson Creek and Stibnite roads.

This section describes only the differences from the 2021 MMP that have been incorporated into the Johnson Creek Route Alternative. Under this alternative, all of the mining, ore processing, and development rock storage activities would be the same as described in the 2021 MMP. Previously approved activities (i.e., approved exploration activities and associated reclamation obligations) would continue as well as the ASAOC activities. The modifications in the Johnson Creek Route Alternative are listed in **Table 2.5-1** and include the rationale for inclusion of each component. The proposed facilities and access roads related to this alternative are shown on **Figure 2.4-1**; and **Figure 2.5-1**. Forest Service requirements and EDFs as described in **Section 2.4.9** would apply to the Johnson Creek Route Alternative.

Table 2.5-1 Johnson Creek Route Alternative Components and Rationale for Inclusion

Phase – Component/ Subcomponent	Facility or Process Change	Rationale for Inclusion
Construction/Operations/ Closure and Reclamation – Access Roads	The Johnson Creek Route would be the mine access route as well as the public access route.	Using the Johnson Creek Route for mine access could avoid impacts from construction of approximately 15 miles of new road for the Burntlog Route, including impacts to IRAs, whitebark pine (a proposed threatened plant species), federally listed fish species, and wetlands and riparian areas.
Construction/Operations/ Closure and Reclamation – Public Access	The Johnson Creek temporary groomed OSV Trail from Landmark to Trout Creek campground would be maintained through operations. The segment from Trout Creek to Wapiti Meadows would be closed from construction through Closure and Reclamation.	Keeping the temporary groomed OSV trail open during construction and operations would provide for public access each winter and connect to other OSV routes during construction and mine operation.
Operations – Utilities/Communication Towers and Repeater Sites	Cell tower/repeater sites construction within IRAs would be by helicopter.	Helicopter construction could reduce impacts to IRAs and whitebark pine (a proposed threatened plant species).



LEGEND

Project Components
- SGP Features
- Operations Area Boundary

Access Roads and Trail Systems
- Johnson Creek Route

Offsite Facilities
- Landmark Maintenance Facility
- Johnson Creek Route Borrow Source

Other Features
- U.S. Forest Service
- Wilderness
- IRA and/or Forest Plan Special Area
- County
- City/Town
- Monumental Summit
- Airport/Landing Strip
- Road
- Stream/River
- Lake/Reservoir

0 1.15 2.3 Miles

1 inch = 2.3 miles when printed at 11x17

Figure 2.5-1
Johnson Creek Route
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS The National Map: 3D Elevation Program. USGS Earth Resources Observation & Science (EROS) Center: GMTED2010. Data refreshed March, 2021. Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

Document Path: U:\2023\21098\103_data\gis_cad\gis\FEIS\MXD\SDEIS\General\Fig2_5_1_Johnson_Creek_Route_Overview_20211217.mxd (Updated by: JAJ 6/6/2022)

2.5.2 Land Management and Affected Areas

For the Johnson Creek Route Alternative, the estimated maximum land affected by component and land ownership is shown in **Table 2.5-2**.

Table 2.5-2 Land Management and Acreage by Component for the Johnson Creek Route Alternative

Component		Perpetua Private	Other Private	Payette National Forest	Boise National Forest	Salmon-Challis National Forest[4]	Bureau of Reclamation	Idaho Department of Lands	Totals
Mine Site	New Disturbance	46.0	0	764.8+ 65[2]	0	0	0	0	875.8
	Re-disturbance	454.6	0	397.6	0	0	0	0	852.2
Off-site Facilities	New Disturbance	24.3	0	0	4.8	0	0	0	29.1
	Re-disturbance	0	0	0	0	0	0	0	0
Access Roads	New Disturbance	5.5	4.6	27.0	179.5	0	0	0	216.6
	Re-disturbance	4.8	4.5	28.3	65.4	8.7	0	0	111.7
Utilities1	New Disturbance	2.9	105.9	61.4	220.8	0	3.5	26.0	420.5
	Re-disturbance	1.0	174.0	19.4	349.8	0	9	36.1	589.3
Disturbance Totals	Total New Disturbance	78.7	110.5	853.2 + 65	405.1	0	3.5	26.0	1,542.0
	Total Re-disturbance	460.4	178.5	445.3	415.2	8.7	9	36.1	1,553.2
Total New and Re-Disturbance		539.1	289.0	1,363.5	820.3	8.7	12.5	62.1	3,095.2[3]

[1] Affected acres for utilities include both existing utility corridors and access routes, some of which would be upgraded, and new utility corridors and access routes.

[2] Approximately 65 acres associated with surface exploration pads and temporary roads (SGP component) have unknown land ownership breakdown because the exact locations of these exploration areas are not yet known; however, these are included in the PNF SGP subtotal.

[3] Subtotals may not add to totals due to rounding.

[4] Approximately 9 acres of land is within the boundary of the Salmon Challis National Forest but is administered by the PNF.

2.5.3 Phases and Timeline

The upgrades to the Johnson Creek Route, particularly along portions of the Johnson Creek Road and Stibnite Road, would take longer. Construction at the SGP could not be completed until the Johnson Creek Route is sufficiently upgraded. Accordingly, if the Johnson Creek Route Alternative were selected, the overall construction timeframe would need to be extended by a minimum of 2 years relative to the 2021 MMP in order to upgrade the Johnson Creek Route and complete construction at the SGP. The time period for SGP operations and closure and reclamation phases would be unchanged, but the start of operations would be delayed in comparison to the 2021 MMP.

2.5.4 Site Preparation, Access, Infrastructure, and Mine Operations

Site preparation, access, and infrastructure, and mining activities under the Johnson Creek Route Alternative would be the same as under the 2021 MMP except for construction/operations of the Johnson Creek Route as described below.

2.5.4.1 Access Roads

Under this Alternative, the Johnson Creek Route would be improved and used to access the SGP through construction, operations, and closure and reclamation and would be the only route of ingress and egress for the SGP. Road widening and straightening, along with drainage and bridge improvements, would be required for the Johnson Creek Road (CR 10-413) portion of the Johnson Creek Route. The Stibnite Road (FR 50412) portion would be improved by straightening curves, constructing retaining walls, and installing 182 18-inch culverts and two 60-inch culverts. Rock blasting would be required in areas to accommodate increasing the road width. Mesh and anchors, retaining walls, and concrete barriers are anticipated to be necessary due to steep rock canyon topography to mitigate safety hazards. The Johnson Creek Route would take approximately twice as long to construct as the Burntlog Route as the level and pace of construction would be limited by space constraints and the need to maintain some level of access through the construction zone to allow for passage of equipment, materials, and laborers to the mine site. It would also require drilling and blasting of rock overhands. Approximately 1 mile of road through the village of Yellow Pine would be paved.

Construction of facilities at the SGP would be completed following upgrades to the Johnson Creek Route. Construction of improvements to the Johnson Creek Route would require approximately 4 years due to the nature of the topography and terrain and the inability to do construction from both ends simultaneously.

During construction, Johnson Creek Road would require periodic temporary road closures. To complete upgrades to the Stibnite Road, daily road closures would be required from 10 a.m. to 4 p.m. during a 3-year construction period to conduct the cut and fill activities required to straighten curves and install retaining walls.

2.5.4.2 Public Access

During construction and mine operations, the public would share the Johnson Creek Route with mine related traffic transporting personnel, materials, and supplies to the SGP. The access route around the Yellow Pine pit would provide public access, employee access, and delivery access of supplies and equipment to the processing, warehouse, worker housing facility, and administration areas. Therefore, this road would need to accommodate heavy vehicles in addition to light vehicles.

This alternative would include constructing a road through the SGP to accommodate public access and delivery of mining materials and supplies. The road would be constructed around the Yellow Pine pit and into the SGP as shown on **Figure 2.4-2**, the same as the 2021 MMP.

Under the Johnson Creek Route Alternative, the Johnson Creek groomed OSV trail would be on the west side of Johnson Creek Road from Landmark to Trout Creek campground during operations as described for 2021 MMP but the segment along Johnson Creek Road from Trout Creek campground to Wapiti Meadows would be closed from construction through closure and reclamation. Other OSV trails as described in **Section 2.4.4.4** would be the same as the 2021 MMP.

2.5.4.3 Utilities

The transmission line upgrade and new construction would be the same as under the 2021 MMP. Helicopters would be used to construct and maintain high frequency radio repeater and cell tower sites located within IRAs managed for Backcountry/Restoration. Other utilities would be the same as 2021 MMP.

2.5.4.4 Off-site Facilities

Under the Johnson Creek Route Alternative, the access road maintenance facility would be shifted to the west and located on approximately 3.5 acres of NFS land near the intersection of Warm Lake and Johnson Creek roads, it would be accessed via Warm Lake Road. It would be called the Landmark Maintenance Facility and would include the same components as listed under the Burntlog Maintenance Facility (**Figure 2.4-8**) described in the 2021 MMP.

2.5.5 Closure and Reclamation

The improvements to the Johnson Creek Route would remain after mine operations end. Johnson Creek Road and Stibnite Road would not be returned to the pre-mine width. Rock cuts, 9-foot-high retaining walls, 182 18-inch culverts, and the two 60-inch culverts would remain.

Post-closure public access through the SGP would be the same as 2021 MMP (**Figure 2.4-18**).

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