ATTACHMENT D: Draft Compensatory Mitigation Plan for Streams and Wetlands

DRAFT

Compensatory Stream and Wetland Mitigation Plan

Stibnite Gold Project
Valley County, Idaho

U.S. Army Corps of Engineers File Number: NWW-2013-0321

Prepared for
Perpetua Resources Idaho, Inc.
Boise, Idaho
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Compensatory Stream and Wetland Mitigation Plan



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List of Abbreviations

AA	assessment area
AJD	approved jurisdictional determination
AOP	aquatic organism passage
BCCRP	Big Creek Culvert Replacement Project
bgs	below ground surface
BNF	Boise National Forest
C:N	carbon to nitrogen
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMP	Compensatory Mitigation Plan
CWA	Clean Water Act
DA	Department of the Army
DEIS	Draft Environmental Impact Statement
District	Stibnite-Yellow Pine Mining District
DRSF	development rock storage facility
EFSFSR	East Fork of the South Fork of the Salmon River
EIS	environmental impact statement
EOY	end of year
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FA	functioning appropriately
FESL	fabric encapsulated soil lift
FMP	Fisheries and Aquatic Resources Mitigation Plan
FOMP	Fishway Operations and Management Plan
FR	functioning at risk
GM	growth media
GMS	Growth Media Stockpile
HDR	HDR, Inc.
HUC	hydrologic unit code
IDEQ	Idaho Department of Environmental Quality
IDL	Idaho Department of Lands
IPC	Idaho Power Company
JD	jurisdictional determination
kV	kilovolt
LEDPA	least environmentally damaging practicable alternative
LRLT	Lemhi Regional Land Trust
LRMP	Land and Resource Management Plan
LWD	large woody debris
Mitigation Area	Stibnite Gold Mitigation Area
ModPRO	Modified Plan of Restoration and Operations
ModPRO2	Modified Plan of Restoration and Operations 2
MWAM	Montana Wetland Assessment Method
NEPA	National Environmental Policy Act
NF	National Forest (road)
NOAA Fisheries	National Ocean and Atmospheric Administration National Marine Fisheries Service
OHWM	ordinary high water mark
OM	organic matter
OW	open water
PAB	palustrine aquatic bed
Perpetua Resources	Perpetua Resources Idaho, Inc.
PEM	palustrine emergent marsh
PFO	palustrine forested
PJD	preliminary jurisdictional determination
PNF	Payette National Forest
PRM	permittee responsible mitigation
PRO	Plan of Restoration and Operations
Project	Stibnite Gold Project
PSS	palustrine scrub-shrub
RCRA	Resource Conservation and Recovery Act
SBM	seedbank material
SDEIS	Supplemental Draft Environmental Impact Statement
SFA	stream functional assessment
SGP	Stibnite Gold Project
SGLF	Stibnite Gold Logistics Facility
SGMP	Stibnite Gold Mitigation Plan
SMU	soil map unit
SODA	spent ore disposal area
SOM	soil organic matter
TSF	tailings storage facility
UR	functioning at unacceptable risk
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
VHF	very high frequency
WCI Matrix	Watershed Condition Indicators Matrix
WHMP	Wildlife Habitat Mitigation Plan
WOTUS	waters of the United States

Section 1

Introduction

The Compensatory Stream and Wetland Mitigation Plan (Compensatory Mitigation Plan, or CMP) is a comprehensive accounting of the Stibnite Gold Project (Project) impacts (debits) to jurisdictional waters of the United States (WOTUS) and mitigation (credits) resulting from permittee responsible restoration and enhancement of streams, wetlands, and aquatic organism passage as well as the purchase of credits from an existing mitigation bank for wetland impacts in the North Fork Payette subbasin. The CMP is based on the proposed action in the Supplemental Draft Environmental Impact Statement (SDEIS) (USFS, 2022) and Perpetua Resources Idaho, Inc.'s (Perpetua Resources; formerly Midas Gold Idaho, Inc.) ModPRO2 (Perpetua Resources 2021 For context, the CMP is one of four inter-related mitigation plans proposed by Perpetua for the Project (**Figure 1-1**).

- Fisheries and Aquatic Resources Mitigation Plan (FMP),
- Compensatory Mitigation Plan (CMP)
- Wildlife Habitat Mitigation Plan (WHMP), and
- Fishway Operations and Management Plan (FOMP).

Figure 1-1 shows the process by which the CMP and related mitigation plans were developed. The mitigation plans are supported by multiple years of baseline data collection and analysis, evaluation of reference sites, interactions with the agencies on resource assessment methods, and continuous evaluation of options to avoid potential impacts of the SGP. While the CMP focused on direct mitigation for impacts to WOTUS, the other plans also contribute significantly to protect, maintain, and enhance aquatic resource integrity indirectly.

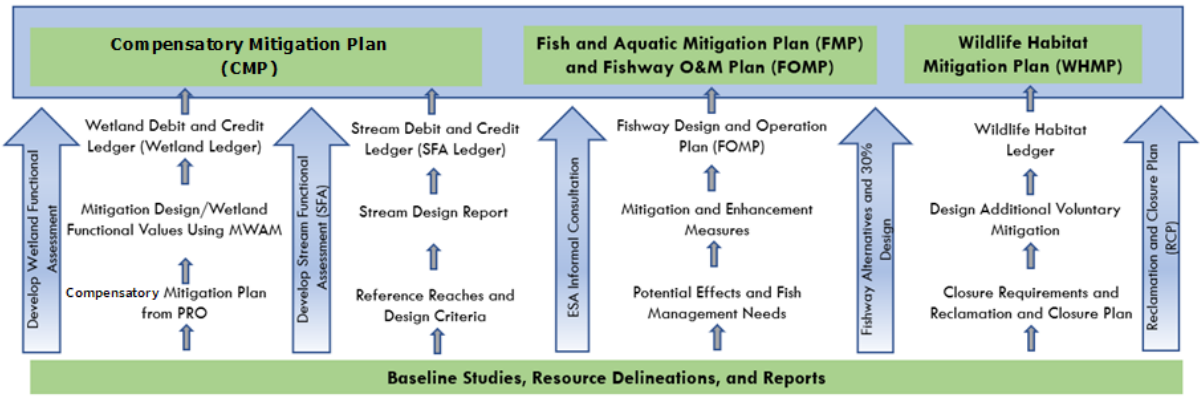

Figure 1-1. Schematic showing the development of functional assessments, designs, plans, and Endangered Species Act (ESA) informal consultation resulting in the four inter-related mitigation plans for the Project..

During the early stages of development of Perpetua Resources' mitigation plans, an umbrella document – the SGMP – was useful to describe the connections and interdependencies of the plans to agencies and regulators. The individual plans have been widely distributed, presented, refined, and used in the Stibnite Gold Project (SGP, or Project) Draft Environmental Impact Statement (DEIS) and the Supplemental Draft Environmental Impact Statement (SDEIS). The SGMP still serves its original purpose, but does not need to be further revised or updated. The initial draft was distributed for review and comment to the United States Forest Service (USFS), agencies, and tribes in June

2018 (Brown and Caldwell 2018a). Comments were received and addressed in the Final SGMP published and distributed in April 2019 (Brown and Caldwell 2019).

This preamble describes at a high level each of the Final SGMP's component plans. The SGMP is part of Perpetua Resources' overall mitigation process, which also includes numerous avoidance, minimization, monitoring, and resource protection measures focused on the aquatic environment.

Perpetua Resources' overarching goal for the CMP is to design, construct, and monitor wetland and stream restoration and enhancement, upland wildlife habitat improvements and reforestation, fish passage and access, and water quality improvement projects over the course of mine construction, operation, and closure to achieve a net ecological benefit. To meet this goal, Perpetua Resources developed the following primary objectives.

- Repair and rehabilitate habitats adversely affected by historical mining impacts in the SGP area, with the primary goal of producing a net benefit to wetlands, streams, water quality, and fisheries following mining and closure (Midas Gold 2016; Perpetua Resources 2021) and as prescribed in the Administrative Settlement Agreement and Order on Consent.
- Implement mitigation and management measures to avoid and minimize potential ongoing impacts to fish and aquatic organisms during operation and closure, specifically addressing the federally listed species Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*), Snake River Basin steelhead (*O. mykiss*), and bull trout (*Salvelinus confluentus*) and the USFS designated sensitive species westslope cutthroat trout (*O. clarki lewisi*),
- Provide upstream and downstream volitional fish passage and habitat access for anadromous and migratory salmonids (e.g., Chinook salmon, steelhead, bull trout) during mining.
- Provide compensatory mitigation for unavoidable impacts to jurisdictional streams and wetlands due to the SGP as authorized under Clean Water Act (CWA).
- Offset the SGP's authorized impacts to satisfy mitigation requirements, ensuring there will be no net loss of function of streams and wetlands resulting from construction, operation, and reclamation of the SGP.
- Provide upland and wildlife habitat restoration and rehabilitation to exceed Idaho standards for mineral mine reclamation and improve long-term habitat conditions for wildlife species of management importance.
- Restore permanent volitional fish passage in the East Fork of the South Fork Salmon River (EFSFSR) channel by providing access to historical spawning and rearing areas for Chinook salmon and steelhead currently blocked at the cascade immediately upstream of the Yellow Pine pit lake from historical mining activity.
- Improve habitat connectivity for Chinook salmon, steelhead, bull trout, westslope cutthroat trout, and other fish species and aquatic organisms by reconnecting critical and important habitats in the upper EFSFSR with the EFSFSR downstream of the impassable cascade at the Yellow Pine pit; and
- Implement restoration and mitigation in a manner consistent with the USFS' Land and Resource Management plans (LRMPs) for the Payette National Forest (PNF) (USFS 2003/2010) and the Boise National Forest (BNF) (BNF 2003/2010) and associated management prescriptions in those plans. Accomplish as much on-site mitigation as possible and enhance and restore resources in areas adjacent to where impacts would occur or restore resources after completion of mining activities.

The four mitigation plans, summarized below, were developed to meet these goals and objectives.

Conceptual Stream and Wetland Mitigation Plan

The Conceptual Mitigation Plan (Perpetua Resources 2021) described Perpetua Resources' proposed stream and wetland mitigation plans designed to fully compensate for unavoidable impacts on WOTUS. Section 1.1 provides additional information.

Fisheries and Aquatic Resources Mitigation Plan

The FMP (Brown and Caldwell 2021a) describes Perpetua Resources' proposed measures to avoid and minimize potential impacts to aquatic organisms, federally listed fish species and their critical habitat, and USFS designated sensitive species during SGP operations and closure. The FMP is focused on Chinook salmon, steelhead, bull trout, and westslope cutthroat trout and their critical habitat, but will also have benefits for other fish and aquatic species. The FMP includes fish protection, salvage, and relocation during diversions and dewatering activities; a process for mitigating 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.

Fishway Operations and Management Plan

The EFSFSR tunnel fishway represents an important part of the overall SGMP by providing safe upstream fish passage for adult anadromous and migratory fish to access potential spawning and rearing habitats currently prevented by the fish barrier at the Yellow Pine pit. The tunnel is intended to be a temporary improvement during mining and near the end of mining will be replaced with a restored channel over the backfilled Yellow Pine pit providing for permanent volitional fish passage. These measures support federally listed species and help maintain aquatic ecosystem function during and after mining.

The design of the proposed fishway is consistent with the criteria, rationale, guidelines, and definitions for the purpose of designing proper fish passage facilities for the safe, timely, and efficient upstream and downstream passage of anadromous salmonids at passage impediments created by artificial structures outlined as in the Anadromous Salmonid Passage Facility Design manual (NMFS 2011). The design of the tunnel fishway has been reviewed and discussed at length with the National Ocean and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service and other agencies during 2019 and 2020 Endangered Species Act (ESA) Section 7 informal consultation meetings.

The FOMP (Brown and Caldwell 2021b) outlines the operation of the fishway and monitoring for effective fish passage as an adaptive approach to provide for fish trap and haul operations as an alternative, using the same facilities. Fish protection measures for the EFSFSR tunnel and Yellow Pine pit dewatering are outlined as well, such as a temporary fish barrier downstream of the tunnel during construction, carefully sequenced dewatering of the Yellow Pine pit, and start of fishway operations. Importantly, the FOMP includes adaptive management for successful operation of the fishway in response to the number of arriving fish, success of fish entering and passing upstream through the fishway and plans for trap and haul operations if the fishway performance is not meeting its operational goals.

Wildlife Habitat Mitigation Plan

The WHMP (Tetra Tech, 2021a) describes Perpetua Resources' proposed plan to rehabilitate, restore and enhance upland wildlife habitats, including those previously disturbed by historical mining and wildfires and those designed to offset unavoidable impacts from the SGP on wildlife habitats. In addition, Perpetua Resources' revised Reclamation and Closure Plan (Tetra Tech 2021b) describes the concurrent reclamation during mining operation and restoration of habitat during closure of the mine as required by USFS and Idaho Department of Lands (IDL) regulations and policies. The WHMP

furthers the RCP with the goal of producing a net environmental benefit for wildlife habitat in the mine area by further enhancing the ecological functions and values beyond the reclamation requirements established by the USFS and IDL. The WHMP is not based on regulatory requirements for compensatory mitigation because there is no specific mandated compensatory mitigation for upland wildlife habitats under federal or Idaho regulations and therefore considered voluntary mitigation proposed by Perpetua Resources. While not directly related to WOTUS, upland wildlife habitat mitigation actions promote watershed health and can reduce potential adverse effects to restored streams and wetlands (e.g.' sedimentation, runoff patterns and duration, etc.).

1.1 Purpose of Plan

This CMP describes proposed stream and wetland mitigation to compensate for unavoidable impacts to jurisdictional WOTUS associated with activities that would be authorized by a Department of the Army (DA) permit for Perpetua Resources' SGP located in Valley County, Idaho. This CMP revises and supersedes the Conceptual Mitigation Plan (Tetra Tech 2021g).

Construction of the Project would impact CWA jurisdictional wetlands and streams, and other waters subject to regulation under Section 404 of the CWA. As part of the Project development, Perpetua Resources has submitted a permit application with the United States Army Corps of Engineers (USACE) for a DA permit issued pursuant to section 404 of the CWA (33 United States Code 1344). Additionally, the USACE will request certification from the Idaho Department of Environmental Quality (IDEQ) for applicable provisions under Section 401 of the CWA and state water quality standards which would result in IDEQ's issuance of a 401water quality certification for the Project. The permit application addresses the anticipated impacts to wetlands and streams from construction and operation of the SGP. This CMP describes Perpetua Resources' approach for mitigating Project-related impacts to WOTUS and is intended to satisfy the mitigation requirements of the *Final Rule, Compensatory Mitigation for Losses of Aquatic Resources* (33 Code of Federal Regulations [CFR] Parts 325 and 332 and 40 CFR Part 230).

This version of the CMP is the result of multiple revisions and is the result of agency consultation and review and modified as part of the Section 404 permitting and National Environmental Policy Act (NEPA) processes for the SGP. The USACE was a cooperating agency on the draft environmental DEIS and SDEIS which has been prepared by the lead federal agency, the PNF of the USFS under NEPA to evaluate environmental effects of the proposed Project, alternatives, and associated mitigation measures. The DEIS and SDEIS evaluated and disclosed the potential environmental effects from: (1) the Proposed Action and Alternatives, to occupy and use National Forest System lands for operations associated with open-pit mining and ore processing; and (2) related amendments to the PNF Land and Resource Management Plan (LRMP; USFS 2003/2010) and/or the BNF LRMP (BNF 2003/2010).

The USACE cooperated on the preparation of the DEIS and SDEIS and evaluated its content to ensure that the SDEIS can be adopted by the USACE to support an eventual decision to either issue, issue with conditions, or deny a DA Permit under Section 404 of the CWA for the SGP. For the USACE to use the DEIS, SDEIS, and a Final Environmental Impact Statement FEIS as a supporting evaluation for its permit decision, there must be an alternative that is the Least Environmentally Damaging Practicable Alternative (LEDPA) in accordance with the USACE Guidelines at 40 CFR 230.10(a) as it pertains to Section 404 of the CWA. The 404(b)(1) evaluation submitted as a part of the 404 permit application package was used to provide Perpetua Resources determination analysis of alternatives to support the USACE's determination of the LEDPA. The United States Environmental Protection Agency (EPA) cooperated on the preparation of the DEIS and SDEIS, while the USACE administers the 404 permit program, EPA retains oversight responsibility and other rights under Section 404. This

CMP considers potential impacts from Perpetua Resource's Proposed Action, and includes measures designed to mitigate anticipated impacts; it does not address other alternatives considered in the DEIS and SDEIS. Perpetua Resources' proposed action is the ModPRO2, also named the 2021 MMP in the SDEIS.

1.2 Jurisdictional Determination

The USACE uses jurisdictional determinations (JDs) to assess which wetlands and streams fall under the jurisdiction of Section 404 of the CWA. An approved JD (AJD) indicates if waters on a site are WOTUS. A preliminary JD (PJD) indicates that there may be WOTUS present and assumes that those waters are jurisdictional, until an AJD indicates otherwise (USACE and EPA 2008).

Field delineations and reporting were completed for the Project Area (Project features and off-site infrastructure) and submitted to the USACE for a JD. Initially, an AJD (USACE 2014) was issued for the WOTUS delineated in the Wetland Resources Baseline Study (HDR 2013). Subsequently, a PJD was issued in response to addendum reports (USACE 2015a, USACE 2016a, USACE 2015b, HDR 2016a, USACE 2020). There are several areas within the permanent SGP disturbance boundary of the Proposed Action where field delineations have been completed (Tetra Tech 2021c) and submitted to the USACE for a JD.

In March of 2021, Tetra Tech submitted an AJD request to the USACE for all streams and wetlands that fall within any of the disturbance areas of any of the alternatives associated with the SGP (Tetra Tech 2021d). A web-based viewer with data sheets, air and ground-based photos, and jurisdictional recommendations has been provided to the USACE to aid in their review and issuance of the AJD. To expedite the USACE permit review, Perpetua Resources completed this CMP assuming all delineated features are jurisdictional, thus accounting for all potential impacts regardless of jurisdiction.

The stream and wetland study area includes all field delineations completed in support of baseline data gathering for the Project Area (HDR 2013, 2014a, 2014b, 2015, 2016a, 2017a; Great Ecology 2017; Tetra Tech 2018, Tetra Tech 2021c) and totals 12,565 acres. Approximately 181 acres of the permanent SGP disturbance boundary of the Proposed Action are outside of the stream and wetland study area. These data gaps are a result of micrositing along the transmission line and Burnt Log Road or lack of right of entry on private lands and thus field delineations are still required. This version of the CMP includes the recommended WOTUS calls made with the March 2021 AJD submittal request to the USACE. The final CMP will include the USACE issued AJD for all impacted WOTUS within the disturbance footprint. Perpetua Resources has submitted this CMP for the proposed action, the ModPRO2/2021 MMP, based on the 404(b)(1) indicating it would likely be the LEDPA.

1.3 Organization of the Compensatory Mitigation Plan

Section 1.4 of this CMP provides an overview of the Project. Section 2 discusses Perpetua Resources' mitigation strategy for the Project and Sections 3 through 7 and 9 through 15 primarily address the 12 fundamental elements required in mitigation plans as outlined in *Compensatory Mitigation for Losses of Aquatic Resources* (33 CFR 332). An additional section, Section 8 – Temporal Impact Analysis, which is not required as a fundamental element of a mitigation plan, has been included in this CMP to further elaborate on Perpetua Resources' mitigation approach for the Project. These 12 fundamental elements of a mitigation plan, and their corresponding sections in this CMP, are listed below:

Section 3 – Goals and Objectives

Section 4 – Site Selection

Section 5 – Site Protection Instruments
Section 6 – Baseline Information
Section 7 – Credit Determination Methodology
Section 8 – Disturbance Sequence
Section 9 – Mitigation Work Plan
Section 10 – Maintenance Plan
Section 11 – Ecological Performance Standards
Section 12 – Monitoring Requirements
Section 13 – Long-term Management Plan
Section 14 – Adaptive Management Plan
Section 15 – Financial Assurances

Appendices are included to provide more detailed information, including baseline information and documents created to support the Project.

1.4 Project Background

1.4.1 Mining History

Located in Valley County in central Idaho, the District is characterized by historical mining activities and unpatented (federal land) and patented (private land) mining claims with known deposits of gold, silver, tungsten, and antimony. The District is in the BNF but is administered by the Krassel Ranger District of the PNF.

Mining began in the District in the late 1800s and continued on and off through 1997. Two main phases of mining activity, which included antimony, gold, and tungsten mining, have occurred at the Project site. The first phase took place from the 1920s through the 1950s, and the second phase began in 1974 and ended in 1997. Historical mining activities at the Project site have created numerous legacy impacts including underground mine workings, multiple open pits, development rock dumps, tailings deposits, heap leach pads, spent heap leach ore piles, a mill and smelter site, three town sites, camp sites, a ruptured water dam (with its associated erosion and downstream sedimentation), and partially reclaimed or un-reclaimed haul roads. **Figure 1-2** illustrates past mining and related activities at the Project site (Midas Gold 2016).

Beginning in 2009, Perpetua Resources began to acquire mining claims throughout the District from prior owners or by staking claims on its own behalf. With federal and state approval, Perpetua Resources initiated mineral exploration activities in 2009 as part of the Golden Meadows Exploration Project to better define the mineral deposit potential for the area (USFS 2015). This work included using the existing road network and constructing several temporary roads to access drill sites, build drill pads, and drill on both National Forest System and private lands, and to access disturbed areas for reclamation when exploration work ends (USFS 2015). Proposed Project development into the mining phase of activities (Midas Gold 2016), includes an ore processing facility, three open pits (Hangar Flats, West End, and Yellow Pine), a temporary tunnel diversion of the EFSFSR, three development rock storage facilities (DRSFs), a lined tailings storage facility (TSF), haul roads, an access road, upgrades to and extension of an existing transmission line into the Project site, employee housing, and ancillary facilities and infrastructure. Additional details regarding proposed on-site and off-site Project activities, facilities, and infrastructure are provided in Sections 1.4.2 and 1.4.3, respectively.

The Project site is heavily affected by the past mining-related activity of prior operators, presenting opportunities for Perpetua Resources to improve the site by conducting reclamation beyond which would be required to simply mine the deposits that it owns. In the PRO (Midas Gold 2016), Perpetua Resources outlined its environmental restoration and mitigation goals to provide early and sustainable on-site mitigation for stream and wetland impacts. The CMP focuses on proposed stream and wetland mitigation to compensate for unavoidable impacts to WOTUS. Additionally, Perpetua Resources will undertake a variety of reforestation, water quality improvement projects, and restoration of anadromous fish passage at the Yellow Pine pit over the course of mine construction, operation, and closure. Many of these activities focus on the repair of legacy impacts, with the goal of producing a net benefit to wetlands, streams, water quality, and fisheries in the Project Area. The Project will also include extensive cleanup of legacy impacts from past mining activity, including reprocessing of legacy tailings, repurposing of spent leach ore and development rock material, identification and proper disposal of contaminated soil and fill material, and repair of the East Fork of Meadow Creek (Blowout Creek).

1.4.2 Project Summary

Perpetua Resources plans to redevelop portions of the Stibnite-Yellow Pine Mining District (District), as outlined in the PRO (Midas Gold 2016), which was submitted to the USFS and the IDL in September 2016 and deemed complete by the USFS in December 2016.

Concurrently with preparation of the DEIS, federal and state permits, and agency and stakeholder consultations required for approval of the PRO (Midas Gold 2016), Perpetua Resources advanced the Project's engineering design to the Feasibility Study level. While the USFS was in the process of evaluating alternatives in the DEIS, Perpetua Resources continued to refine and clarify the PRO. This included completing more detailed feasibility analyses and re-evaluating components of the project to further avoid and minimize environmental impacts. The combination of incremental improvements to the PRO was submitted to the USFS in May 2019 as the Modified Proposed Action (Modified PRO or ModPRO) (Brown and Caldwell 2019) and represented Perpetua Resources' refined proposal to be evaluated in the DEIS as Alternative 2.

Concurrent to the preparation of the DEIS Perpetua Resources continued to study alternatives to reduce the overall project footprint, reduce associated wetland impacts, improve surface water and groundwater quality, reduce temperature impacts to surface water, reduce air emissions, improve fisheries and wildlife habitat, and improve upon reclamation and restoration design. These considerations guided the preparation of the PRO and the Modified PRO and were equally influential in preparation of Perpetua Resources' Feasibility Study (M3, 2021). From this, Perpetua Resources developed the Modified Proposed Action 2 (ModPRO2), which is Perpetua Resource's Proposed Action. TheModPRO2 was developed from information derived from agency and public scoping, the alternatives development process, baseline data collection and analysis, and predictive modeling (hydrologic, geochemical, stream temperature). It was also informed by Perpetua Resources' interactions with the public; federal, state, and local governments; Native American tribes; and other Project stakeholders. It also considers substantive comments made during the public comment period on the DEIS. Perpetua Resources' proposed project , as outlined in the ModPRO2 (Perpetua Resources 2021), was advanced as the preferred alternative in the SDEIS (USFS 2022).

Further details about the Project Area and on-site and off-site activities, facilities, and infrastructure associated with the Project are provided in the sections below.

1.4.3 Project Area Description

The Project is located near Stibnite, Idaho, approximately 100 miles northeast of Boise, Idaho, 38 miles east of McCall, Idaho, and approximately 10 air miles east of Yellow Pine, Idaho. **Figure 1-3** illustrates the Project location.

Located in the Salmon River Mountains, a high-relief mountainous physiographic province in central Idaho, the terrain within the Project Area consists of narrow valleys surrounded by steep mountains. Elevations along valley floors range from 6,000 to 6,600 feet above mean sea level. The surrounding mountains reach elevations over 8,500 feet above mean sea level. The main drainage basin in the Project Area is the EFSFSR. The EFSFSR is joined by Johnson Creek 16 miles downstream near Yellow Pine and flows into the South Fork of the Salmon River approximately 14.5 miles downstream of the Johnson Creek confluence.

The following terms are used throughout this document for Project features and locations:

- **Project site** includes the mine area and associated on-site infrastructure and facilities (**Figure 1-4**).
- **Project Area** includes all Project features, including both the Project site and off-site infrastructure (**Figure 1-5**).
- **Off-site infrastructure** includes all infrastructure and facilities outside of the Project site.

The Project Area is encompassed by two subbasins (hydrologic unit code [HUC] 8) and seven watersheds (HUC 10) (**Figure 1-6**). Tributaries of the EFSFSR include Sugar Creek, Meadow Creek, Johnson Creek, Riordan Creek, Burntlog Creek, Trout Creek, Hennessy Creek, Midnight Creek, Fiddle Creek, Garnet Creek, and Rabbit Creek, with West End Creek a tributary of Sugar Creek. The Project Area also includes Cabin Creek and Warm Lake Creek, which are tributary streams to the South Fork of the Salmon River (**Figure 1-6**). Diverse wetlands are located throughout Project Area drainages and slopes that drain to the valleys downslope and include wetlands classified as palustrine emergent marsh (PEM), palustrine shrub-scrub (PSS), palustrine forested (PFO), and open water (OW) (Cowardin, et al. 1979). The primary uses or activities in the Project Area have been mineral exploration, mining, logging, and dispersed recreation.

During non-winter conditions (unmaintained roads clear of snow), the Project site/area can be accessed from the city of Cascade by traveling northeast on Warm Lake Road (National Forest [NF] road NF-22) for about 37 miles to Landmark, then north on Johnson Creek Road (NF-413) for 28 miles to Yellow Pine, and 14 miles east on Stibnite Road (NF-412) (**Figure 1-3**). The site can also be accessed from McCall during non-winter conditions by traveling east on Lick Creek Road (NF-48) for 33 miles to East Fork Road, then 16 miles to Yellow Pine, and 14 miles on Stibnite Road (NF-412). During winter, the site can be accessed with highway vehicles only from Cascade by traveling 24 miles northeast on Warm Lake Road (NF-22) to the intersection with South Fork Road (NF-674), then north on South Fork Road for 32 miles to East Fork Road, 16 miles east on East Fork Road to Yellow Pine, and 14 miles on Stibnite Road (NF-412).

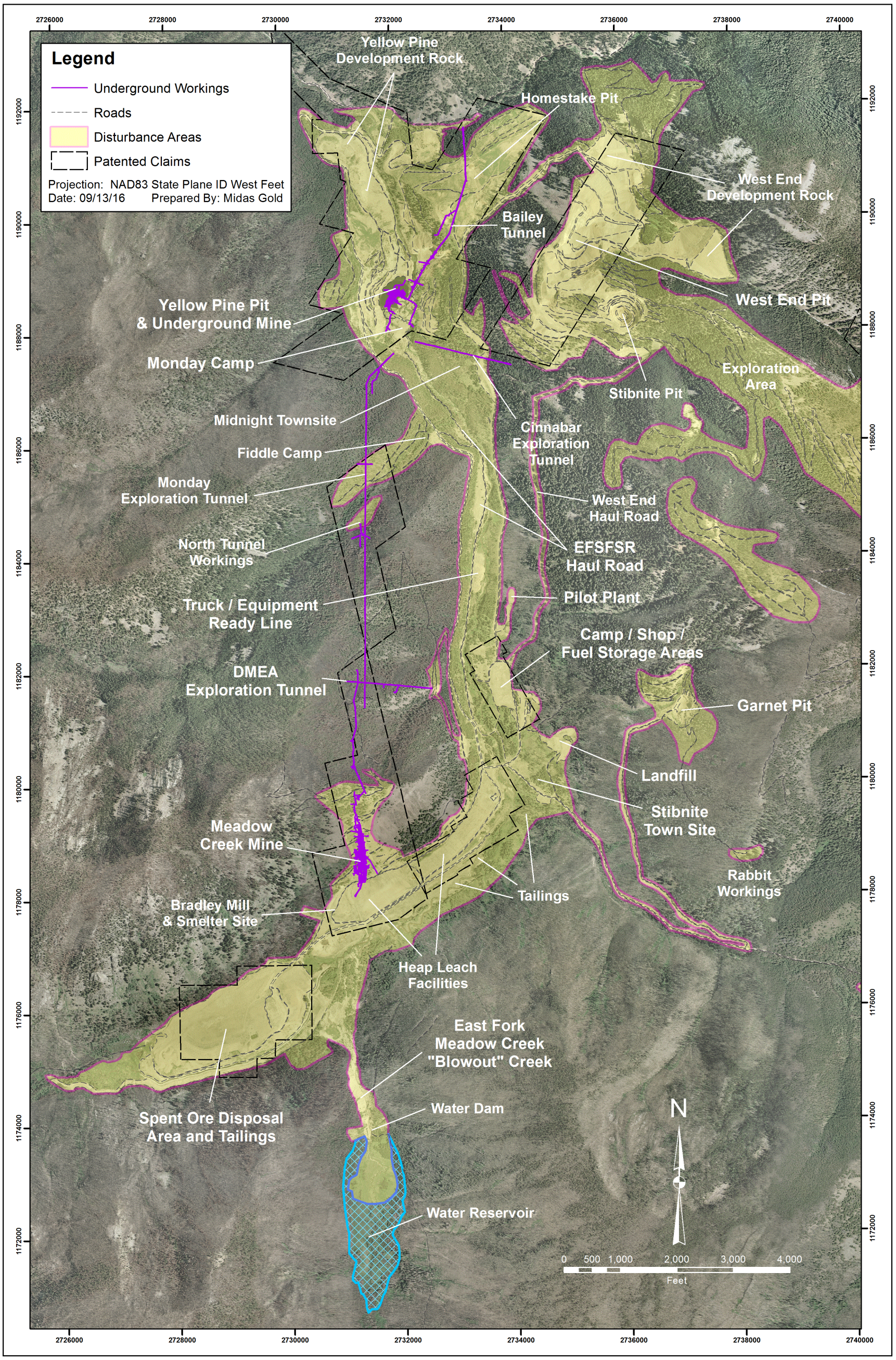

Figure 1-2. Past Mining and Related Activities

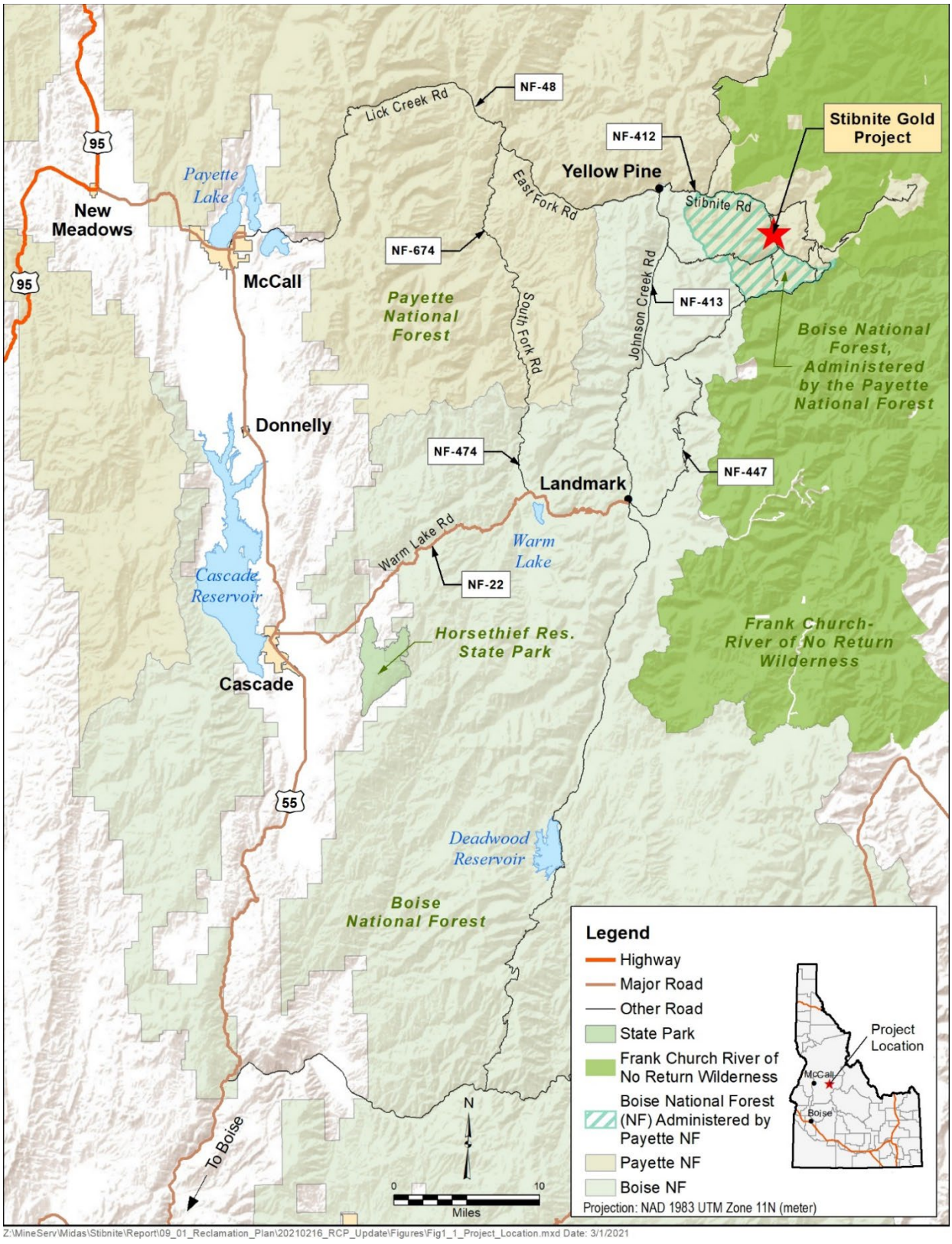

Figure 1-3. Project Location Map

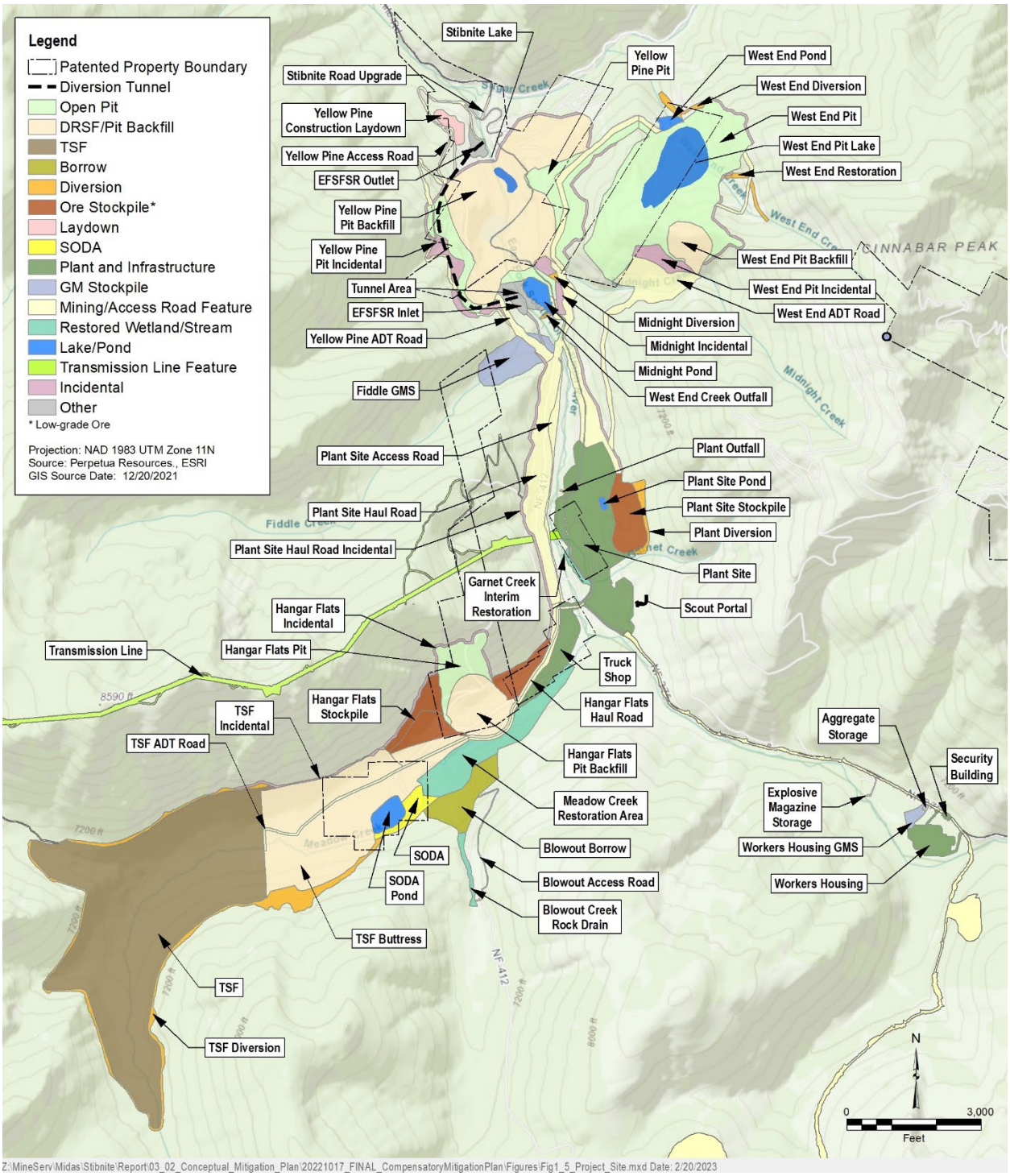

Figure 1-4. Project Site (End of Year 12)

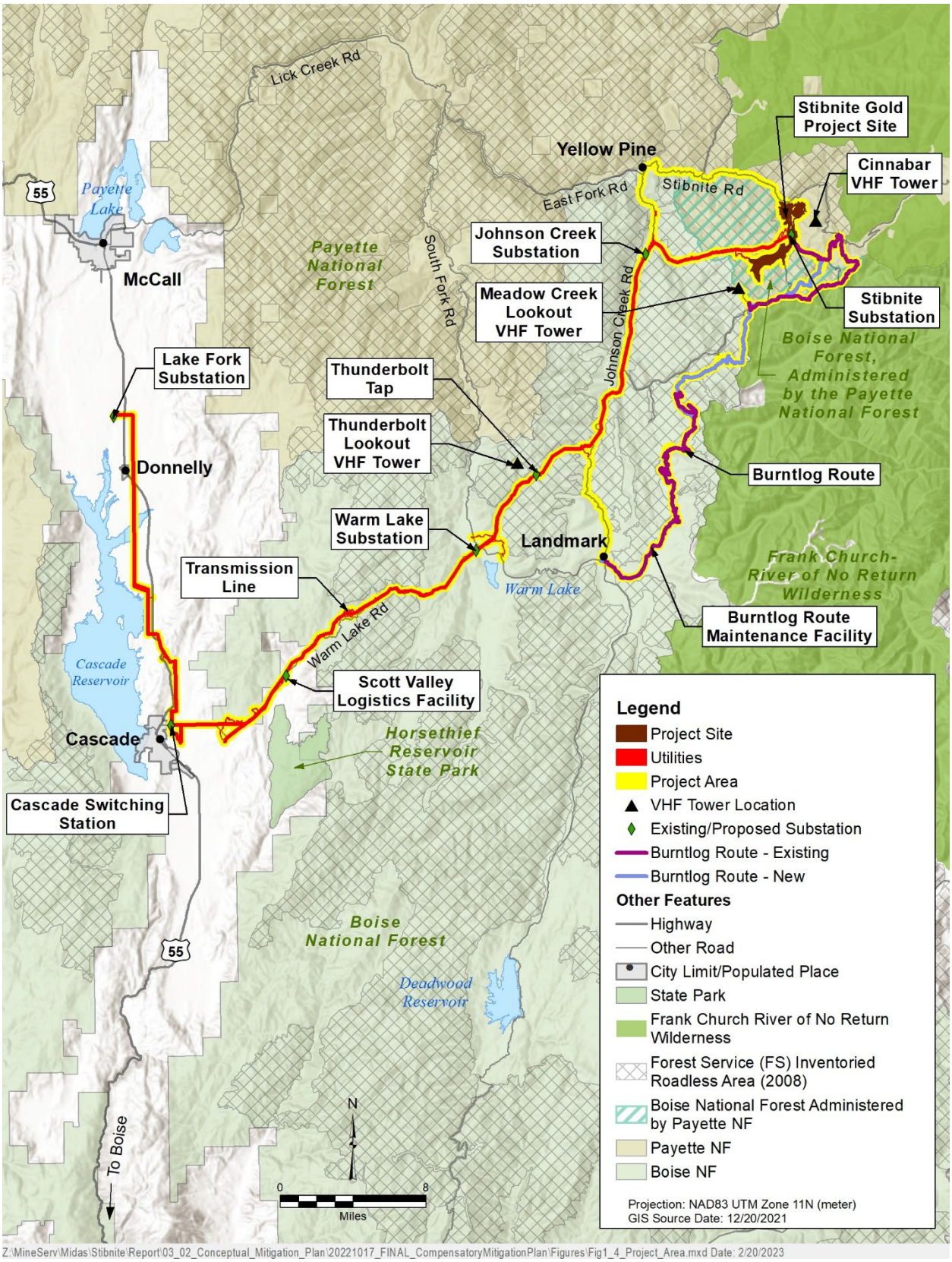

Figure 1-5. Project Area

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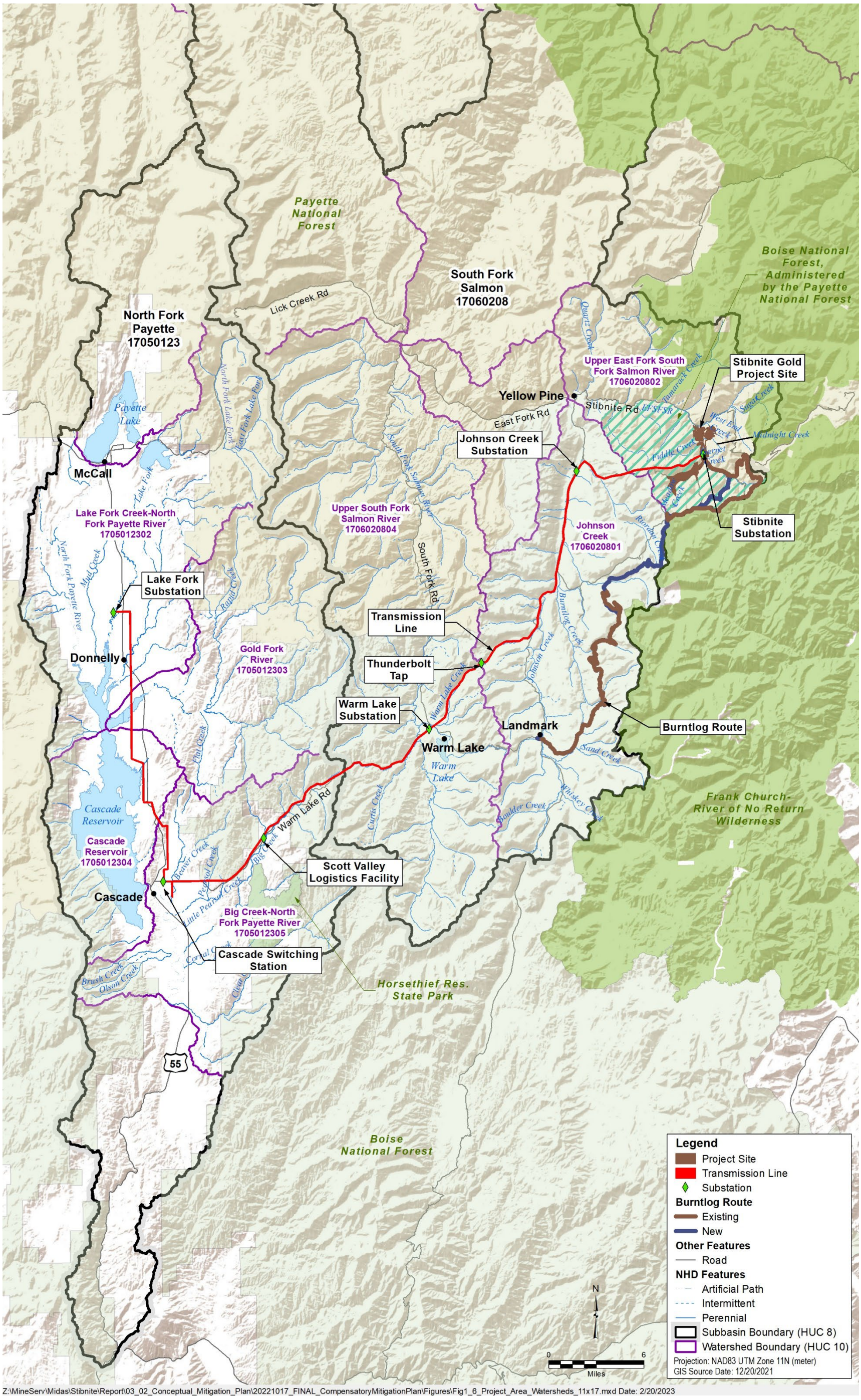

Figure 1-6. Project Area Watersheds

1.4.4 Project Site Activities, Facilities, and Infrastructure

Conventional open pit mining is the proposed option for Project mining operations. Site preparation and cleanup and on-site facilities and infrastructure are needed to support SGP construction and mining and ore processing operations, as well as to support proposed compensatory mitigation activities, site restoration and reclamation, and site closure. Facilities and infrastructure to support these activities will include: 1) a primary SGP access road, 2) utilities for ore processing and day-to-day activities (e.g., electric power supply and distribution, water supply, and sewage disposal systems); 3) offices; 4) employee housing; and 5) workshops and warehouses for construction activities, site workforce and equipment, ore mining and processing, and reclamation and restoration activities that would occur at the Project site. **Figure 1-4** depicts the Project site and the proposed on-site Project features.

Proposed on-site activities, facilities, and infrastructure include:

- **Site Preparation and Support Infrastructure** – Construction of surface facilities, mine site haul roads, and water management features will be required, along with the removal of some legacy mining features. To allow for site operations, trees, vegetation, and topsoil (as practical) will be removed and stored for use as part of site reclamation and restoration. The existing potable water supply system will be used and expanded for the initial construction camp and supplemented if needed. Construction of the Burntlog Route will occur from both ends of the route at the same time on a seasonal basis as conditions allow. Installation of surface water management features and implementation of best management practices will occur to reduce erosion and sediment delivery to streams.
- **Open Pits** – Three open pits—Hangar Flats, West End, and Yellow Pine—will be developed with mining expected to occur for approximately 12 to 15 years. Yellow Pine pit will be developed first, followed by Hangar Flats, and then West End, to use development rock from the West End pit to backfill the Yellow Pine pit for restoration of the EFSFSR. Details on mining progression and procedures are included in the ModPRO2 (Perpetua Resources 2021).
- **Development Rock Management** – Four areas are identified for development rock management—TSF Buttress, Hangar Flats Backfill, Yellow Pine Backfill, and TSF Embankment. Development rock removal will occur during pre-stripping and pre-production and concurrently with ore mining.
- **Spent Ore and Legacy Tailings Removal** – Legacy tailings that remain uncontained in the Meadow Creek valley will be removed and reprocessed—the spent ore disposal area (SODA), Hecla Heap Leach Pad, the Stibnite Mines Inc. Leach Pads, and Bradley tailings underlying the SODA.
- **Process Plant Area** – The process plant area will include development of ore processing facility buildings, tanks, ore stockpile areas and primary crusher. Water used for ore processing would be recycled within the facility and TSF and/or managed via enhanced evaporation and will not be discharged into the environment.
- **Lined Tailings Storage Facility** – The lined TSF will be constructed west of the Hangar Flats DRSF. Historical heap leach ore and recycled and newly generated development rock will be used to construct the TSF dam.
- **Mine Support Facilities** – These facilities will include the mine administration office, maintenance workshop and truck wash, and fuel and explosive storage. Additionally, haul roads will be required to transport ore, development rock, and reclamation materials, or to transport vehicles to the mobile equipment maintenance shop.

- **Surface Exploration Drilling and Underground Exploration** – In addition to previously approved exploration activities, additional surface exploration drill site disturbance as well as proposed underground exploration are planned. Underground exploration activities will occur in a mineralized zone known as the "Scout Prospect" located south of the proposed ore processing facility. Facilities associated with underground exploration will include portal pad access roads, administrative offices, dry facilities, ventilation facilities, maintenance shop and storage area, batch plant, power supply, compressor facility, and explosives and fuel storage.
- **Employee Housing and Recreation Facility** – Existing exploration housing facilities will be expanded, and new on-site housing (worker housing facility) and a recreational facility will be constructed near the main gate in the EFSFSR drainage above the confluence with Meadow Creek.
- **Employee and Visitor Parking** – Several on-site parking areas will be used during initial site restoration and construction; during operations and concurrent restoration, parking areas will be maintained at the Worker Housing Facility, at the shop area and equipment ready lines, and near the mine administration office.
- **On-site Roads and Trail System** – In addition to haul roads, internal service roads and a trail system designed for smaller vehicles and foot traffic will be constructed and maintained.
- **Sanitary Waste Handling Facilities** – Existing sanitary waste handling facilities will be upgraded, and additional sanitary waste treatment facilities will be constructed.
- **Solid Waste Handling Facilities** – Existing solid waste management practices, which maximize reuse and recycling to minimize waste, will be continued and expanded during construction and operations. Methods for handling solid waste will include composting organic materials; recycling; collection and off-site disposal of municipal, non-compostable/non-recyclable inert and hazardous waste materials.
- **Warehouse Facilities** – In addition to the off-site warehousing at the Stibnite Gold Logistics Facility (SGLF), additional warehouse facilities will be constructed on-site.
- **Site Distribution of Electric Power** – Solar power and propane or diesel generators will be utilized during construction and as back-up power generation during operations and closure. During operations, electric power will be provided through a 138-kilovolt (kV) line connected to the Idaho Power Company (IPC) electric grid system (see Section 1.4.3) and routed to the Project's main substation. Distribution from the main substation to facilities within the Project Area will primarily be via an overhead 24.9-kV electric distribution line, while electric power within the ore processing facility area will be in underground conduits. Additional solar arrays may be installed on the roofs of Worker Housing Facility and other buildings, if feasible.
- **Surface Water Management** – Water management will be conducted to prevent generation of contact water or commingling of contact water and non-contact water, keeping clean water clean; and to prevent flooding of mine facilities by runoff generated on-site. This includes temporarily diverting streams around mine site facilities such as the open pits, Growth Media Stockpiles (GMSs), stockpiles, and the TSF within constructed surface water channels. Diversion of storm water and streams in the vicinity of the pits and TSF would minimize sediment and metals from mine pits from entering the surface water and groundwater. If water does come in contact with mining facilities, it will be collected in surface water runoff collection features and routed to collection basins and recycled to the ore processing facility or used for dust control, as practicable.
- **Water Use** – Additional water rights to support ore mining and processing and provide potable water for housing and maintenance facilities will be secured through a permit from the Idaho Department of Water Resources. Water supply for human consumption, mining-related activities,

and ore processing activities will be provided by groundwater dewatering wells, reclaimed water, and potable water wells. The ModPRO2 (Perpetua Resources 2021) estimated water usage would be approximately 120 gallons per minute during construction and start-up, 4,431 gallons per minute during operations, and 22.5 gallons per minute during closure and reclamation.

- **Water Supply and Storage** – Potable water will be provided through an existing well near the exploration housing facility and wellfields developed adjacent to the Worker Housing Facility. Water for ore processing will primarily be recycled from the TSF with additional fresh water or make-up water (any addition of fresh water for the ore processing facility is known as make-up water) supplied from groundwater (dewatering) wells around the Hangar Flats, Yellow Pine, and West End pits. Water will be pumped from dewatering wells to 360,000-gallon freshwater/firewater head tanks near the ore processing facility site. The tank facilities will also be used for fire suppression and potentially for exploration drilling, development drilling, and road dust control. Of the 360,000 gallons; 240,000 gallons will be available for process uses,and the remaining 120,000 gallons will be held in reserve for fire suppression only. Reclaimed water will be pumped from the supernatant water pond at the TSF and detention basins to a reclaimed water tank located at the ore processing facility site.
- Alluvium in the EFSFSR and Meadow Creek valleys will be dewatered prior to and during mining activities to maintain stability of pit slopes and limit water infiltration to the Yellow Pine and Hangar Flats pits. Dewatering water will be sent to the ore processing facility as high-quality make-up water as needed. (Midas Gold 2016)
- **Water Treatment** – Three water types will require treatment over the life of the Project: 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). Enhanced evaporation will potentially be used to manage excess water accumulated in the TSF or collected from disturbance area surface water collection networks.
- **Firefighting Equipment and Support Facilities** – Water for firefighting needs will be maintained in the water tanks at the ore processing facility.
- **Security and Fencing** – Security gates will be installed at the main entrance to the Project near the Worker Housing Facility and near the existing bridge over Sugar Creek. A public turnaround area will be provided near the intersection of the Stibnite and Sugar Creek roads. Additionally, exclusion fencing (typically 6- to 8-foot-high chain-link fencing) will be installed around the perimeter of the ore processing facilities, the TSF, the explosive storage areas, and the as well as at the security gates.
- **Communications Facilities** – The existing communications system will be upgraded, and a series of VHF repeaters will be placed along the Burntlog Route near the existing Meadow Creek Lookout and Thunderbolt Lookout communication sites, the new Burntlog Road Maintenance Facility, and on private parcels and the mine site, as needed. A cell tower will also be installed near the proposed transmission line upslope of the Hangar Flats pit to facilitate area communications for safety and emergency communications.
- **Borrow Sources** – Borrow sources willbe developed to provide various types of material required for restoration, construction, maintenance, and closure-related projects. Materials will primarily be sourced on-site from native alluvial and glacial materials and will be obtained within the footprint of the TSF, TSF Buttress and Hangar Flats pit, outwash soils in the lower Blowout Creek alluvial fan, glacial soils in the Fiddle Creek valley walls, and within the footprint of the Fiddle GMS.

Additional details regarding Project components listed above, as well as mining procedures and techniques, are provided in Sections 8 through 13 of the PRO (Midas Gold 2016) and the ModPRO2 (Perpetua Resources 2021).

1.4.5 Off-site Activities, Facilities, and Infrastructure

Off-site infrastructure is necessary for exploration, mining, ore processing, and site closure, as well as to support the proposed compensatory mitigation for impacts to WOTUS, cleanup of legacy impacts, and site reclamation and restoration. Off-site infrastructure includes upgrades to existing roads, bridges, and services, as well as new off-site facilities required for the Project. Locations of proposed off-site facilities and infrastructure are depicted in **Figure 1-5**. Off-site Project activities and infrastructure will include:

- **Site Access** – Burntlog Road, Meadow Creek Lookout Road, and portions of the Thunder Mountain Road will be upgraded, improved, extended, and connected to construct a safe and reliable all-season access route to the Project site (i.e., the Burntlog Route). Construction borrow sites will be established along the Burntlog Route corridor in upland locations, where possible, as needed to meet construction and maintenance needs. Upon Project closure and reclamation, the upgraded portions of the Burntlog and Thunder Mountain Roads will be restored to approximately their present condition, while newly constructed sections of the Burntlog Route will be obliterated and reclaimed. Additional details regarding upgrades to the Burntlog, Meadow Creek Lookout and Thunder Mountain Roads are provided in Section 7.1 of the PRO (Midas Gold 2016).
- **Solar Power and Electric Grid Power Supply** – The existing solar power generation system will be expanded by installing solar panels on rooftops of selected on-site buildings, as well as on the off-site Burntlog Maintenance Facility. Most of the SGP's power supply will come from upgrades and improvements to the existing IPC electrical distribution system. Perpetua Resources will contract with IPC to upgrade the electric service to the Project site from the existing Lake Fork substation. This will include upgrading an existing 42-mile-long 69-kV electric transmission line and a 21.5-mile-long 12.5-kV electric transmission line to a 138-kV capacity; construction of 9 miles of overhead 138-kV line from the new Johnson Creek substation to the new Stibnite substation; upgrades to the switchgear at substations located at Oxbow Dam, Horseflat, McCall, Lake Fork, Cascade, and Warm Lake; and installation of approximately 3 miles of new underground distribution power along Johnson Creek Road from the Johnson Creek substation south to Wapati Meadows.
- **Stibnite Gold Logistics Facility (SGLF)** – The SGLF will house off-site administrative offices, a warehouse, parking and assembly areas for employees and contractors using buses or van pooling to the Project, and radio and microwave repeater equipment. The SGLF will be powered by a direct line connection to an IPC power line in the valley and a substation will potentially be constructed at the SGLF to transition power from the upgraded IPC power line.

  Burntlog Maintenance Facility – This facility will be located on National Forest System land 4.4 miles east of the intersection of Warm Lake and Johnson Creek roads and will be accessed via the Burntlog Route. The maintenance facility will be located within the footprint of a borrow source established for construction of the Burntlog Route. Facility structures will include a 7,500-square foot maintenance building; a 7,100-square foot aggregates storage building; a 4,300 square foot equipment shelter and an 825 square foot sleeping quarters. The maintenance building will house sanding/snowplowing trucks, snow blowers, road graders, and support equipment. Additional features of this facility may include covered stockpiles of coarse sand and gravel for winter sanding activities, and communications equipment.

  This facility will include a double-contained fuel storage area housing three 2,500-gallon fuel tanks for on-road diesel, off-road diesel, and unleaded gasoline. Additionally, a 1,000-gallon used oil tank will be located inside the maintenance facility and a 1,000-gallon propane tank will be located at the facility for heating. Stormwater runoff during construction of the facility will be managed under a general permit through IDEQ.

Section 2

Mitigation Strategy

Perpetua Resources developed the SGP, through multiple alternatives analysis and refinement, to avoid impacts to streams and wetlands to the extent possible, while still meeting the SGP's purpose and need. Perpetua Resources is committed to protecting and improving local surface water and groundwater quality and designing and constructing facilities in a manner that minimizes impacts to aquatic and terrestrial wildlife, improves habitat across the SGP, and protects anadromous and resident aquatic populations.

2.1 Avoidance and Minimization

Perpetua Resources considered and reviewed many alternatives for Project components as the PRO was developed, and project specific design features to minimize and reduce adverse impacts. Specifically, Appendix G of the PRO describes alternatives assessments for the Project mining method, tailings management, ore processing, on-site infrastructure, development rock management, EFSFSR water management, fish passage during operations, Blowout Creek water and sediment management, project road access, power supply, contractor and employee housing, and employee transportation. To align the Project design features with Perpetua Resources' core values, design principles were incorporated into the alternative assessments (Midas Gold 2016). One of the 11 primary design principles Perpetua Resources identified in Appendix G of the PRO was to minimize or avoid, where practicable, direct disturbance to environmentally sensitive resources, such as streams and wetlands, leaving a buffer where possible. The design principles were taken into consideration along with other design criteria to identify the Project components identified in the proposed Project (also listed above in Section 1.4).

After submittal of the PRO, Perpetua Resources continued to refine the Proposed Action and advance the SGP's engineering design to the Feasibility Study level via the ModPRO and the ModPRO2 as described in Section 1.4. This reduces the overall Project footprint, reduces associated wetland impacts, improves surface water and groundwater quality, reduces potential temperature impacts to surface water, reduces air emissions, improves fisheries and wildlife habitat, and improves reclamation and restoration design.

2.2 Compensatory Mitigation

The CWA, signed into law in 1972 and amended at various times since, prohibits the discharge of dredged or fill material into WOTUS, including wetlands and streams, unless authorized by a DA permit issued by the USACE under Section 404 of the Act. When an authorized activity results in unavoidable impacts (i.e., adverse effects) to WOTUS, compensatory mitigation measures that are practicable and capable of sufficiently compensating for aquatic resource functions lost resulting from the permitted activity will be required.

In 2008, the EPA and USACE issued a final rule for Compensatory Mitigation for Losses of Aquatic Resources, codified in 33 CFR Part 332 (the "Mitigation Rule"). These regulations establish standards and criteria for the use of appropriate and practicable compensatory mitigation (USACE and EPA 2008; 33 CFR 332). Per 33 CFR 332.2, compensatory mitigation means the restoration (re-establishment or rehabilitation), establishment, enhancement, and/or in certain circumstances

preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which are not offset by appropriate and practicable avoidance and minimization to those unavoidable impacts. Under 33 CFR 332.2, the terms restoration, establishment, enhancement, and preservation are defined as follows:

- **Restoration** - "the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historical functions to a former or degraded aquatic resource. For tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation."
  - "**Re-establishment** means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historical functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions."
  - "**Rehabilitation** means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historical functions to a degraded aquatic resource. Re-habilitation results in a gain in aquatic resource function but does not result in a gain in aquatic resource area."
- **Establishment (creation) – "**the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions."
- **Enhancement – "**the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function. Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area."
- **Preservation – "**the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions."

The Mitigation Rule recognizes three mechanisms for providing compensatory mitigation for unavoidable impacts to WOTUS. These mechanisms are mitigation banks, in-lieu fee programs, and permittee-responsible (PRM) compensatory mitigation. Both mitigation banks and in-lieu fee programs involve off-site compensation activities that are conducted by a mitigation bank or an in-lieu fee program sponsor. PRM is the most traditional form of compensation and continues to represent most of the compensation acreage provided each year (USACE and EPA 2008). As its name implies, the permittee retains responsibility for ensuring that required compensation activities are completed and that associated performance standards for the mitigation activities have been achieved.

Compensatory projects can be located at or adjacent to the impact site (i.e., on-site compensatory mitigation) or at another location generally within the same watershed as the impact site (i.e., off-site compensatory mitigation). SGP-related impacts are proposed in the North Fork Payette and South Fork Salmon watersheds and therefore will require compensatory mitigation in each watershed. Compensatory mitigation options are further described below.

Perpetua Resources proposes to accomplish compensatory mitigation for impacts to streams and wetlands associated with the proposed SGP through a combination of mitigation bank credits and off-site mitigation through fish passage improvement in the North Fork Payette subbasin (HUC 8;

Figure 1-6), permittee-responsible on-site mitigation within South Fork Salmon subbasin (HUC 8, **Figure 1-6**) and off-site mitigation in the Upper Lemhi River watershed within the Upper Salmon River subbasin. As further described in Section 4, mitigation for streams and wetland impacts will occur within the subbasin where the impacts will occur.

2.2.1 Mitigation Bank

A mitigation bank is a wetland, stream, or other aquatic resource area that has been restored, established, enhanced, or, in certain circumstances, preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under Section 404 or a similar state or local wetland regulation. A mitigation bank may be created when a government agency, corporation, nonprofit organization, or other entity undertakes these activities under a formal agreement with a regulatory agency. Upon approval from regulating agencies, permittees may acquire credits from a mitigation bank to compensate for their proposed impacts. USACE's preferred mitigation mechanism is a mitigation bank because the mitigation is already in place (USACE and EPA 2008).

The SGP-related stream and wetland impacts that fall within the South Fork Salmon subbasin (**Figure 1-6**) do not fall within the service areas of any approved and operational mitigation banks (Martinez 2017). In addition, it is unlikely any approved mitigation banks would be operational within service areas appropriate for this Project on a schedule that would allow for timely Project permitting.

Project-related wetland impacts within the North Fork Payette subbasin (**Figure 1-6**) will be mitigated in the Salmon Meadows Wetland Mitigation bank managed by The Wetlands Group in Star, Idaho. Section 7 identifies the method by which those impacts have been calculated. Section 9 identifies the coordination and timing associated with the Salmon Meadows Wetland Mitigation Bank credit acquisition.

2.2.2 In-Lieu Fee Mitigation

A permit applicant may make a payment to an in-lieu-fee program that would conduct wetland, stream, or other aquatic resource restoration, creation, enhancement, or preservation activities. In-lieu fee programs are generally administered by government agencies or non-profit organizations that have established an agreement with regulatory agencies, such as the USACE and EPA, to use in-lieu fee payments collected from permit applicants. In-lieu fee mitigation is USACE's second most preferred mechanism for compensatory mitigation because it may involve larger, more ecologically valuable compensatory mitigation projects compared to PRM, which is described in the following section.

At this time, Perpetua Resources has not identified any current opportunities for potential in-lieu fee mitigation projects with a non-profit organization or government organization that would conduct mitigation off-site. However, Perpetua Resources continues to look for opportunities to use this type of compensatory mitigation.

2.2.3 Permittee-Responsible Mitigation

A permittee may be required to provide compensatory mitigation through an aquatic resource restoration, establishment, enhancement, and/or preservation activity. This compensatory mitigation may be provided at or adjacent to the impact site (i.e., on-site mitigation) or at another location, usually within the same watershed as the permitted impact (i.e., off-site mitigation). The permittee retains responsibility for implementation, ensuring that performance standards are met and that the site is managed after performance standards are achieved to ensure the long-term sustainability of the mitigation project (USACE and EPA 2008).

Currently, there are no mitigation banks or in-lieu fee programs available for Perpetua Resources to offset unavoidable impacts to natural resources in the South Fork Salmon River subbasin. Therefore, PRM will be the primary mechanism for which compensatory mitigation will be accomplished for this Project. Compensatory mitigation will focus on private lands owned by Perpetua Resources, on properties for which Perpetua Resources has an easement or where there is a potential to negotiate with a public entity. If additional land is needed to fulfill the compensatory PRM requirements, additional private land and/or public lands will be considered.

Perpetua Resources has identified permittee-responsible on-site and off-site mitigation for most of the compensatory mitigation for streams and wetlands associated with the proposed SGP. As further described in Section 4, off-site mitigation for stream and wetland impacts would occur within the subbasin where the impacts occur. Off-site mitigation in the Upper Salmon River subbasin will occur at the Lemhi Regional Land Trust's (LRLT) Little Springs Conservation Easement and Restoration Project on the Lemhi River. Off-site mitigation in the Payette River subbasin to offset temporal stream losses will occur on the Boise National Forest through the Big Creek Culvert Replacement Project (BCCRP). The BCCRP includes the replacement of three culverts identified as partial or complete fish passage barriers with upstream habitat potential. The culvert replacement projects will occur in Hargrave Creek (one culvert, second order stream), and Big Creek (two culverts, second order stream), and will improve aquatic organism access to upstream habitat.

Section 3

Goals and Objectives

The fundamental goal of compensatory mitigation is to compensate for functional losses caused by a project's authorized and unavoidable impacts to streams and wetlands. Perpetua Resources has developed this CMP and the actions outlined in the SGMP and supporting documents to ensure that the compensatory mitigation requirements will be satisfied and that aquatic resource functions lost because of the SGP will be compensated for consistent with 33 CFR Part 332. Perpetua Resources proposes to mitigate for unavoidable stream and wetland impacts associated with the SGP by restoring and establishing stream segments and wetlands before, during, and after mining, as part of site cleanup, mine construction, operations, and closure. The goal is to accomplish mitigation by enhancing and restoring resources in areas adjacent to where impacts would occur, and to minimize temporal loss by restoring streams and wetlands as soon as practical. As indicated by the appropriate and practicable provision, steps that would be unreasonably costly or would be not practicable or which would accomplish only inconsequential reductions in impact need not be taken (USACE and EPA 2008). All proposed on-site, in-kind stream and wetland mitigation will occur on Perpetua Resources' patented claims and USFS-managed lands, as described in later sections of this document. The selected off-site mitigation project is within the Upper Lemhi River watershed within the Upper Salmon River subbasin. The timing and sequence of impacts and mitigation are described in Section 8.

In accordance with 33 CFR 332.4(c)(2), Sections 3.1 and 3.2 summarize Perpetua Resources' proposed mitigation in terms of (1) the resource types and amounts that would be provided, (2) the method(s) of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and (3) the way the resource functions of the mitigation project(s) would address the needs of geographic region of interest (e.g., watershed).

For the remainder of the document, discussions as they relate to streams are presented first, followed by similar discussions as they relate to wetlands.

3.1 Compensatory Mitigation for Streams

Compensatory mitigation for unavoidable impacts to streams will be completed in several ways at the Project site (Rio ASE 2023). Stream reaches that have been completely lost, moved, or eliminated would be re-established during mining operations and/or post-operation and closure. Some streams with impaired functions will be rehabilitated and other streams will have habitat features that are enhanced; however, the majority of the stream restoration will involve temporary relocation during mining and re-establishment near their historical locations. For ease of discussion in this document, collectively the activities of temporary relocation, re-establishment, rehabilitation, and enhancement will hereafter be referred to as "restoration."

The goals of proposed compensatory stream mitigation are to:

- Provide the required compensation for unavoidable impacts to streams resulting from the SGP and to offset the SGP's authorized impacts.
- Restore stream functions within the Project Area.

- Provide additional off-site mitigation for streams in the same subbasin in which the impacts occur.

Objectives for proposed compensatory stream mitigation include:

- Restore functions to streams and floodplains that have been, or would be, disturbed by past mining activities or proposed mining activities and improve habitat conditions for aquatic species.
- Remove the existing fish passage barrier at Yellow Pine pit, restore permanent and volitional passage in the EFSFSR, and make lower Meadow Creek accessible to fluvial and anadromous fish for the first time since the 1930s.
- Allow for fish passage to restored stream channels, where possible, by incorporating appropriate design features.
- Improve physical channel processes and aquatic habitat within restored stream channels by selectively adding large woody debris (LWD) and rock structures, eliminating fish passage barriers, creating scour pools, enabling improved sediment sorting, and generally increasing hydraulic and habitat diversity.
- Provide spawning and rearing habitat for anadromous and resident fish populations, including three ESA-listed salmonid species: bull trout (*Salvelinus confluentus*), Chinook salmon (*Oncorhynchus tshawytscha*), and steelhead (*O. mykiss*).
- Plant riparian vegetation to improve long-term bank stability and increase woody debris recruitment, overhead cover, shade, and terrestrial wildlife habitat.

3.2 Compensatory Mitigation for Wetlands

Compensatory mitigation for unavoidable impacts to wetlands will be accomplished through establishment of new wetlands, re-establishment of historical wetlands, and enhancement of existing wetlands. Wetland establishment will occur at areas that were not historically wetlands. This includes areas where a stream is rerouted or where the shallow groundwater and surface hydrology would support wetland establishment. Wetland re-establishment will occur where low functioning wetlands can be returned to historical conditions, thus re-establishing their function. Wetland enhancement may occur where activities can increase the functions of a wetland beyond existing conditions. This may include increasing the functions for certain wildlife species, or planting vegetation, such as hydrophytic shrubs, that increases a wetland's functional value.

The goals of proposed compensatory wetland mitigation are to:

- Compensate for unavoidable impacts to wetlands resulting from the SGP's authorized impacts.
- Restore wetland functions within the Project Area.
- Provide additional off-site mitigation for wetlands in the same subbasin in which the impacts occur.

Objectives for wetlands mitigation include:

- Restore functions to wetland areas that are disturbed from legacy and proposed mining activities and restore and establish on-site wetlands after completion of mining.
- To the extent possible, restore PEM, PSS, and PFO wetland habitats in similar ratios to baseline conditions.
- Restore hydrologic conditions that will support wetland vegetation and overall function.

- Restore wetland plant communities comparable to existing wetlands and/or reference site wetlands that would be sustainable over the long term with minimal human intervention.
- Restore and increase wetland functions and values within the Project Area.

Section 4

Site Selection

This section describes the factors that Perpetua Resources considered during the mitigation site selection process in accordance with 33 CFR 332.4(c)(3), which includes watershed needs and on-site alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, and/or preservation at the compensatory mitigation site. In accordance with 33 CFR 332.3(b), Perpetua Resources' selection of a mitigation site also considered mitigation type and location options, including mitigation bank credits, in-lieu fee program credits, and PRM under a watershed approach. As described in the Compensatory Mitigation Section (Section 2.2), mitigation bank and in-lieu credits are not currently available for impacts in the South Fork Salmon River subbasin, so PRM under a watershed approach at the Project site was selected as the preferred method in that subbasin. Mitigation bank credits are available in the North Fork Payette subbasin, so mitigation bank credits have been selected as the preferred method in that subbasin.

Mitigation for streams and wetland impacts will occur within the subbasin where the impacts occur. Most of the mitigation for streams and wetland impacts will occur within and near the Project site, where it will most successfully replace lost functions, values, and services. Stream restoration will occur as closely as possible to the original location, with wetlands being restored in close proximity, taking advantage of the hydrology of the streams. The SGP site is within the South Fork Salmon River subbasin and Upper EFSFSR watershed (**Figure 1-6**). Geographically, this area covers several hundred thousand acres and numerous drainages of varying size. Hereafter, the area where the on-site mitigation would occur within and near the Project site is called the Stibnite Gold Mitigation Area (Mitigation Area).

4.1 Site Selection Criteria for Streams

Site selection criteria for the proposed stream restoration reaches include the following:

- Stream restoration occurs within the subbasin where impacts occur to the extent feasible.
- Watershed-scale features such as aquatic habitat diversity, habitat connectivity, and relationships to hydrologic sources (including water rights), land use trends, ecological benefits, and compatibility with adjacent land uses are considered.
- An opportunity exists to improve fish passage and/or habitat within the Project site.
- Restored streams are sustainable without human intervention within 5 years following construction and implementation of long-term management measures.

4.2 Site Selection Criteria for Wetlands

Site selection criteria for the proposed wetland restoration areas include the following:

- Wetland restoration occurs within the subbasin where impacts occur to the extent feasible.
- Locations are considered where hydrology is suitable to sustain wetlands.

- Watershed-scale features such as aquatic habitat diversity, habitat connectivity, and relationships to hydrologic sources, land use trends, ecological benefits, and compatibility with adjacent land uses are considered.
- Restored wetlands are sustainable without human intervention within 5 years following construction and implementation of long-term management measures.

Section 5

Site Protection Instruments

The Mitigation Rule, 33 CFR 332.4 (c)(4), requires that a compensatory mitigation plan include a description of the legal arrangements and instruments, including site ownership, that will be used to ensure the long-term protection of the Mitigation Area. Per 33 CFR 332.7(a), long-term site protection must also, to the extent appropriate and practicable, prohibit incompatible uses that might otherwise jeopardize the objectives of the compensatory mitigation.

Long-term protection may be provided through real estate instruments such as conservation easements; deed restrictions (restrictive covenants); transfer of title to federal, tribal, state, or local resource agencies, non-profit conservation organizations, or private land managers; or multi-party agreements (USACE 2016b). Compensatory mitigation possible on federal lands differ in the sponsor of the mitigation, who holds the liability, how the mitigation project is funded, and include PRM/land-user responsible compensatory mitigation, mitigation banks, and in lieu fee mitigation/mitigation fund (Duke 2020). Federal agencies, including the USFS, are typically precluded by law from recording easements or restrictive covenants on their lands. On USFS-managed lands, long-term protection may be provided through Conservation Land Use Agreements, Forest Management Plans, or Memoranda of Understanding (USACE 2016b).

Under 33 CFR 332.3(c)(1), current rules for wetlands and streams, all program types must use a watershed approach for compensation. Land ownership within the Mitigation Area includes both private land (patented mining claims) and unpatented mining claims located on public National Forest System land administered by the USFS. It should be noted that, in the past, regulatory actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), and state law have been taken by the EPA, USFS, IDEQ, and IDL against historical mining operators. All of these regulatory activities and related clean-up programs predate any ownership or activity by Perpetua Resources. Several of the patented lode and mill site claims acquired by subsidiaries of Perpetua Resources are subject to consent decrees, which cover certain environmental liability and remediation responsibilities with respect to such claims. The consent decrees provide the regulatory agencies (that were party to the agreements) access and the right to conduct remediation activities under their respective CERCLA and RCRA authorities as necessary and to prevent the release or potential release of hazardous substances. The consent decrees also require and place certain obligations on Perpetua Resources. Any restrictive covenants, deed restrictions, or transfers of title associated with the CMP would not supersede these obligations, which could include the need to access areas covered under the CMP to establish, maintain, repair, or monitor engineering controls, water management features, or other facilities related to past or any potential future CERCLA response actions to address releases or potential releases of hazardous substances.

As stated in 33 CFR 332.2 (a)(3), “credits for compensatory mitigation projects on public land must be based solely on aquatic resource functions provided by the compensatory mitigation project, over and above those provided by public programs already planned or in place.” There are no other mitigation or enhancement projects currently planned for public lands within the Mitigation Area. Perpetua Resources anticipates that the private lands upon which compensatory mitigation will be conducted (i.e., the Mitigation Area) will be protected in perpetuity through either a conservation easement or deed restrictions (i.e., adding a restrictive covenant to the deed that prohibits or limits

certain uses of the Mitigation Area) or a similar instrument, or transferring the title to a natural resource management or other governmental agency, land trust, land management entity, or another non-profit entity deemed acceptable to the USACE. These protective covenants and/or restrictions will be enacted upon completion of any authorized exploration, mining, reclamation, and restoration activities. During authorized activities, the operator may require access to areas designated for mitigation under the CMP for implementation of adaptive management practices to deal with unforeseen circumstances. Any protective covenants and/or restrictions will not impair the operator's ability to implement such adaptive management practices to ensure the integrity of mitigation areas or maintain overall site compliance with applicable environmental laws and regulations. An example conservation easement agreement from the USACE's website is provided in **Appendix A.**

Public lands within the Mitigation Area will be protected through either a Conservation Land Use Agreement, which is an agreement that would allow compatible uses but would restrict other uses that are incompatible with compensatory mitigation; or through inclusion of the Mitigation Area in the PNF LRMP (USFS 2003/2010). The LRMP would identify the extent of the Mitigation Area on USFS-managed land and will identify suitable and incompatible management activities within the Mitigation Area. Perpetua Resources or its designated contractor(s) will perform long-term maintenance of the Mitigation Area as necessary (Section 12) in perpetuity once the final performance standards are met, or until such responsibility is relinquished to an appropriate third party (e.g., USFS).

The selected off-site mitigation option to fully offset all predicted temporal loss of stream function in the Upper Salmon River subbasin includes side channel and floodplain reconnection entirely on private land in the Upper Lemhi River watershed. The Lemhi Regional Land Trust is negotiating a perpetual conservation easement for the property to ensure the restoration benefits and associated mitigation credits persist for at least the length of predicted temporal loss for the SGP (see Appendix A).

Compensatory mitigation areas that fall within the patented mine claims controlled by Perpetua Resources are intended to be placed under conservation easement and held by the Idaho Foundation of Parks and Lands (See Appendix A).

Section 6

Baseline Information

The Mitigation Rule, 33 CFR 332(c)(5), requires that a compensatory mitigation plan contain a description of baseline information. Baseline information on wetlands and streams has been reported in the Wetland Resource Baseline Study and its addenda (HDR 2013, 2014a, 2014b, 2015, 2016a, 2017a; Great Ecology 2017; Tetra Tech 2018, Tetra Tech 2021c). Wetland and upland habitats have been described in the DEIS and SDEIS. The vegetation in the Project Area is generally upland forest with riparian and wetland plant communities interspersed throughout. The most common plant communities are mixed forest, grassland, lodgepole pine (*Pinus contorta*), and Douglas-fir (*Pseudotsuga menziesii*). Subalpine fir (*Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*) forest communities are found at higher elevations.

Much of the forest in the Project Area, including approximately 76 percent of Perpetua Resources' mineral claims, was burned in a series of fires from 2000 through 2007 and is in varying stages of post-fire recovery. Burned areas have experienced accelerated erosion and have contributed sediment to Project Area streams and wetlands.

6.1 Project Area

The Project Area is characterized by cool, dry summers and cold, wet winters. Much of the annual precipitation occurs as snowfall during the winter months. Runoff typically peaks in late spring (May-June) (MWH 2017). Most of the streams are perennial and support some riparian and/or wetland vegetation along the streambanks (HDR 2016b). Three federally listed, threatened fish species occur in the Project Area: bull trout, Chinook salmon, and steelhead (MWH 2017).

Over the course of many years of historical mining, streams in the Project Area have been impacted by the placement of tailings and other mine-related fill in floodplains and adjacent to streambanks, the diversion of streams away from mining activities, siting of mining towns and ore processing facilities adjacent to stream channels, and erosion resulting from disturbed areas associated with mining and fire damage. In addition, the failure of a water dam on Blowout Creek in 1965 caused extensive erosion of that stream, both upstream and downstream of the former dam, and extensive and ongoing deposition of sediment in Meadow Creek and transport of sediment into the EFSFSR. Furthermore, stream water quality (HDR 2017c) is affected by the presence of legacy tailings, spent leach ore, and native mineralized materials in contact with surface water and groundwater.

As described in Section 1.2, there are approximately 181 acres within the permanent Project disturbance boundary where investigations of streams and wetlands (i.e., delineations) are still required. These data gaps exist on small private parcels without access. The data gaps result largely from the inability of field crews to access some areas due to lack of access on private land. Perpetua Resources plans to acquire access to these parcels and at that time will conduct stream and wetland delineations and provide relevant information to the USACE, if relevant.

6.1.1 Stream Delineation

Stream ordinary high water mark (OHWM) delineations were conducted concurrently with the wetland delineations by HDR from 2011 to 2016 (HDR 2013, 2014a, 2014b, 2015, 2016a, 2017a) and other areas were assessed in 2018 and 2019 (Tetra Tech 2021c) or will be assessed in the

future. The study area for these delineations included major drainages and the hillsides between them for the Project site, primary access road alternatives, the power line corridor, and the proposed logistics center. **Table 6-1** summarizes the various baseline studies associated with stream OHWM and wetland delineations included in this document, including the year conducted and areas assessed.

Table 6-1. Baseline Study Reports of Streams and Wetlands Assessed

Report Title	Study Area Summary	Field Work Year	Reference
Wetland Resources Baseline Study	Project site	2011 and 2012	HDR 2013
Wetland Resources Baseline Study Addendum #1	Off-site facilities and infrastructure including proposed access road alternatives and existing access roads	2013	HDR 2014a
Wetland Resources Baseline Study Addendum #2	Off-site facilities and infrastructure including proposed power line corridor and access road (Burntlog Route). Additional areas at the Project site	2014	HDR 2014b
Wetland Resources Baseline Study Addendum #3	Off-site facilities and infrastructure including proposed power line corridor across private land. Complete delineations were not conducted due to access limitations	2015	HDR 2015
Wetland Resources Baseline Study Addendum #4	Off-site facilities and infrastructure including Burntlog Route access road revisions, utility task vehicle access trail, and Landmark road maintenance facility. Project site updates including Meadow Creek growth media stockpile areas, and West End Development Rock Storage Facility (DRSF)	2016	HDR 2016a
Summary of Project Wetland Resource Baseline Studies 2011-2016	Summary of all wetland baseline studies from 2011 to 2016	2011 to 2016	HDR 2017d
Wetland Resources Baseline Study for Logistics Center Site	Off-site logistics center along Warm Lake Road	2016 and 2017	HDR 2017a
Wetland Resources Baseline Study Addendum #5	Data gaps in the mine area near Fiddle Creek and Meadow Creek, Option 8a, and Burntlog Route, and along the transmission line from Stibnite to the transmission terminus near Lake Fork	2018 and 2019	Tetra Tech 2021c

6.1.2 Baseline Stream Functional Assessment

To comply with Section 404 of the CWA and obtain a permit from the USACE, Perpetua Resources will demonstrate that its CMP ensures adequate and suitable mitigation for the SGP's unavoidable impacts on aquatic resources (streams and wetlands). Any mitigation projects initiated to satisfy the compensatory mitigation requirements of Section 404 will be designed to replace aquatic resource functions lost because of the permitted activity (33 CFR §332.3(a); 40 CFR §230.93). As such, these regulations require a method of quantifying both the "aquatic resource functions" (functional values) that will be lost because of unavoidable impacts from the SGP, as well as the functional value of the restoration and enhancement efforts that will be completed to offset these impacts. The 2008 Mitigation Rule requires any aquatic resource functions lost because of a regulated activity be compensated by suitable mitigation (USACE and EPA 2008). However, the Regulatory Division of the USACE Walla Walla District currently has no accepted protocol for quantifying stream function for Idaho. Without a tool for quantifying stream function in Idaho, USACE Walla Walla District has historically relied on methods of evaluating mitigation options that depend on stream length, ratios, or other assessments that do not clearly consider the functional value of impacts or associated mitigation.

To address this issue, HDR developed an initial stream functional assessment (SFA) in 2016 to characterize existing (baseline) ecological function of pre-mining conditions at the Project site (HDR 2016c). Great Ecology refined the initial SFA to meet USACE regulatory requirements, to be used to facilitate EIS impact analyses, and to be consistent with the intent of the 2008 Mitigation Rule.

The USFS suggested Perpetua Resources consider using the Watershed Condition Indicators Matrix (WCI Matrix) (USFS 2003/2010) to develop a SGP-specific SFA. The WCI Matrix evaluates stream function by measuring elements that reflect water quality, habitat access, channel conditions and dynamics, flow and hydrology, and watershed conditions. Furthermore, the WCI Matrix comprises a series of "pathways" by which mining activities or restoration can have potential effects on native and desired non-native fish species, their habitats, and the associated ecological function. Finally, the WCI Matrix was developed specifically to assist in project design and analysis during NEPA assessments of proposed projects (USFS 2003/2010), for application in the PNF. Rio ASE has further refined the SFA to include the WCI Matrix elements, improve functionality, and evaluate proposed conditions over time relative to baseline conditions (Rio ASE 2023).

The SFA is a reach-scale assessment tool used to rate stream function by evaluating up to 20 discrete elements. Each element represents a different physical, chemical, or biological condition collectively used as a surrogate for evaluating stream function. The SFA merges a matrix of diagnostics, pathways, and indicators (USFS 2003/2010) with functional objectives for stream restoration. This approach was informed by USACE, EPA, and USFWS via the Function-Based Framework for Stream Assessment and Restoration Projects (Harman, et al. 2012) and Stream Functions Pyramid Framework (Harman and Jones 2016). The outcome is an assessment approach that has been adapted for use for the SGP, modified to be applied primarily at the scale of a stream reach, and that permits quantitative comparison of existing and future (impacted, restored, or enhanced) habitat functional character.

The initial SFA (HDR 2016c) was revised to establish a framework for quantifying both stream impacts (debits) and restoration (credits) over time, and for determining the appropriate amount and type of mitigation, based on the suite of stream functions at the Project site (HDR 2016c). The SFA uses a modified version of the WCI Matrix (USFS 2003/2010) along with several fish use indicators to evaluate stream condition by evaluating a broad range of elements that reflect specific indicators related to water quality, habitat access, channel conditions and dynamics, flow and hydrology, watershed conditions, and fish use. **Table 6-2** summarizes the SFA indicators and associated elements (Rio ASE 2023). Refugia, disturbance regimes, integration of species and habitat, and fish population data were not included in the SFA because they are not readily measurable, not readily predictable, and/or because the element(s) may be impacted by conditions not directly attributable to the SGP. The SFA was not intended to evaluate conditions significantly influenced by drivers occurring beyond the scale of the SGP.

Table 6-2. Summary of Stream Functional Assessment Indicators and Associated Elements

Indicator	Water Quality			Habitat Access	Habitat Elements					Channel Conditions and Dynamics			Flow and Hydrology		Watershed Conditions			Fish Use		
						LWD														
Element	Temperature	Fine Sediment	Chemical Contaminants	Physical Barriers Located Downstream	Substrate Embeddedness	Large Woody Debris Frequency	Recruitment Potential	Pool Frequency	Pool Quality	Off-Channel Habitat with Cover	Width/Depth Ratio	Streambank Condition	Floodplain Connectivity	Change in Peak/Base Flows	Change in Drainage Network	Road Density and Location	Riparian Conservation Areas	Disturbance History	Occupancy Potential	Critical Habitat	Presence / Absence

SFA baseline data were collected from sites established with feedback from the USFS, in locations considered appropriate for the conditions measured and/or representative of larger reaches and/or sub-reaches. It is understood that representative samples do not produce exact measurements at a spatially continuous scale and may therefore result in rounding/averaging errors when compared with data from sites other than those measured.

Field data were collected (HDR 2016c) from assessed streams and ratings were assigned based on whether elements were "functioning appropriately" (FA), "functioning at risk" (FR), or "functioning at unacceptable risk" (UR), based on scoring criteria identified from Appendix B of the PNF LRMP (USFS 2003/2010). This nomenclature implies a relative evaluation based on undefined "appropriate" conditions and "risk." To overcome potential confusion and to establish standard/absolute evaluation criteria, Rio ASE (2023) updated the nomenclature to High, Moderate, and Low Function, respectively. Several criteria were modified through a collaborative process engaging the USFS and key stakeholders to develop standard/absolute evaluation criteria and to better fit the scope and scale of the SGP (Rio ASE 2023). Great Ecology completed supplemental data collection for streams not represented in the original data collection (Great Ecology 2017). Wherever possible, supplemental data collection methods largely followed those used for collecting the original data. Rio ASE collected spatially continuous field data for LWD, pools, and off-channel habitat for lower Meadow Creek and the EFSFSR from Meadow Creek to Sugar Creek (Rio ASE 2019). A numeric score was assigned for each measured element by interpreting the processed data relative to the scoring criteria summarized in the SFA Report (Rio ASE 2023).

A specific accounting of conditions evaluated for the SGP has been developed using a Microsoft Excel spreadsheet ledger (SFA Ledger) (Rio ASE 2023). The SFA Ledger evaluates and compares measured or calculated baseline conditions with proposed future conditions in which debits (impacts) and credits (mitigation) are quantified over time.

For the purposes of the SFA, qualitative values normally applied to elements have been assigned numerical scores for use in the SFA Ledger as follows:

- High Function = 3
- Moderate Function = 2
- Low Function = 1

These scores have been applied to SFA elements for the four phases of the Project.

- Baseline (existing),
- Interim (during mining),
- Restored (immediately following restoration), and
- Fully Restored (following the reestablishment of mature vegetation where applicable)

The SFA Ledger functions by creating a normalized, weighted average of the available element scores per reach (Functional Index) multiplied by reach length (linear feet) and size (stream order) to develop a Functional Unit score (Rio ASE 2023). A number of filters or weighting factors are then applied to the Functional Unit score. The functional unit is the mitigation currency proposed for the SGP such that subtracting the functional units calculated for the baseline phase from the functional units calculated for any of the three proposed phases yields either a debit (negative difference) or credit (positive difference) for that phase of the project. In this way, proposed mitigation efforts can be evaluated across the life of the proposed project.

Both the Functional Index and Functional Unit can be evaluated individually (per reach) or grouped (multiple reaches) as desired by the user of the SFA Ledger to evaluate larger sections of channel, an entire stream, or the entire project area. The Functional Index represents the relative functional character of the stream reach regardless of its size (i.e., quality). The product of the stream order and the stream length represents the relative size of the stream (i.e., quantity) applied to the Functional Index to generate the Functional Unit "score" and is akin to a weighted usable area in aquatic habitat analyses. In this way both quality and quantity are accounted for in the SFA across multiple spatial and temporal timescales.

Reporting from the Stream Design Report (Rio ASE 2021a) and SFA ledger (Rio ASE 2023) combines ephemeral and intermittent streams into one category: non-perennial. **Tables 6-3a** and **6-3b** summarize the baseline functional assessment results by subbasin.

Table 6-3a. Baseline Stream Functional Assessment Results in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Stream Order	Stream Length (ft)	Functional Index	Functional Units[a]
Blowout Creek	BC0.01	Blowout Creek (East Fork Meadow Creek)	Perennial	1	566	0.73	821
	BC0.02	Blowout Creek (East Fork Meadow Creek)	Perennial	1	2,438	0.73	3,536
	BC0.02	Blowout Creek (East Fork Meadow Creek)	Non-Perennial	0	1,217	0.69	844
	BC0.1	Blowout Creek (East Fork Meadow Creek)	Perennial	1	3,267	0.71	4,643
	BC0.2	Blowout Creek (East Fork Meadow Creek)	Non-Perennial	0	1,529	0.69	1,060
	BC1	Blowout Creek (East Fork Meadow Creek)	Perennial	1	2,097	0.57	2,371
	BC2	Blowout Creek (East Fork Meadow Creek)	Perennial	1	1,576	0.54	1,707
	BC2	Blowout Creek (East Fork Meadow Creek)	Non-Perennial	0	-	-	-
	BC2.1	Blowout Creek (East Fork Meadow Creek)	Perennial	1	1,909	0.65	2,467
	BC3	Blowout Creek (East Fork Meadow Creek)	Perennial	1	642	0.63	807
	BC4	Blowout Creek (East Fork Meadow Creek)	Perennial	1	281	0.63	353
	BR1	Blowout Road	Non-Perennial	0	1,705	0.69	1,182

Table 6-3a. Baseline Stream Functional Assessment Results in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Stream Order	Stream Length (ft)	Functional Index	Functional Units[a]
East Fork South Fork Salmon River (EFSFSR)	BL1.1	Burnt Log Road	Non-Perennial	0	149	0.69	103
	BL1.2	Burnt Log Road	Perennial	2	61	0.68	125
	BL2	Burnt Log Road	Non-Perennial	0	626	0.69	434
	BL2.1	Burnt Log Road	Perennial	3	105	0.64	268
	BL2.2	Burnt Log Road	Perennial	1	85	0.66	112
	BL2.3	Burnt Log Road	Perennial	1	89	0.61	109
	EF0.01	EFSFSR	Perennial	1	1,307	0.68	1,786
	EF0.02	EFSFSR	Perennial	1	6,750	0.68	9,225
	EF0.03	EFSFSR	Perennial	1	1,392	0.68	1,902
	EF0.04	EFSFSR	Perennial	2	2,836	0.68	5,814
	EF0.05	EFSFSR	Perennial	1	5,676	0.68	7,758
	EF0.06	EFSFSR	Perennial	2	2,163	0.68	4,435
	EF0.07	EFSFSR	Perennial	3	3,498	0.76	10,612
	EF0.08	EFSFSR	Perennial	1	2,494	0.70	3,512
	EF0.09	EFSFSR	Perennial	1	5,186	0.70	7,303
	EF0.10	EFSFSR	Perennial	2	3,760	0.70	7,944
	EF0.11	EFSFSR	Perennial	2	4,167	0.77	9,610
	EF0.11	EFSFSR	Non-perennial	0	155	0.69	107
	EF0.12	EFSFSR	Perennial	3	3,458	0.76	10,491
	EF0.12	EFSFSR	Non-perennial	0	610	0.69	423
	EF0.13	EFSFSR	Non-perennial	0	1,892	0.69	1,312
	EF0.14	EFSFSR	Perennial	3	689	0.76	2,091
	EF0.15	EFSFSR	Perennial	3	945	0.76	2,867
	EF0.15	EFSFSR	Non-perennial	0	2,024	0.69	1,402
	EF0.16	EFSFSR	Perennial	1	2,059	0.68	2,814
	EF0.17	EFSFSR	Perennial	3	3,384	0.80	10,829
	EF0.17	EFSFSR	Non-perennial	0	2,068	0.69	1,433
	EF0.18	EFSFSR	Perennial	3	1,085	0.73	3,146
	EF0.19	EFSFSR	Perennial	1	1,400	0.70	1,972
	EF0.20	EFSFSR	Perennial	1	2,339	0.68	3,196
	EF0.21	EFSFSR	Perennial	1	684	0.68	935
	EF0.23	EFSFSR	Perennial	1	2,618	0.68	3,579
	EF1	EFSFSR	Perennial	3	1,918	0.80	6,137
	EF1	EFSFSR	Non-Perennial	0	1,118	0.69	775
	EF2	EFSFSR	Non-Perennial	0	5,027	0.69	3,484
	EF2.1	EFSFSR	Perennial	4	2,175	0.68	7,389
	EF2.2	EFSFSR	Perennial	4	5,869	0.70	20,427
	EF2.3	EFSFSR	Perennial	4	127	0.68	431
	EF2.4	EFSFSR	Perennial	4	447	0.74	1,652
	EF2.5	EFSFSR	Perennial	4	943	0.70	3,281
	EF3	EFSFSR	Non-Perennial	0	493	0.69	342
	EF3.1	EFSFSR	Perennial	4	414	0.68	1,402
	EF3.2	EFSFSR	Perennial	4	514	0.65	1,676
	EF3.3	EFSFSR	Perennial	4	1,394	0.72	5,043
	EF3.4	EFSFSR	Perennial	4	181	0.72	649

Table 6-3a. Baseline Stream Functional Assessment Results in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Stream Order	Stream Length (ft)	Functional Index	Functional Units[a]
	EF4.1	EFSFSR	Perennial	4	520	0.70	1,814
	EF4.2	EFSFSR	Perennial	4	517	0.75	1,931
	EF4.3	EFSFSR	Perennial	4	1,226	0.75	4,574
	PA1	Public Access Route	Non-Perennial	0	143	0.69	99
	ST1	Stibnite Road	Perennial	2.6	74	0.69	185
	ST1	Stibnite Road	Non-Perennial	0	464	0.69	322
	YP1	Yellow Pine Pit	Perennial	4	800	0.58	2,325
Fiddle Creek	FC0.1	Fiddle Creek	Perennial	1	2,245	0.70	3,162
	FC0.2	Fiddle Creek	Perennial	2	3,475	0.70	7,342
	FC0.3	Fiddle Creek	Perennial	2	1,376	0.69	2,841
	FC1	Fiddle Creek	Perennial	2	4,940	0.69	10,197
	FC1	Fiddle Creek	Non-Perennial	0	589	0.69	408
	FC2	Fiddle Creek	Perennial	2	1,691	0.68	3,473
	FC3	Fiddle Creek	Perennial	2	386	0.68	793
Garnet Creek	GC0	Garnet Creek	Non-perennial	0	-	-	-
	GC0.1	Garnet Creek	Perennial	1	1,100	0.69	1,515
	GC0.2	Garnet Creek	Perennial	1	903	0.68	1,229
	GC0.3	Garnet Creek	Perennial	1	191	0.65	249
	GC1	Garnet Creek	Perennial	1	1,428	0.68	1,943
	GC1	Garnet Creek	Non-perennial	0	-	-	-
	GC2	Garnet Creek	Perennial	1	-	-	-
Hennessy Creek	HC0.01	Hennessy Creek	Perennial	1	3,840	0.70	5,345
	HC0.2	Hennessy Creek	Perennial	1	691	0.70	962
	HC1.1	Hennessy Creek	Perennial	1	226	0.70	315
	HC1.2	Hennessy Creek	Perennial	1	1,924	0.52	2,013
	HC1.3	Hennessy Creek	Perennial	1	1,515	0.52	1,585
	HC1.3	Hennessy Creek	Non-perennial	0	475	0.69	330
	HC1.4	Hennessy Creek	Perennial	1	244	0.69	339
Johnson Creek	BL3	Burnt Log Road	Perennial	1	124	0.69	172
	BL3	Burnt Log Road	Non-Perennial	0	35	0.69	25
	BL4	Burnt Log Road	Perennial	1.05	1,150	0.69	1,634
	BL5	Burnt Log Road	Perennial	1.3	1,235	0.69	1,969
	BL5	Burnt Log Road	Non-Perennial	0	8,456	0.69	5,860
	JC1	Johnson Creek Road	Perennial	2.4	146	0.69	343
	JC1	Johnson Creek Road	Non-Perennial	0	1,804	0.69	1,250
Meadow Creek	HF1	Hangar Flats	Non-Perennial	0	-	-	-
	MC0.01	Meadow Creek	Perennial	1	2,306	0.71	3,276
	MC0.02	Meadow Creek	Perennial	1	2,247	0.71	3,193
	MC0.02	Meadow Creek	Non-perennial	0	692	0.69	480
	MC0.03	Meadow Creek	Perennial	1	2,246	0.73	3,257
	MC0.04	Meadow Creek	Perennial	1	928	0.75	1,385
	MC0.05	Meadow Creek	Perennial	1	1,787	0.75	2,665
	MC0.06	Meadow Creek	Perennial	2	1,969	0.75	4,405
	MC0.7	Meadow Creek	Perennial	1	210	0.68	285
	MC0.8	Meadow Creek	Perennial	2	545	0.69	1,135

Table 6-3a. Baseline Stream Functional Assessment Results in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Stream Order	Stream Length (ft)	Functional Index	Functional Units[a]
	MC0.9	Meadow Creek	Perennial	1	35	0.67	47
	MC1.1	Meadow Creek	Perennial	1	5,049	0.67	6,746
	MC1.1	Meadow Creek	Non-Perennial	0	1,262	0.69	875
	MC1.2	Meadow Creek	Perennial	1	3,041	0.70	4,273
	MC1.3	Meadow Creek	Perennial	2	2,790	0.69	5,774
	MC1.3	Meadow Creek	Non-Perennial	0	715	0.69	496
	MC1.31	Meadow Creek	Perennial	2	-	-	-
	MC1.4	Meadow Creek	Perennial	2	3,833	0.72	8,270
	MC1.5	Meadow Creek	Perennial	3	3,278	0.73	9,525
	MC1.5	Meadow Creek	Non-Perennial	0	4,452	0.69	3,085
	MC2	Meadow Creek	Perennial	3	852	0.74	2,516
	MC2	Meadow Creek	Non-Perennial	0	60	0.69	42
	MC3	Meadow Creek	Perennial	3	2,144	0.62	5,322
	MC3	Meadow Creek	Non-Perennial	0	-	-	-
	MC3.1	Meadow Creek	Perennial	3	2,038	0.71	5,822
	MC3.1	Meadow Creek	Non-Perennial	0	-	-	-
	MC4.1	Meadow Creek	Perennial	3	2,082	0.60	4,981
	MC4.1	Meadow Creek	Non-Perennial	0	1,315	0.69	911
	MC4.2	Meadow Creek	Perennial	3	986	0.63	2,475
	MC4.2	Meadow Creek	Non-Perennial	0	2,645	0.69	1,833
	MC5	Meadow Creek	Perennial	3	2,583	0.65	6,686
	MC6.1	Meadow Creek	Perennial	3	1,483	0.61	3,605
	MC6.2	Meadow Creek	Perennial	3	874	0.65	2,262
Midnight Creek	MN0.1	Midnight Creek	Perennial	1	2,534	0.68	3,463
	MN0.2	Midnight Creek	Perennial	1	1,600	0.65	2,096
	MN0.3	Midnight Creek	Perennial	1	912	0.65	1,195
	MN0.4	Midnight Creek	Perennial	1	743	0.65	974
	MN0.5	Midnight Creek	Perennial	1	985	0.65	1,290
	MN0.5	Midnight Creek	Non-Perennial	0	426	0.69	295
	MN1	Midnight Creek	Perennial	1	446	0.65	585
	MN2	Midnight Creek	Perennial	1	152	0.64	193
Transmission Line, Misc. Watersheds on South Fork Salmon River	TR1	Transmission Line	Perennial	1.58	2,118	0.69	3,787
	TR1	Transmission Line	Non-Perennial	0	1,200	0.69	832
	TR2	Transmission Line	Perennial	1.16	10,852	0.69	16,245
	TR2	Transmission Line	Non-Perennial	0	5,494	0.69	3,807
	TR2.1	Transmission Line	Perennial	1	2,543	0.72	3,652
	TR2.2	Transmission Line	Perennial	1	724	0.67	965
	TR2.3	Transmission Line	Perennial	3	398	0.72	1,148
	TR2.4	Transmission Line	Perennial	4	130	0.69	450
	TR2.5	Transmission Line	Perennial	1	381	0.74	567
	TR2.6	Transmission Line	Perennial	3	220	0.62	541
West End Creek	WE1	West End Creek	Non-Perennial	0	3,189	0.69	2,210
	WE2.1	West End Creek	Non-Perennial	0	919	0.69	637
	WE2.2	West End Creek	Non-Perennial	0	2,222	0.69	1,540
	WE3.1	West End Creek	Perennial	1	13	0.73	39

Table 6-3a. Baseline Stream Functional Assessment Results in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Stream Order	Stream Length (ft)	Functional Index	Functional Units[a]
	WE3.1	West End Creek	Non-Perennial	0	687	0.69	476
	WE3.2	West End Creek	Perennial	1	72	0.73	106
	WL1	West End Lake	Perennial	1	-	-	-
Total					**240,940**	**NA**	**399,361**

[a] *The functional units are not weighted, do not include fish use elements, and assume fish passage is provided via the EFSFSR Tunnel at the end of year -1. The ledger and associated functional units will be updated as results of analyses become available and as data gaps are addressed.*

- = 0; EFSFSR = East Fork of the South Fork Salmon River

Table 6-3b. Baseline Stream Functional Assessment Results in the North Fork Payette River Subbasin

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Stream Order	Length (ft)	Functional Index	Functional Units
North Fork Payette River	TR3	Transmission Line	Perennial	2.96	4,361	0.69	11,967
	TR3	Transmission Line	Non-Perennial	0	15,008	0.69	10,401
Total					**19,369**	**NA**	**22,368**

6.1.3 Wetland Delineation

Consultants formally trained in and/or certified in wetland delineation conducted wetland delineations and functional assessments to characterize the condition and value of wetlands within the Project Area. The study area for field and desktop studies included the Project site and off-site facilities and infrastructure, as described in **Table 6-1**. Wetlands throughout the Project Area consist of PFO, PSS, PEM, and OW habitats. Wetlands are situated in valley bottoms and along steep slopes that drain to the valleys downslope.

PFO wetlands commonly include Engelmann spruce (*Picea engelmannii* var. *engelmannii*), subalpine fir, and lodgepole pine (*Pinus contorta)* in the tree stratum; alder (*Alnus* spp.), willows (*Salix* spp.), and currant (*Ribes* spp.) in the shrub stratum; and a variety of wetland forbs and grasses in the herb stratum. PFO wetlands were likely more abundant prior to wildfires that disturbed large amounts of vegetation. However, many PFO wetlands were spared due to the wet conditions present in the wetlands during the wildfires (HDR 2017b). PSS wetlands commonly include alder, willow, bog birch (*Betula glandulosa*), and currant in the shrub stratum with an herbaceous understory comprising grasses, sedges (*Carex* spp.), and forbs (HDR 2013). PEM wetland communities are often present in large sedge meadows or associated with hillside seeps. Vegetation in these communities primarily consists of various grasses, sedges, moss, and forbs (HDR 2017b).

Wetland hydrology is generally tied to surface water flows throughout the Project Area. Many wetlands located on slopes and tributary drainages are associated with hillside seeps and springs. In most cases, these seep and spring features are not isolated and water typically reaches a larger wetland complex in the valley floor or stream down slope. Snowmelt runoff and high groundwater tables also contribute to the hydrologic support of wetlands.

A common characteristic of soils in the Project Area is their very young geologic age. This is expressed in weak horizon[1] development, shallow depth to bedrock, and coarse textures. The soils

[1] A soil horizon is a layer parallel to the surface, whose physical characteristics differ from the layers above and beneath.

typically range from sandy to loamy texture and are generally "skeletal," where skeletal soils lack horizon development due to steep slopes or the nature of the parent material (HDR 2013).

Shallow drought-prone soils are more common in areas of ridge tops and upper slopes, and deep moist soils are more common in areas of accumulation, which are typically the areas where moisture collects. The thickness of the surface horizon is related to the amount and type of organic matter deposited by the vegetation growing on the soil. Soils with the thickest surface horizons generally support dense stands of brush or herbaceous vegetation. Soils under conifer stands generally have thinner surface horizons. Vegetation also retards surface erosion, resulting in the formation of thicker surface horizons.

Hydric soil indicators vary between wetlands in the Project Area. Many of the wetland soils have a distinct odor of hydrogen sulfide, which indicates anaerobic conditions. Other hydric soil indicators within the Project Area include thick organic soils such as histosols[2] and soils that are gleyed[3] or reduced.

Since mining and exploration has occurred in the Project Area for almost a hundred years, many wetlands have been disturbed, especially along streambanks and roads. Past mining operations and related activities have impacted wetlands, as various mine operators filled wetlands to construct mineral processing facilities, DRSFs, TSFs, mine access and haul roads, town sites, and other mining-related facilities. These activities mostly occurred prior to the enactment of the CWA or implementation of requirements for mitigation for wetland and stream impacts. Today, many of these areas are reclaimed to an upland condition.

Past forest fires and erosion resulting from lack of vegetative cover have impacted wetlands throughout the Project Area, increasing sediment input to wetland areas. Many of these areas are starting to recover from the Cascade complex fire in 2007 that burned large portions of the Project site and Area. There are more wildlife sightings, and shrub and herbaceous species continue to recolonize burnt areas (Midas Gold 2016). In 2020, the Buck fire burned through wetlands along portions of the Burntlog Route and Johnson Creek transmission line. However, this fire was substantially smaller than the massive Cascade complex fire of 2007.

6.1.4 Baseline Wetland Functional Assessment

In consultation with the USACE, Perpetua Resources assessed wetland function using the Montana Wetland Assessment Method (MWAM) (Berglund and McEldowney 2008). The MWAM is a functional assessment approach for quantifying wetland impacts and mitigation that is regionally appropriate for Idaho. Perpetua Resources evaluated the wetland functions in the Project Area as of the February 16, 2021, permanent disturbance boundary associated with the ModPRO2.

HDR conducted a wetland functional assessment for the delineated wetlands, using the MWAM, which the USACE identified as appropriate to meet federal requirements for the Project (Martinez 2016, Martinez and Griffith 2018). Depending on the specific wetland being evaluated, up to 11 functions/values can be evaluated for each assessment area (AA) using MWAM, including the following:

- Habitat for federally listed or proposed threatened or endangered plants or animals

[2] Histosols are soils with a deep surface layer of purely organic material, at least 20 to 30 percent organic matter by weight and more than 16 inches thick. They form when organic matter accumulates more rapidly than it decomposes; they are common in wetlands where restricted drainage inhibits plant decomposition (University of Idaho, College of Agricultural and Life Sciences 2018).

[3] Gleyed soils are poorly aerated, saturated wetland soils low in iron, with characteristic grey/blue/green coloring (University of Idaho Extension 2012).

- General wildlife habitat
- General fish habitat
- Flood attenuation
- Long- and short-term surface water storage
- Sediment/nutrient/toxicant retention and/or removal
- Sediment/shoreline stabilization
- Production export/terrestrial and aquatic food chain support
- Groundwater discharge/recharge
- Uniqueness
- Recreation/education potential

Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society and relate to ecological significance without regard to subjective human values. Flood attenuation is an example of a wetland function. Values are benefits that derive from either one or more functions and the physical characteristics associated with a wetland. The value of a given wetland function is based on human judgment of worth, merit, and importance (Berglund and McEldowney 2008).

The MWAM ranks wetland functions and values in four categories, numbered I through IV. Category I has higher functional value than Category IV. Descriptions of the categories are as follows:

- **Category I**—Wetlands are of exceptionally high quality and are generally rare to uncommon in the state or are important from a regulatory standpoint. Category I wetlands can provide primary habitat for federally listed or proposed threatened and endangered species; represent a high-quality example of a rare wetland type; provide irreplaceable ecological functions (e.g., are not replaceable within a human lifetime, if at all); exhibit exceptionally high flood attenuation capability or are assigned high ratings for most of the assessed functions and values.
- **Category II**—Wetlands are more common than Category I wetlands and are those that provide habitat for sensitive plants or animals, function at very high levels for wildlife/fish habitat, are unique in a given region, or are assigned high ratings for many of the assessed functions and values.
- **Category III**—Wetlands are more common and generally less diverse than Category I and II wetlands. They can provide many functions and values, although they may not be assigned high ratings for as many parameters as are Category I and II wetlands. To be rated as a Category III site, the site must not qualify as a Category I, II, or IV site.
- **Category IV**—Wetlands are generally small, isolated, and lack vegetative diversity. These sites provide little in the way of wildlife habitat and are often indirectly disturbed. To be rated as a Category IV site, the AA must not qualify as a Category I, II, or III site.

The results of the wetland functional assessment are presented in the Project's *Wetland Functional Assessment* (HDR 2016b), and Tetra Tech's Technical Memorandum which provides updates to the functional assessment with current information on state listed wildlife habitat, and includes additional wetlands that were not included in the HDR document (Tetra Tech 2020a).

Through a series of pre-application meetings, Perpetua Resources and the USACE determined that it would be appropriate to revise the approach taken to identify the AAs in the functional assessment by consolidating those AAs to be more reflective of the watersheds in which they occur. A new functional assessment has been prepared that incorporates and consolidates the 2016 HDR and 2020 Tetra Tech documents (Tetra Tech 2021e). All wetlands delineated for SGP are included in the functional assessment, including those in areas not affected by permanent Project disturbance. Most of the evaluated wetland AAs rated as Category III; one is rated as Category IV, and three are rated as Category II.

Similar to the SFA, a specific accounting of wetland conditions evaluated for the SGP has been developed using a Microsoft Excel spreadsheet ledger (Wetland Ledger) (Tetra Tech 2021f). The Wetland Ledger evaluates and compares measured or calculated baseline conditions with proposed future conditions in which debits (impacts) and credits (mitigation) are quantified over time. **Tables 6-4a** and **6-4b** summarize the Wetland Ledger results by subbasin. Figures identifying the locations of the AAs and wetlands associated with each are included in the functional assessment report (Tetra Tech, 2021e).

Table 6-4a. Baseline Wetland Functional Assessment Results in the South Fork Salmon River Subbasin

AA Number	AA Name	AA Acreage (Total)	Wetland Classification				Wetland Category	Functional Points	Functional Units
			PFO	PSS	PEM	OW			
1	Upper Meadow Creek	71.59	61.25	8.38	1.96	–	II	6.7	479.64
2	Upper Meadow Creek Seeps	32.84	7.21	5.46	20.17		II	5.45	178.97
3	Lower Meadow Creek	71.23	10.28	40.87	19.61	0.47	III	4.5	320.53
4	Lower Meadow Creek Seeps	7.29	–	5.50	1.79	–	III	5.6	40.85
5	East Fork Meadow Creek	60.43	4.55	10.23	45.64	–	III	4.3	259.84
6	EFSF valley	35.91	2.87	24.87	8.11	0.07	III	5.6	201.11
7	Fiddle Creek	17.73	14.14	1.55	1.97	0.07	III	5.35	94.88
8	Hennessy Creek	8.81	0.18	3.55	4.89	0.20	III	4.2	37.02
9	Midnight Creek	2.85	0.86	1.57	0.42	–	III	2.9	8.27
10	West End Creek	4.35		3.95	0.40	–	III	2.7	11.74
11	Burntlog	82.93	12.07	25.43	45.43	–	III	3.9	323.43
12	Riordan Road Alternative and Powerline Corridor	35.63	7.30	8.29	20.05	–	III	4.2	149.65
13	Johnson Creek Road Alternative	50.07	6.99	39.03	3.98	0.07	III	4.7	235.31
14	Cabin/Trout and Powerline	47.03	4.57	26.90	15.56	–	III	5.5	258.67
15	Upper EFSFSR	40.40	6.77	22.29	11.34	–	II	6.7	270.65
16	Stibnite Road Wetlands	25.95	4.52	21.27	0.16	–	III	3.8	98.61
17	Transmission Line and Warm Lake Wetlands	5.97	0.05	4.95	0.97	–	III	5.7	34.03
19	Yellow Pine Pit	4.50	–	–	–	4.50	IV	2.55	11.49
20	Rabbit Creek Slope Wetlands	4.98	1.10	1.84	2.04	–	III	4	19.92
21	Thunder Mountain Road	45.76	10.76	9.70	25.30	–	III	5.4	247.08
TOTAL		**656.25**	**155.46**	**265.63**	**229.77**	**5.39**			**3,281.69**

"–" = 0

Columns and rows may not sum exactly due to rounding.

AA = assessment area; EFSFSR = East Fork of the South Fork of the Salmon River; OW = open water; PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub

Table 6-4b. Baseline Wetland Functional Assessment Results in the North Fork Payette River Subbasin

Assessment Area (AA) Number	AA Name	AA Acreage	Wetland Classification (Acres)				Wetland Category	Functional Points	Functional Units
			PFO	PSS	PEM	OW			
17	Transmission Line and Warm Lake Wetlands	19.23		12.87	6.36		III	5.7	109.60
18	Transmission Line-Valley	98.60	1.17	5.92	90.67	0.84	III	4.95	488.06
TOTAL		**117.82**	**1.17**	**18.78**	**97.03**	**0.84**			**597.65**

"–" = 0
OW = open water; PEM = palustrine emergent; PFO = palustrine forested; PSS = palustrine scrub-shrub

6.2 Impacts to Resources

Perpetua Resources proposes to develop a new mine with associated facilities in areas that support streams and wetlands that are subject to regulation under the CWA. **Figure 6-1** shows existing streams and wetlands that overlap anticipated Project disturbance. **Appendix B** contains a link to a webmap that illustrates how existing streams and wetlands overlap off-site facilities and infrastructure disturbance, as well as Project site disturbance. Perpetua Resources anticipates four types of impacts to WOTUS associated with the Project:

- Direct Impacts—Direct impacts result from disturbances that occur within WOTUS. Common direct impacts to WOTUS include filling, grading, removal of vegetation, building construction, and changes in water levels and drainage patterns.
- Indirect Impacts—Indirect impacts result from disturbances that occur in areas outside of WOTUS, such as uplands, non-jurisdictional wetlands or streams. Common indirect impacts include changes in surface water and/or groundwater inputs, sediments, chemical contaminants, and temperature, as well as fragmentation of a wetland from a contiguous wetland complex, loss of recharge area, or changes in local drainage patterns.
- Temporal Impacts—Temporal impacts to WOTUS can be identified as the time period between when the loss of functions and values occurs to when those functions and values are replaced.
- Temporary Impacts—Temporary impacts are those impacts caused by activities to WOTUS that do not cause a permanent alteration of the physical, chemical, or biological properties of the WOTUS. Temporary impacts include activities in which the ground is restored to its preconstruction contours and elevations, such that previous functions and values are restored.

Perpetua Resources has a clear understanding of the temporary, direct and temporal impacts to WOTUS associated with the Project which are quantified in the SFA and Wetland Ledgers (further defined in Sections 7.1 and 7.2) and presented in tables in Section 8. While it is anticipated that indirect impacts may occur, the effects are expected to be localized and occur in areas of anticipated permanent impacts. An approach to evaluate indirect impacts on restored wetlands and streams is further discussed in Section 14 – Adaptive Management.

As stated in the 2008 Mitigation Rule (USACE and EPA 2008), the District Engineer will determine the appropriate compensatory mitigation requirements for temporary impacts. Temporary impacts are most likely to occur with the construction of the transmission line. As design and engineering for that Project component advances, the temporary impacts will be better quantified and revised in Sections 6.2.1 and 6.2.2, if warranted.

As previously described in Section 1.2 an AJD request has been submitted by Perpetua Resources to the USACE. That submittal has made a preliminary jurisdictional determination on all the streams

and wetlands proposed for impact. However, for the purposes of this CMP, all potential stream and wetland impacts, regardless of jurisdiction, have been included in the impacts analysis and debit calculations. Therefore, all identified features are included in the impact tables and figures of this document.

As described in Sections 1.2 and 6.1, there are several small or isolated areas within the Project disturbance boundary where investigations of streams and wetlands are still pending. As such, minor additional impacts are possible in both the South Fork Salmon River and North Fork Payette River subbasins. Most of the data gaps are within the North Fork Payette subbasin along the transmission line corridor and associated access roads (see Section 6.1). Once the data gaps are resolved, a final reconciliation of all impacts in tables and figures associated with this document will be completed.

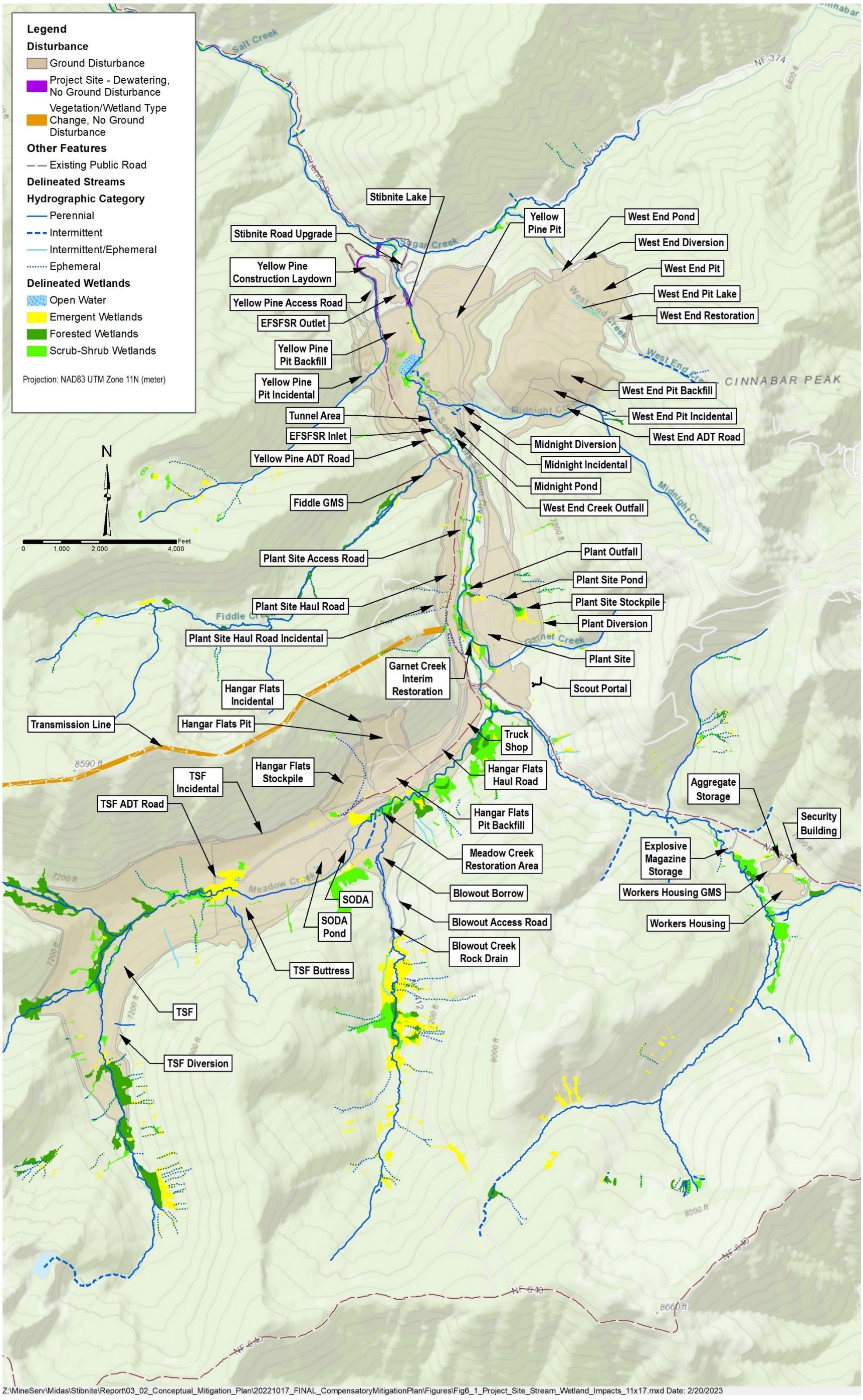

Figure 6-1. Project Site Stream and Wetland Impacts

6.2.1 Impacts to Streams

Proposed impacts to streams from implementation of the Project are summarized in **Tables 6-5a** and **6-5b**, listed by subbasin and watershed as depicted on **Figure 1-6**. Additionally, the drainage where the impact occurs and the project feature is included. Most impacts are from ground disturbance, however additional impacts were identified due to dewatering of a stream at the Project site or from transmission ROW expansion and a change in vegetation type along the ROW. The SFA Ledger does not distinguish between direct and indirect impacts while accounting for both. **Tables 6-5a** and **6-5b** summarize those streams proposed to be impacted by the Project that overlap the proposed Project disturbance footprint and therefore provides an estimate of impacts. Many stream reaches lying outside of the disturbance footprint may be indirectly impacted by the Project as evaluated and summarized in the SFA Ledger (Rio ASE 2023). Nearly all stream impacts are within the South Fork Salmon subbasin (85 percent), with minor impacts in the North Fork Payette subbasin (15 percent). More detailed description and level of impact is described in other reports, including the Stream Functional Assessment report (Rio ASE 2023) and Stream Design Report (Rio ASE 2021a).

Table 6-5a. Estimated Impacts on Streams in the South Fork Salmon River Subbasin

Drainage	Project Feature	Perennial Streams (LF)	Intermittent Streams (LF)	Intermittent /Ephemeral Streams (LF)	ES Streams (LF)	Ephemeral Streams (LF)	Dredge/ Fill Total (LF)[a]	Total (LF)[b]
Johnson Creek								
Burntlog Creek	Burntlog Route - Existing	61	447			269		777
	Burntlog Route Cut/Fill	359	1,917			682	2,958	2,958
Johnson Creek	Burntlog Route - Existing	15	50					65
	Burntlog Route Cut/Fill	43	93				135	135
	Johnson Creek Road - Existing	68	120					189
	OSV Route	31	122					153
	Transmission Line Access - Existing	7						7
	Transmission Line Access - Major Improvements	278	81					359
	Transmission Line Pulling and Tensioning Work Area		223					223
	Transmission Line ROW - Existing/Upgrade	3,482	477			377		4,336
	Transmission Line ROW - New	199						199
	Transmission Line Staging Work Area		422					422
	Transmission Line Structure Work Area	148	98					246
Riordan Creek	Burntlog Route Cut/Fill	124				35	159	159
	Johnson Creek Road - Existing	5						5
	Transmission Line Access - Major Improvements	128					30	128
	Transmission Line ROW - New	803						803
Trapper Creek	Burntlog Route - Existing	81					59	81
	Burntlog Route Cut/Fill	1,478					1,478	1,478
Trout Creek	Johnson Creek Road - Existing	7						7
	OSV Route	17						17
	Transmission Line Access - Existing	18						18

Table 6-5a. Estimated Impacts on Streams in the South Fork Salmon River Subbasin								
Drainage	Project Feature	Perennial Streams (LF)	Intermittent Streams (LF)	Intermittent /Ephemeral Streams (LF)	ES Streams (LF)	Ephemeral Streams (LF)	Dredge/ Fill Total (LF)[a]	Total (LF)[b]
	Transmission Line Access - Major Improvements	167	61					228
	Transmission Line Access - Minor Improvements	456	75	26		169	131	725
	Transmission Line Access - Overland Travel	14	17			30		62
	Transmission Line ROW - Existing/Upgrade	3,600	905	90		621		5,216
	Transmission Line Structure Work Area	251	17			8	9	277
Drainage Total		*11,838*	*5,126*	*115*		*2,192*	*4,901*	*19,271*
Upper East Fork South Fork Salmon River								
Blowout Creek	Blowout Borrow	2,833					2,833	2,833
	Blowout Creek Rock Drain	1,780					1,780	1,780
East Fork South Fork Salmon River	Burntlog Route - Existing	17	19	1,549			37	1,585
	Burntlog Route Cut/Fill	391	251	7		437	1,085	1,085
	EFSFSR Inlet	449					449	449
	EFSFSR Outlet	13					13	13
	Garnet Creek Restoration	49					49	49
	Meadow Creek Lookout Rd FS Rd #50441 - Existing				257			257
	Plant Site	176		57			233	233
	Plant Site Access Road					602	602	602
	Plant Site Haul Road	263				1,595	1,859	1,859
	Plant Site Haul Road Incidental					430	430	430
	Pond Tunnel Area	261					261	261
	Stibnite Road - Existing	33	2					35
	Transmission Line Access - Minor Improvements					24		24
	Transmission Line ROW - New	52				418		470
	West End Creek Outfall	26					26	26
	Yellow Pine Access Road	28					28	28
	Yellow Pine Disturbed-Dewatering	509					509	509
	Yellow Pine Pit	3,535	494				4,028	4,028
	Yellow Pine Pit Incidental	50					50	50
Fiddle Creek	EFSFSR Inlet	46					46	46
	Fiddle GMS	1,408					1,408	1,408
	Yellow Pine ADT Road	283					283	283
Garnet Creek	Garnet Creek Restoration	280					280	280
	Plant Diversion					388	388	388
	Plant Site	1,284				904	2,188	2,188
	Plant Site Pond					252	252	252
	Plant Site Stockpile					616	616	616
	Transmission Line ROW - New	146						146
Hennessy Creek	Stibnite Road - Existing	8						8
	Yellow Pine Access Road	356					356	356
	Yellow Pine Construction Laydown	79					79	79

Table 6-5a. Estimated Impacts on Streams in the South Fork Salmon River Subbasin								
Drainage	Project Feature	Perennial Streams (LF)	Intermittent Streams (LF)	Intermittent /Ephemeral Streams (LF)	ES Streams (LF)	Ephemeral Streams (LF)	Dredge/ Fill Total (LF)[a]	Total (LF)[b]
	Yellow Pine Disturbed-Dewatering	1,928					1,928	1,928
	Yellow Pine Pit	1,604					1,604	1,604
	Yellow Pine Pit Incidental	685					685	685
Meadow Creek	Blowout Borrow	2,910	931				3,840	3,840
	Hangar Flats Construction Laydown					930	930	930
	Hangar Flats Haul Road	956				812	1,768	1,768
	Hangar Flats Incidental	1,102				60	1,162	1,162
	Hangar Flats Pit	241					241	241
	Hangar Flats Stockpile					179	179	179
	SODA	2,038					2,038	2,038
	Transmission Line Access - Bladed	178					65	178
	Transmission Line Access - Minor Improvements	658	10					668
	Transmission Line ROW - New	432						432
	Truck Shop	39					39	39
	TSF	18,665	809	540		3,864	23,879	23,879
	TSF ADT Road					1,020	1,020	1,020
	TSF Buttress	4,640				483	5,123	5,123
	TSF Diversion	364		35		370	768	768
Midnight Creek	Midnight Diversion	189	48				237	237
	Plant Site Haul Road	202	173				374	374
	West End ADT Road	1,600					1,600	1,600
	Yellow Pine Pit	1,187	205				1,392	1,392
No Mans Creek	Transmission Line Access - Major Improvements	61		169		30		260
	Transmission Line ROW - New	140		321		107		568
Sugar Creek	Stibnite Road - Existing	7						7
West End Creek	West End Diversion		151				151	151
	West End Pit			857			857	857
Drainage Total		*54,179*	*3,093*	*3,533*	*257*	*13,522*	*70,047*	*74,584*
Upper South Fork Salmon River								
Trail Creek	Transmission Line Access - Major Improvements	319	4			31	15	354
	Transmission Line ROW - Existing/Upgrade	1,108	301	106		252		1,767
Upper South Fork Salmon River	Transmission Line Access - Minor Improvements	9						9
	Transmission Line ROW - Existing/Upgrade	262						262
Warm Lake Creek	Transmission Line Access - Bladed	67					38	67
	Transmission Line Access - Major Improvements	97						97
	Transmission Line Access - Minor Improvements	749	479				113	1,228
	Transmission Line Pulling and Tensioning Work Area	247	165					412

Table 6-5a. Estimated Impacts on Streams in the South Fork Salmon River Subbasin

Drainage	Project Feature	Perennial Streams (LF)	Intermittent Streams (LF)	Intermittent /Ephemeral Streams (LF)	ES Streams (LF)	Ephemeral Streams (LF)	Dredge/ Fill Total (LF)[a]	Total (LF)[b]
	Transmission Line ROW - Existing/Upgrade	2,529	1,367			86		3,982
	Transmission Line Structure Work Area	329	207					536
Drainage Total		*5,715*	*2,524*	*106*		*369*	*166*	*8,713*
Salmon River Drainage Total		**71,731**	**10,744**	**3,754**	**257**	**16,083**	**75,114**	**102,568**

[a] *This column's data are not included in the "Total" column to the right.*
[b] *Total length is rounded due to processing of multiple large GIS datasets and multiple levels of analyses.*
Columns and rows may not sum exactly due to rounding.
– = no impact; DRSF =development rock storage facility; GMS = growth media stockpile; LF = linear feet; ROW = right of way; TSF = Tailings Storage Facility
"Project Site - Disturbed Area" is a general term to describe features and components of the Project that fall within or below a surface water diversion and small sliver gaps not covered by individual mine features, such as between Hangar Flats Pit and the Hangar Flats Reclamation/Stockpile Area.

Table 6-5b. Estimated Impacts on Streams in the North Fork Payette River Subbasin

Drainage	Facility Name	Perennial Streams (LF)	Intermittent Streams (LF)	Intermittent/ Ephemeral Streams (LF)	ES Streams (LF)	Ephemeral Streams (LF)	Dredge/ Fill Total (LF)[a]	Total (LF)[b]
Big Creek-North Fork Payette River								
Big Creek	Transmission Line Access - Existing	15	31					45
	Transmission Line Access - Minor Improvements		663					663
	Transmission Line Access - No Improvements					15		15
	Transmission Line Access - Overland Travel	506	30					535
	Transmission Line Pulling and Tensioning Work Area		469					469
	Transmission Line ROW - Existing/Upgrade	55	195			223		473
	Transmission Line ROW - New	134	133					267
	Transmission Line Structure Work Area	35	157					192
Upper Big Creek	Transmission Line Access - Existing	153	28					181
	Transmission Line Access - Major Improvements	288				10	117	298
	Transmission Line Access - Minor Improvements	211	115					325
	Transmission Line Access - No Improvements					46		46
	Transmission Line ROW - Existing/Upgrade	3,033	641			322		3,996
	Transmission Line Structure Work Area	273						273
Drainage Total		*4,702*	*2,460*			*616*	*117*	*7,778*
Cascade Reservoir								
Cascade Reservoir	Transmission Line Access - Existing		13					13
	Transmission Line Access - Overland Travel	33						33

Table 6-5b. Estimated Impacts on Streams in the North Fork Payette River Subbasin								
Drainage	Facility Name	Perennial Streams (LF)	Intermittent Streams (LF)	Intermittent/ Ephemeral Streams (LF)	ES Streams (LF)	Ephemeral Streams (LF)	Dredge/ Fill Total (LF)[a]	Total (LF)[b]
	Transmission Line ROW - Existing/Upgrade	118	416					534
	Transmission Line Structure Work Area	100	61					161
Drainage Total		*252*	*491*					*743*
Lake Fork Creek-North Fork Payette River								
Boulder Creek	Transmission Line ROW - Existing/Upgrade	170	245					415
	Transmission Line Structure Work Area	62	120					182
Lake Fork Creek	Transmission Line ROW - Existing/Upgrade	51						51
Drainage Total		*283*	*365*					*648*
Payette River Drainage Total		**5,236**	**3,317**			**616**	**117**	**9,169**

[a] *This column's data are not included in the "Total" column to the right.*

[b] *Total length is rounded due to processing of multiple large GIS datasets and multiple levels of analyses.*

– = no impact; LF = linear feet

Columns and rows many not sum exactly due to rounding.

6.2.2 Impacts to Wetlands

Proposed impacts to wetlands from implementation of the Project are identified in **Tables 6-6a** and **6-6b**. The wetland impacts are displayed by subbasin and watershed as shown on **Figure 1-6**. Additionally, the drainage where the impact occurs and the project feature is included. All drainages at the Project site contribute to the EFSFSR within the Upper EFSFSR watershed; however, wetland impacts are listed by the lowest-order named drainage in which they occur. The majority of the wetland impacts would occur in the Project site and Mitigation Area within the South Fork Salmon subbasin in the Upper EFSFSR watershed (95.1 percent) (**Table 6-6a**). However, wetland impacts would also occur outside the Mitigation Area within the North Fork Payette River subbasin (7.18 acres or 4.9 percent of the total impact) (**Table 6-6b**).

Approximately 21.3 acres (South Fork Salmon and North Fork Payette River subbasins) could be directly impacted by conversion of wetland type due to transmission line ROW expansion and maintenance. This conversion is further described in the functions and values assessment (Tetra Tech 2021e) and accounted for in the Wetland Ledger.

Table 6-6a. Wetland Impacts in the South Fork Salmon River Subbasin						
Drainage	Facility Name	Palustrine Forested (PFO) (acres)	Palustrine Scrub-Shrub (PSS) (acres)	Palustrine Emergent (PEM) (acres)	Open Water (OW) (acres)	Total Acres of Wetland Impact (acres)
Johnson Creek						
Burntlog Creek	Burntlog Maintenance Facility	–	0.11	–	–	**0.11**
	Burntlog Route Borrow Source	–	0.64	0.13	–	**0.77**
	Burntlog Route Cut/Fill	0.01	0.12	1.63	–	**1.76**
Johnson Creek	Burntlog Route Cut/Fill	0.01	0.13	0.01	–	**0.15**
	OSV Route	–	0.15	0.01	–	**0.16**
	Transmission Line Access - Major Improvements*	0.04	0.28	0.03	–	**0.36**

Table 6-6a. Wetland Impacts in the South Fork Salmon River Subbasin						
Drainage	Facility Name	Palustrine Forested (PFO) (acres)	Palustrine Scrub-Shrub (PSS) (acres)	Palustrine Emergent (PEM) (acres)	Open Water (OW) (acres)	Total Acres of Wetland Impact (acres)
	Transmission Line Access - Minor Improvements*	–	0.01	0.01	–	**0.02**
	Transmission Line Pulling and Tensioning Work Area*	–	0.07	–	–	**0.07**
	Transmission Line ROW - Existing/Upgrade*	0.20	2.79	–	–	**2.99**
	Transmission Line Staging Work Area*	–	0.55	–	–	**0.55**
	Transmission Line Structure Work Area	0.01	0.21	–	–	**0.22**
Riordan Creek	Burntlog Route Cut/Fill	–	–	0.30	–	**0.30**
	Transmission Line Access - Major Improvements	–	0.06	0.03	–	**0.08**
	Transmission Line ROW - New*	–	0.56		–	**0.56**
Sand Creek	Burntlog Route Cut/Fill	–	0.01	0.07	–	**0.08**
Trapper Creek	Burntlog Route Cut/Fill	1.14	1.47	1.28	–	**3.90**
Trout Creek	OSV Route	–	0.04	–	–	**0.04**
	Transmission Line Access - Major Improvements*	–	0.05	0.01	–	**0.06**
	Transmission Line Access - Minor Improvements*	0.01	0.09	0.07	–	**0.16**
	Transmission Line ROW - Existing/Upgrade*	0.23	3.95	–	–	**4.18**
	Transmission Line Structure Work Area*	–	0.10	–	–	**0.10**
Drainage Subtotal		*1.65*	*11.36*	*3.58*	–	***16.60***
Upper East Fork South Fork Salmon River						
Blowout Creek	Burntlog Route Cut/Fill	0.48	0.34	0.02	–	**0.84**
	EFSFSR Inlet	–	0.18	–	–	**0.18**
	EFSFSR Outlet	–	0.04	–	–	**0.04**
East Fork South Fork Salmon River	Plant Outfall	–	0.01	–	–	**0.01**
	Plant Site	–	0.03	0.06	–	**0.08**
	Plant Site Access Road	0.02	1.25	–	–	**1.27**
	Plant Site Haul Road	0.10	0.91	0.25	0.02	**1.29**
	Plant Site Haul Road Incidental	–	0.21	0.05	–	**0.25**
	Pond Tunnel Area	–	0.09	–	–	**0.09**
	Security Building	–	0.03	–	–	**0.03**
	Transmission Line Access - Minor Improvements	–	0.01	–	–	**0.01**
	Transmission Line ROW - New	0.15	0.70	–	–	**0.84**
	Transmission Line Structure Work Area	–	0.02	–	–	**0.02**
	Truck Shop	–	–	–	–	**0.00**
	West End ADT Road	–	–	0.01	–	**0.01**
	West End Creek Outfall	–	0.02	–	–	**0.02**
	Workers Housing	–	0.02	–	–	**0.03**
	Yellow Pine Pit	0.08	4.22	1.29	4.50	**10.09**
	Yellow Pine Pit Incidental	–	0.03	0.04	–	**0.06**
	(blank)	–	0.22	0.02	–	**0.25**
	Burntlog Route Cut/Fill	0.48	0.34	0.02	–	**0.84**
	EFSFSR Inlet	–	0.18	–	–	**0.18**
	EFSFSR Outlet	–	0.04	–	–	**0.04**
Fiddle Creek	EFSFSR Inlet	0.04	0.05	–	–	**0.09**
	Fiddle GMS	0.75	–	–	–	**0.75**
	Yellow Pine ADT Road	0.12	–	–	–	**0.12**

Table 6-6a. Wetland Impacts in the South Fork Salmon River Subbasin						
Drainage	Facility Name	Palustrine Forested (PFO) (acres)	Palustrine Scrub-Shrub (PSS) (acres)	Palustrine Emergent (PEM) (acres)	Open Water (OW) (acres)	Total Acres of Wetland Impact (acres)
Garnet Creek	Garnet Creek Restoration	–	0.54	0.49	–	**1.03**
	Plant Diversion	–	0.12	0.03	–	**0.15**
	Plant Site	0.65	0.98	1.44	0.05	**3.12**
	Plant Site Stockpile	0.50	0.96	1.28	–	**2.74**
Hennessy Creek	Yellow Pine Access Road	–	–	0.01	–	**0.02**
	Yellow Pine Construction Laydown	–	0.01		–	**0.01**
	Yellow Pine Pit	–	0.27	0.04	–	**0.31**
	Yellow Pine Pit Incidental	–	0.07		–	**0.07**
	(blank)	0.18	0.11	–	–	**0.29**
Meadow Creek	Blowout Borrow	2.26	6.68	1.34	–	**10.28**
	Hangar Flats Haul Road	0.03	0.84	0.37	–	**1.24**
	Hangar Flats Incidental	0.01	1.36	0.11	–	**1.48**
	Hangar Flats Pit	–	0.39	0.66	–	**1.05**
	Hangar Flats Stockpile	–	0.52	0.84	0.05	**1.41**
	SODA	–	–	0.56	0.14	**0.70**
	Transmission Line Access - Bladed	–	–	0.04	–	**0.04**
	Transmission Line Access - Minor Improvements	0.08	–	0.08	–	**0.16**
	Transmission Line ROW - New*	–	0.03	–	–	**0.03**
	Truck Shop	–	0.01	0.08	–	**0.09**
	TSF	41.09	13.21	4.00	–	**58.29**
	TSF Buttress	–	2.02	11.63	0.28	**13.93**
	TSF Diversion	2.53	0.38	0.03	–	**2.94**
Midnight Creek	Midnight Diversion		0.02	0.01	–	**0.02**
	Plant Site Haul Road		0.03	0.11	–	**0.14**
	West End ADT Road		0.53	0.01	–	**0.54**
	Yellow Pine Pit		0.41	0.16	–	**0.57**
No Mans Creek	Transmission Line Access - Major Improvements*	0.21	–	–	–	**0.21**
	Transmission Line ROW - New*	1.32	–	–	–	**1.32**
	Transmission Line Structure Work Area	–	–	–	–	**0.00**
West End Creek	West End Diversion	–	–	0.02	–	**0.02**
	West End Pit	–	0.64		–	**0.64**
Drainage Total		*52.59*	*38.53*	*25.23*	*5.04*	***121.39***
Upper South Fork Salmon River						
Trail Creek	Transmission Line Access - Major Improvements	–	0.09	0.02	–	**0.10**
	Transmission Line ROW - Existing/Upgrade	0.02	0.64	–	–	**0.66**
Trout Creek	Transmission Line Access - Minor Improvements	–	–	–	–	**0.00**
	Transmission Line ROW - Existing/Upgrade	–	0.06	–	–	**0.06**
Upper South Fork Salmon River	Transmission Line Access - Minor Improvements	–	–	–	–	**0.00**
	Transmission Line ROW - Existing/Upgrade	–	0.12	–	–	**0.12**
Warm Lake Creek	Transmission Line Access - Bladed	–	–	–	–	**0.00**
	Transmission Line Access - Major Improvements*	–	0.01	0.02	–	**0.02**
	Transmission Line Access - Minor Improvements*	–	0.22	0.01	–	**0.23**
	Transmission Line Access - Overland Travel*	–	0.03		–	**0.03**
	Transmission Line ROW - Existing/Upgrade*	0.03	3.73		–	**3.76**

Table 6-6a. Wetland Impacts in the South Fork Salmon River Subbasin

Drainage	Facility Name	Palustrine Forested (PFO) (acres)	Palustrine Scrub-Shrub (PSS) (acres)	Palustrine Emergent (PEM) (acres)	Open Water (OW) (acres)	Total Acres of Wetland Impact (acres)
	Transmission Line Structure Work Area*	–	0.29	–	–	**0.29**
Drainage Total		*0.05*	*5.18*	*0.04*	–	***5.27***
Salmon Subbasin Total		**54.29**	**55.07**	**28.85**	**5.05**	**143.26**

**Includes conversion wetlands*

– = no impact.

Columns and rows may not sum exactly due to rounding.

DRSF =development rock storage facility; EFSFSR = East Fork of the South Fork of the Salmon River; GMS = growth media stockpile; ROW =right of way; TSF = Tailings Storage Facility

"Disturbed Area-Other" is a general term to describe features and components of the Project that fall within or below a surface water diversion and small sliver gaps not covered by individual mine features, such as between Hangar Flats Pit and the Hangar Flats Reclamation/Stockpile Area.

Table 6-6b. Wetland Impacts in the North Fork Payette River Subbasin

Drainage	Facility Name	Palustrine Forested (PFO) (acres)	Palustrine Scrub-Shrub(PSS) (acres)	Palustrine Emergent (PEM) (acres)	Open Water (OW) (acres)	Total Acres of Wetland Impact (acres)
Big Creek-North Fork Payette River						
Big Creek	Transmission Line Access - Bladed	–	–	0.04	–	**0.04**
	Transmission Line Access - Major Improvements*	–	0.02	–	–	**0.02**
	Transmission Line Access - Minor Improvements*	–	0.01	0.33	–	**0.33**
	Transmission Line Access - Overland Travel*	–	0.04	–	–	**0.04**
	Transmission Line Pulling and Tensioning Work Area*	–	–	–	–	**0.00**
	Transmission Line ROW - Existing/Upgrade*	–	0.11	–	–	**0.11**
	Transmission Line ROW - New	0.48	0.97	–	–	**1.46**
	Transmission Line Structure Work Area*	–	0.05	0.01	–	**0.05**
Upper Big Creek	Logistics Facility	–	0.65	0.14	–	**0.79**
	Transmission Line Access - Major Improvements	–	0.27	0.07	–	**0.35**
	Transmission Line Access - Minor Improvements	–	–	–	–	**0.00**
	Transmission Line Access - Overland Travel*	–	0.09	–	–	**0.09**
	Transmission Line ROW - Existing/Upgrade*	–	2.44	–	–	**2.44**
	Transmission Line Structure Work Area*	–	0.26	–	–	**0.26**
Drainage Total		*0.48*	*4.92*	*0.59*	–	***5.99***
Cascade Reservoir						
Cascade Reservoir	Transmission Line Access - Overland Travel*	–	0.01	–	–	**0.01**
	Transmission Line ROW - Existing/Upgrade*	–	0.03	–	–	**0.03**
	–	–	–	–	–	**0.00**
Drainage Total		–	*0.04*	–	–	***0.05***
Gold Fork River						
Gold Fork River	Transmission Line Pulling and Tensioning Work Area*	–	0.05	–	–	**0.05**
	Transmission Line ROW - Existing/Upgrade*	–	0.51	–	–	**0.51**
	Transmission Line Structure Work Area*	–	0.01	–	–	**0.01**
Drainage Total			*0.57*	–	–	***0.57***

Table 6-6b. Wetland Impacts in the North Fork Payette River Subbasin						
Drainage	Facility Name	Palustrine Forested (PFO) (acres)	Palustrine Scrub-Shrub(PSS) (acres)	Palustrine Emergent (PEM) (acres)	Open Water (OW) (acres)	Total Acres of Wetland Impact (acres)
Lake Fork Creek-North Fork Payette River						
Boulder Creek	Transmission Line ROW - Existing/Upgrade*	–	0.06	–	–	**0.06**
	Transmission Line Structure Work Area	–	–	–	–	**0.00**
Lake Fork	Transmission Line Access - Overland Travel*	–	0.16	–	–	**0.16**
	Transmission Line ROW - Existing/Upgrade*	–	0.27	–	–	**0.27**
	Transmission Line Structure Work Area*	–	0.09	–	–	**0.09**
Drainage Total		–	–	–	–	***0.58***
Payette Subbasin Total		**0.48**	**6.11**	**0.59**	–	**7.18**

**Includes conversion wetlands*

– = no impact.

Columns and rows may not sum exactly due to rounding.

"Disturbed Area-Other" is a general term to describe features and components of the Project that fall within or below a surface water diversion and small sliver gaps not covered by individual mine features, such as between Hangar Flats pit and the Hangar Flats Reclamation/Stockpile Area.

Section 7
Credit Determination Methodology

This section provides a description of the number of mitigation credits that would be provided for both streams and wetlands, and a rationale for the determination in accordance with 33 CFR 332.4(c)(6). Per 33 CFR 332.2, a credit is a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the accrual or attainment of aquatic functions at a compensatory mitigation site. The measure of aquatic functions is based on the resources restored, established, enhanced, or preserved. In other words, credits are based on aquatic resource functions provided by the compensatory mitigation project. This section describes the rationale for how the Mitigation Area would provide the required compensation for unavoidable impacts to streams and wetlands from construction, maintenance, and restoration of the Project.

To ensure that the Project's impacts on aquatic resources are compensated appropriately, Perpetua Resources has quantified the functional value of the impacted streams and wetlands of the proposed mitigation projects by conducting "functional assessments." As discussed in Sections 6.1.2 and 6.1.4, functional assessments are broadly applied tools used to quantify impacts and mitigation based on quantifiable habitat function. Functional assessments can be defensibly used to support a ledger of debits (impacts) and compensatory mitigation (credits) for the Project in the CWA Section 404 permitting process.

Perpetua Resources is proposing compensatory mitigation for streams and wetlands at a ratio greater than a one-to-one. As further described in Sections 7.1 and 7.2. Functional assessments were used to quantify stream and wetland functional unit impacts (debits), and to calculate functional unit replacement (credits) through mitigation . Perpetua Resources will improve the function of existing streams and wetlands and create streams and wetlands designed and predicted to have a higher functional value than present ones.

7.1 Stream Functional Assessment and Calculated Direct Impacts

Perpetua Resources quantified stream function using broadly accepted quantification tools to ensure compensatory mitigation requirements will be satisfied for unavoidable impacts to stream and aquatic resource functions from the Project. Any lost stream functions would be replaced by stream restoration, in keeping with the 2008 Mitigation Rule (USACE and EPA 2008). The proposed SFA merges a matrix of diagnostics, pathways, and indicators (USFS 2003/2010) with functional objectives for stream restoration.

The evolution of the SFA approach derives from USACE, EPA, and USFWS via the Function-Based Framework for Stream Assessment and Restoration Projects (Harman, et al. 2012) and Stream Functions Pyramid Framework (Harman and Jones 2016), which have been applied across the United States. The outcome is an assessment approach that has been adapted for use for the Project, is modified to be applied primarily at the scale of stream assessment area (i.e., stream reach rather than watershed), and enables comparison of existing and future (restored or enhanced) stream function (Rio ASE 2023). Refer to Section 6.1.2 for an SFA summary and the latest SFA Report (Rio ASE 2023) for details of the SFA methodology, rationale, and results.

Tables 7-1a and **7-1b** are summaries of the stream lengths anticipated to be directly impacted in the South Fork Salmon River and the North Fork Payette River subbasins and the baseline functional

unit score that includes indirect impacts from upstream and adjacent reaches (e.g., temperature, chemical contaminants, passage) (Rio ASE 2023).

Table 7-1a. Stream Functional Assessment Impacts in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Baseline Stream Length (ft)	Baseline Functional Units	Mine Year of Direct Impact[a]	Functional Units at Maximum Impact	Net Functional Units at Maximum Impact
Blowout Creek	BC0.01	Blowout Creek (East Fork Meadow Creek)	Perennial	566	821	-	774	-47
	BC0.02	Blowout Creek (East Fork Meadow Creek)	Perennial	2,438	3,536	-	3,333	-204
	BC0.02	Blowout Creek (East Fork Meadow Creek)	Non-Perennial	1,217	844	-	844	0
	BC0.1	Blowout Creek (East Fork Meadow Creek)	Perennial	3,267	4,643	-	4,643	0
	BC0.2	Blowout Creek (East Fork Meadow Creek)	Non-Perennial	1,529	1,060	-	1,060	0
	BC1	Blowout Creek (East Fork Meadow Creek)	Perennial	2,097	2,371	-	2,117	-254
	BC2	Blowout Creek (East Fork Meadow Creek)	Perennial	1,576	1,707	-1	0	-1,707
	BC2	Blowout Creek (East Fork Meadow Creek)	Non-Perennial	-	-	-	0	-
	BC2.1	Blowout Creek (East Fork Meadow Creek)	Perennial	1,909	2,467	-1	1,368	-1,099
	BC3	Blowout Creek (East Fork Meadow Creek)	Perennial	642	807	-1	754	-53
	BC4	Blowout Creek (East Fork Meadow Creek)	Perennial	281	353	3	0	-353
	BR1	Blowout Road	Non-Perennial	1,705	1,182	-	1,182	0
East Fork South Fork Salmon River (EFSFSR)	BL1.1	Burnt Log Road	Non-Perennial	149	103	-3	93	-10
	BL1.2	Burnt Log Road	Perennial	61	125	-3	106	-19
	BL2	Burnt Log Road	Non-Perennial	626	434	-3	392	-42
	BL2.1	Burnt Log Road	Perennial	105	268	-3	248	-20
	BL2.2	Burnt Log Road	Perennial	85	112	-3	104	-8
	BL2.3	Burnt Log Road	Perennial	89	109	-3	99	-10
	EF0.01	EFSFSR	Perennial	1,307	1,786	-	1,786	0
	EF0.02	EFSFSR	Perennial	6,750	9,225	-	9,225	0
	EF0.03	EFSFSR	Perennial	1,392	1,902	-	1,902	0
	EF0.04	EFSFSR	Perennial	2,836	5,814	-	5,814	0
	EF0.05	EFSFSR	Perennial	5,676	7,758	-	7,758	0
	EF0.06	EFSFSR	Perennial	2,163	4,435	-	4,435	0
	EF0.07	EFSFSR	Perennial	3,498	10,612	-	10,612	0
	EF0.08	EFSFSR	Perennial	2,494	3,512	-	3,304	-208
	EF0.09	EFSFSR	Perennial	5,186	7,303	-	7,303	0
	EF0.10	EFSFSR	Perennial	3,760	7,944	-	7,944	0
	EF0.11	EFSFSR	Perennial	4,167	9,610	-	9,610	0

Table 7-1a. Stream Functional Assessment Impacts in the South Fork Salmon River Drainage								
Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Baseline Stream Length (ft)	Baseline Functional Units	Mine Year of Direct Impact[a]	Functional Units at Maximum Impact	Net Functional Units at Maximum Impact
	EF0.11	EFSFSR	Non-perennial	155	107	-	107	0
	EF0.12	EFSFSR	Perennial	3,458	10,491	-	10,491	0
	EF0.12	EFSFSR	Non-perennial	610	423	-	423	0
	EF0.13	EFSFSR	Non-perennial	1,892	1,312	-	1,312	0
	EF0.14	EFSFSR	Perennial	689	2,091	-	2,091	0
	EF0.15	EFSFSR	Perennial	945	2,867	-	2,867	0
	EF0.15	EFSFSR	Non-perennial	2,024	1,402	-	1,402	0
	EF0.16	EFSFSR	Perennial	2,059	2,814	-	2,814	0
	EF0.17	EFSFSR	Perennial	3,384	10,829	-	10,829	0
	EF0.17	EFSFSR	Non-perennial	2,068	1,433	-	1,433	0
	EF0.18	EFSFSR	Perennial	1,085	3,146	-	3,146	0
	EF0.19	EFSFSR	Perennial	1,400	1,972	-	1,972	0
	EF0.20	EFSFSR	Perennial	2,339	3,196	-	3,001	-195
	EF0.21	EFSFSR	Perennial	684	935	-	935	0
	EF0.23	EFSFSR	Perennial	2,618	3,579	-	3,579	0
	EF1	EFSFSR	Perennial	1,918	6,137	-	6,137	0
	EF1	EFSFSR	Non-Perennial	1,118	775	-3	443	-332
	EF2	EFSFSR	Non-Perennial	5,027	3,484	-2	0	-3,484
	EF2.1	EFSFSR	Perennial	2,175	7,389	-	6,962	-427
	EF2.2	EFSFSR	Perennial	5,869	20,427	-	12,000	-8,427
	EF2.3	EFSFSR	Perennial	127	431	-	406	-25
	EF2.4	EFSFSR	Perennial	447	1,652	-	1,564	-88
	EF2.5	EFSFSR	Perennial	943	3,281	-1	0	-3,281
	EF3	EFSFSR	Non-Perennial	493	342	-1	0	-342
	EF3.1	EFSFSR	Perennial	414	1,402	-1	0	-1402
	EF3.2	EFSFSR	Perennial	514	1,676	-1	1,563	-114
	EF3.3	EFSFSR	Perennial	1,394	5,043	-1	2,916	-2,128
	EF3.4	EFSFSR	Perennial	181	649	-1	0	-649
	EF4.1	EFSFSR	Perennial	520	1,814	-1	1,275	-539
	EF4.2	EFSFSR	Perennial	517	1,931	-	1,809	-122
	EF4.3	EFSFSR	Perennial	1,226	4,574	-	4,285	-289
	PA1	Public Access Route	Non-Perennial	143	99	-	99	0
	ST1	Stibnite Road	Perennial	74	185	-	185	0
	ST1	Stibnite Road	Non-Perennial	464	322	-	322	0
	YP1	Yellow Pine Pit	Perennial	800	2,325	-1	0	-2,325

Table 7-1a. Stream Functional Assessment Impacts in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Baseline Stream Length (ft)	Baseline Functional Units	Mine Year of Direct Impact[a]	Functional Units at Maximum Impact	Net Functional Units at Maximum Impact
Fiddle Creek	FC0.1	Fiddle Creek	Perennial	2,245	3,162	-	3,162	0
	FC0.2	Fiddle Creek	Perennial	3,475	7,342	-	7,342	0
	FC0.3	Fiddle Creek	Perennial	1,376	2,841	-	2,841	0
	FC1	Fiddle Creek	Perennial	4,940	10,197	-	10,197	0
	FC1	Fiddle Creek	Non-Perennial	589	408	-	408	0
	FC2	Fiddle Creek	Perennial	1,691	3,473	-1	1,963	-1510
	FC3	Fiddle Creek	Perennial	386	793	-	738	-55
Garnet Creek	GC0	Garnet Creek	Non-perennial	-	-	-	0	-
	GC0.1	Garnet Creek	Perennial	1,100	1,515	-	1,515	0
	GC0.2	Garnet Creek	Perennial	903	1,229	-	1,229	0
	GC0.3	Garnet Creek	Perennial	191	249	-2	0	-249
	GC1	Garnet Creek	Perennial	1,428	1,943	-2	1,824	-119
	GC1	Garnet Creek	Non-perennial	-	-	-	0	-
	GC2	Garnet Creek	Perennial	-	-	-	0	-
Hennessy Creek	HC0.01	Hennessy Creek	Perennial	3,840	5,345	-	5,289	-56
	HC0.2	Hennessy Creek	Perennial	691	962	-1	837	-125
	HC1.1	Hennessy Creek	Perennial	226	315	-1	0	-315
	HC1.2	Hennessy Creek	Perennial	1,924	2,013	-1	0	-2013
	HC1.3	Hennessy Creek	Perennial	1,515	1,585	-1	0	-1585
	HC1.3	Hennessy Creek	Non-perennial	475	330	-1	0	-330
	HC1.4	Hennessy Creek	Perennial	244	339	-1	0	-339
Johnson Creek	BL3	Burnt Log Road	Perennial	124	172	-3	130	-43
	BL3	Burnt Log Road	Non-Perennial	35	25	-2	19	-6
	BL4	Burnt Log Road	Perennial	1,150	1,634	-2	1,235	-400
	BL5	Burnt Log Road	Perennial	1,235	1,969	-3	1,533	-436
	BL5	Burnt Log Road	Non-Perennial	8,456	5,860	-3	4,928	-932
	JC1	Johnson Creek Road	Perennial	146	343	-	343	0
	JC1	Johnson Creek Road	Non-Perennial	1,804	1,250	-	1,250	0
Meadow Creek	HF1	Hangar Flats	Non-Perennial	-	-	-	0	-
	MC0.01	Meadow Creek	Perennial	2,306	3,276	-	3,276	0
	MC0.02	Meadow Creek	Perennial	2,247	3,193	-	3,193	0
	MC0.02	Meadow Creek	Non-perennial	692	480	-	480	0
	MC0.03	Meadow Creek	Perennial	2,246	3,257	-	3,257	0
	MC0.04	Meadow Creek	Perennial	928	1,385	-	1,385	0
	MC0.05	Meadow Creek	Perennial	1,787	2,665	-	2,665	0
	MC0.06	Meadow Creek	Perennial	1,969	4,405	-	4,405	0
	MC0.7	Meadow Creek	Perennial	210	285	-2	17	-268
	MC0.8	Meadow Creek	Perennial	545	1,135	-2	13	-1,122
	MC0.9	Meadow Creek	Perennial	35	47	-2	23	-24
	MC1.1	Meadow Creek	Perennial	5,049	6,746	-2	2,439	-4,307
	MC1.1	Meadow Creek	Non-Perennial	1,262	875	-2	84	-791
	MC1.2	Meadow Creek	Perennial	3,041	4,273	-2	2,895	-1,378

Table 7-1a. Stream Functional Assessment Impacts in the South Fork Salmon River Drainage

Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Baseline Stream Length (ft)	Baseline Functional Units	Mine Year of Direct Impact[a]	Functional Units at Maximum Impact	Net Functional Units at Maximum Impact
	MC1.3	Meadow Creek	Perennial	2,790	5,774	-2	4,307	-1,467
	MC1.3	Meadow Creek	Non-Perennial	715	496	-2	352	-144
	MC1.31	Meadow Creek	Perennial	-	-	-	0	-
	MC1.4	Meadow Creek	Perennial	3,833	8,270	-2	1,020	-7,250
	MC1.5	Meadow Creek	Perennial	3,278	9,525	-2	2,922	-6,604
	MC1.5	Meadow Creek	Non-Perennial	4,452	3,085	-2	0	-3,085
	MC2	Meadow Creek	Perennial	852	2,516	-2	1,218	-1,299
	MC2	Meadow Creek	Non-Perennial	60	42	-2	0	-42
	MC3	Meadow Creek	Perennial	2,144	5,322	-2	3,819	-1,504
	MC3	Meadow Creek	Non-Perennial	-	-	-	0	-
	MC3.1	Meadow Creek	Perennial	2,038	5,822	-2	343	-5479
	MC3.1	Meadow Creek	Non-Perennial	-	-	-	0	-
	MC4.1	Meadow Creek	Perennial	2,082	4,981	-2	4,313	-669
	MC4.1	Meadow Creek	Non-Perennial	1,315	911	-2	0	-911
	MC4.2	Meadow Creek	Perennial	986	2,475	-	2243	-232
	MC4.2	Meadow Creek	Non-Perennial	2,645	1,833	-1	841	-992
	MC5	Meadow Creek	Perennial	2,583	6,686	-	6,078	-608
	MC6.1	Meadow Creek	Perennial	1,483	3,605	-	3,256	-349
	MC6.2	Meadow Creek	Perennial	874	2,262	-	2,125	-137
Midnight Creek	MN0.1	Midnight Creek	Perennial	2,534	3,463	-	3,463	0
	MN0.2	Midnight Creek	Perennial	1,600	2,096	-1	1,935	-161
	MN0.3	Midnight Creek	Perennial	912	1,195	-1	1,132	-63
	MN0.4	Midnight Creek	Perennial	743	974	-1	863	-111
	MN0.5	Midnight Creek	Perennial	985	1,290	-1	0	-1,290
	MN0.5	Midnight Creek	Non-Perennial	426	295	-1	0	-295
	MN1	Midnight Creek	Perennial	446	585	-1	0	-585
	MN2	Midnight Creek	Perennial	152	193	-1	0	-193
Transmission Line, Misc. Watersheds on South Fork Salmon River	TR1	Transmission Line	Perennial	2,118	3,787	-3	3,440	-347
	TR1	Transmission Line	Non-Perennial	1,200	832	-3	756	-77
	TR2	Transmission Line	Perennial	10,852	16,245	-3	1,4757	-1,488
	TR2	Transmission Line	Non-Perennial	5,494	3,807	-3	3,459	-349
	TR2.1	Transmission Line	Perennial	2,543	3,652	-2	3,521	-131
	TR2.2	Transmission Line	Perennial	724	965	-2	965	0
	TR2.3	Transmission Line	Perennial	398	1,148	-3	1,104	-44
	TR2.4	Transmission Line	Perennial	130	450	-3	417	-33
	TR2.5	Transmission Line	Perennial	381	567	-2	547	-20
	TR2.6	Transmission Line	Perennial	220	541	-2	518	-23
West End Creek	WE1	West End Creek	Non-Perennial	3,189	2,210	-	2,210	0
	WE2.1	West End Creek	Non-Perennial	919	637	-1	637	0
	WE2.2	West End Creek	Non-Perennial	2,222	1,540	-1	0	-1,540
	WE3.1	West End Creek	Perennial	13	39	-1	0	-39

Table 7-1a. Stream Functional Assessment Impacts in the South Fork Salmon River Drainage								
Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Baseline Stream Length (ft)	Baseline Functional Units	Mine Year of Direct Impact[a]	Functional Units at Maximum Impact	Net Functional Units at Maximum Impact
	WE3.1	West End Creek	Non-Perennial	687	476	-1	476	0
	WE3.2	West End Creek	Perennial	72	106	-1	0	-106
	WL1	West End Lake	Perennial	-	-	-	0	-
Total				**240,940**	**399,361**	**NA**	**NA[b]**	**NA[b]**

[a] *Where a direct impact year does not occur, but there are losses to Functional Units these losses are associated with indirect impacts.*

[b] *Functional Units at maximum impact and net Functional Units at maximum impact are not summed as these maximum impacts occur in various mine years.*

– = no impact

Table 7-1b. Stream Functional Assessment Impacts in the North Fork Payette River Drainage								
Watershed	Assessment Area ID	SFA Area Trunk Stream Name	Channel Type	Baseline Stream Length (ft)	Baseline Functional Units	Mine Year of Direct Impact	Functional Units at Maximum Impact	Net Functional Units at Maximum Impact
North Fork Payette River	TR3	Transmission Line	Perennial	4,361	11,967	-1	10,871	1,096
	TR3	Transmission Line	Non-Perennial	15,008	10,401	-1	9,448	953
Total				**19,369**	**22,368**	**NA**	**20,319**	**2,049**

7.2 Wetland Functional Assessment and Direct Impacts

The MWAM produces a unitless numeric value for each AA analyzed via the process. This numeric value is multiplied by the acreage of the AA to produce a functional unit. Through this process, acres of wetlands within the AA that are disturbed can be converted to functional units of wetlands that are lost and would need to be replaced via the compensatory mitigation process. Likewise, the same MWAM methodology can be used to create a unitless numeric value for wetlands that are enhanced, restored or created to satisfy compensatory mitigation. The functional units generated via this process can be used to compensate for those that are impacted by Project disturbance.

To account for and track the impacted functional units and those that are part of the compensatory mitigation process, Perpetua Resources developed a comprehensive spreadsheet "Wetland Ledger" that accounts for each wetland delineated across the Project site (also see Section 6.1.4) and off-site areas and the functional units associated with each of those wetlands. This spreadsheet also accounts for the functional units that are predicted to be associated with the restored wetlands across the Mitigation Area (Tetra Tech 2021f). Hereafter, this spreadsheet will be referred to as the wetland functional assessment ledger (ledger). The ledger provides the total wetland debits and total wetland credits data. It provides snapshot data of impacts and restoration, using existing data sources including wetland delineations and functions and values assessments. The ledger also shows annual and cumulative gains and losses in function and acreage over the life of the mine project.

Tables 7-2a and **7-2b** are a summary of the acres of wetlands anticipated to be directly and permanently impacted, the baseline function impact score, and the total wetland functional units

arranged by AA number and name in the South Fork Salmon River and the North Fork Payette River subbasins, respectively.

Table 7-2a. Wetland Functional Assessment Impacts in the South Fork Salmon River Subbasin

Assessment Area (AA) Number	AA Name	Total Impacted Wetland Area (acres)	Baseline Function Impacted	Total Impacted Wetland Functional Units
1	Upper Meadow Creek	52.09	6.70	349.03
2	Upper Meadow Creek Seeps	3.32	5.45	18.08
3	Lower Meadow Creek	33.94	4.50	152.71
4	Lower Meadow Creek Seeps	4.25	5.60	23.81
5	East Fork Meadow Creek	0.10	4.30	0.44
6	EFSF Valley	16.24	5.60	90.97
7	Fiddle Creek	0.91	5.35	4.85
8	Hennessy Creek	0.70	4.20	2.96
9	Midnight Creek	1.28	2.90	3.70
10	West End Creek	0.66	2.70	1.79
11	Burntlog	7.06	3.90	27.53
12	Riordan Road Alternative and Powerline Corridor	0.24	4.20	1.00
13	Johnson Creek Road Alternative	0.95	4.70	4.48
14	Cabin Trout	0.32	5.50	1.76
15	Upper EFSFSR	0.90	6.70	6.03
19	Yellow Pine Pit	0.07	5.70	0.39
*	Transmission Line Wetland Type Conversion PFO to PEM	4.50	2.55	11.49
*	Transmission Line Wetland Type Conversion PSS to PEM	2.09	1.00	2.09
TOTAL IMPACT		**143.26**	–	**706.51**

**Assessment Area Number not given for the Conversion AA Type.*

EFSFSR = East Fork of the South Fork of the Salmon River

Table 7-2b. Wetland Functional Assessment Impacts in the North Fork Payette River Subbasin

Assessment Area (AA) Number	AA Name	Total Impacted Wetland Area (acres)	Baseline Function Impacted	Total Impacted Wetland Functional Units
17	Transmission Line and Warm Lake	1.07	5.70	6.09
18	Transmission Line – Valley	0.60	4.95	2.98
*	Transmission Line Wetland Type Conversion PFO to PEM	0.48	1	0.48
*	Transmission Line Wetland Type Conversion PSS to PEM	5.03	0.25	1.26
TOTAL IMPACT		**7.18**		**10.81**

**Assessment Area Number not given for the Conversion AA Type.*

Section 8

Temporal Impact Analysis

Perpetua Resources plans for conventional open pit mining operations at the Project for 12 years based on environmental, technical, and economic assessments of alternatives. Mining would be preceded by a 3-year construction period for power and road access, ore-processing facilities, support facilities, water diversions around all mine facilities, and pre-stripping. Closure, reclamation, and monitoring activities will be completed on an area by area basis at the end of mining operations. Mining and mineral processing will entail open pit mining; ore processing; recovery of gold, silver, and antimony; placement of neutralized tailings in a composite-lined TSF; and development rock placement in fully engineered and designed DRSFs.

Due to the nature of the mineral deposits, topography, and mining/mineral processing economics, not all resources will be mined concurrently, nor will all DRSFs be operated throughout mine life. This enables stream and wetland restoration to occur as soon as practicable after a facility or portion of a facility is no longer required rather than awaiting overall site closure. Similarly, the TSF will be expanded as needed to keep up with mine production, rather than built all at once, delaying impacts to forests, streams, and wetlands.

A key feature of the mine plan relating to stream and wetland restoration is the pit sequencing. The Yellow Pine pit will be mined first, followed by Hangar Flats pit, with West End pit last. It should be noted that this overall sequence will also include several years of overlap in mining activity between pits. This allows backfilling of Yellow Pine pit with development rock from West End, allowing restoration of the EFSFSR over the backfill after approximately Year 10 of mining when the Yellow Pine pit is fully backfilled. Similarly, Hangar Flats pit will be backfilled by Year 8 of mining, then will be occupied by material stockpiles until approximately Year 17 after which a series of non-perennial streams and a large wetland will be restored over its surface. A geosynthetic stream liner will separate the stream and wetland materials from underlying development rock and groundwater.

To facilitate mining of Yellow Pine pit and to open the upper watershed to fish passage, the EFSFSR will be diverted around the west side of the pit in a tunnel developed during initial project construction (**Figure 1-4**). The tunnel will be designed to facilitate fish passage, restoring natural anadromous fish and migratory fish species access to the upper EFSFSR and Meadow Creek. The presence of the tunnel also allows control of river flow during initial establishment of riparian vegetation along the restored EFSFSR, reducing the risk of losing new plantings to a flood within the first year or two following restoration.

Figure 8-1 is a summary of the proposed construction schedule for stream restoration implementation as it relates to key benchmarks in the mine sequence. The beginning of mining operations is identified as Year 1. Operations will run through Year 14, followed by a closure phase, which will last at least 8 years. Elements occurring prior to mining operations are shown in sequential negative years (there is no Year 0), while elements occurring after the initiation of mining operations are shown in sequential positive years. Many elements can be implemented across a range of time; therefore, for simplicity, the earliest possible timing has been assumed for all elements. Elements occurring within a given year are said to have occurred before the end of the year. For that reason, each year demarcation is identified as “End of Year” (or EOY). Compensatory yearly development figures are provided in **Appendix C** (Tetra Tech 2021b).

Project Tasks and Activities	Year -4	Year -3	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Year 40	Year 41
Baseline = Existing Conditions																																													
EOY -4 •																																													
Pre-Production and Construction: 3 years																																													
EOY -3 • No significant stream alterations																																													
EOY -2 • Existing Garnet Creek diversion extended around plant site; restored downstream of plant site • Begin construction of EFSFSR fish tunnel around Yellow Pine pit (up to approximately 2 years to build) • Divert Meadow Creek and tributaries around TSF and TSF buttress area including low-flow pipes to moderate temperature																																												
EOY -1 • Fiddle Creek piped beneath growth media stockpile • Midnight Creek diverted into EFSFSR upstream of the tunnel, and Hennessy Creek diverted into Fiddle Creek • EFSFSR tunnel and associated fishway completed; EFSFSR diverted into tunnel and Yellow Pine pit lake dewatering begins • Upper Midnight Creek placed in pipe under the West End ADT road • West End Creek diverted around West End pit • Enhancement in EFSFSR (excluding Yellow Pine pit) and the lower portion of Meadow Creek • Sediment control and rock drain constructed on East Fork Meadow Creek (Blowout Creek)																																												
Mining Operations: 14 years																																													
EOY 1 • Upper Blowout Creek meadow, groundwater table, and associated wetlands restored																																													
EOY 2 • No significant stream alterations																																													
EOY 3 • Divert Meadow Creek into a restored channel around Hangar Flats pit footprint and downstream approximately 1,000 feet • Restore the lower section of Blowout Creek (downstream of the rock drain) to its new confluence with Meadow Creek																																												
EOY 4 – EOY 5 • No significant stream alterations • Yellow Pine pit backfill begins in EOY 5																																												
EOY 6 – EOY 7 • Hangar Flats pit backfilled																																													
EOY 8 • Midnight pit backfilled																																													
EOY 9 • No significant stream alterations																																													
EOY 10 • Yellow Pine pit backfill completed • Yellow Pine pit backfill surface preparation for stream liner and placement of floodplain material and growth media • Construct West End Lake overflow channel																																												
EOY 11 • Yellow Pine pit stream restoration including EFSFSR, Hennessy Creek, and Midnight Creek • Flow restored to EFSFSR and Hennessy Creek over the Yellow Pine backfill • EFSFSR diversion tunnel inactive w/ option to divert extreme high flows through tunnel to protect riparian vegetation development • Stibnite Lake fills and spills																																												
EOY 12 • Pipe removed from upper Midnight Creek ADT roads and stream segment restored																																												
EOY 13 • Flow restored to lower Midnight Creek including restored stream over Yellow Pine pit backfill • Remaining road crossings removed and remaining portions of Midnight Creek restored (upstream of Yellow Pine pit) • Removal of diversion around West End pit • West End Lake begins to fill; not expected to spill except possibly in extreme runoff																																												
EOY 14 • No significant stream alterations																																												
Closure: 8+ years																																													
EOY 15 • Final tailings deposited into TSF; TSF allowed to consolidate before placing stream liner and growth media • EFSFSR diversion tunnel deactivated • Plant site and ancillary facilities decommissioning/reclamation begins																																												
EOY 16 • No significant stream alterations																																												
EOY 17 • Non-perennial streams restored on TSF buttress • Stockpiles used up from Hangar Flats stockpile area; non-perennial streams and wetlands restored over the backfilled pit																																												
EOY 18 • Meadow Creek restored from toe of TSF buttress to previously restored channel around Hangar Flats footprint																																												
EOY 19 – EOY 23 • Meadow Creek surface prep for stream liner; placement of floodplain material and growth media atop TSF and TSF buttress • TSF contact water collection basins installed outside of Meadow Creek floodplain corridor; treated contact water discharged to non-perennial streams on TSF buttress draining to restored wetland on backfilled Hangar Flats pit																																												
EOY 23 • Plant site decommissioning completed • Garnet Creek and associated wetland restored through decommissioned plant site • Meadow Creek stream restoration at TSF and TSF buttress completed; restore perennial flow into new Meadow Creek channel and deactivate low-flow pipes in Meadow Creek diversions • Maintain former Meadow Creek diversions for non-perennial hillslope runoff to reduce volume of TSF contact water																																												
EOY 24 • Fiddle Creek restored after growth media stockpile removed																																												
EOY 25 – EOY 39 • No significant stream alterations																																												
EOY 40 • End water treatment																																												
EOY 41 • TSF contact water collection basins deactivated; Meadow Creek non-perennial diversions fully decommissioned, and non-perennial streams restored on TSF • Water treatment plant decommissioned and water treatment plant site reclaimed																																												

Figure 8-1. Timeline and Milestones for Reclamation and Mitigation

8.1 Disturbance Sequence for Stream Impacts

As described in Section 1.2, this version of the CMP assumes all streams are jurisdictional. The final CMP will include the USACE-issued AJD for all impacted WOTUS within the proposed Project disturbance footprint.

Impacts are listed temporally by when the impact is anticipated in mine life years and includes the linear feet and functional units, including their cumulative total, anticipated to be permanently impacted. The functional units anticipated to be restored and the cumulative total are also included (**Tables 8-1a** and **8-1b**).

Stream function lost as a result of unavoidable impacts (i.e., debits) from the SGP would be offset by mitigation (i.e., credits) as summarized below in Section 9.1. Perpetua Resources has proposed several early on-site mitigation efforts in an effort to offset unavoidable project impacts. These early mitigation efforts include:

- Restore passage to anadromous and migratory fish at Yellow Pine pit via the proposed tunnel fishway.
- Restore stream and wetland function to the upper Blowout Creek meadow.
- Restore stream function by stabilizing slopes in the lower Blowout Creek gully.
- Enhance habitat in portions of the EFSFSR not directly impacted by the SGP by placing large woody debris and boulder clusters along with pool excavation.

Over 99 percent of stream impacts would occur during the 3 years of construction based on direct, initial impacts to baseline stream length. Additional small-scale indirect impacts would occur in several reaches following the initial impact as illustrated in **Table 8-1a**. Stream restoration is anticipated to begin in conjunction with mine construction and continue in phases throughout the mine life to be largely completed within 10 years of closure. Two non-perennial stream channels would not be fully restored near the Hangar Flats backfill until after TSF water treatment has concluded approximately 18 years later.

Table 8-1a. Impacts and Restoration of Streams During Mine Life in the South Fork Salmon River Drainage

Mine Life Years		Total Stream Length of Direct Impacts (LF)	Cumulative Total Stream Length Direct Impacts (LF)	Total Stream Functional Units Impacted	Cumulative Total Stream Functional Units Impacted	Total Streams Restored (LF)	Cumulative Total Streams Restored (LF)	Stream Functional Units Restored	Cumulative Stream Functional Units Restored	Cumulative Net Functional Units From Baseline
Construction	-3	32,239	32,239	-16,180	-16,180	10,442	10,442	25,900	25,900	9,720
	-2	45,399	77,638	-32,686	-48,866	10,442	20,884	32,083	57,983	9,117
	-1	26,956	104,594	-28,552	-77,418	12,368	33,252	32,024	90,007	12,589
Operation	1	-	104,594	-139	-77,557	2,097	35,349	1,414	91,420	13,864
	2	-	104,594	-734	-78,291	-	35,349	1,902	93,322	15,032
	3	351	104,945	-1,124	-79,414	6,021	41,370	2,155	95,477	16,063
	4	-	104,945	-927	-80,341	-	41,370	227	95,704	15,363
	5	-	104,945	-29	-80,370	-	41,370	2,802	98,506	18,137
	6	-	104,945	-3,630	-84,000	-	41,370	419	98,925	14,925
	7	-	104,945	-336	-84,335	-	41,370	801	99,726	15,391
	8	-	104,945	-66	-84,401	-	41,370	2,951	102,677	18,276
	9	-	104,945	-1,696	-86,097	-	41,370	675	103,352	17,255
	10	-	104,945	-440	-86,537	828	42,198	108	103,460	16,923
	11	-	104,945	-6,957	-93,493	9,555	51,753	12,900	116,360	22,867
	12	-	104,945	-102	-93,595	2,512	54,264	1,844	118,204	24,609
	13	-	104,945	-2,828	-96,423	6,394	60,658	5,854	124,058	27,635
	14	-	104,945	-237	-96,660	-	60,658	66	124,123	27,464
Post Operation/ Closure	15	-	104,945	-1,644	-98,304	-	60,658	1,167	125,290	26,986
	16	-	104,945	-33	-98,336	-	60,658	0	125,290	26,954
	17	-	104,945	-145	-98,481	3,589	64,247	6,840	132,130	33,649
	18	-	104,945	-2,497	-100,978	25,657	89,904	3,355	135,484	34,507
	19	-	104,945	-348	-101,326	-	89,904	390	135,874	34,548
	20	-	104,945	-96	-101,421	-	89,904	1,951	137,825	36,404
	21	-	104,945	-30	-101,451	-	89,904	97	137,921	36,471
	22	-	104,945	-1,107	-102,557	-	89,904	657	138,578	36,021
	23	-	104,945	-6,828	-109,385	32,227	122,131	38,231	176,809	67,424
	24	-	104,945	0	-109,385	1,798	123,929	14,970	191,779	82,394
	25	-	104,945	-36	-109,421	1,212	125,140	730	192,509	83,088
	26	-	104,945	0	-109,421	4,176	129,316	1,522	194,031	84,610

Notes: EOY -1 includes the reduction in length associated with the restoration of BC2.1 and EOY 3 includes the reduction in length associated with the restoration of MC4.2. These two things were added manually.

[a] *It is possible that an impact can result in a positive change in functional units if the length is significantly greater. This table makes the assumption that a negative change in functional units for a given year is associated with an impact while a positive change in functional units is associated with restoration.*

[b] *Due to temporal impacts (temperature, hydrology, etc.) reduction or gain in functional units are observed as an indirect impact and occur both on the impact and restoration side even when direct impacts are not occurring. This is seen in a specific year when the length impacted or restored is zero, but there still exists and change in functional units.*

[c] *Off-site mitigation has been included in the table during Mine Years -3 and -2 with 50% of the length and functional units applied to each year given the expectation for 2 years of construction.*

– = no impact; LF = linear feet

Table 8-1b. Impacts and Restoration of Streams During Mine Life in the North Fork Payette River Drainage

Mine Life Years		Total Stream Length of Direct Impacts (LF)	Cumulative Total Stream Length Direct Impacts (LF)	Total Stream Functional Units Impacted	Cumulative Total Stream Functional Units Impacted	Total Streams Restored (LF)	Cumulative Total Streams Restored (LF)	Stream Functional Units Restored	Cumulative Stream Functional Units Restored	Cumulative Net Functional Units From Baseline
Construction	-3	-	0	0	0	-	0	0	0	0
	-2	-	0	0	0	-	0	0	0	0
	-1	6,924	6,924	-2,049	-2,049	17,990	17,990	14,901	14,901	12,853
Operation	1	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	2	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	3	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	4	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	5	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	6	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	7	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	8	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	9	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	10	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	11	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	12	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	13	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	14	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
Post Operation/ Closure	15	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	16	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	17	-	6,924	0	-2,049	-	17,990	0	14,901	12,853
	18	-	6,924	0	-2,049	6,924	24,914	0	14,901	12,853
	19	-	6,924	0	-2,049	-	24,914	0	14,901	12,853
	20	-	6,924	0	-2,049	-	24,914	0	14,901	12,853

Table 8-1b. Impacts and Restoration of Streams During Mine Life in the North Fork Payette River Drainage										
Mine Life Years		Total Stream Length of Direct Impacts (LF)	Cumulative Total Stream Length Direct Impacts (LF)	Total Stream Functional Units Impacted	Cumulative Total Stream Functional Units Impacted	Total Streams Restored (LF)	Cumulative Total Streams Restored (LF)	Stream Functional Units Restored	Cumulative Stream Functional Units Restored	Cumulative Net Functional Units From Baseline
	21	-	6,924	0	-2,049	-	24,914	0	14,901	12,853
	22	-	6,924	0	-2,049	-	24,914	0	14,901	12,853
	23	-	6,924	0	-2,049	-	24,914	0	14,901	12,853
	24	-	6,924	0	-2,049	-	24,914	0	14,901	12,853
	25	-	6,924	0	-2,049	-	24,914	0	14,901	12,853
	26	-	6,924	0	-2,049	-	24,914	0	14,901	12,853

Notes:

[a] *It is possible that an impact can result in a positive change in functional units if the length is significantly greater. This table makes the assumption that a negative change in functional units for a given year is associated with an impact while a positive change in functional units is associated with restoration.*

[b] *Due to temporal impacts (temperature, hydrology, etc.) reduction or gain in functional units are observed as an indirect impact and occur both on the impact and restoration side even when direct impacts are not occurring. This is seen in a specific year when the length impacted or restored is zero, but there still exists and change in functional units.*

[c] *Restoration associated with the transmission route nets no increase from the impacted condition due to the assumptions that the WCI associated with habitat conditions (LWD, pools, etc.) would not be recreated until the fully recovered condition.*

[d] *Off-site mitigation has been included in the table during Mine Year -1.*

– = no impact; LF = linear feet

8.2 Disturbance Sequence for Wetland Impacts

As described in Section 1.2, this version of the CMP assumes all impacted wetlands to be jurisdictional. The final CMP will include the USACE-issued AJD for all impacted WOTUS within the proposed project disturbance footprint.

Impacts are listed in **Tables 8-2a** and **8-2b** temporally by when the impact is anticipated in mine plan years and includes the acreage and functional units, including their cumulative total, anticipated to be permanently impacted. The functional units anticipated to be restored and the cumulative total are also included (**Tables 8-2a** and **8-2b**). These temporal impacts occur given the lag time from impact (early in the mining process) to mitigation (late in the mining process). Additional compensation for these temporal impacts is further described in Section 9.2.3. There will be no temporal loss of functions and values for impacted wetlands in the North Fork Payette River subbasin as those wetland impacts will be compensated for in the Salmon Meadows Wetland Mitigation Bank.

Approximately 67 percent of wetland impacts will occur during the 3 years of construction with the remaining 33 percent in the first 7 years of operation. Restored wetlands construction is anticipated to begin in the first year of operation (6 percent), another 10 percent will be completed in operational years 7 and 8, with the remainder occurring in operational year 11 and beyond.

Table 8-2a. Impacts and Restoration of Wetlands During Mine Life in the South Fork Salmon River Drainage									
Mine Life Years		Acres of Wetlands Permanently Impacted	Cumulative Total of Wetland Acres Impacted	Wetland Functional Units Impacted	Cumulative Total of Wetland Functional Units Impacted	Wetland Functional Units Restored	Cumulative Total of Wetland Functional Units Restored	Acres of Wetlands Restored	Cumulative Total of Wetland Acres Restored
Construction	-3	23.50	23.50	100.60	100.60	–	–	–	–
	-2	79.75	103.25	421.90	522.50	–	–	–	–
	-1	21.53	124.78	97.07	619.57	–	–	–	–
Operation	1	0.03	124.81	0.17	619.74	15.39	15.39	8.64	8.64
	2	5.20	130.01	23.53	643.27	–	15.39	–	8.64
	3	10.89	140.90	49.17	692.43	118.20	133.59	15.26	23.91
	4	1.90	142.80	12.76	705.19	38.36	171.95	4.96	28.87
	5	–	142.80	–	705.19	–	171.95	–	28.87
	6	–	142.80	–	705.19	–	171.95	–	28.87
	7	–	142.80	–	705.19	–	171.95	–	28.87
	8	–	142.80	–	705.19	–	171.95	–	28.87
	9	–	142.80	–	705.19	–	171.95	–	28.87
	10	0.46	143.26	1.33	706.51	–	171.95	–	28.87
	11	–	143.26	–	706.51	152.47	324.42	19.82	48.69
	12	–	143.26	–	706.51	–	324.42	–	48.69
	13	–	143.26	–	706.51	–	324.42	–	48.69
	14	–	143.26	–	706.51	–	324.42	–	48.69
Post Operation/ Closure	15	–	143.26	–	706.51	–	324.42	–	48.69
	16	–	143.26	–	706.51	–	324.42	–	48.69
	17	–	143.26	–	706.51	266.09	590.51	37.06	85.75
	18	–	143.26	–	706.51	232.01	822.52	30.23	115.98
	19	–	143.26	–	706.51	–	822.52	–	115.98
	20	–	143.26	–	706.51	–	822.52	–	115.98
	21	–	143.26	–	706.51	–	822.52	–	115.98
	22	–	143.26	–	706.51	–	822.52	–	115.98

Table 8-2a. Impacts and Restoration of Wetlands During Mine Life in the South Fork Salmon River Drainage

Mine Life Years		Acres of Wetlands Permanently Impacted	Cumulative Total of Wetland Acres Impacted	Wetland Functional Units Impacted	Cumulative Total of Wetland Functional Units Impacted	Wetland Functional Units Restored	Cumulative Total of Wetland Functional Units Restored	Acres of Wetlands Restored	Cumulative Total of Wetland Acres Restored
	23		143.26	–	706.51	819.15	1641.67	113.52	229.50
	24		143.26	–	706.51	20.10	1661.77	2.61	232.11
	25		143.26	–	706.51	36.47	1698.24	4.89	237.00
	26		143.26	–	706.51	–	1698.24	–	237.00

– = 0

Table 8-2b. Impacts and Restoration of Wetlands During Mine Life in the North Fork Payette River Drainage

Mine Life Years		Acres of Wetlands Permanently Impacted	Cumulative Total of Wetland Acres Impacted	Wetland Functional Units Impacted	Cumulative Total of Wetland Functional Units Impacted	Wetland Functional Units Restored	Cumulative Total of Wetland Functional Units Restored	Acres of Wetlands Restored	Cumulative Total of Wetland Acres Restored
Construction	-3	0.79	0.79	4.49	4.49	4.49	4.49	0.79	0.79
	-2	3.14	3.93	2.32	6.81	2.32	6.81	3.14	3.93
	-1	3.26	7.18	4.01	10.81	4.01	10.81	3.26	7.18

– = 0

Section 9

Mitigation Work Plan

This section provides a general description of the CMP at the Mitigation Area, per 33 CFR 332.4(c)(7). The CMP includes stream and wetland restoration within the on-site Mitigation Area and the off-site mitigation areas based on the goals and objectives described in Section 3 and the site selection criteria provided in Section 4.

The conceptual designs (draft plans) supporting this mitigation work plan and CMP are final pending refinement during implementation (Appendix D). The draft plans provide specifications and work descriptions for the compensatory mitigation, including, but not limited to, the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; vegetation planting prescriptions by zone; typical cross section drawings; grading plans, soil management; and erosion control measures.

The draft plans, will be finalized for construction at a future date. Perpetua Resources will document any deviations from the draft plans and provide the USACE with any changes that affect the anticipated stream or wetland functional units resulting from those changes.

9.1 Streams Mitigation Work Plan

The stream design approach has followed a sequence of coarse- to fine-scale development. The coarse-scale analysis initiated with the PRO (Midas Gold 2016). Perpetua Resources compiled a stream design team including specialists in engineering, geomorphology, fisheries biology, riparian ecology, and wetland ecology to refine the stream design concepts from the PRO. Each stream within the Project site was divided into design reaches based on proposed valley gradient, fish use, and hydrology. Reference sites were identified and evaluated (Rio ASE 2021a). Design criteria, including proposed channel geometries, were developed for each reach based on evidence derived from (1) geographic information system and field measurements from reference sites, (2) empirical formulae developed from local and regional data, and (3) published design guidelines available in the scientific literature. Refinements to post-mining-topography (primarily changes to valley slope and width) were made to improve the intrinsic potential and associated habitat conditions within select reaches where possible. The channel geometry and reach-specific design criteria were revised then evaluated using standard at-a-station hydraulic calculations to ensure appropriate sediment transport and physical habitat conditions would be achieved.

The reach-specific design criteria were then applied to a design template illustrating the reach plan view, a representative meander plan and profile, and representative cross sections. From these plans, design quantities were calculated to quantify construction costs as well as proposed habitat functional value using WCIs for comparison with baseline conditions (Rio ASE 2023). Typical bank treatments and in-channel features (i.e. large woody debris, log jams, boulder clusters, and pools) were developed to support the design criteria, provide habitat diversity, and facilitate bank stabilization until riparian vegetation becomes established. Finally, a generalized revegetation and planting plan was developed for specific riparian, wetland, and upland zones to improve long-term bank stability, woody debris recruitment, overhead cover, shade, terrestrial/wetland habitat, and soil productivity.

The SGP stream design has been developed to approximate a geomorphically appropriate quasi-equilibrium state, while enabling each stream reach to evolve naturally over time in response to changing environmental drivers and potential future disturbances (i.e., fire, climate change, etc.). Built into the SGP stream design are a diversity of treatments and channel prescriptions allowing a certain amount of variability and associated uncertainty in the channel response over time. For example, by using appropriate streambed, bank, and floodplain materials; allowing channels to migrate across appropriately sized floodplains; incorporating horizontal and vertical control at strategic locations; and incorporating bioengineered bank stabilization treatments and revegetation, the design mimics the stability and diversity observed in natural reference streams. This approach provides some amount of resilience to disturbances and sets the project up for long-term resiliency and sustainability.

Water quality (sediment, temperature, nutrients) and aquatic habitat (runs, riffles, pools, cover) would be improved within stream segments that are tributaries to the EFSFSR. Within topographic constraints, Perpetua Resources would design each stream profile gradient and channel configuration to promote development and maintenance of a coarse (gravel/cobble) substrate while maintaining a stable planform and profile.

Appendix D illustrates the restoration design reaches for streams and wetlands. Refer to Rio ASE (2021a) for detailed stream design documentation, including associated hydrology details in Appendix C of the Stream Design Report.

9.1.1 Stream Restoration Summary for Direct Impacts

Design reaches were delineated per stream based on hydrology (confluence with major tributary) and significant changes in proposed channel gradient (Rio ASE 2021a). Each reach is identified in **Table 9-1** along with its associated mine feature, length, and associated functional units. The location of each proposed reach in relation to prominent mine features is shown in **Figure 9-1**. Transition channels are areas where the stream would be recontoured to match the existing grade and slopes, resulting in post-restoration stream length identical to the baseline length (Rio ASE 2023). The transitional channels are depicted on **Figure 9-1**.

Table 9-1. Stream Restoration Reaches

Drainage	Mine Feature	Reach ID	EOY Restored	Location	Total Perennial Stream Length (LF)	Total Non-Perennial Stream Length (LF)	Total Stream Length (LF)	Associated Stream Functional Units
Meadow Creek	TSF	MC1a	23	Southernmost branch of creek on TSF	6,179	1,968	8,147	8,698
		MC1b	23	Middle branch of creek on TSF	3,015	0	3,015	3,790
		MC1c	23	Northern branch of creek on TSF	4,375	515	4,890	8,245
		MC1d	23	Trunk stream between middle branch and northern branch on TSF	3,001	0	3,001	5,144
		MC1e	23	Trunk stream below confluence of northern branch on TSF	4,163	6,962	11,125	15,862
	Hangar Flats DRSF (top)	MC2	23	Area on DRSF Upstream of chute	1,839	0	1,839	4,760
	Hangar Flats DRSF (face)	MC3	23	Chute on face of DRSF	2,880	6,703	9,583	10,290
	Hangar Flats DRSF (toe)	MC4	18	Between Chute and Blowout Creek	3,512	1,870	5,382	11,105
	Hangar Flats Pit	MC5	3	Blowout Creek to below Hangar Flat wetland	2,779	3,589	6,368	11,010
	Hangar Flats Pit	MC6	3	Restoration and enhancement downstream of Hangar Flats pit	2,514	0	2,514	7,007
Blowout Creek	Blowout Creek (Meadow)	BC1	1	Meadow channel upstream of boulder chute	2,097	0	2,097	2,753
	Blowout Creek (Boulder chute)	BC2	23	Steep channel between meadow and alluvial fan	2,668	0	2,668	3,154
	Blowout Creek (Toe of fan)	BC3	3	Alluvial fan area of Blowout Creek to confluence with Meadow Creek	685	0	685	989
EFSFSR	Yellow Pine Pit (Enhancement Reach)	EF2	-1	Section upstream of Yellow Pine pit restoration reach	9,561	0	9,561	35,354
	Yellow Pine Pit (Backfill area)	EF3	11	Final stream segment replacing the temporary tunnel	4,103	1,952	6,056	16,475
	Yellow Pine Pit (Enhancement Reach)	EF4	11	Section downstream of Yellow Pine pit restoration reach	2,264	0	2,264	8,395
Fiddle Creek	Fiddle DRSF (Growth media stockpile)	FC2	24	Restoration where growth media stockpile was located	1,798	0	1,798	1,963
Midnight Creek	Yellow Pine Pit (Backfill area)	MNC1	13	Steep reach above EFSFSR floodplain	3,053	0	3,053	3,736
	Yellow Pine Pit (Backfill area)	MNC2	13	Channel on top of EFSFSR floodplain	863	0	863	1,172
Hennessy Creek	Yellow Pine Pit (Highwall)	HC1	11	Cascade over edge of Yellow Pine pit	969	0	969	1,180
	Yellow Pine Pit (Backfill area)	HC2	11	Channel on top of EFSFSR floodplain	1,067	0	1,067	1,295
Garnet Creek	Processing Facility	GC1	23	Restoration through the plant site	3,992	1,185	5,177	5,858
West End Creek	West End pit Face	WE2	13	Restoration upstream of pit within mining disturbance	0	934	934	647
	West End Lake	WL1	13	West End pit	1,279	0	1,279	1,876
	West End pit (lower)	WE3	10	Downstream of West End pit within mining disturbance area	0	756	756	524

Table 9-1. Stream Restoration Reaches

Drainage	Mine Feature	Reach ID	EOY Restored	Location	Total Perennial Stream Length (LF)	Total Non-Perennial Stream Length (LF)	Total Stream Length (LF)	Associated Stream Functional Units
SF Salmon Off-Site Mitigation			-2	Lemhi River (Snyder Ranch)	20,884	0	20,884	51,800
Payette River Off-Site Mitigation			-1	SF Payette River Fish Passage Culvert Replacement (Hargrave Creek and Big Creek)	17,990	0	17,990	14,901
TOTAL					**107,531**	**26,434**	**133,964**	**237,978**

Columns and rows may not sum exactly due to rounding.

DRSF = development rock storage facility; EFSFSR = East Fork of the South Fork of the Salmon River; EOY = end of year; LF = linear feet; TSF = Tailings Storage Facility

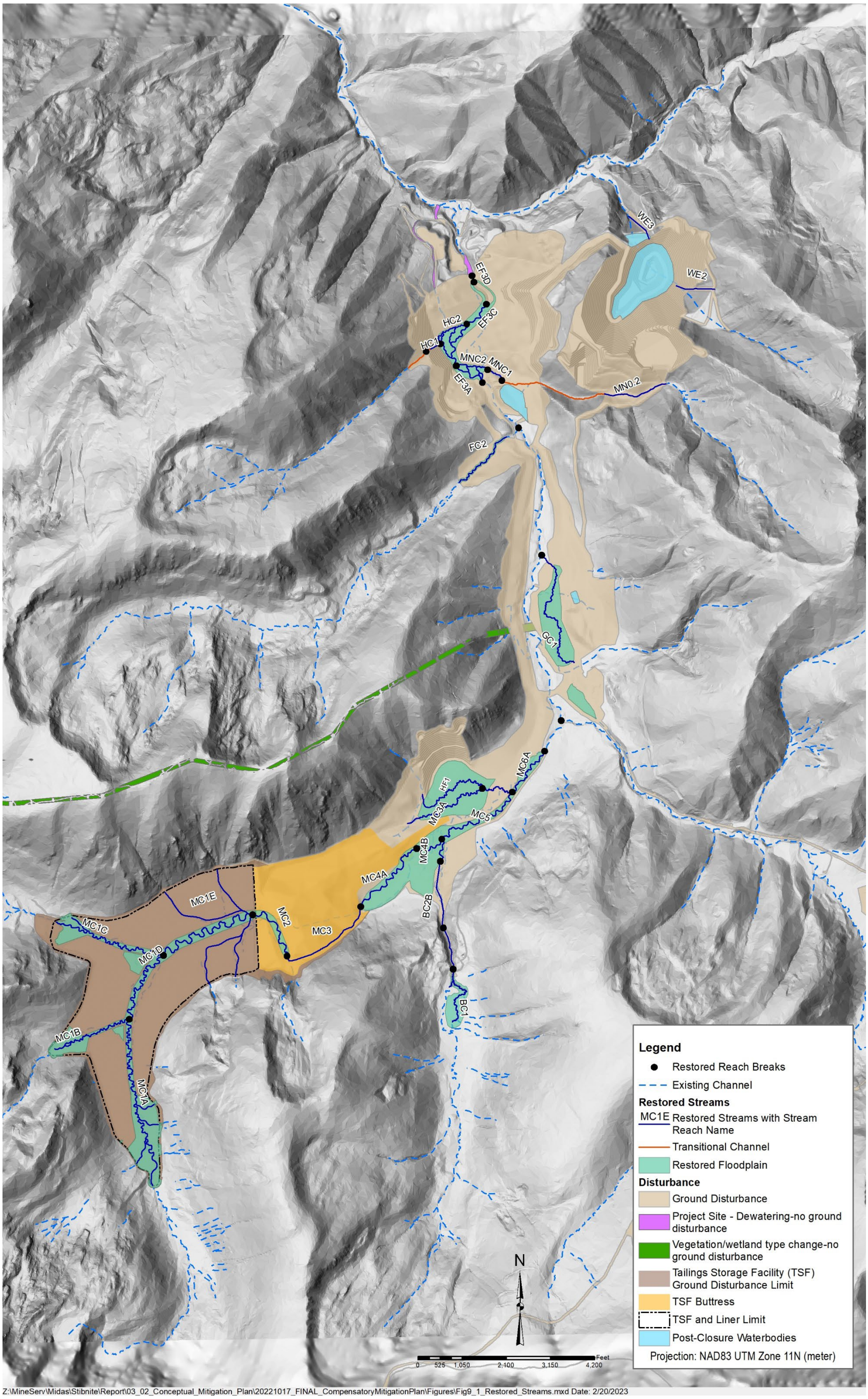

Figure 9-1. Stream Restoration Reaches

9.1.2 Stream Restoration Summary for Temporal Impacts

9.1.2.1 Upper Salmon River Subbasin

Perpetua Resources has evaluated additional on-site and off-site mitigation measures to account for the predicted temporal loss of stream function described above in Section 7.1. Additional on-site mitigation opportunities consisted of small and relatively insignificant actions that would not offset the predicted temporal losses, or the actions potentially overlapped with ongoing Administrative Settlement Agreement and Order on Consent removal actions coordinated with the EPA and the USFS. As a result, Perpetua Resources evaluated off-site mitigation options within the Project Area subbasin (South Fork Salmon River). Insufficient off-site mitigation actions were identified within the South Fork Salmon River subbasin. Additionally, many of the actions identified had an associated high degree of uncertainty related to scope, scale, and schedule, suggesting a low probability of successfully offsetting the predicted temporal losses from the SGP. Off-site mitigation options were therefore expanded to the entire Salmon River basin, upon which a single project with a high likelihood of successful completion was identified that would fully offset the entire predicted temporal loss of stream function with additional surplus functional credit as a buffer (i.e., factor of safety).

The selected off-site mitigation option to fully offset all predicted temporal loss of stream function in the Upper Salmon River subbasin includes side channel and floodplain reconnection completely on private land in the Upper Lemhi River watershed. The proposed project has been coordinated with and vetted by a multi-agency, multi-disciplinary technical team (Rio ASE 2021b) and is within the highest priority restoration area of the entire Upper Salmon River subbasin (OSC Team 2019). This project would reconnect and/or create a series of interconnected perennial and non-perennial side channels and wetland complexes within a broad floodplain area that has been previously impacted by land use alterations, riparian vegetation clearing, levees, and grazing.

The proposed concept (see **Figure 9-2**) employs current restoration best practices based loosely on the Stream Evolution Model described by Cluer and Thorne (2013) and refined as a restoration strategy by Powers et al. (2018) whereby the existing single-threaded channel would be bifurcated and obstructed using natural materials at multiple locations forcing flow into relic channels on the floodplain. This action would be augmented by complete channel excavation (primary channel – approximately 5,721 linear feet), partial channel excavation (secondary channel – approximately 6,663 linear feet). and no additional excavation (tertiary channel – approximately 4,613 linear feet). The combination of predicted new primary and secondary channels in addition to improved instream habitat and channel conditions/dynamics is estimated to produce a total of 51,800 stream functional units plus any additional functional units generated by the creation of tertiary channels not accounted for in this calculation (**Table 9-2**). Furthermore, a local land trust is negotiating a perpetual conservation easement for the property to ensure the restoration benefits and associated mitigation credits persist for at least the length of predicted temporal loss for the SGP (See **Appendix A**).

Table 9-2. Predicted Stream Functional Units for the Proposed Off-site Mitigation Project on Little Springs Conservation Easement and Restoration Project, Lemhi River, ID

Channel Type	Status	Length (feet)	Certainty of Result	Stream Functional Units
Main/Primary	Existing	8,500	High	5,800
Primary	Proposed	5,721	High	25,000
Secondary	Proposed	6,663	Moderate	21,000
Tertiary	Proposed	4,613	Low	0 credited

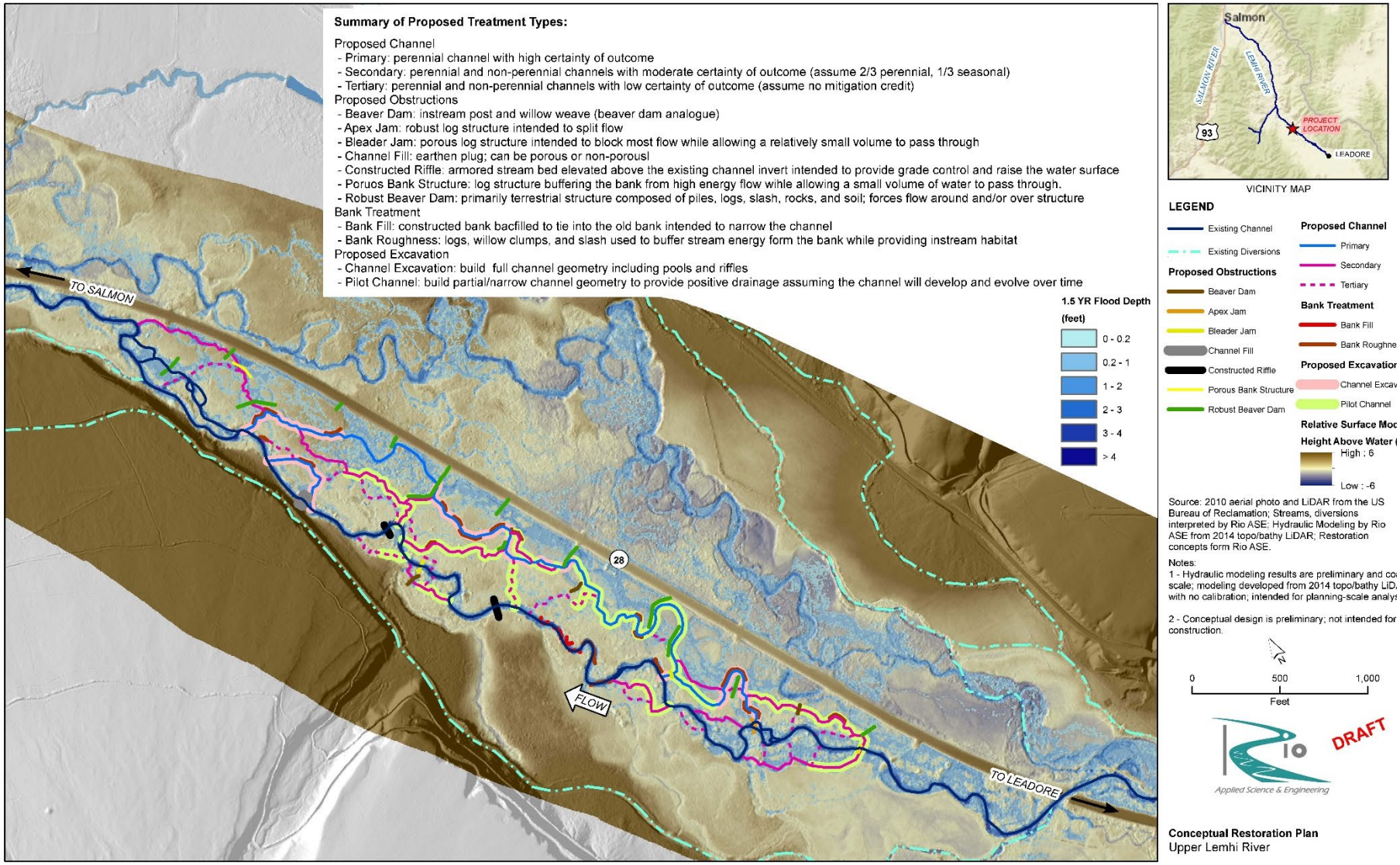

Figure 9-2. Compensatory Stream Restoration Plan

Predicted SFA credits for the proposed off-site mitigation project were calculated assuming 21 SFA elements were tabulated but only 7 would be affected by the project changing them from moderate function to high function including 1) LWD density, 2) pool frequency, 3) pool quality, 4) off-channel habitat with cover, 5) width/depth ratio, 6) streambank condition, and 7) floodplain connectivity. Additionally, it was assumed that the existing (baseline) functional index derived from the 17 SFA elements tabulated would equal 0.750 (an above average baseline score relative to the reaches evaluated for the SGP). Existing and proposed conditions will need to be measured and quantified to confirm these assumptions.

9.1.2.2 Payette River Subbasin

Perpetua Resources has evaluated additional off-site mitigation measures to account for the predicted temporal loss of stream function described above in Section 7.1 associated with the upgrades to an existing power transmission line in the Payette River subbasin. Off-site mitigation options were evaluated and identified near expected impacts.

The selected off-site mitigation option to fully offset all predicted temporal loss of stream function in the Payette River subbasin includes replacing or removing three potential fish barriers to allow volitional aquatic organism passage (AOP) and therefore access to suitable upstream habitat. The proposed project BCCRP was identified through the Stibnite Gold Project Payette Watershed Fish Passage Evaluation (Rio ASE 2022). This project would reconnect upstream habitat on Hargrave Creek (one culvert, second order stream), and Big Creek (two culverts, second order stream).

The proposed BCCRP (see **Table 9-3** and **Figure 9-3**) employs USFS accepted design criteria for AOP at road crossings. The improvement in volitional upstream AOP is expected provide immediate improvement in functional values, with no temporal lag in net functional values.

Table 9-3. Predicted Stream Functional Units for the Proposed Off-site Mitigation Project in the Payette River Subbasin

Stream Name	Barrier Type	Stream Length Above Barrier w/ Expected Fish Use (feet)	Stream Functional Units
Hargrave Creek	Complete	7,895	8,357
Big Creek (Lower)	Complete	2,268	2,401
Big Creek (Upper)	Complete	7,827	4,144
Total		**17,990**	**14,902**

[a]

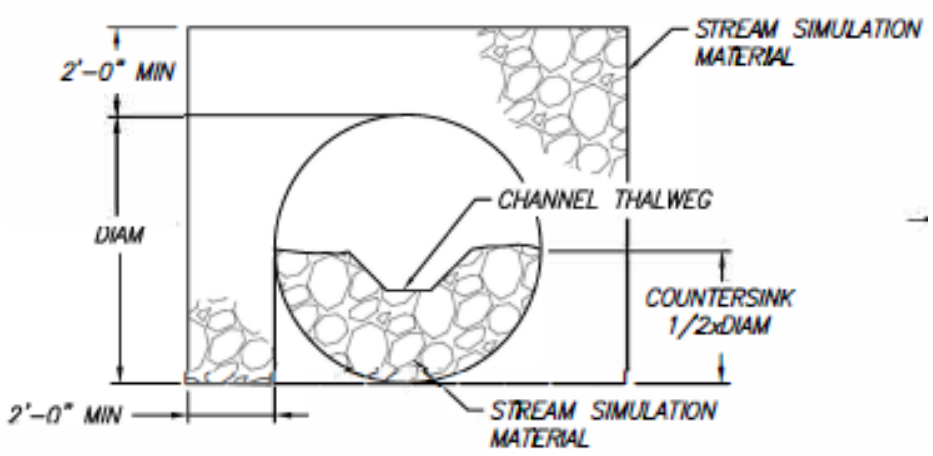

Figure 9-3. Typical Culvert Cross Section Applying Aquatic Organism Passage Design Criteria

9.2 Wetland Mitigation Work Plan

The wetland design approach, like the stream restoration design discussed in Section 9.1, has followed a sequence of coarse- to fine-scale development. The coarse-scale analysis initiated with the PRO (Midas Gold 2016). Perpetua Resources compiled a wetland design team including specialists in engineering, geomorphology, and wetland ecology to refine the wetland design concepts from the PRO. Wetlands were delineated throughout the Project Area and functional assessments were completed as discussed in Sections 6.1.3 and 6.1.4. These delineated wetlands are the reference sites for wetland restoration.

The MWAM functions and values were considered for the purposes of creating design and performance standards for wetland restoration efforts. **Table 9-4** lists each MWAM parameter (i.e., the function or value), a range of existing functional units for each parameter, and the likelihood of mitigation attaining or exceeding baseline functional values with proposed engineering and biologic controls. Primary opportunities for improvement in functional values are also proposed in **Table 9-4**. These existing functional units are a baseline from which to measure attainment of performance standards, and the opportunities for improvement are intended to guide restoration design. Adaptive management of all restoration areas during the Project's re-development sequence would allow for periodic assessment and adjustment of restoration methods.

Surface and groundwater would support wetlands restored for compensatory mitigation. Surface water is mostly associated with streams, snowmelt runoff, and water from groundwater sources in the form of seeps and springs that runs off and collects in low topographic areas. Groundwater supports wetlands in areas where the groundwater table is within 12 to 18 inches of the surface or flows to the surface from the toe of slopes. The CMP designed wetland restoration to collect surface water runoff and intercept groundwater to support wetland plant communities. Engineers and hydrologists prepared water models that were reviewed to ensure hydrology would be adequate to support the intended wetland plant communities on a self-sustaining basis as detailed designs are advanced (Brown and Caldwell 2018b).

To intercept the groundwater table and/or collect surface water runoff to support target wetland plant communities, Perpetua Resources would grade wetland mitigation areas to blend with adjacent topography. Where the gradient permits, stream restoration would include grading and developing meandering streams to meet minimum gradient requirements to carry flows up to the 1.5-year flood event within the banks while providing sufficient stream competence to transport the expected sediment load without silting-in or degrading. Perpetua Resources would grade terraces outside and above the streambank elevation to contain and convey larger flood events within the resulting floodplain. In steep-gradient areas, streams would be more confined (floodplain/terraces not necessarily present) and follow an engineered step-pool morphology. Proposed wetland restoration types are described in Section 9.2.1. **Appendix D** illustrates the restoration design reaches for streams and wetlands. Refer to Rio ASE (2021a) for detailed stream design documentation, including associated hydrology details in Appendix C of the Stream Design Report.

Table 9-4. MWAM Parameters and Wetland Restoration Opportunity

Parameter[a]	Baseline Functional Unit Range & Average Within the Permanent Disturbance Footprint	Likelihood of Meeting or Exceeding Baseline Functional Values	Opportunities for Uplift
Listed or Proposed TES Habitat	Range: 0.0-0.0[b] Average: 0.00	Moderate likelihood to attain or exceed the average existing functional value	Re-establish or increase habitat for bull trout, Chinook salmon, and/or steelhead (if applicable) based on research into life histories. Extensive work is being done by the stream design team to optimize aquatic habitat for several life stages of these fish species. Wetland design to support aquatic species will focus on stream shading and sediment reduction done primarily with planting prescriptions based on micro-topography.
Idaho NHP Species Habitat	Range: 0.0-0.8 Average: 0.37	Strong likelihood to attain or exceed the average existing functional value	Several amphibians with special status designation in Idaho have been identified in the wetland complexes at the site. Those species reside in the riverine and slope wetlands on-site and would be expected to repopulate the created wetlands from undisturbed habitat above and below the disturbed areas. Numerous other special status avian and mammal special status species use slope, depressional, and riverine habitats as primary and secondary habitat, depending on seasonal or life stage habitats. Wetland design will focus on the vegetative component of these species needs and re-establish those vegetative components as conditions allow.
General Wildlife Habitat	Range: 0.1-0.9 Average: 0.55	Strong likelihood to attain or exceed the average existing functional value	Create "even" vegetated class cover distribution in planting plans by having equal relative cover of herbaceous, scrub-shrub, and forested plant palette that includes transitional wetland to upland shrub-scrub and forested habitat. Create wetlands in floodplains of existing and designed streams to ensure adequate water supply and increase duration of surface water and or saturated soils in the wetland complex. Encourage structural diversity by designing planting plans with at least two Cowardin vegetated classes; one should contain a vertical element (shrubs or trees).
General Fish Habitat	Range: 0.0-0.0[b] Average: 0.0	Strong likelihood to attain or exceed the average existing functional value	Include subsurface structure (large woody debris, undercut banks) in areas with permanent or long-term surface water. Create open water connectivity between wetlands and adjacent perennial streams. Plant vegetation that shades banks and reduces erosion. Plant woody species for future in-stream structure recruitment.
Flood Attenuation	Range: 0.1-0.8 Average: 0.53	Moderate likelihood to attain or exceed the average existing functional value	Stream and wetland design will focus on wide floodplains that would successfully retain overbank flooding and encourage longer ponding times and slower release times to accommodate flood pulses. Planting prescriptions will include roughness and species with root wads to maintain soils and capture sediments and nutrients associated with flooding.
Short- & Long-Term Surface Water Storage	Range: 0.3-1.0 Average: 0.69	Moderate likelihood to attain or exceed the average existing functional value	Use grading to create depressional wetlands and micro topography capable of storing precipitation and floodwater. Storage volume goals should be designed for Q2 or Q5 events depending on floodplain size and position within the watershed. Created wetlands will be designed to include seasonal and permanent pools wherever possible.

Table 9-4. MWAM Parameters and Wetland Restoration Opportunity			
Parameter[a]	Baseline Functional Unit Range & Average Within the Permanent Disturbance Footprint	Likelihood of Meeting or Exceeding Baseline Functional Values	Opportunities for Uplift
Sediment, Nutrient and Toxicant Removal	Range: 0.4-1.0 Average: 0.79	Moderate likelihood to attain or exceed the average existing functional value	Design riverine wetlands to allow for overbank flooding to reduce flow volumes allowing for sediment deposition. Planting prescriptions will include species capable of uptake of any nutrients (low likelihood of occurrence) or toxicants (some likelihood of metals). Use grading to create depressional wetlands capable of storing precipitation and floodwater. If major pollutant inputs are related to surrounding land, incorporate a vegetated upland buffer around wetland that would adequately limit delivery of sediments, nutrients, or compounds to a level that would not substantially impair ecological functions within the wetland.
Sediment/ Shoreline Stabilization	Range: 0.3-1.0 Average: 0.73	Strong likelihood to attain or exceed the average existing functional value	PEM, PSS, and PFO[c] that occur along the major streams would be planted with deep-rooted, stabilizing vegetation. It is likely that a nursery would be established in which existing willow and alder root wads would be harvested and stored for future use in planting prescriptions. These existing materials would greatly accelerate achievement of performance goals and add assurance of the survivability of these species on site.
Production Export/ Food Chain Support	Range: 0.3-1.0 Average: 0.74	Moderate likelihood to attain or exceed the average functional value	Wetland planting prescriptions will focus on providing food sources for both generalist and specialist species that are likely to occur in the area after mine operations.
Groundwater Discharge & Recharge	Range: 0.9-1.0 Average: 0.99	Strong likelihood to attain or exceed the average functional value	Groundwater recharge and groundwater discharge wetlands are anticipated above and below the tailings storage facility dam toe and will be specifically designed as these types of systems. Other recharge and discharge would occur throughout the system, but would be restricted to the shallow alluvium above a liner in most cases.
Uniqueness	Range: 0.1-0.6 Average: 0.37	Some likelihood to attain or exceed the average existing functional value	Design planting plans that incorporate Idaho NHP listed plant associations.
Recreation & Education Potential	Range: 0.05-0.3 Average: 0.18	Strong likelihood to attain or exceed the average existing functional value	Existing numeric values can be increased by providing general public access, converting private lands to public lands, or commitment of land to conservation easement programs. Wetland design will also incorporate a recreational component which may include a trail system, road access with parking area, and/or an educational component into the design (e.g., educational signage and placarding).

[a] *TES = Threatened and Endangered Species; NHP= Natural Heritage Program*

[b] *Functions and values related to fish and/or habitat are accounted for in the SFA.*

[c] *PEM = Palustrine Emergent; PFO= Palustrine Forested; and PSS = Palustrine Shrub Scrub*

9.2.1 Proposed Wetland Types

Numerous classifications exist for wetlands. Two of the most common classifications focus on vegetation community (Cowardin, et al. 1979) and hydrogeomorphic position on the landscape (Brinson 1993). Most of the existing wetlands within the Project fall into the vegetation classification of PEM, PSS, or PFO wetlands (Cowardin, et al. 1979). Those three wetland vegetation communities are mostly associated with the hydrogeomorphic position on the landscape of slope, depressional, or riverine wetlands (Brinson 1993). To meet the “in- kind” criteria associated with the USACE’s

compensatory mitigation rules, replacement wetlands would focus on the three vegetation classifications as well as their position on the landscape. Based on the proposed disturbance footprint and proposed stream restoration, this document will hereafter refer to the slope wetlands as valley margin wetlands and riverine wetlands as riparian fringe and floodplain wetlands to better describe these landscape position wetlands. Each of these wetland types is further broken into one of four wetland vegetation classifications that include PEM, PSS, PFO, and palustrine aquatic bed (PAB). Each of these wetland types and their vegetation classifications are further described in the sections below. Blowout Creek enhanced wetlands are also described below. While not impacted by the Project disturbance, historical impacts have degraded wetlands in this drainage and Perpetua Resources plans to enhance and restore these wetlands as mitigation for impacts elsewhere in the Project Area. Successful wetland mitigation like the proposed wetland types has been completed at elevations and conditions similar to those of the Project site, as described for the Montana Department of Transportation in a report on a statewide mitigation site monitoring project (RESPEC 2016).

9.2.1.1 Valley Margin Wetlands

Valley margin wetlands would be established at the margins of the TSF (see **Appendix D**, Restoration Design Sheet 134). At these locations, the gently sloping surface of the TSF meets the steeply sloping valley sidewall. A water supply consisting of non-perennial or perennial rivulets is collected on the steeply sloping valley sidewall and flows downhill where it meets the gently sloping TSF surface. Because of the sudden change in energy at this location, eroded material carried down the valley sidewall is deposited at the valley floor-sidewall intersection. Typically, this material is deposited in an alluvial fan configuration. The rivulets from the valley sidewall also tend to disperse across the fan forming a broad wetland fed by surface water. Some of the water infiltrates into the fan material, saturating it and creating a near surface groundwater table.

The opportunities for establishment of this type of wetland at the Project are relatively small in comparison to riparian floodplain wetlands (see Section 9.2.1.2). As noted above, 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. Because debris fans (rock and organic materials) accumulate due to episodic events that might not occur for long periods after the TSF reclamation is completed, it is anticipated that some placement and grading of mixed materials to produce the fan-like landform required for these types of wetlands would be necessary. Established valley margin wetlands would include three vegetation classifications: PEM, PSS, and PFO.

9.2.1.2 Riparian Fringe and Floodplain Wetlands

A floodplain is the area of low-lying ground adjacent to a stream or river that is subject to flooding during periods of high discharge. As part of the mitigation design, riparian fringe and floodplain wetlands are proposed to be restored adjacent to the major streams within the Mitigation Area (see **Appendix D**, Restoration Design Sheet 133). Major streams within the Mitigation Area include Meadow Creek, EFSFSR, Midnight Creek, Hennessy Creek, Blowout Creek, Fiddle Creek, and West End Creek. Riparian fringe and floodplain wetlands would be established on the broad, gently sloping floodplains on both sides of the restored stream channels (see Section 9.1). In some areas, these stream channels would be designed over steep dam faces or rock chutes. In these locations, it is anticipated that wetlands would not naturally develop. However, everywhere there is a low-gradient, sinuous stream, it is anticipated that wetlands would occur and riparian fringe and floodplain wetlands would be established in these areas. The floodplain on which riparian fringe and floodplain wetlands would be established is expected to be up to two times as wide as the meander belt width of the stream channel. The floodplain widths are expected to vary from about 20 feet on the smallest tributaries to a little over 200 feet on the larger

streams. The restored floodplains would consist of gently sloping surfaces on which irregularities such as minor depressions, slightly raised areas or berms, simulated abandoned oxbow channels, and other features would be established. This wetland type would include all four vegetation classifications—PAB, PEM, PSS, and PFO—which would be established at various locations across the floodplains. A large forested component would line the stream corridor atop the TSF providing shade along these reaches thereby cooling the stream (ModPRO2; Perpetua Resources 2021). For restorations atop the TSF and DRSFs, and the Hangar Flats diversion of Meadow Creek, it is anticipated that the entire floodplain width would be underlain by a liner (see **Appendix D**). The liner would prevent streamflow from escaping deep into the underlying permeable material thereby keeping a live stream in the near surface area above the liner and keeping most of the materials above the liner saturated for an extended portion of the year. Liner depth would need to be carefully coordinated with plant materials type and their respective root systems to avoid compromising either the integrity of the liner or the rooting ability of deeper rooted materials, such as woody plants.

Lodgepole pine and Engelmann spruce are two common conifers present in the PFO vegetation class. While lodgepole pine can develop vertical roots up to 11 feet deep (Canadell, Jackson and Ehleringer 1996), most of the lateral roots are in the first few inches of the soil (Horton 1958). The depth of vertical roots is affected by soil texture, moisture, and fertility. The assurance of sufficient soil depth (over the liner) and fertility would ensure the success of lodgepole pine establishment and integrity of the geosynthetic liner (Rio ASE 2023). Engelmann spruce typically have a shallow root system but can develop roots of up to 8-feet if growing on deep, porous well-drained soils (Alexander 1958). The liner is designed to keep soil saturated. The roots of Engelmann spruce will draw from the saturated soil above the liner thereby sustaining the species' typical shallow root system (Rio ASE 2023). Previous studies from landfills (Dobson and Moffat 1995, Robinson and Handel 1995, Handel, et al. 1997, Hutchings, Moffat and Kemp 2001) and examples from past mine reclamations (Tetra Tech 2021b; Rio ASE 2023) show successful establishment of woody species that do not comprise geosynthetic liners (summarized in Rio ASE 2023). A properly performed restoration that maintains soil moisture will encourage shallow lateral root growth, limit deep vertical root growth, and ensure the integrity of the geosynthetic liner.

Perpetua Resources proposes to restore and enhance PAB, PEM, and PSS wetlands that were impacted when a historical dam used for water supply and hydroelectric power 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 (see **Appendix D**, Restoration Design Sheet 135 for a conceptual design of these features). The nature and details of this structure are currently under design consideration.

9.2.1.3 Yellow Pine Pit-like Feature

When restored, the Yellow Pine pit lake would be replaced by the proposed Stibnite Lake of similar size and location within the lined EFSFSR floodplain over the backfilled Yellow Pine pit. Stibnite Lake is proposed to moderate maximum stream temperature and provide lacustrine habitat similar to the Yellow Pine pit lake. This riverine system will have a deep water component, but shorelines will have planting shelves that would be classified as lower perennial aquatic bed and emergent wetlands.

9.2.2 Wetland Restoration Summary for Impacts

Restored wetlands were designed within the floodplains designed for the stream restoration reaches. The restored wetland types, as described in Section 9.2.1, are further broken out by wetland classification and listed by drainage, associated mine feature, and acreage in **Table 9-5**. The location of restored wetlands in relation to restored stream reaches and prominent mine features is shown in **Appendix D**.

Wetland restoration would begin after the end of mine construction (after mine life year -1), with the first restored wetlands occurring in the Blowout Creek drainage. Additional restoration would occur beginning in operational year 3 and continue to closure year 25 (**Table 8-2a**).

Table 9-5. Compensatory Wetland Restoration by Stream Restoration Reach

Drainage	Mine Feature	Stream Reach ID	Proposed Year of Construction	Location	Riparian Fringe and Floodplain Wetlands				Valley Margin Wetlands			Total	Associated Functional Units
					PAB	PEM	PSS	PFO	PEM	PSS	PFO		
Meadow Creek	Tailings Storage Facility (TSF)	MC1a	23	Southernmost branch of creek on TSF	0.94	15.94	1.32	12.56	0.91	0.35	0.56	32.58	229.0
		MC1b	23	Middle branch of creek on TSF	0.16	3.30	3.74	4.02	0.56	0.54	0.52	12.84	91.2
		MC1c	23	Northern branch of creek on TSF	0.30	4.57	4.63	7.47	0.09	0.32	0.28	17.66	129.2
		MC1d	23	Trunk stream between middle branch and northern branch on TSF	0.31	-	0.47	6.01	–	–	–	6.79	52.3
		MC1e	23	Trunk stream below confluence of northern branch on TSF	0.49	-	1	11.98	-	–	–	13.47	104.0
	TSF Buttress	MC2	23	Area on TSF Upstream of Chute	0.41	-	–	4.97	–	–	–	5.38	41.0
	TSF Buttress (face)	MC3	-	Chute on face of TSF Buttress	–	–	–	–	–	–	–	–	–
	TSF Buttress (toe)	MC4	3/18	Between Chute and Hangar Flats pit	0.1	2.52	8.61	26.37	–	–	–	37.60	289.3
	Hangar Flats Pit	MC5	3	Enhancement of existing channel below pit	0.36	-	0.72	6.73	–	–	–	7.81	60.0

Table 9-5. Compensatory Wetland Restoration by Stream Restoration Reach

Drainage	Mine Feature	Stream Reach ID	Proposed Year of Construction	Location	Riparian Fringe and Floodplain Wetlands				Valley Margin Wetlands			Total	Associated Functional Units
					PAB	PEM	PSS	PFO	PEM	PSS	PFO		
	Hangar Flats Pit Backfill	HF1	17	Pit Backfill		20.04	2.55	14.46	–	–	–	37.05	266.0
Meadow Creek	Below Hangar Flats pit	MC6	3/4	Enhancement of existing channel below pit	–	-	1.19	3.86	–	–	–	5.05	39.3
Blowout Creek	Blowout Creek (Meadow)	BC1	1	Meadow channel upstream of boulder chute	4.34	1.03	3.28	–	–	–	–	8.65	58.0
Blowout Creek	Blowout Creek	BC3	12	Channel Joining MC4	–	–	–	–	–	–	–	See Note (1)	
Fiddle Creek	GMS	FC2	24	Fiddle Creek			1.35	1.27				2.62	20.2
EFSFSR		EF1	25	Former Townsite		0.89	2.80	1.2				4.89	36.5
EFSFSR	Plant Site	GC1	23	Plant Site		18.55	-	6.23				24.78	172.3
EFSFSR	Yellow Pine pit	EF3	11	Final stream segment replacing the temporary tunnel	1.93	2.26	0.8	14.84	–	–	–	19.83	147.1
TOTAL					**9.34**	**69.10**	**32.46**	**121.97**	**1.56**	**1.21**	**1.36**	**237.00**	**1,735.4**

(1) BC3 acres included in MC4 total

– = 0 or N/A.

Columns and rows may not sum exactly due to rounding.

EFSFSR = East Fork of the South Fork of the Salmon River; GMS = Growth Media Stockpile; PAB = palustrine aquatic bed; PEM = palustrine emergent; PFO = palustrine forested PSS = palustrine scrub-shrub

9.2.3 Wetland Restoration Summary for Temporal Impacts

The amount of time associated with the temporal impacts related to wetlands is approximately 20 years, during which time as many as 576 functional units are outstanding. Perpetua Resources and its consultants have developed a mitigation design that produced a surplus of functional units used for the accounting for wetland mitigation. The current mitigation design accounts for approximately 1,030 functional units of surplus. This surplus is being proposed to compensate for wetland temporal loss.

9.3 Planting Design

Wetland and riparian vegetation provide surface roughness to slow floodwaters, which reduces erosion and encourages sediment deposition. It also provides habitat for wildlife, birds, and insects, and shade that moderates stream water temperatures. In addition, wetland and riparian vegetation can provide a sediment- and pollutant-filtering buffer as well as diverse native wetland and riparian plant communities. These communities, consisting of graminoids, forbs, woody shrubs, and trees, provide a large variety of habitat features including food sources, LWD, and various rooting depths that provide stream bank stability. In general, species composition and percent cover of wetland and riparian vegetation profoundly affect wetland ecosystem functions and habitat quality for wildlife (Nishihiro, Nishihiro and Washitani 2006).

Perpetua Resources will seed and plant stream reaches, riparian areas, and wetlands throughout the Mitigation Area with native plant species that are present currently in existing PAB, PEM, PSS, and PFO wetlands and riparian areas along streams within the SGP area. Details regarding methods for establishment of wetland and riparian vegetation in the Mitigation Area are presented in Sections 9.3.1 through 9.3.5, which also describe wetland soil management and preservation of seed banks, organic matter (OM) emendation, and the establishment of an on-site plant nursery. Section 9.4 discusses actual implementation of the planting design in stream restoration reaches and wetland mitigation areas.

9.3.1 Soil Salvage

The use of salvaged O and A horizons from existing wetland or hydric soils (primarily composed of slightly to highly decomposed soil organic matter [SOM] containing seeds and other plant propagules or seedbank materials [SBM]) over or in combination with salvaged AC and C horizons from existing upland and wetland subsoils (primarily composed of mineral soils or growth media [GM]) to re-create soil conditions conducive to the establishment of phreatophytic vegetation is preferred over using salvaged GM alone. When compared to GM, SBM has banks of native phreatophytic plant seeds and propagules, lower bulk density, higher cation exchange capacity, relative abundance of reduced chemical species, and higher SOM content because of the high rate of rate of biomass production relative to rate of decomposition (Sumners 2000). Vegetative diversity in restored wetlands should be promoted through the separate salvage and storage of SBM from the Project Area prior to construction and mining, followed by its replacement on non-stream channel portions of the Mitigation Area. The management of hydric and non-hydric soils present within the Project Area is based on these factors.

The volume of SBM and GM available from hydric soils and for wetland restoration presented in **Table 9-5** was based on rough estimates of the aerial extent for each soil map unit (SMU) within the Project Area and the depths of suitable soil within and percent of each SMU that can be practicably salvaged using conventional earth-moving equipment. These estimates were based on mapping, classification, and grouping of Project Area soils at an Order 2 level of soil survey (USDA 2017), their

physicochemical characteristics, and the GM suitability criteria presented in the *Supplemental Soil Survey Report: Stibnite Gold Project* (Tetra Tech 2020b). Prior to this soil survey, wetlands were delineated within the Project Area (HDR 2017d). The actual volume of SBM and GM salvage for wetland restoration (and upland reclamation) may vary from the estimates presented in **Table 9-6**. Additionally, these estimates do not account for bulk density changes that will be affected by soil salvage (i.e., swell), storage during mine operations (i.e., consolidation), and placement during wetland restoration (i.e., swell). Soil volume estimates indicate there would be enough salvage soil to cover, at minimum, approximately 253 acres with GM and SBM with the various replacement profile depths; 8 inches GM/4 inches SBM (with the top 2 inches of GM comingled with the SBM), 6 inches GM/6 inches SBM, and 2 inches GM/4 inches SBM comingled (Tetra Tech 2021b). Current estimates indicate there would be approximately 262,000 and 599,000 cubic yards of SBM and GM (blended with chipped wood from on-site) salvaged, respectively, and approximately 146,000 and 157,000 cubic yards of SBM and GM (blended with chipped wood from on-site) replaced for wetland restoration, respectively (Tetra Tech 2021b).

Table 9-6. Estimated SBM and GM Salvage Volumes (following GM blending with chipped wood)

Soil Salvage Lift Depths (inches below ground surface)	Soil Map Unit	Soil Map Unit Area (Acres)	Percent of Map Unit Available for GM/SBM Salvage	Estimated Volume (Cubic Yards)
0-24 First Lift (SBM)	mOD: coarse-silty, mixed, frigid Oxyaquic Dystrocryepts	43.5	90%	126,500
24-33 Second Lift (GM)				47,500
0-25 First Lift (SBM)	cTH: cryic Typic Haplosaprists	45.2	90%	135,300
25-42 Second Lift (GM)				78,900
Estimated Total Salvage for Lifts 1 and 2				
Estimated Total SBM Salvage Volumes from 1st Lift from mOD + cTH		88.7	90%	261,800
Estimated Total GM Salvage Volumes from 2nd lift from mOD + cTH				126,400

GM = growth media (excluding chipped wood); SBM = seedbank material

SBM is available from soils developed adjacent to stream and in wetlands identified and mapped as SMUs mOD: Coarse-silty, mixed, frigid Oxyaquic Dystrocryepts and cTH: cryic Typic Haplosaprists (Tetra Tech 2020b). SBM and GM located adjacent to stream and within wetland settings (mOD and cTH) will be removed in two lifts. The first lift would be approximately 0 to 24 inches below ground surface (bgs) and will include primarily the O and A horizons. The second lift (excluding GM blending with chipped wood), estimated to be approximately 24 to 36 inches bgs, will include GM and will include primarily the C horizon.

The salvaged first lift materials from SMUs mOD and cTH will be used as SBM. GM from these SMUs (SMUs mTC, sTC, and AoD+) will be blended with chipped wood from on-site, and glacial till excavated from the Yellow Pine pit will be used as GM. Along stream corridors and within wetland mitigation areas, GM will underlie SBM and be placed at 2-inch and 4-inch lifts or be comingled at an approximate ratio of 33 and 67 percent, respectively. Exceptions to this are the stream corridors and wetlands located on the TSF (i.e., MC1) where GM and SBM will be placed at approximately 6 and 6 inches, respectively, and the stream corridors and wetlands located on the Hangar Flat pit backfill (i.e., HF1) where GM and SBM will be placed at approximately 8 and 4 inches SBM (with the top 2 inches of GM comingled with the SBM), respectively. However, placement thicknesses may be revised based on information gathered during the monitoring and documentation of site development and concurrent restoration activities as well as conditions present at the time of restoration. If additional volume of

materials is required for wetland restoration, GM from hydric and upland soil and glacial till will be applied. If salvaged first and second lift materials are not needed for wetland restoration, then this GM and SBM will be applied to areas reclaimed as uplands and used to increase the soil nutrient and SOM status of these areas.

SOM is important to plant growth because it provides nutrients for plants, promotes microbial activity, reduces soil bulk density, and improves soil water holding and cation exchange capacity. The SOM content of Project site soils ranges from 1.3 percent to 76.8 percent and averages 7.9 percent. Based on these findings, SBM and GM materials proposed for salvage and wetland mitigation are expected to promote vegetative growth. Based on estimates of SBM and GM availability and quality and restoration and reclamation needs, additional sources of GM and OM may be needed to offset any anticipated GM deficits and as soil amendments. Sections 9.3.3 and 9.3.4 discuss strategies for offsetting the anticipated GM deficit and amending SBM and GM.

9.3.2 Seed Bank Preservation

Seeds and rhizomes retained in the soil may remain viable for months to years (National Academy Press 2001). The viability and longevity of seed varies greatly by species, with some wetland types being relatively short-lived (a few years), versus others surviving from 20 to 50 to 100 years or more. The use of existing seed banks, such as through spreading or transplanting soil that contains seeds or propagules of wetland and riparian plant species, has been shown to promote revegetation of wetland restoration and creation sites (Brown and Bedford 1997, Nishihiro, Nishihiro and Washitani 2006). In addition to allowing for passive recovery of wetland and riparian vegetation, soil seed banks may help increase vegetation complexity of created or restored wetlands as they may contain a variety of species, including species not currently present aboveground (DeBerry and Perry 2000, Nishihiro, Nishihiro and Washitani 2006).

As discussed in Section 9.3.1, Perpetua Resources proposes to salvage, store, protect, and preserve the GM and SBM of wetlands and riparian areas that would be impacted by the Project. Soil salvage operations will be phased according to the planned mining sequence. As such, soil salvage will be delayed to the extent practicable to limit the duration of soil storage in stockpiles. Impacts to wetlands and streams from Project activities would, in most cases, occur several years prior to establishment of the wetland restoration and stream mitigation areas. Salvaged SBM would need to be stored for approximately 1 to 25 years prior to use. Few opportunities exist to “live handle” SBM (i.e., soil salvage and direct haul to restoration areas, thereby avoiding stockpiling). and the average SBM storage period is approximately 3 years.

9.3.3 Growth Media/Seed Bank Material Offsets and Organic Matter Amendation

According to the current GM/SBM mass balance estimate, a deficit and surplus of GM and SBM will exist, respectively. To achieve the volume of GM needed on-site for wetland mitigation (and upland reclamation), blending GM with woodchips from on-site and glacial till excavated from the Yellow Pine pit will be used to offset the anticipated GM deficit. As estimated and actual salvaged SBM volumes may differ, the addition or blending of media high in OM with GM may also be necessary to sufficiently enhance its fertility, microbial activity, and water-holding capacity to function as a SBM for wetland restoration. Under both circumstances, compost (and potentially other OM amendments) will be applied and incorporated into the GM and/or SBM.

Application of compost at a rate of 10 tons/acre is currently proposed for the restoration of wetlands and reclamation of uplands at the Project site. A SOM content of 5 percent or higher in soils is recommended for wetland restoration (M. Burchell 2018). The target SOM content of comingled or separately applied SBM and GM for wetland restoration will therefore be 5 percent. Since the SOM

content of applied GM and SBM will vary, the amount of OM amendment applied and incorporated into them will also vary. The SBM and GM applied to wetlands and stream corridors at the Project site will therefore be tested to determine OM content following their application. The rate of compost (and potentially other OM amendments) applied will be adjusted according to these test results, the targeted SOM values of 5 percent and further evaluation of the amount of soil OM necessary to successfully restore wetlands on at the Project site.

9.3.4 Composting

Compost is aerobically decomposed OM, where decomposition processes have been managed. The management of these materials is important because poor composting practices can result in poor quality material that would have negative effects on soil and vegetation as well as produce a foul odor. However, properly managed composted organic materials, when incorporated as a soil amendment, can improve soil quality by increasing plant-available nutrients and soil water holding capacity, decreasing soil bulk density, and stimulating microbial growth.

Compost (and potentially other OM amendments) will be purchased and imported to the Project site. This is the preferred approach to procuring the volumes of OM amendments needed for the Project because available resources, operating space, and cold temperatures will likely create insurmountable obstacles to on-site compost production.

When procuring compost (and potentially other OM amendments), it is important to consider the carbon to nitrogen (C:N) ratio of OM amendments and the presence and type of noxious and invasive weeds seeds. To prevent net nitrogen immobilization, the optimal C:N ratio of the OM amendment applied to soil is 20:1 (Tisdale, et al. 1993). Beef and dairy feedlot operations are the likely sources in southern Idaho with the compost production capacities to meet the Project needs, however, these sources may also contain noxious and invasive weeds. The compost applied to GM and/or SBM at the Project site will therefore be delivered at a C:N ratio of 20:1 and be certified weed-free. The moisture content of compost optimally will be ≤ 30 percent. Compost will be hauled to the Project site using highway-legal trucks; however, this will depend on compost properties and source(s).

9.3.5 Restoration Nursery

To facilitate propagation of plant species that would be installed in stream and wetland restoration areas, if feasible, Perpetua Resources may develop a restoration nursery. This nursery may be located on-site (or in close proximity of the Project Area) and may be developed prior to or during construction or operations. Seeds of native forb, graminoid, shrub, and tree species would be collected on-site, to the extent possible, and grown to a seedling condition in the restoration nursery. These nursery-grown seedlings would then be planted in the stream and wetland restoration areas. Additionally, plugs or sprigs of riparian and wetland graminoid species could potentially be harvested and grown-out or stored short term in the mitigation nursery for transplanting into the restoration areas. Cuttings of native shrub species, such as willows and redosier dogwood (*Cornus sericea*), could also be harvested and propagated and/or stored short term in the nursery prior to use as live-stakes for revegetation purposes. Additionally, root wads of species such as alder and willows could be harvested and stored short-term (no longer than 72 hours) in a cold growth room in the nursery. Harvested materials, including root wads, would be harvested and installed by an experienced horticulturalist during the correct seasonal window. In addition to plant material collected and propagated at the on-site restoration nursery, supplemental plant material will be purchased, as necessary, through commercial, off-site nurseries.

9.4 Planting Implementation

To improve functions and values, including providing terrestrial and wildlife habitat, improving stream bank stability, and reducing sediment delivery, stream restoration reaches and wetland restoration areas would be revegetated with a variety of native herbaceous and woody species. Seed mixes, live stakes, and nursery-grown container plants and plugs of native graminoids, forbs, shrubs, and trees would be utilized for revegetation. Plant species for revegetation were chosen based on existing riparian and wetland vegetation observed during surveys of the Project Area and reference sites. Sections 9.4.1 and 9.4.2 provide further details on revegetation of restoration areas.

9.4.1 Streams

Stream restoration reaches would be revegetated with a variety of native herbaceous and woody species with the goal of establishing streambank stability and riparian areas that will enhance aquatic functions and increase the overall ecological functioning of the Mitigation Area and aquatic and terrestrial resources in the Project Area. Three bank treatment types have been proposed for stream mitigation and each of these stream bank treatment types has a vegetation planting prescription differentiated by four stream planting zones. The three bank treatment types and four stream planting zones are briefly described below and the bank treatment types are depicted in **Appendix D**, Sheet 116. Information provided for the bank treatment types below and in **Appendix D** are preliminary and will be finalized to support implementation. No changes to functional value units are anticipated because of minor changes to preliminary designs. Characteristics and specifics for each bank treatment type would continue to be revised as the designs move from the permitting to implementation phase.

Four different planting zones would be utilized for each stream bank treatment. **Appendix D**, Sheet 132 identifies proposed planting prescriptions for these four planting zones. Species listed in these tables may change, based on availability.

- Stream Planting Zone 1 would be located below the water surface and would be inundated 95-100 percent of the year. Within the streams, this zone is expected to form in areas of slow-moving water and alcoves, side channels, or oxbows of the main channel and may or may not support consistent vegetation depending on flows.
- Stream Planting Zone 2 would be located on the bank from approximately 0 feet to 1 foot above the low-flow water surface and would be inundated approximately 70 to 95 percent of the year.
- Stream Planting Zone 3 would extend from approximately 1 foot above the low-flow water surface to bankfull and would be inundated approximately 40 to 70 percent of the year.
- Stream Planting Zone 4 would be located from bankfull to approximately 5 feet above bankfull and would be inundated less than 40 percent of the year.

9.4.1.1 Stream Bank Treatment Type A

Bank Treatment Type A will include installation of fabric encapsulated soil lifts (FESL). FESLs, also known as vegetated reinforced soil slopes, are commonly used for bank treatments as described in the USFS Technical Supplement 14I: Streambank Soil Bioengineering (USFS 2007). These types of bank treatments have been successfully used to impart temporary bank stability to newly constructed streambanks for several years until riparian vegetation can become established and provide long-term stability, as described by in the Stream Design Report (Rio ASE 2021a). FESLs will be installed by placing fine and coarse biodegradable erosion control blankets on the bank and backfilling the blanket with native soil. The erosion control blanket would then be pulled tight and anchored with dead and live stakes to retain and protect the soil comprising the newly constructed

stream bank. Each FESL will be constructed with a maximum thickness of 1 foot and as many FESLs as necessary would be constructed until the desired bank height is achieved. Live stakes and a brush layer may also potentially be utilized with Bank Treatment Type A.

Following installation of the FESLs, a brush layer and/or live stakes may be applied, where applicable, and the bank will be revegetated with native graminoids, forbs, shrubs, and trees.

9.4.1.2 Stream Bank Treatment Type B

Bank Treatment Type B would include installation of a 12-inch slash brush layer with live stakes. After excavation or construction on the stream bank, live stakes will be placed at the specified spacing within a trench and covered with clean native fill followed by slash material at the specified thickness. Following bank construction and placement of live stakes and slash, the bank will be revegetated with native graminoids, forbs, shrubs, and trees.

9.4.1.3 Stream Bank Treatment Type C

Bank Treatment Type C is identical to Type B, but specifies a 6-inch slash layer intended for use in areas with less stream energy than Type B treatments.

9.4.2 Wetlands

Four vegetation classifications or planting zones would be utilized for restoration of wetland vegetation (**Figure 9-4**) and further described in the subsections below. Depending on the planting zone, revegetation will be accomplished through the use of native seed mixes, container plants, transplants, and/or live stakes. The four wetland planting zones and proposed planting prescriptions are described below.

9.4.2.1 Wetland Zone 1 - Aquatic Bed Vegetation

Zone 1 vegetation occurs within riparian fringe and floodplain and Blowout Creek restored wetland types. This zone typically occurs in areas greater than 6 inches below the low water surface and would be inundated for approximately 100 percent of the year (**Figure 9-4**). **Appendix D**, Sheet 135 identifies a proposed planting prescription for Wetland Zone 1. Surveys for aquatic macrophytes have not been conducted for the Project; therefore, species chosen were based on species documented as occurring near the Project and/or within Valley County in the Consortium of Pacific Northwest Herbaria database (CPNWH 2018) or PLANTS database (NRCS 2018). Aquatic macrophytes are not often commercially available and would likely need to be propagated from divisions collected from the vicinity of the Project. Therefore, the species listed for Zone 1 are suggested species for revegetation; however, this list may need to be revised based on what species are commercially available or available for harvest in the vicinity of the Project.

9.4.2.2 Wetland Zone 2 - Emergent Vegetation

Wetland Zone 2 vegetation occurs within riparian fringe and floodplain, valley margin, groundwater discharge, and Blowout Creek restored wetland types. This zone occurs above Wetland Zone 1 and would be inundated for approximately 40 to 70 percent of the year (**Figure 9-4**). **Appendix D**, Sheet 135 identifies a proposed planting prescription for Wetland Zone 2.

9.4.2.3 Wetland Zone 3 – Scrub-shrub Vegetation

Wetland Zone 3 vegetation occurs within riparian fringe and floodplain, valley margin, groundwater discharge, and Blowout Creek restored wetland types. This zone occurs above Wetland Zone 2 and would be seasonally or temporarily flooded or saturated during the growing season (**Figure 9-4**). **Appendix D**, Sheet 135 identifies a proposed planting prescription for Wetland Zone 3.

9.4.2.4 Wetland Zone 4 – Forested Vegetation

Wetland Zone 4 vegetation occurs within riparian fringe and floodplain and valley margin wetland types. This zone occurs above Wetland Zone 3 and would be temporarily or seasonally flooded or saturated during the growing season (**Figure 9-4)**. **Appendix D**, Sheet 135 identifies a proposed planting prescription for Wetland Zone 4.

Wetland Planting Zones

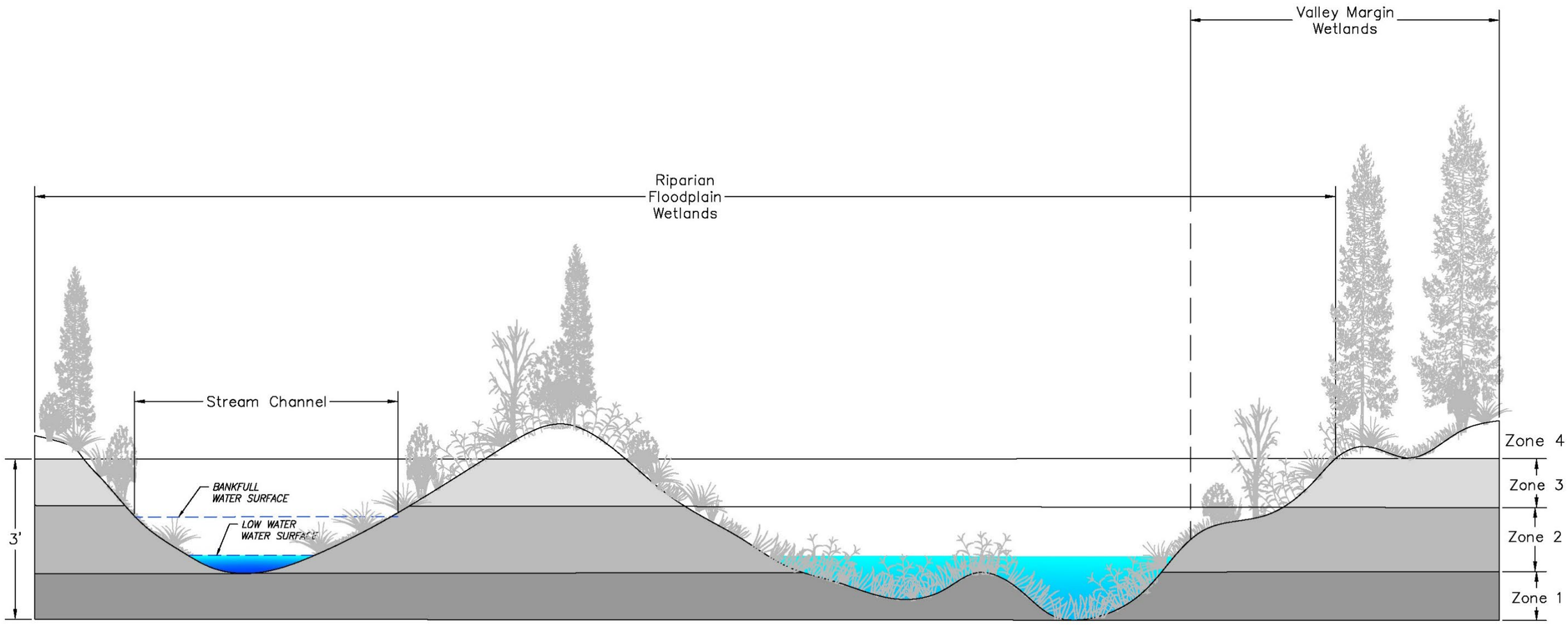

Figure 9-4. Wetland Planting Zones

Section 10

Maintenance Plan

In accordance with 33 CFR 332.4 (c)(8), this compensatory mitigation plan includes a maintenance plan that includes a description and schedule of maintenance requirements to ensure the continued viability of the Mitigation Area once initial construction is complete. Maintenance of the Mitigation Area will be implemented as needed to address conditions that may be limiting the success of the Mitigation Area in attainment of the performance standards (see Section 11). Perpetua Resources will be responsible for maintenance of the Mitigation Area until the performance standards are met. Once the performance standards are met, Perpetua Resources or its designated contractor will perform long-term maintenance of the Mitigation Area in perpetuity or until such responsibility is relinquished to an appropriate third party (e.g., USFS) as approved by the USACE (see Section 5).

Periodic maintenance activities will include repair of damaged, eroded, or unstable slopes, removal of excess silt and/or debris in created wetlands if it is impeding wetland functions, water regime management, soil treatments, noxious weed control (Midas Gold Inc. 2015), vegetation protection, supplemental irrigation, supplemental planting and/or seeding, garbage removal, and repairing any damage from vandalism. Soil treatments may include application of amendments such as fertilizer and mulch. Vegetation protection may include staking woody tree stems and installing protective barriers around individual plants or fencing portions of sites to provide protection from herbivory. Additionally, Perpetua Resources will conduct surveys of all mitigation areas during the growing season for 5 years after construction to survey for Idaho state-listed noxious weed species. Perpetua Resources will chemically treat, using herbicides safe for application near water, or mechanically and/or manually remove weeds identified through the surveys before they develop seeds or spread rhizomatous roots and establish large colonies that are hard to eradicate. Fall and spring weed surveys are especially important to identify and locate perennial and biennial weeds in their early stages of development.

A qualified landscape biologist, botanist, forester, or ecologist will make recommendations to Perpetua Resources related to the need for soil treatments and other maintenance, based on site observations and monitoring studies. Recommendations for maintenance will be included in the monitoring reports submitted to the responsible agencies (USACE and EPA). Perpetua Resources or their contractors will perform required maintenance.

Section 11

Ecological Performance Standards

In accordance with 33 CFR 332.5, this compensatory mitigation plan contains performance standards that will be used to assess whether the Mitigation Area is achieving its objectives. Performance standards are observable or measurable physical, chemical, and/or biological attributes that are used to determine if a compensatory mitigation project meets its objectives. Mitigation activities are intended to meet these performance standards within a specified time frame. The ecological performance standards described in the following sections provide benchmarks for measuring achievement of the goals and objectives of the mitigation areas.

The proposed mitigation restores stream channels and wetlands within the Mitigation Area. Implementation of stream and wetland mitigation activities will occur sequentially over a period of approximately 18 years. Approximately 10 years of implementation of stream and wetland mitigation activities would occur concurrent with mining activities, and approximately 5 to 8 years after mine closure. Monitoring of the mitigation actions will begin following completion of a particular stream restoration reach and/or wetland restoration area; therefore, the timelines for meeting performance standards presented in the sections below are intended to be associated with completion of a stream reach and/or wetland restoration area. Section 12 contains the detailed methodology for monitoring these performance standards.

11.1 Streams

Stream restoration would be considered successful when the following stream performance standards have been achieved:

- Stream Design: the desired physical conditions for a design reach have been constructed as designed;
- Physical Channel Conditions and Aquatic Habitat: Restoration of physical channel conditions, such as removal of fish passage barriers and installation of LWD, have been completed and have been demonstrated to meet the design intent;
- Riparian Vegetation: Riparian vegetation is established and is similar in vegetation composition, diversity, and structure to baseline conditions and/or reference sites; and
- Functions and Values: Restored stream channels are providing the desired functions and values, as expressed in SFA scoring.

Table 11-1 summarizes the performance standards, timeline for achievement of performance standards, and required documentation for restored streams within the Mitigation Area. Monitoring methodologies that will be utilized to assess whether the restored streams are meeting the performance standards are described in Section 12.

Table 11-1. Summary of Proposed Performance Standards and Timeline for Stream Restoration Reaches		
Performance Standard	Timeline [a] (Year)	Documentation
Stream Design		
The proposed physical conditions within a stream design reach have been constructed as designed.	Year 0-1	As-built Report or Year 1 Monitoring Report
Physical Channel Conditions and Aquatic Habitat [b]		
Physical channel conditions are as intended based on initial stream design and relative to near-by reference reaches.	Year 1-5	Years 1-5 Monitoring Report
Installed LWD and rock structures are intact and functioning as intended, where constructed.	Year 1-5	Years 1-5 Monitoring Report
Stream reach is not demonstrating excessive sedimentation or turbidity as measured by percent surface fines.	Year 1-5	Years 1-5 Monitoring Report
Documentation that fish passage is attainable along the length of the restored or enhanced stream reach for fish bearing streams.	Year 1-5	Years 1-5 Monitoring Report
Stream reach is providing diverse habitat for aquatic species, where applicable.	Year 1-5	Years 1-5 Monitoring Report
Suitable spawning and rearing habitat for ESA-listed salmonids is documented within the stream reach, where applicable.	Year 1-5	Years 1-5 Monitoring Report
Riparian Vegetation		
Cover of native herbaceous species at least 50 percent and cover of native woody species at least 10 percent.	Year 2	Year 2 Monitoring Report
Cover of native herbaceous species at least 60 percent and cover of native woody species at least 25 percent.	Year 3	Year 3 Monitoring Report
Cover of native herbaceous species at least 80 percent and cover of native woody species at least 50 percent.	Year 5	Year 5 Monitoring Report
At least 5 native herbaceous species and 4 native shrub or tree species present in riparian buffer.	Year 1-5	Years 1-5 Monitoring Report
Less than 10 percent cover of Idaho-listed noxious weed species.	Years 1-5	Year 1-5 Monitoring Report
Functions and Values		
Stream restoration and enhancement areas will meet or exceed the net total (sum) of restored phase stream functional units as calculated in the SFA .	Year 5	Year 5 Monitoring Report

[a] *Timeline assumes no large, unanticipated natural disturbance, fire, or other "act of God"*

[b] *Physical channel conditions and aquatic habitat objectives vary per stream reach*

11.2 Wetlands

Wetland restoration will be considered successful when the following conditions have occurred:

- **Hydrology:** Hydrologic conditions support wetland vegetation and overall function.
- **Vegetation**: Wetland plant communities are established and are similar in vegetation composition, diversity, and structure to baseline conditions and/or reference sites.
- **Soils:** Soils have developed hydric soil indicators and characteristics.
- **Wetland Delineation:** The desired acreage of each wetland type (i.e., PEM, PSS, PFO) has been established.
- **Wetland Functions and Values:** Wetland restoration is providing desired functions and values.

Table 11-2 summarizes the performance standards and timeline for achievement of performance standards for wetland restoration.

Table 11-2. Summary of Proposed Performance Standards and Timeline for Wetland Restoration		
Performance Standard	**Timeline (Year)**	**Documentation**
Hydrology		
Establishment of desired ground elevations.	Year 0	As-built Report
Observations of wetland hydrology indicators.	Years 1-5	Years 1-5 Monitoring Report
Adequate hydrology without supplemental irrigation.	Years 3, 4, 5	Years 3-5 Monitoring Report
Vegetation		
Cover of native submerged aquatic vegetation at least 10 percent in aquatic bed wetlands Cover of native herbaceous species at least 40 percent in emergent wetlands Cover of native woody species at least 10 percent in scrub-shrub and forested wetlands.	Year 2	Year 2 Monitoring Report
Cover of native submerged aquatic vegetation at least 20 percent in aquatic bed wetlands Cover of native herbaceous species at least 60 percent in emergent wetlands Cover of native woody species at least 25 percent in scrub-shrub and forested wetlands At least 15 percent of woody cover in forested wetlands composed of native tree species	Year 3	Year 3 Monitoring Report
Cover of native submerged aquatic vegetation at least 30 percent in aquatic bed wetlands Cover of native herbaceous species at least 80 percent in emergent wetlands Cover of native woody species at least 50 percent in scrub-shrub and forested wetlands At least 30 percent of woody cover in scrub-shrub wetlands composed of native shrub species At least 30 percent of woody cover in forested wetlands composed of native tree species	Year 5	Year 5 Monitoring Report
2 native submerged aquatic vegetation species present in aquatic bed wetlands 5 native herbaceous species present in emergent wetlands 4 species of native shrubs present in scrub-shrub and forested wetlands 2 native tree species and 2 native shrub species present in forested wetlands.	Years 1-5	Year 1-5 Monitoring Report
Less than 10 percent cover of Idaho-listed noxious weed species.	Years 1-5	Year 1-5 Monitoring Report
Soils		
Accumulation of organic matter or development of organic soils	Years 1-5	Year 1-5 Monitoring Report
Soil colors (i.e., value and chroma) meet hydric soil indicators	Years 1-5	Year 1-5 Monitoring Report
Development of redoximorphic features	Years 1-5	Year 1-5 Monitoring Report
Wetland Delineation		
Identify and delineate acres of wetlands and their classification within the Mitigation Area.	Year 5	Year 5 Monitoring Report
Functions and Values		
Complete functional assessments of delineated wetlands within the Mitigation Area. Wetland restoration will meet or exceed the predictive MWAM functional units.	Year 5	Year 5 Monitoring Report

Section 12

Monitoring Requirements

In accordance with 33 CFR 332.4 (c) (10), this compensatory mitigation plan includes a monitoring schedule and a description of parameters to be monitored to determine if the Mitigation Area meets performance standards and to determine if adaptive management is needed. Following completion of restoration actions within a wetland restoration area or stream restoration reach, Perpetua Resources will conduct monitoring annually for at least 5 years to determine the progress of each restoration area in meeting the ecological performance standards (see Section 11). If, after 5 years, it is determined that the performance standards have not been met, monitoring will continue every other year until the performance standards have been achieved.

The monitoring schedule would coincide with the appropriate season relative to the field data to be gathered. Perpetua Resources proposes to lead annual site visits for USACE, EPA, IDL, Idaho Department of Fish and Game, and other interested agency personnel to facilitate agency review of restoration areas.

Additional details regarding monitoring of stream and wetland restoration areas are provided in the sections below and in Section 14 – Adaptive Management Plan.

12.1 Streams

Monitoring of stream restoration will occur annually in the low-flow period for the first 5 years following completion of restoration actions. Assessment of the stream design for the restoration reach will occur in Year 1 and physical channel conditions, aquatic habitat, and riparian vegetation will be monitored annually for 5 years. If the restoration progresses successfully and is meeting performance standards, final monitoring will include an SFA of the stream restoration reach in Year 5 to confirm SFA predictions. Monitoring protocols are described further in the sections below.

12.1.1 Stream Design

Following construction, the stream restoration reach will be assessed to determine if the reach has been constructed within design tolerances. Any changes between design and construction would be noted, as well as the reasons for the changes. Documentation of completion of construction of the stream reach will be provided in an As-built Report or included in the Year 1 Monitoring Report.

12.1.2 Physical Channel Conditions and Aquatic Habitat

Stream monitoring will include measurements of physical channel conditions and aquatic habitat along the stream restoration reach. Stream channel characteristics, including bankfull width, maximum and mean pool depth, bankfull width/depth ratio, and average channel depth, will be documented annually by establishing perpendicular transects across the width of the stream at 3 to 5 riffle and pool features along the design reach. Perpendicular transects would also be used to determine if channel dimensions are within design tolerances. These transects would be marked with stakes or flagging and global positioning system points would be taken for relocation during subsequent surveys. Surveys of these transects in subsequent years will also document any vertical or lateral changes of the channel. Photos will be taken along each transect during each monitoring period to document conditions.

To document bedform complexity and average channel slope, a survey of the longitudinal profile of the channel thalweg of a representative sub-reach of the stream restoration reach would be conducted at years 1, 3, and 5. These longitudinal profile surveys would also help determine whether a variety of aquatic habitat types such as pools and riffles are present along the stream restoration reach. Additionally, longitudinal profiles will help determine if pools occur at the desired frequency and depth to provide suitable aquatic habitat within the stream restoration reach.

Stream banks along the length of the stream restoration reach will be visually inspected during annual monitoring to document eroding banks and determine whether installed LWD and rock structures are intact. The length of any bank erosion and potential causes of bank erosion will be noted and photographs of the eroding bank will be taken. Rock structures and LWD that are no longer present or not functioning as intended will also be noted.

12.1.3 Riparian Vegetation

To assess the establishment and composition of planted riparian vegetation within the stream restoration reach, monitoring will measure:

- Year 1:
  - The number of different native herbaceous, shrub, and tree species within the stream restoration reach
  - Percent cover of Idaho-listed noxious weed species
- Years 2 through 5:
  - The number of different native herbaceous, shrub, and tree species within the stream restoration reach
  - Percent cover of native herbaceous, shrub, and tree species observed within the stream restoration reach
  - Percent cover of Idaho-listed noxious weed species

To measure percent cover of native herbaceous and woody plant species, at least two permanent transects will be established, one on each side of the stream within the stream restoration reach. Transects would be aligned to run perpendicular to the stream channel. The line-intercept (Coulloudon, et al. 1999, Elzinga, Salzer and Willoughby 1998) or belt transect (Herrick, et al. 2005, Lutes, et al. 2006) methods will be used to determine percent cover of all plant species observed along each transect. To measure percent cover of Idaho-listed noxious weed species, all observations of these species within the stream restoration reach will be documented and mapped. Percent cover will be determined based on the size of the mapped noxious weed infestations observed within the stream restoration reach.

In addition to measuring the parameters above, a floristic inventory of all plant species observed within the stream restoration reach will be compiled. Riparian vegetation will also be qualitatively assessed to determine the general vigor and condition of installed plants. Permanent photo-point locations will also be established following construction of the stream restoration reach. Photos will be taken from these photo point locations during each monitoring event to document vegetation establishment and stream bank conditions within the stream restoration reach.

12.1.4 Functional Assessment

An SFA of the stream restoration reach will be conducted during Year 5 monitoring. The functional assessment will follow protocols previously used (Rio ASE 2023) to assess streams in the Project Area that incorporate the USFS WCI Matrix. The results of the SFA for a restoration design reach will

be compared to results of functional assessments previously conducted for the Project and will also be used to determine if the restoration design reach is functioning appropriately.

12.2 Wetlands

Monitoring of wetland restoration areas will occur annually during the growing season for the first 5 years following completion of restoration actions. Wetland vegetation, hydrology, and soils will be monitored during each annual monitoring period. If the restoration progresses successfully and is meeting performance standards, final monitoring will include wetland delineation and functional assessments in the established wetland restoration areas in year five or as determined in consultation with the USACE. Wetland monitoring protocols are described further in the sections below. Perpetua Resources understands that restored PFO wetlands may take longer than 5 years to meet the performance standards and thus may require longer term monitoring.

12.2.1 Hydrology

Following construction or during the first year of monitoring, the wetland mitigation area will be assessed to determine whether site grading during construction achieved the desired design elevations and whether these elevations provide adequate hydrology to sustain the desired wetland plant communities. Subsequent monitoring periods will assess hydrology to determine if all areas of the mitigation area are receiving adequate water to support establishment and maintenance of desirable wetland vegetation. Perpetua Resources will monitor groundwater levels by installing piezometers, monitoring wells, or shallow well points in select wetland restoration areas along defined monitoring transects. Piezometers, monitoring wells, or shallow well points will also be used to determine the duration and frequency of near-surface saturation as groundwater is a critical component of the hydrologic support of wetland plant communities. Additionally, test pits may be dug along established transects in each wetland mitigation area to determine the groundwater levels and to assess whether soil saturation is observed within 12 inches of the soil surface. Other indicators of wetland hydrology, such as water marks, drift lines, sediment deposits, and drainage patterns, within the mitigation area will be noted during each monitoring period.

12.2.2 Vegetation

To assess the establishment and composition of planted wetland vegetation within the wetland restoration area, monitoring will measure:

- Year 1:
  - The number of different native submerged aquatic, herbaceous, shrub, and tree species within each wetland classification (PAB, PEM, PSS, PFO) within the Mitigation Area.
  - Percent cover of Idaho-listed noxious weed species.
- Years 2 through 5:
  - The number of different native submerged aquatic, herbaceous, shrub, and tree species within each wetland classification (PAB, PEM, PSS, PFO) within the restoration area.
  - Percent cover of native submerged aquatic, herbaceous, shrub, and tree species observed within the mitigation area, by wetland classification.
  - Percent cover of Idaho-listed noxious weed species.

To measure percent cover of submerged aquatic vegetation, transects will be run perpendicular to the contour intervals and topographic gradient of the restored wetland area. Percent cover of submerged aquatic vegetation would be recorded within 0.2 meter by 0.2 meter quadrats placed at

regular intervals along the transect. The length of the transect and the number of transects monitored will depend on the size of the restored aquatic bed vegetation within the wetland restoration area. A view scope would be used to help determine the species present within each quadrat.

To measure percent cover of native herbaceous and woody plant species, permanent transects will be established within each wetland classification (PEM, PSS, PFO) within the wetland restoration area. These transects will run perpendicularly to the contour intervals and topographic gradient of the wetland restoration area and generally align with stream channel cross sections established to monitor stream restoration success. For PEM wetlands, percent cover will be measured within 0.5-meter by 0.5-meter plots placed at regular intervals along the transect. For PSS and PFO wetlands, percent cover of herbaceous and woody species will be measured through either the line-intercept or belt transect method.

To measure percent cover of Idaho-listed noxious weed species, all observations of these species within the wetland mitigation area will be documented and mapped. Percent cover will be determined based on the size of the mapped noxious weed infestations observed within the wetland restoration area.

In addition to measuring the parameters above, a floristic inventory of all plant species observed within the wetland restoration area will be compiled. Vegetation will also be qualitatively assessed to determine the general vigor and condition of installed plants. Permanent photo-point locations will be established following construction of the wetland restoration area. Photos will be taken from these photo point locations during each monitoring event to document vegetation establishment within the wetland restoration area.

12.2.3 Soils

Hydric soil conditions occur when soils have been inundated with water and anaerobic conditions develop. These anaerobic, or reduced, conditions can occur relatively quickly with the time required for oxygen depletion on the order of several hours to a few days after inundation begins (Mitsch and Gosselink 2007). However, depletion of oxygen within the soil system is not readily observable in the field and devolvement of other observable hydric soil indicators takes longer to develop depending on hydrological regimes. Hydric soil conditions were shown to develop after only two years of continued flooding (Mitsch, et al. 2005). Not all wetland habitats included in the mitigation plan would be continually or permanently flooded based on topography and hydric conditions. Fringe wetland habitat with seasonal wetting and drying cycles takes longer to develop hydric soil conditions. Based on this, hydric soil development across the site will be monitored for 5 years and for one or more hydric soil indicators that are likely to occur in the different wetland habitat types as listed below:

- Years 1 through 5:
  - Development of organic wetland soil or an increase in organic matter on soil surfaces. These indicators occur as organic matter accumulates in wetlands as a result of the anaerobic conditions created by standing water or poorly drained conditions.
  - Monitoring of soil profile coloration to determine if the soil color meets the hydric soil indicator criteria in the appropriate USACE wetland delineation regional supplement. In general, soils with colors of chroma of 2 or less on the Munsell color chart are classified as a hydric soil (Mitsch and Gosselink 2007).

- Development of redoximorphic features. These features are formed by the reduction, translocation, and/or oxidation of iron and manganese oxides (Vepraskas 1995) and include reduced matrices, oxidized rhizosphere, redox concentrations, and redox depletions.

Measurement of hydric soil conditions will occur in conjunction with vegetation monitoring along permanent transects. This would allow monitoring of hydric soil development within the differing wetland habitat types and hydrological conditions occurring across the wetland mitigation areas, including permanently inundated wetlands, fringe wetlands with fluctuating water levels and seasonal wetting/drying regimes.

12.2.4 Wetland Delineation

Wetland delineations, using the appropriate regional supplement, will be conducted in a wetland restoration area during Year 5 monitoring. The acres of each wetland type delineated within the restoration area will be documented and used to determine if the proposed acreage of each wetland type has been established.

12.2.5 Functional Assessment

A functions and values assessment of a wetland restoration area will be conducted during Year 5 monitoring. The MWAM will be used to conduct the assessment and the results would be compared to results of functions and values assessments conducted prior to construction. Functions and values assessments will help determine if the wetland restoration area is meeting the performance standard of meeting or exceeding predicted functions and values ratings.

12.3 Monitoring Reports

Perpetua Resources will submit a written monitoring report to the USACE and EPA for each calendar year during the monitoring period. The report prepared for the first monitoring year will include “as-built” drawings of each stream and wetland restoration project(s) completed that year, showing site condition, topography, planted areas, site dimensions, and water supply and control features. Any deviations from the original mitigation plan will be documented and the report will include pre-construction and during construction photographs taken from established photo point locations. Annual monitoring reports will contain the following:

- Project Overview—This section will include the following:
  - USACE Permit Number and name and contact information of permittee, agent, and/or consultant.
  - Names of party responsible for conducting the monitoring, and the dates the monitoring was conducted.
  - Description of the Project, acreage and type of aquatic resources impacted, and mitigation acreage, and type of aquatic resources authorized to compensate for the aquatic impacts. Description of the location, identifiable landmarks (including information to locate the mitigation area), and coordinates of the mitigation area(s) monitored.
  - Date that each stream restoration reach and wetland mitigation area being monitored commenced and/or was completed.
  - Statement of whether performance standards are being met.
  - Dates any recent corrective or maintenance actions were conducted.
  - Specific recommendations for any additional corrective or remedial actions.

- **Monitoring Requirements and Performance Standards—**This section would include the monitoring requirements and performance standards, as specified in the approved mitigation plan and an evaluation of whether each stream and wetland mitigation area is achieving the performance standards or is trending towards meeting the standards.
- **Summary Data—**This section would summarize data collected to substantiate the success and/or potential challenges associated with the mitigation area. Photo documentation from permanently established photo-point locations would be included in this section to support the finding and recommendations referenced in the monitoring report and to assist the USACE in assessing whether the mitigation area is meeting applicable performance standards for that monitoring period.
- **Maps and Plans**—Maps showing the mitigation areas relative to other landscape features, habitat types, locations of photo-points, transects, sampling data points, and/or other features pertinent to the mitigation plan would be included. The perimeters of the mitigation areas would also be clearly delineated on the maps to assist the USACE in locating the mitigation areas during subsequent site inspections.
- **Conclusions**—This section will include a general summary describing the conditions in the compensatory mitigation area. If performance standards are not being met, a brief explanation of the difficulties and potential remedial actions proposed, including a timetable, will be included.

Section 13

Long-term Management Plan

In accordance with 33 CFR 332.4 (c) (11) and 33 CFR 332.7 (d), the mitigation plan must include a description of how the compensatory Mitigation Area would be managed after performance standards have been achieved to ensure the long-term sustainability of the resources within the Mitigation Area, including long-term financing mechanisms and the party responsible for long-term management. Perpetua Resources proposes to design the Mitigation Area, including streams and wetlands, to become self-sustaining and to operate and function with minimal or no required maintenance or human intervention after vegetation establishment. However, Perpetua Resources is aware that long-term management and maintenance may be necessary for the Mitigation Area to continue to meet the objectives.

Perpetua Resources proposes that it 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 (e.g., USFS, a land trust entity or conservation organization) as approved by the USACE (see Section 5). Perpetua Resources or an appropriate third party would conduct inspections of the Mitigation Area at a re-occurring interval (10 years) in perpetuity. Long-term management activities would include evaluating the Mitigation Areas in the following categories:

PHYSICAL

- Does the floodplain contain streams, wetlands and riparian areas as originally designed? ____Yes ___ No
- Do the Mitigation Area floodplains remain free of excessive erosion? ____Yes ___ No

BIOLOGICAL

- Do the vegetation communities in wetlands appear healthy and remain intact? ____Yes ___ No
- Do the Mitigation Areas remain free of Idaho-listed noxious weeds? ____Yes ___ No

SOCIAL

- Is signage and placarding in place and legible? ____Yes ___ No
- Are any trails or viewpoints in good repair and safe? ____Yes ___ No
- Do the Mitigation Areas remain free of any unintended roads, trails or camping areas? ____Yes ___ No

For any categories that contain a no answer, excluding any act of God (i.e., catastrophic meteorological event, fire, or earthquake), it would be the responsibility of the conservation easement holder to ensure the Mitigation Area is returned to as near the original design and associated success criteria as possible.

Section 14

Adaptive Management Plan

In accordance with 33 CFR 332.4 (c) (12), this compensatory mitigation plan includes a management approach to address unforeseen changes in site conditions or other components of the Mitigation Area, including the party or parties responsible for implementing adaptive management measures. If monitoring or other indicators show that the mitigation areas are failing to achieve the prescribed ecological performance standards as anticipated, reasons for failure (e.g., plant species installed in locations not conducive to their survival, hydrology not functioning as anticipated) will be evaluated and adaptive management actions will be proposed to correct shortcomings. Adaptive management actions, if needed, would be implemented early in the mitigation implementation phase to ensure that these actions move a mitigation area toward meeting performance standards early in the project life cycle. Adaptive management would phase out as mitigation areas meet prescribed performance standards.

Perpetua Resources will consult with the USACE and other applicable agencies to identify strategies for meeting mitigation obligations. An adaptive management plan will identify potential reasons the Mitigation Area is failing to meet its objectives, corrective actions to be implemented, and a timeline for completion of adaptive management actions. If it is determined that the original performance standards may not be attainable, new performance standards may be developed based on the site evaluations. Perpetua Resources will work with the USACE and other applicable regulatory and resource agencies to develop an adaptive management plan, and adaptive management actions will only be undertaken after consulting and gaining approval from the appropriate regulatory and resource agencies.

Adaptive management strategies (assumptions and dependencies) identified for this project are included in **Appendix E**.

Section 15

Financial Assurances

In accordance with 33 CFR 332.4 (c) (13), a mitigation plan must include a description of financial assurances that would be provided and how they would ensure a high level of confidence that the compensatory Mitigation Area would be successfully completed in accordance with its performance standards. Financial assurance for mitigation project success can be defined as a mechanism that ensures that sufficient resources will be available for use to complete or replace a mitigation provider's obligations to implement a required mitigation project and meet specified ecological performance standards in the event that the mitigation provider proves unable or unwilling to meet those obligations (USACE 2016c).

The amount of the financial assurances would be commensurate with the final mitigation work plan and would be based on the estimated cost needed for all proposed mitigation activities, as well as a contingency for additional efforts needed to meet the performance standards. For the purposes of the Project, financial assurance can be placed into two categories, which are on-site mitigation associated with planned restoration and enhancement and off-site mitigation associated with compensation for temporal losses. The following sections describe the intended methods of establishing financial assurance for these categories.

On-Site Financial Assurance

On-site mitigation, restoration, and enhancement work is planned to take place during the mine operations and mine reclamation and closure schedule and as part those activities. Perpetua Resources will estimate the cost of the financial assurance for all aspects of mine operations and mine reclamation and closure using the Standardized Reclamation Cost Estimator (version 2.01 or newer). This estimate will include on-site stream and wetland mitigations outlined in this plan. Recognizing multiple state and federal agencies will be stakeholders in such a holistic reclamation arrangement, Perpetua Resources will itemize, and present for acceptance, the components of the estimate which would be allocated to meet the regulatory requirements of each stakeholder. A holistic financial assurance cost estimate will not be deemed completed until all agency stakeholders, including the USACE, have reviewed and agreed to the estimated costs for their respective regulatory responsibilities. In the event of a company default, all on-site closure, restoration, and enhancement work would be completed in a holistic manner led by a single stakeholder agency. State and federal agency stakeholders entering into a Memorandum of Agreement regarding how a holistic financial assurance will be managed and utilized, if ever required, would ensure each stakeholder's closure requirements are met and would be an effective means to facilitate this holistic closure approach. Although IDL or USFS would be effective in holding and managing a holistic financial assurance, the stakeholders will collectively determine which stakeholder agency will hold and manage the financial assurance. The USACE's portion of the holistic financial assurance would phase out when the USACE determines the Mitigation Area is functioning appropriately in accordance with the performance standards (see Section 11).

Off-Site Financial Assurance

Financial assurance required for off-site work associated with compensation for temporal losses will be established separately from the on-site financial assurance. The USACE would approve and hold this financial assurance and would lead or designate a lead agency for off-site work should a

company default occur. In discussions with the USACE Walla Walla District, Regulatory Division, the following financial assurance options for wetland and stream mitigation are generally acceptable:

- Letter of credit
- Casualty insurance
- Performance bond
- Escrow account

The LRLT's Little Springs Conservation Easement and Restoration Project on the Lemhi River, as described in Section 2.2.3 and Section 9.1.2.1, will likely require establishment of a financial assurance instrument to ensure the establishment of the anticipated credits and overall project success.

The BCCRP, as described in Section 2.2.3 and Section 9.1.2.2, does not require a financial assurance, as the benefits and net gain in functional values are expected to be immediate with no temporal lag.

Section 16

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Appendix A: Sample Conservation Easement for USACE

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CONSERVATION EASEMENT

_____(Grantor) is the owner of that real property more particularly described and shown in Exhibit "A" (hereinafter the "Property") attached hereto and made a part hereof. The approximately _____-acre Property is also referenced in "The Mitigation Plan For _____". The Property is subject to the conditions of Department of the Army Section 404/Section 10 Permit Number _____, dated _____, or a revision thereof. One of the conditions of the referenced permit requires restrictions be placed on the deed for the Property for the purpose of providing compensation for adverse impacts to waters of the United States". Any activities, not included in the permit which may, in the future, be conducted within the Property and will affect the vegetative and hydrologic condition outlined in the success criteria of the Mitigation Plan, must be approved by the United States Army Corps of Engineers (USACE), Galveston District, Regulatory Branch, prior to initiation. This Conservation Easement is created pursuant to the Texas Uniform Conservation Easement Act of 1983 in Chapter 183 of the Texas Natural Resources Code. It is the purpose and intent of this Conservation Easement to assure that the subject lands will be retained and maintained forever predominantly in the vegetative and hydrologic condition described in the success criteria of "The Mitigation Plan for _____".

WHEREAS, Grantee is qualified to hold a conservation easement, and is either

(a) a governmental body empowered to hold an interest in real property under the laws of this State or the United States; or

a charitable, not-for-profit or educational corporation, association, or trust: *, qualified under §501 (c)(3) and § 170(h) of the Internal Revenue Code]*, the purposes or powers of which include one or more of the purposes (a)-(e) below;

WHEREAS, the purpose of this Conservation Easement include, without limitation, one or more of the following:

(a) retaining or protecting natural, scenic, or open-space aspects of real property;
(b) ensuring the availability or real property for recreational, educational, or open-space use;
(c) protecting natural resources;
(d) maintaining or enhancing air and water quality;
(e) preserving the historical, architectural, archaeological, or cultural aspects of real property.

The parties to this agreement include the USACE Permit Applicant, the Grantor, and the Third-Party Administrator (Grantee) who hereby agree that a conservation easement is created which will be subject to the following conditions:

1) Property Description

(Applicant) will provide as Attachment A-1:

(a) On-site photographs taken at appropriate locations on the Protected Property including all major natural features; and

(b) A copy of the deed with an accurate legal description or a current survey certified by a Texas Registered Professional Land Surveyor (RPLS) of the Protected Property.

(c) A copy of a verified wetland survey map, which delineates all waters of the United States, including wetlands within the Property.

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2) Term

These restrictions shall run with the land in perpetuity and be binding on all future owners, heirs, successors, administrators, assigns, lessees, or other occupiers and users. The owner must file this Conservation Easement of record with the County Clerk of _____ County, Texas within 10 days of the date this document is signed and provide a copy of the recorded conservation easement to the USACE, Galveston District within 30 days of filing.

3) General

Except for such specific activities as authorized pursuant to DA Permit Number _____, the following activities are prohibited on the Property subject to this Conservation Easement:

(a) There shall be no filling, excavation, mining or alteration of the Property that will affect the success criteria outlined in the Mitigation Plan unless approved in writing in advance by the USACE, Galveston District.

4) Rights of Access and Entry

The USACE shall have the right to enter and go upon the Property for purposes of inspection, and to take actions including but not limited to scientific or educational observations and studies, and collection of samples.

5) Grantor's Reserved Rights

Notwithstanding the foregoing Restrictions, Grantor reserves for Grantor, its heirs, successors, administrators, and assigns the following Reserved Rights, which may be exercised upon provision of prior written notice to Grantee and to the USACE, except where expressly provided otherwise:

(a) Reserved Rights, Grantor reserves the right to engage in all acts or uses not prohibited by the Restrictions, and which are not inconsistent with the conservation purposes of this grant, which is the preservation of the Property substantially in its natural vegetative and hydrologic condition described in the Mitigation Plan.

[Insert for approved mitigation banks: (b) Grantor reserves the sole and unrestricted right to sell credits or other entitlements or interests in the Property in order to perfect and carry out the purpose of a mitigation bank.]

[Additional, case-specific reservations may be listed e.g. wildlife management plans]

6) Enforcement

This Conservation Easement may be enforced by the Grantee and the USACE, or its successor agencies, in an action at law or equity against any person(s) or other entity/entities violating or attempting to violate this Conservation Easement. Any forbearance on the part of the USACE to exercise its rights in the event of a violation shall not be deemed or construed to be a waiver of their rights hereunder in the event of any subsequent failure of the Grantor to comply. In the event of a breach of the Conservation Easement by the Grantor, Grantee, or

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another party, or any party working for or under the direction of the Grantor or Grantee, the USACE must be notified immediately. If the USACE becomes aware of a breach of the restrictions, the USACE will notify the Grantor and Grantee of the breach. The parties shall have thirty (30) days after receipt of such notice to undertake actions that are reasonably calculated to swiftly correct the conditions constituting the breach. If the conditions constituting the breach are corrected in a timely and reasonable manner, no further action is warranted or authorized. If the Grantor or Grantee fail to initiate such corrective action within thirty (30) days or fail to complete the necessary corrective action, the USACE may undertake such actions, including legal proceedings, as are necessary to effect such corrective action.

7) Assignment or Transfer

It is understood that this Conservation Easement and any obligations under this Conservation Easement shall not be assigned by Grantee or Grantor, except to another organization qualified to hold such interest under the applicable state and federal laws. The USACE shall be notified in writing of any intention to reassign this Conservation Easement to a new Grantee. A copy of the acceptance must be delivered to the USACE. The Conservation Easement will then be recorded and indexed in the same manner as the original instrument and a copy of the new Conservation Easement must be furnished to the USACE.

8) Warranty

Grantor warrants that it owns the Property in fee simple and that there are no outstanding mortgages, tax liens, encumbrances, or other interests in the Property which have not been expressly subordinated to this Conservation Easement. Grantor further warrants that Grantee shall have the use of and enjoy all the benefits derived from and arising out of this Conservation Easement.

IN WITNESS WHEREOF, Grantor, Grantee and Applicant have executed this Conservation Easement, on the date written hereon. By its execution and acceptance of this Conservation Easement, Grantor, Grantee and Applicant accept the third-party rights of enforcement herein.

Approved by Property Owner (Grantor):

_____ _____

Signature Date

_____

Printed Name

_____

Title

Approved by Grantee:

DRAFT

_____ _____
Signature Date

_____
Printed Name

_____
Title

Approved by the Applicant:

_____ _____
Signature Date

_____
Printed Name

_____
Title

OFFICERS

JUDY PEAVEY-DERR
President
Boise ID

TREVOR KRAMER
Vice President
Nampa ID

STEPHANI HILDING
Secretary/Treasurer
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Boise ID

EXECUTIVE DIRECTOR
MAKENZIE BANNISTER

IDAHO FOUNDATION *for* PARKS AND LANDS

March 27, 2023

United State Army Corps of Engineers
Walla Walla District

Transmitted with Perpetua Resources' 404 Joint Permit Application

RE: Intent to Hold and Support Conservation Easement on Perpetua Resources Private Lands at Stibnite Idaho

Dear Lt. Col. ShaiLin KingSlack:

The Idaho Foundation for Parks and Lands (Foundation) is a statewide 501(c)(3) non-profit land trust whose mission is to preserve and protect open space lands and unique natural, scenic settings for public benefit.

Since its founding in 1972, the Foundation has protected beautiful and critically important properties throughout Idaho. The Foundation has handled real estate assets valued at $12,000,000 at the time of their donation or purchase, and our administrative budget has never been more than one percent of our asset base. We pride ourselves in being conservative in both our economic environment and our natural environment.

The Foundation is actively working with Perpetua Resources Idaho, Inc. (PRII) to develop an agreement for which a conservation easement will be applied to PRII private lands at the Stibnite Gold Project where stream and wetlands mitigation will occur. The conservation easement is meant to insure the long-term protection of the specified private lands in conformance with the Mitigation Rule, 33 CFR 332.4 (c)(4) and 33 CFR 332.7(a). A conservation easement (or conservation agreement) is a voluntary and legal contract between a landowner and a land trust or government agency that permanently restricts uses forever on the property to restrict or prevent future development that may be detrimental to the environment. The conservation easement will

be implemented upon completion of the restoration of the stream and wetlands area to the satisfaction of the USACE.

Although this letter does not create a formal commitment, it is the Foundation's intent to accept the responsibility and stewardship of holding this conservation easement in order to protect those lands from future development or misuse. As illustrated on the attached map, the conservation easement is estimated to contain 91 acres of restored streams and wetlands proposed as mitigation in PRII's Compensatory Mitigation Plan for Streams and Wetlands. While stream and wetland restoration will not come to fruition for many years, the Foundation believes that the protection of these mitigative lands via conservation easement is in alignment with the Foundation's mission to preserve open space throughout Idaho and represents a significant conservation opportunity. Copies of the conservation easement will be supplied to the United State Army Corps of Engineers upon completion and final execution.

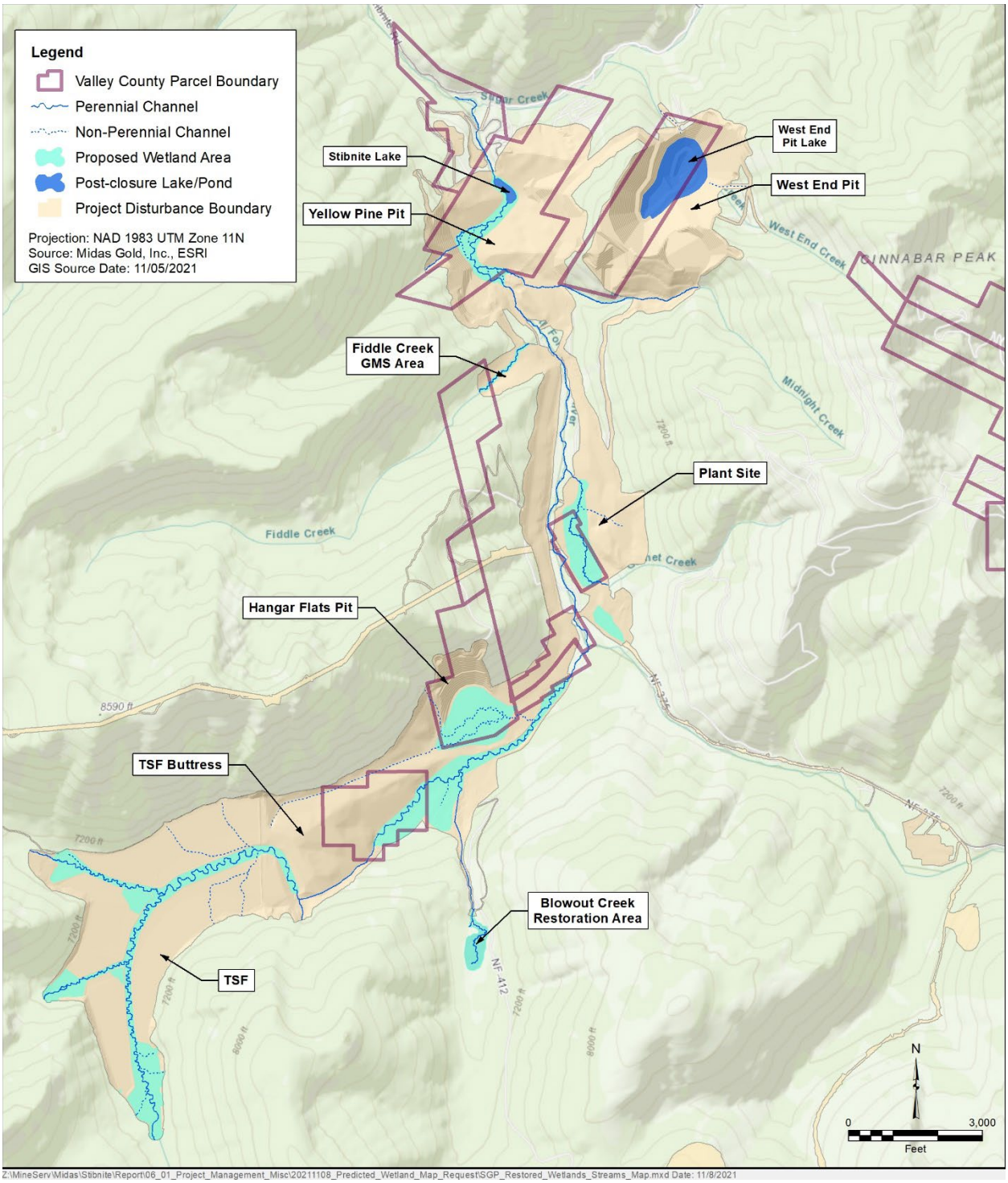
Sincerely,

Judy Peavey-Derr

Judy Peavey-Derr
President, Idaho Foundation for Parks and Lands

Attachment

Stibnite Gold Project: Proposed Stream and Wetlands Mitigation Location Map



LEMHI REGIONAL Land Trust

105 South Center Street
Salmon, Idaho 83467
(208)756-8879
www.lemhilandtrust.org
info@lemhilandtrust.org

October 4, 2022

United States Army Corps of Engineers
Attn: Lt. Col. ShaiLin KingSlack

RE: Letter of Support for Perpetua 404 Application

To Whom It May Concern,

I am writing today to outline Lemhi Regional Land Trust's (LRLT) Little Springs Conservation Easement and Restoration Project (Project), our partnership with Perpetua Resources (Perpetua), and our support of Perpetua's proposal to provide funding towards completion of the project to be used as mitigation credit for their Stibnite Gold Project.

The Project is located on the Snyder Ranch in the upper Lemhi River valley near the town of Lemhi, Idaho. The Project's main goal is to conserve, protect, and restore key habitats for targeted fish species including Endangered Species Act (ESA) listed Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*O. mykiss*). A conservation easement will provide permanent protection to nearly 2000 acres of working ranchlands, upland sagebrush steppe habitat, and riparian habitat. An integral part of the conservation easement is the reserved right for LRLT to conduct habitat restoration to benefit resident and anadromous fish. In 2021, draft stream and habitat restoration strategies were developed by a multidisciplinary team of river and salmon habitat professionals. Rio Applied Science and Engineering (Rio ASE) carried out the developed strategy, performed associated technical analyses, and developed a report summarizing the conceptual restoration recommendations. The priority habitat restoration project is proposed to occur on the mainstem Lemhi River on the west side of State Highway 28 with a goal to create a multi-threaded channel network with large woody debris forcing water flow splits and a greater frequency of habitat units. The conservation easement and restoration activities associated with the Project are supported by the landowner.

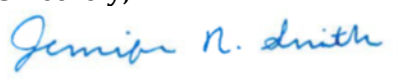
LRLT and Perpetua have been in conversation and partnership since early 2021. We have been exploring opportunities for Perpetua to assist with completion of the Project while also satisfying a portion of their stream mitigation requirements for beginning operations of the Stibnite Gold Project. To date, we have developed draft restoration strategies, including habitat treatments and desired outcomes. In total, we propose to restore 43 acres

Board of Directors:
Bob Russell • Mike Overacker • Ingrid Fulstone
Becca Aceto • Mike Dougherty • Chris Healy • Ace Hess • Mike Kossler

and create an additional 20 acres of floodplain; and restore 1.6 miles of current Lemhi River channel and associated riparian areas and create and restore an additional 2.3 miles of new riparian habitats, for a total project area to enhance over 60 acres of floodplains and nearly 4 miles of stream. We have worked with RIO ASE to develop draft treatments and an anticipated budget of approximately $3.5 million in restoration work. We are excited to be partners with Perpetua to help us reach our goals of protecting and restoring critical habitats in the Lemhi River Basin while also supporting the economics and culture of our region's working ranchlands and assist Perpetua in reaching their goal of beginning operations of the Stibnite Gold Project. It is our understanding that Perpetua will be using the restoration activities of the Project to off-set temporal impacts to streams at the Stibnite Gold Project. There are currently no other entities requesting mitigation credit for the restoration activities of the Project.

Consider this letter to represent our wholehearted support for our partnership with Perpetua and their funding of the Project to meet a portion of their mitigation requirements for opening the Stibnite Gold Project. Please reach out with any additional questions.

Sincerely,



Jennifer N. Smith
Executive Director
Lemhi Regional Land Trust
jsmith@lemhilandtrust.org

Appendix B: Webmap Description

For this document, Tetra Tech has provided a Web based mapping tool in lieu of a book of static maps. This webmap allows the user to focus on the resource or portion of the project area of interest.

The webmap can be found at the following location:
https://tt-mmi.maps.arcgis.com/apps/webappviewer/index.html?id=3a692a9a770e43138d5471983775f0ad

The GIS layers included in the webmap are:

Streams. This is a combined dataset of the stream channels and culverts/undergound pipes delineated for the Stibnite Gold project during the 2011-2019 field seasons.

Wetlands. This is a combined version of the wetland delineations completed for Perpetua Resources for the Stibnite Gold project for field seasons 2011 - 2019. This dataset includes wetland delineations conducted from 2011 to 2017 by HDR Engineering, Inc. and from 2018 to 2019 by Tetra Tech.

This dataset was modified in 2/2023 and was designed to display areas within wetlands that are occupied by stream channels. Streams and wetlands are analyzed separately within the compensatory mitigation framework. The stream channel features will be discussed and analyzed in the RioASE 2023 Stream Functional Assessment Report, while the wetland portions will be discussed and analyzed in the Tetra Tech 2023 Draft Compensatory Stream and Wetland Mitigation Plan.

Wetland Temporal Dataset. This layer depicts the mine feature disturbance area over time for the Stibnite Gold Project for Perpetua Resources. Features have been attributed so that they can be queried based on the year that the disturbance starts, and in some cases when it ends (such as when a haul road disturbance is overtaken by the disturbance area of a pit.) The origins of the layer are from the Project_Disturbance_Boundary feature class from within the PRO geodatabase. The DRSFs, TSF, and Open Pit features were updated with features digitized from EOY TIN files provided by Perpetua Resources. Mine feature footprints were expanded to include the entire area that falls within or below a surface water diversion, as in the area of the TSF and Hangar Flats DRSF. New features were digitized to fill in small sliver gaps not covered by the individual mine features, such as between Hangar Flats Pit and the Hangar Flats Reclamation/Stockpile Area. Timing of feature occurrence was provided by Perpetua Resources. Areas related to the Burntlog Route were generated by Parametrix. Areas related to the transmission line were generated by HDR. Buffers were created around the utility poles based on information gleaned from the transmission line plan of development.

Appendix C: End of Year Project Site Disturbance and Reclamation Sequence

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
West End Creek
East Fork South Fork Salmon River
Midnight Creek
Yellow Pine Access Road
Hennessy Creek
Fiddle GMS
Plant Site Access Road
Garnet Creek
Rabbit Creek
Transmission Line Corridor
Scout Portal
Hangar Flats Access Road
TSF ADT Road
Burntlog Route
Aggregate Storage
Workers Housing GMS
Workers Housing
TSF
TSF
TSF Diversion
TSF ADT Road
Meadow Creek
East Fork Meadow Creek

Perpetua Resources

TETRA TECH

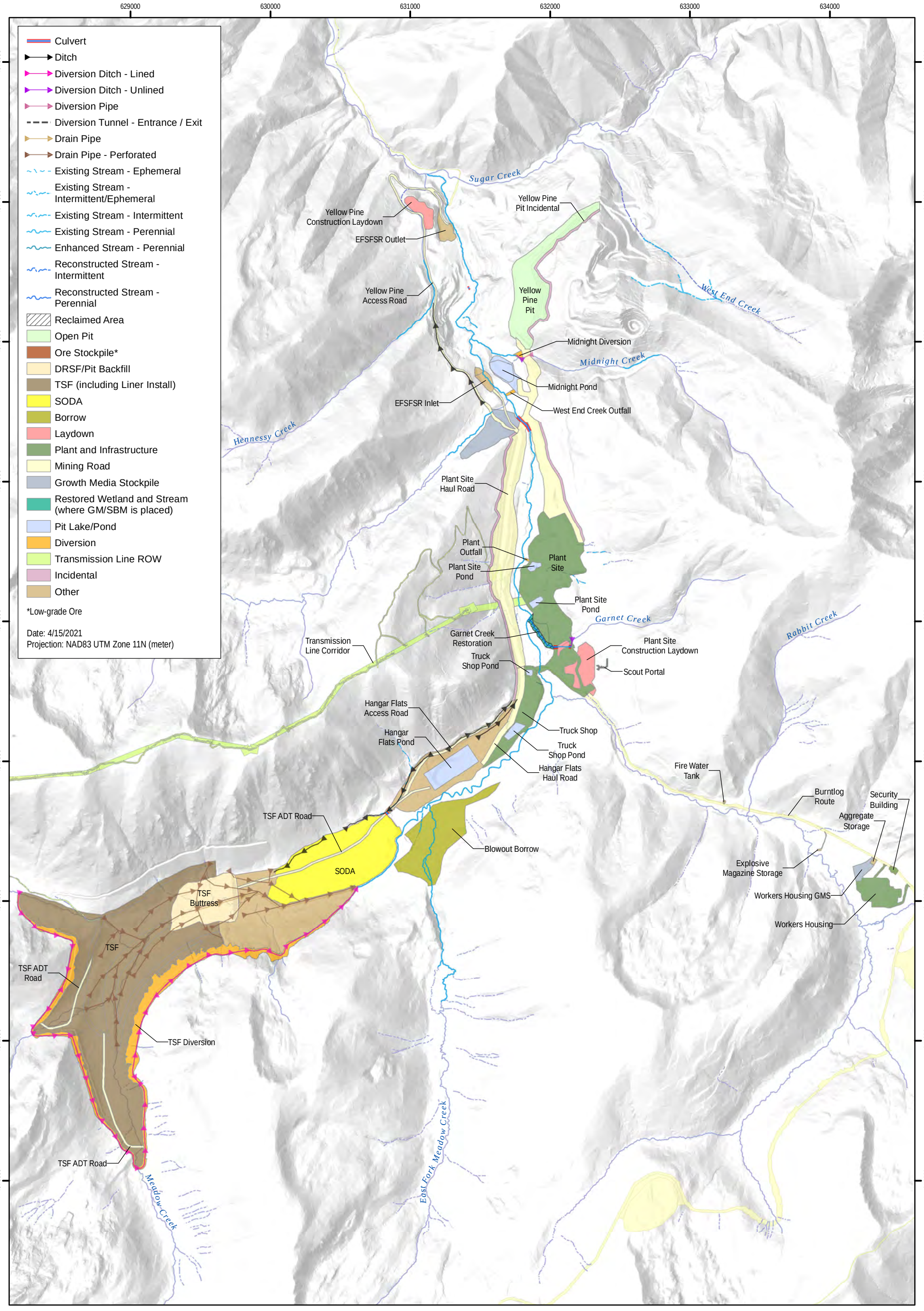
0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY -3



Perpetua Resources

TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY -2

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Yellow Pine Construction Laydown
EFSFSR Outlet
Yellow Pine Pit Incidental
West End Pond
West End Diversion
West End Pit Incidental
West End Pit
Yellow Pine Pit
Yellow Pine Pit
Yellow Pine Pit Incidental
West End Diversion
West End Creek
West End ADT Road
Midnight Creek
Yellow Pine Access Road
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
Hennessy Creek
Yellow Pine ADT Road
Fiddle GMS
Plant Site Access Road
Plant Site Haul Road
Plant Outfall
Plant Site Pond
Plant Site
Plant Site Pond
Garnet Creek
Rabbit Creek
Garnet Creek Restoration
Transmission Line Corridor
Truck Shop Pond
Plant Site Construction Laydown
Scout Portal
Hangar Flats Access Road
Hangar Flats Pond
Hangar Flats Stockpile
Truck Shop
Truck Shop Pond
Hangar Flats Haul Road
Fire Water Tank
Burntlog Route
Security Building
Aggregate Storage
Explosive Magazine Storage
Workers Housing GMS
Workers Housing
Blowout Borrow
TSF Buttress
SODA
TSF
TSF ADT Road
TSF Diversion
Blowout Access Road
Blowout Creek Rock Drain
TSF ADT Road
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

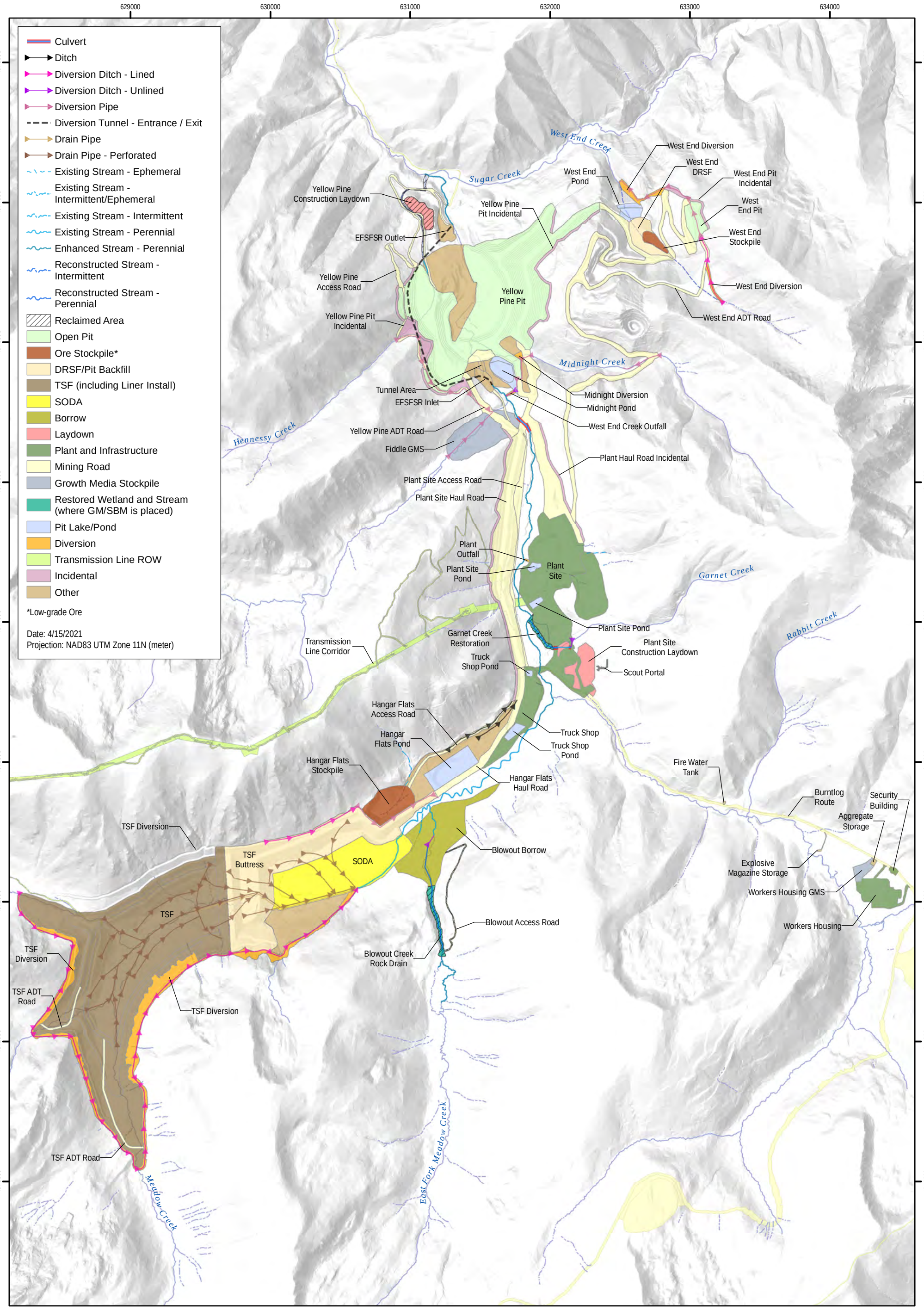
0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY -1



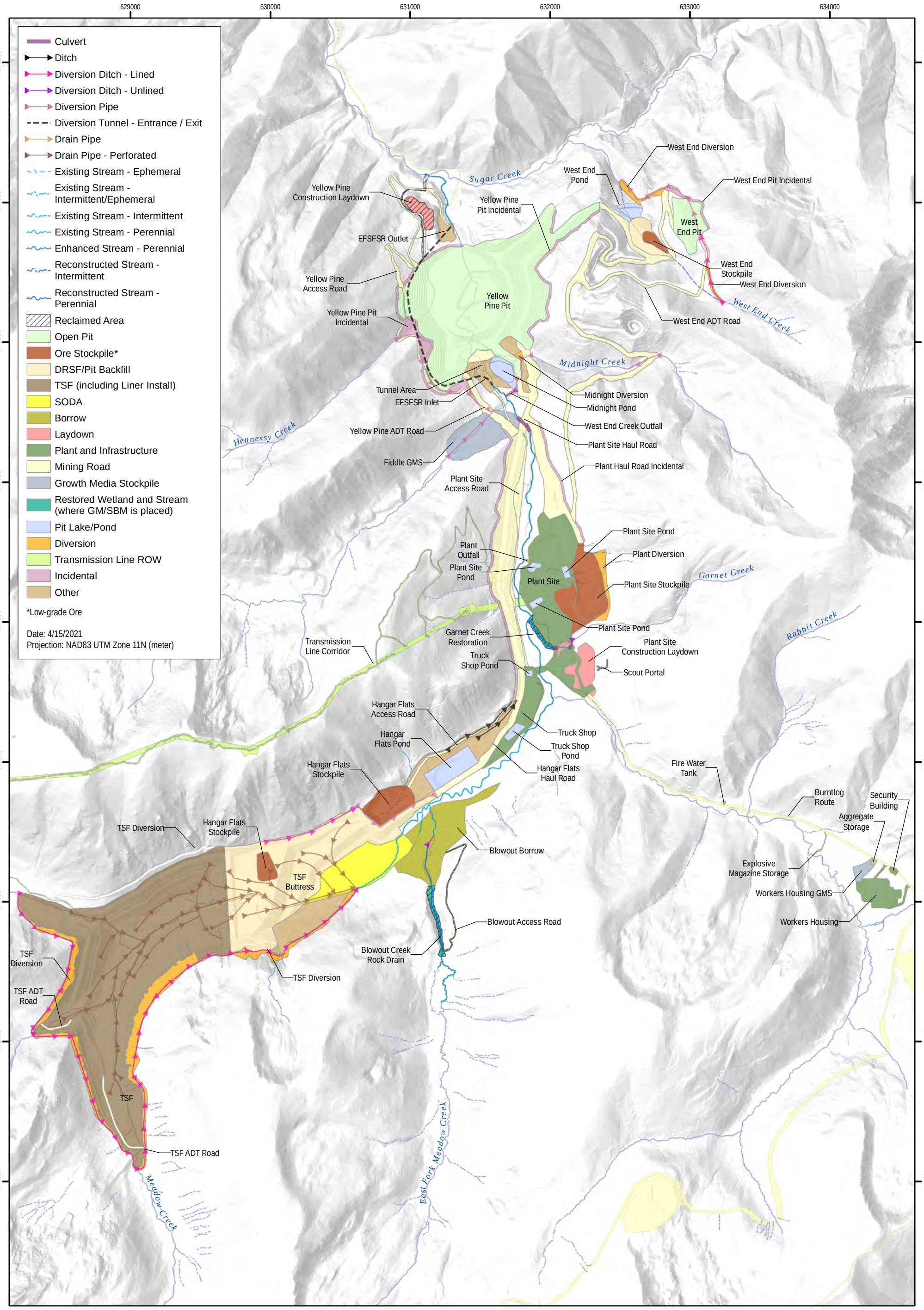
Perpetua Resources

TETRA TECH

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 1


629000
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633000
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4972000
4971000
4970000
Culvert
Ditch
Diversion Ditch - Lined
Diversion Ditch - Unlined
Diversion Pipe
Diversion Tunnel - Entrance / Exit
Drain Pipe
Drain Pipe - Perforated
Existing Stream - Ephemeral
Existing Stream - Intermittent/Ephemeral
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Existing Stream - Perennial
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Reconstructed Stream - Intermittent
Reconstructed Stream - Perennial
Reclaimed Area
Open Pit
Ore Stockpile*
DRSF/Pit Backfill
TSF (including Liner Install)
SODA
Borrow
Laydown
Plant and Infrastructure
Mining Road
Growth Media Stockpile
Restored Wetland and Stream (where GM/SBM is placed)
Pit Lake/Pond
Diversion
Transmission Line ROW
Incidental
Other
*Low-grade Ore
Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)
Sugar Creek
Yellow Pine Construction Laydown
EFSFSR Outlet
Yellow Pine Access Road
Yellow Pine Pit Incidental
Yellow Pine Pit
West End Diversion
West End Pond
West End Pit Incidental
West End Pit
West End Stockpile
West End Diversion
West End Creek
West End ADT Road
Midnight Creek
Midnight Diversion
Midnight Pond
West End Creek Outfall
Plant Site Haul Road
Plant Haul Road Incidental
Tunnel Area
EFSFSR Inlet
Yellow Pine ADT Road
Fiddle GMS
Hennessy Creek
Plant Site Access Road
Plant Site Pond
Plant Diversion
Plant Outfall
Plant Site Pond
Plant Site
Plant Site Stockpile
Garnet Creek
Plant Site Pond
Garnet Creek Restoration
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Truck Shop Pond
Plant Site Construction Laydown
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Truck Shop
Truck Shop Pond
Hangar Flats Pond
Hangar Flats Haul Road
Hangar Flats Stockpile
Fire Water Tank
Burntlog Route
Security Building
Aggregate Storage
Explosive Magazine Storage
Workers Housing GMS
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TSF Diversion
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Blowout Borrow
Blowout Access Road
Blowout Creek Rock Drain
TSF Diversion
TSF Diversion
TSF ADT Road
TSF
TSF ADT Road
Meadow Creek
East Fork Meadow Creek
Perpetua Resources
TETRA TECH
0 500 1,000 2,000 3,000 4,000 Feet
N
STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO
End of Year Project Site Disturbance and Reclamation Sequence
EOY 2

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
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- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Hennessy Creek
Garnet Creek
Rabbit Creek
Midnight Creek
West End Creek
Meadow Creek
East Fork Meadow Creek

Yellow Pine Construction Laydown
EFSFSR Outlet
Yellow Pine Access Road
Yellow Pine Pit Incidental
Yellow Pine Pit
Tunnel Area
EFSFSR Inlet
Yellow Pine ADT Road
Fiddle GMS
Plant Site Access Road
Transmission Line Corridor
Plant Outfall
Plant Site Pond
Plant Site
Garnet Creek Restoration
Truck Shop Pond
Hangar Flats Pit
Hangar Flats Pond
Hangar Flats Incidental
Hangar Flats Stockpile
Hangar Flats Stockpile
Hangar Flats Stockpile
TSF Buttress
TSF
TSF ADT Road
TSF Diversion
TSF Diversion
TSF ADT Road
SODA
SODA Pond
Blowout Creek Rock Drain
MC4
MC4/BC3
MC5
MC6
Meadow Creek Restoration Area
Blowout Borrow
Blowout Access Road
Hangar Flats Access Road
Hangar Flats Haul Road
Truck Shop
Truck Shop Pond
West End Pond
West End Diversion
West End Pit Incidental
West End DRSF
West End Pit
West End Stockpile
West End Diversion
West End ADT Road
Midnight Diversion
Midnight Pond
West End Creek Outfall
Plant Site Haul Road
Plant Haul Road Incidental
Plant Site Pond
Plant Diversion
Plant Site Stockpile
Plant Site Pond
Plant Site Construction Laydown
Scout Portal
Fire Water Tank
Burntlog Route
Security Building
Aggregate Storage
Explosive Magazine Storage
Workers Housing GMS
Workers Housing

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 3

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Hennessy Creek
Garnet Creek
Rabbit Creek
Midnight Creek
West End Creek
Meadow Creek
East Fork Meadow Creek

Yellow Pine Construction Laydown
Yellow Pine Pit Incidental
EFSFSR Outlet
Yellow Pine Pit
Yellow Pine Pit Incidental
Yellow Pine Access Road
Tunnel Area
EFSFSR Inlet
Yellow Pine ADT Road
Fiddle GMS
West End Pond
West End Diversion
West End DRSF
West End Pit Incidental
West End Pit
West End Stockpile
West End Diversion
West End ADT Road
Midnight Diversion
Midnight Pond
West End Creek Outfall
Plant Site Haul Road
Plant Haul Road Incidental
Plant Site Access Road
Plant Site Pond
Plant Diversion
Plant Outfall
Plant Site Pond
Plant Site
Plant Site Stockpile
Plant Site Pond
Garnet Creek Restoration
Plant Site Construction Laydown
Truck Shop Pond
Scout Portal
Transmission Line Corridor
Hangar Flats Pit
Hangar Flats Haul Road
Hangar Flats Haul Road
Truck Shop
Truck Shop Pond
MC6
Hangar Flats Incidental
Hangar Flats Stockpile
Hangar Flats Stockpile
Hangar Flats Stockpile
TSF Incidental
MC5
MC4
MC4/BC3
Meadow Creek Restoration Area
Blowout Borrow
SODA
SODA Pond
TSF Buttress
TSF
Blowout Access Road
Blowout Creek Rock Drain
TSF Diversion
TSF ADT Road
TSF ADT Road
Fire Water Tank
Burntlog Route
Security Building
Aggregate Storage
Explosive Magazine Storage
Workers Housing GMS
Workers Housing

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

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STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 4

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
West End Creek
Yellow Pine Pit Incidental
West End Diversion
West End Pond
West End DRSF
Yellow Pine Construction Laydown
West End Stockpile
West End Pit
West End ADT Road
EFSFSR Outlet
Yellow Pine Pit
Yellow Pine Access Road
Yellow Pine Pit Backfill
West End Diversion
Yellow Pine Pit Incidental
West End Pit Incidental
Midnight Creek
West End Pit Incidental
West End ADT Road
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
Plant Site Haul Road
Yellow Pine ADT Road
Hennessy Creek
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Garnet Creek
Plant Site Stockpile
Plant Site Pond
Rabbit Creek
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Haul Road
Truck Shop
MC6
Truck Shop Pond
Hangar Flats Incidental
Hangar Flats Stockpile
Fire Water Tank
Hangar Flats Stockpile
Hangar Flats Stockpile
MC5
Burntlog Route
Security Building
Hangar Flats Stockpile
MC4
MC4/BC3
Aggregate Storage
TSF Incidental
Meadow Creek Restoration Area
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
SODA
SODA Pond
TSF Alluvial Stockpile
Workers Housing GMS
TSF Buttress
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
TSF ADT Road
TSF ADT Road
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 5

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Pond
West End Diversion
West End DRSF
West End Stockpile
West End Pit Incidental
West End Stockpile
Yellow Pine Construction Laydown
EFSFSR Outlet
Yellow Pine Pit
West End Pit
Yellow Pine Access Road
Yellow Pine Pit Backfill
West End Diversion
West End Creek
Yellow Pine Pit Incidental
West End Pit Incidental
Midnight Creek
West End ADT Road
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Plant Site Stockpile
Garnet Creek
Garnet Creek Restoration
Plant Site Pond
Rabbit Creek
Transmission Line Corridor
Plant Site Construction Laydown
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Haul Road
Truck Shop
MC6
Truck Shop Pond
Hangar Flats Incidental
Hangar Flats Stockpile
Fire Water Tank
Hangar Flats Stockpile
Hangar Flats Pit Backfill
MC5
Burntlog Route
Security Building
Hangar Flats Stockpile
MC4
MC4/BC3
Aggregate Storage
TSF Incidental
TSF Diversion
Meadow Creek Restoration Area
Blowout Borrow
Explosive Magazine Storage
SODA
SODA Pond
Workers Housing GMS
TSF Alluvial Stockpile
Blowout Access Road
Workers Housing
TSF Buttress
TSF
Blowout Creek Rock Drain
TSF Diversion
East Fork Meadow Creek
Meadow Creek

Perpetua Resources

TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 6

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
West End Creek
Yellow Pine Pit Incidental
West End Diversion
West End DRSF
West End Pond
West End Pit Incidental
Yellow Pine Construction Laydown
West End Stockpile
EFSFSR Outlet
Yellow Pine Pit
West End Pit
Yellow Pine Access Road
West End Stockpile
Yellow Pine Pit Backfill
West End Diversion
Yellow Pine Pit Incidental
West End Pit Incidental
Midnight Creek
West End ADT Road
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
Hennessy Creek
Yellow Pine ADT Road
Plant Site Haul Road
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Plant Site Stockpile
Garnet Creek
Plant Site Pond
Rabbit Creek
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Haul Road
Truck Shop
Hangar Flats Incidental
MC6
Truck Shop Pond
Hangar Flats Stockpile
Fire Water Tank
Hangar Flats Pit Backfill
Hangar Flats Stockpile
MC5
Burntlog Route
Security Building
Hangar Flats Stockpile
Meadow Creek Restoration Area
Aggregate Storage
TSF Incidental
MC4
MC4/BC3
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
SODA
Workers Housing GMS
TSF Alluvial Stockpile
SODA Pond
Blowout Access Road
TSF Buttress
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 7

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Hennessy Creek
Midnight Creek
West End Creek
Garnet Creek
Rabbit Creek
Meadow Creek
East Fork Meadow Creek

Yellow Pine Pit Incidental
West End Pond
West End Diversion
West End DRSF
West End Stockpile
West End Pit Incidental
West End Stockpile
West End ADT Road
West End Restoration
West End Diversion
Yellow Pine Construction Laydown
EFSFSR Outlet
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit
West End Pit
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
West End ADT Road
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
Plant Site Haul Road
Yellow Pine ADT Road
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Plant Site Stockpile
Garnet Creek Restoration
Plant Site Pond
Transmission Line Corridor
Plant Site Construction Laydown
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Hangar Flats Haul Road
Truck Shop
MC6
Truck Shop Pond
Hangar Flats Incidental
Fire Water Tank
Hangar Flats Stockpile
Hangar Flats Pit Backfill
MC5
Burntlog Route
Security Building
Aggregate Storage
TSF Incidental
MC4
MC4/BC8
Meadow Creek Restoration Area
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
TSF Alluvial Stockpile
SODA Pond
Workers Housing GMS
Workers Housing
Blowout Access Road
TSF
Blowout Creek Rock Drain
TSF Diversion

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 8

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Diversion
West End Pond
West End DRSF
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
West End ADT Road
Yellow Pine Access Road
West End Restoration
Yellow Pine Pit
Yellow Pine Pit Backfill
Yellow Pine Pit
West End Pit
West End Diversion
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
Midnight Creek
West End Pit Incidental
Tunnel Area
Midnight Diversion
West End ADT Road
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Garnet Creek
Plant Site Stockpile
Plant Site Pond
Rabbit Creek
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Truck Shop
Hangar Flats Stockpile
MC6
Truck Shop Pond
Hangar Flats Haul Road
Fire Water Tank
Hangar Flats Incidental
Hangar Flats Stockpile
Hangar Flats Pit Backfill
MC5
Burntlog Route
Security Building
Aggregate Storage
TSF Incidental
MC4
MC4/BC3
Meadow Creek Restoration Area
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
TSF Alluvial Stockpile
SODA Pond
Workers Housing GMS
Workers Housing
Blowout Access Road
TSF
Blowout Creek Rock Drain
TSF Diversion
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 9

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Hennessy Creek
Midnight Creek
Garnet Creek
Rabbit Creek
West End Creek
Meadow Creek
East Fork Meadow Creek

Yellow Pine Pit Incidental
West End Pond
West End Diversion
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
EF3
Yellow Pine Pit
West End Pit
West End ADT Road
West End Restoration
West End Diversion
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
West End ADT Road
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
Yellow Pine ADT Road
Plant Site Haul Road
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Plant Site Stockpile
Plant Site Pond
Garnet Creek Restoration
Transmission Line Corridor
Truck Shop Pond
Plant Site Construction Laydown
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Haul Road
MC6
Truck Shop Pond
Fire Water Tank
Hangar Flats Incidental
Hangar Flats Pit Backfill
MC5
Burntlog Route
Security Building
Aggregate Storage
TSF Incidental
Meadow Creek Restoration Area
MC4
MC4/BC3
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
Workers Housing GMS
TSF Alluvial Stockpile
SODA Pond
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 10

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Diversion
West End Pond
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
West End ADT Road
Yellow Pine Access Road
Yellow Pine Pit Backfill
West End Pit
West End Restoration
Yellow Pine Pit
Yellow Pine Pit
West End Diversion
EF3
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
Tunnel Area
West End ADT Road
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
Hennessy Creek
Yellow Pine ADT Road
Plant Site Haul Road
Midnight Creek
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Garnet Creek
Plant Site Stockpile
Plant Site Pond
Rabbit Creek
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Truck Shop
MC6
Truck Shop Pond
Hangar Flats Stockpile
Hangar Flats Haul Road
Fire Water Tank
Hangar Flats Incidental
Hangar Flats Pit Backfill
MC5
Burntlog Route
Security Building
Meadow Creek Restoration Area
MC4
MC4/BC3
Aggregate Storage
TSF Incidental
Blowout Borrow
TSF Diversion
TSF Buttress
Explosive Magazine Storage
SODA
TSF Alluvial Stockpile
SODA Pond
Workers Housing GMS
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 11

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Diversion
West End Pond
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
West End ADT Road
Yellow Pine Pit
West End Restoration
Yellow Pine Pit Backfill
West End Pit
West End Diversion
Yellow Pine Pit
EF3
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
Yellow Pine Access Road
West End Pit Incidental
West End ADT Road
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
Hennessy Creek
Yellow Pine ADT Road
Plant Site Haul Road
Plant Haul Road Incidental
Midnight Creek
Fiddle GMS
Plant Site Access Road
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Garnet Creek
Plant Site Stockpile
Plant Site Pond
Rabbit Creek
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Truck Shop
Hangar Flats Stockpile
MC6
Truck Shop Pond
Hangar Flats Haul Road
Fire Water Tank
Hangar Flats Incidental
MC5
Hangar Flats Pit Backfill
Burntlog Route
Security Building
TSF Incidental
MC4
MC4/BC3
Meadow Creek Restoration Area
Aggregate Storage
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
Workers Housing GMS
TSF Alluvial Stockpile
SODA Pond
Workers Housing
Blowout Access Road
TSF
Blowout Creek Rock Drain
TSF Diversion
Meadow Creek
East Fork Meadow Creek

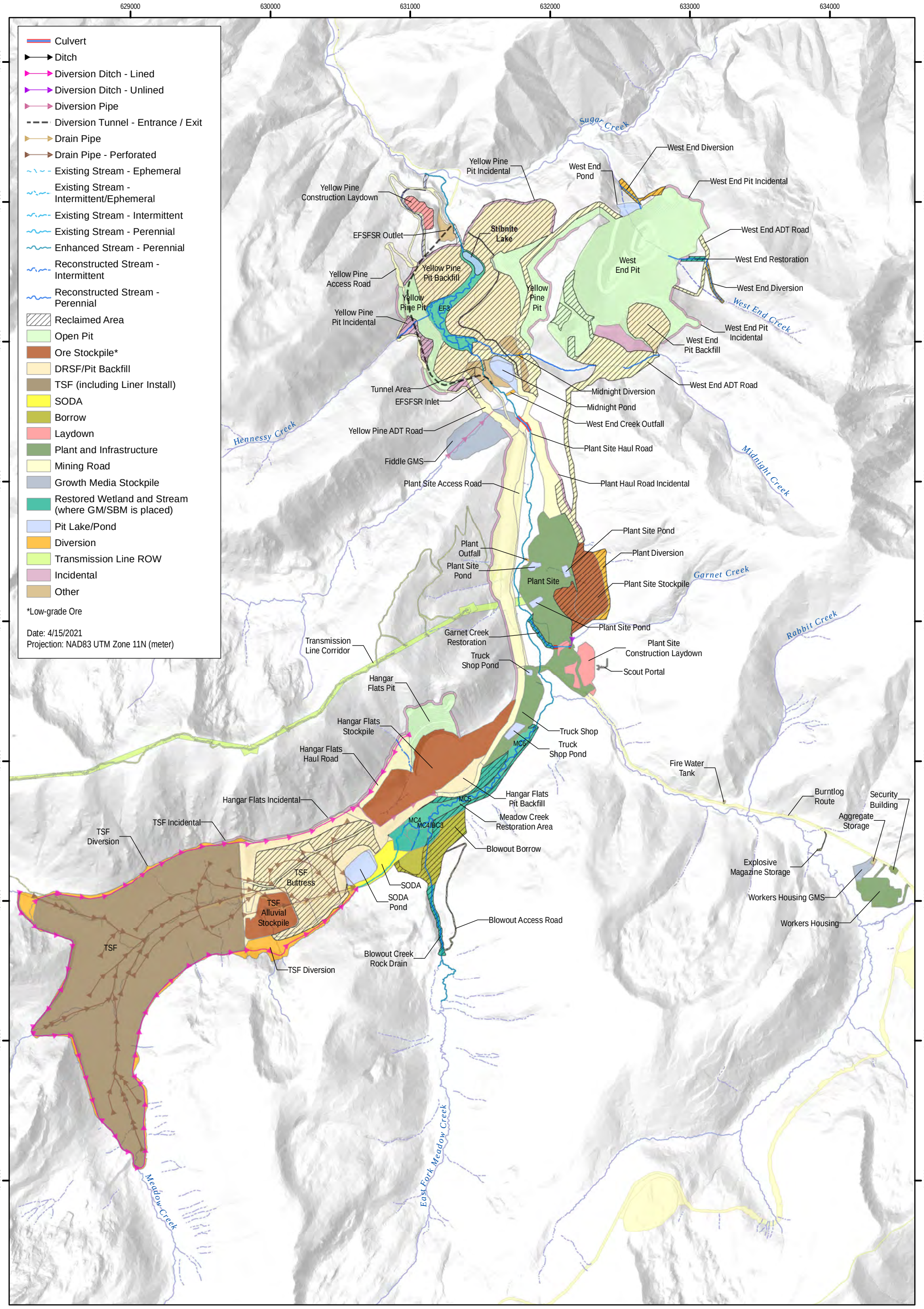
Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 12


629000
630000
631000
632000
633000
634000
4978000
4977000
4976000
4975000
4974000
4973000
4972000
4971000
4970000
Culvert
Ditch
Diversion Ditch - Lined
Diversion Ditch - Unlined
Diversion Pipe
Diversion Tunnel - Entrance / Exit
Drain Pipe
Drain Pipe - Perforated
Existing Stream - Ephemeral
Existing Stream - Intermittent/Ephemeral
Existing Stream - Intermittent
Existing Stream - Perennial
Enhanced Stream - Perennial
Reconstructed Stream - Intermittent
Reconstructed Stream - Perennial
Reclaimed Area
Open Pit
Ore Stockpile*
DRSF/Pit Backfill
TSF (including Liner Install)
SODA
Borrow
Laydown
Plant and Infrastructure
Mining Road
Growth Media Stockpile
Restored Wetland and Stream (where GM/SBM is placed)
Pit Lake/Pond
Diversion
Transmission Line ROW
Incidental
Other
*Low-grade Ore
Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)
Sugar Creek
Hennessy Creek
Midnight Creek
Garnet Creek
Rabbit Creek
West End Creek
Meadow Creek
East Fork Meadow Creek
Yellow Pine Pit Incidental
West End Diversion
West End Pond
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
West End ADT Road
West End Restoration
West End Pit
Yellow Pine Pit Backfill
Yellow Pine Access Road
Yellow Pine Pit
EF3
West End Diversion
Yellow Pine Pit Incidental
West End Pit Incidental
West End Pit Backfill
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End ADT Road
West End Creek Outfall
Yellow Pine ADT Road
Plant Site Haul Road
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Plant Site Stockpile
Plant Site Pond
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
MC6
Truck Shop Pond
Hangar Flats Haul Road
Fire Water Tank
Hangar Flats Incidental
MC5
Hangar Flats Pit Backfill
Burntlog Route
Security Building
Aggregate Storage
TSF Incidental
TSF Diversion
MC4
MC4/BC3
Meadow Creek Restoration Area
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
TSF Alluvial Stockpile
SODA Pond
Workers Housing GMS
Workers Housing
Blowout Access Road
TSF
Blowout Creek Rock Drain
TSF Diversion
Perpetua Resources
TETRA TECH
0 500 1,000 2,000 3,000 4,000 Feet
N
STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO
End of Year Project Site Disturbance and Reclamation Sequence
EOY 13

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Hennessy Creek
Midnight Creek
West End Creek
Garnet Creek
Rabbit Creek
Meadow Creek
East Fork Meadow Creek

West End Diversion
Yellow Pine Pit Incidental
West End Pond
West End Pit Incidental
Yellow Pine Construction Laydown
Stibnite Lake
West End Pit Lake
West End ADT Road
EFSFSR Outlet
West End Restoration
Yellow Pine Access Road
Yellow Pine Pit Backfill
West End Pit
West End Diversion
Yellow Pine Pit
EF3
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
Tunnel Area
West End ADT Road
EFSFSR Inlet
Midnight Diversion
Midnight Pond
Yellow Pine ADT Road
West End Creek Outfall
Plant Site Haul Road
Fiddle GMS
Plant Haul Road Incidental
Plant Site Access Road
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Pond
Plant Site
Plant Site Stockpile
Plant Site Pond
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Hangar Flats Haul Road
Truck Shop
MC6
Truck Shop Pond
Hangar Flats Incidental
Fire Water Tank
Hangar Flats Stockpile
Hangar Flats Pit Backfill
MC5
Burntlog Route
Security Building
TSF ADT Road
Meadow Creek Restoration Area
Aggregate Storage
TSF Incidental
MC4
MC4/BC3
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
Workers Housing GMS
SODA Pond
TSF Alluvial Stockpile
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 14

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Pond
West End Diversion
Yellow Pine Construction Laydown
West End Pit Incidental
EFSFSR Outlet
Stibnite Lake
West End Pit Lake
West End ADT Road
West End Restoration
Yellow Pine Pit Backfill
Yellow Pine Pit
EF3
West End Pit
West End Diversion
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
Yellow Pine Access Road
West End Pit Incidental
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
Yellow Pine ADT Road
West End Creek Outfall
Plant Site Haul Road
Hennessy Creek
Fiddle GMS
Plant Haul Road Incidental
Plant Site Access Road
Midnight Creek
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site
Garnet Creek
Plant Site Stockpile
Rabbit Creek
Transmission Line Corridor
Garnet Creek Restoration
Plant Site Construction Laydown
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
MC6
Hangar Flats Incidental
Truck Shop Pond
Hangar Flats Pit Backfill
Fire Water Tank
Hangar Flats Stockpile
TSF ADT Road
MC5
Burntlog Route
Security Building
MC4
Aggregate Storage
Meadow Creek Restoration Area
MC4/BC3
Hangar Flats Haul Road
TSF Diversion
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
Meadow Creek
Workers Housing GMS
TSF Alluvial Stockpile
SODA Pond
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
East Fork Meadow Creek

Perpetua Resources

TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 15

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Yellow Pine Pit Incidental
West End Pond
West End Diversion
Yellow Pine Construction Laydown
West End Pit Incidental
EFSFSR Outlet
Stibnite Lake
West End Pit Lake
West End ADT Road
West End Restoration
Yellow Pine Pit
West End Diversion
Yellow Pine Pit Backfill
West End Pit
Yellow Pine Pit
EF3
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
Yellow Pine Access Road
West End Pit Incidental
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End ADT Road
West End Creek Outfall
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Midnight Creek
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site
Garnet Creek
Plant Site Stockpile
Garnet Creek Restoration
Plant Site Construction Laydown
Rabbit Creek
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Incidental
MC6
Hangar Flats Stockpile
Truck Shop Pond
Hangar Flats Pit Backfill
Fire Water Tank
Meadow Creek Restoration Area
Burntlog Route
Security Building
TSF ADT Road
MC5
TSF Incidental
MC4
Aggregate Storage
TSF Diversion
MC4/BC3
Hangar Flats Haul Road
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
SODA
Meadow Creek
SODA Pond
Workers Housing GMS
TSF Alluvial Stockpile
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
East Fork Meadow Creek

Perpetua Resources

TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 16

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Pond
West End Diversion
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
West End Pit Lake
West End ADT Road
West End Restoration
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit
West End Diversion
Yellow Pine Pit
West End Pit
EF3
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
West EndADT Road
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Fiddle GMS
Plant Haul Road Incidental
Midnight Creek
Plant Site Access Road
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site
Garnet Creek
Plant Site Stockpile
Rabbit Creek
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Truck Shop Pond
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Incidental
MC6
Truck Shop Pond
Hangar Flats Stockpile
HF1
Fire Water Tank
Burntlog Route
Security Building
TSF ADT Road
Meadow Creek Restoration Area
MC5
Aggregate Storage
TSF Incidental
MC4
Hangar Flats Haul Road
TSF Diversion
MC4/BC3
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
Meadow Creek
SODA Pond
Workers Housing GMS
TSF Alluvial Stockpile
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
East Fork Meadow Creek

Perpetua Resources

TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 17

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Pond
West End Diversion
Yellow Pine Construction Laydown
West End Pit Incidental
EFSFSR Outlet
Stibnite Lake
West End Pit Lake
Yellow Pine Pit
West End Restoration
Yellow Pine Access Road
Yellow Pine Pit Backfill
West End Pit
West End Diversion
Yellow Pine Pit
EF3
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
West End ADT Road
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Fiddle GMS
Plant Haul Road Incidental
Midnight Creek
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Garnet Creek
Plant Site
Plant Site Stockpile
Rabbit Creek
Transmission Line Corridor
Garnet Creek Restoration
Plant Site Construction Laydown
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Stockpile
MC6
Fire Water Tank
Hangar Flats Incidental
HF1
TSF ADT Road
Meadow Creek Restoration Area
Burntlog Route
Security Building
Water Treatment Plant Site
MC5
TSF Incidental
Hangar Flats Haul Road
Aggregate Storage
MC4/BC3
TSF Diversion
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
Meadow Creek
TSF Alluvial Stockpile
Workers Housing GMS
Blowout Access Road
TSF
Workers Housing
Blowout Creek Rock Drain
TSF Diversion
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 18

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Yellow Pine Pit Incidental
West End Diversion
West End Pond
Yellow Pine Construction Laydown
West End Pit Incidental
Stibnite Lake
West End ADT Road
EFSFSR Outlet
West End Pit Lake
West End Restoration
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit
West End Diversion
West End Pit
Yellow Pine Pit
EF3
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
West End ADT Road
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Midnight Creek
Fiddle GMS
Plant Site Access Road
Plant Site Haul Road Incidental
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Garnet Creek
Plant Site
Plant Site Stockpile
Rabbit Creek
Transmission Line Corridor
Garnet Creek Restoration
Plant Site Construction Laydown
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Incidental
MC6
Hangar Flats Stockpile
HF1
Fire Water Tank
Meadow Creek Restoration Area
TSF ADT Road
Burntlog Route
Security Building
Water Treatment Plant Site
MC5
Aggregate Storage
TSF Incidental
MC4/BC3
Hangar Flats Haul Road
TSF Diversion
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
Workers Housing GMS
TSF Alluvial Stockpile
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 19

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Pond
West End Diversion
West End Pit Incidental
Yellow Pine Construction Laydown
Stibnite Lake
West End Pit Lake
West End ADT Road
EFSFSR Outlet
Yellow Pine Pit
West End Restoration
Yellow Pine Access Road
Yellow Pine Pit Backfill
West End Pit
West End Diversion
Yellow Pine Pit
EF3
Yellow Pine Pit Incidental
West End Creek
West End Pit Backfill
West End Pit Incidental
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
West End ADT Road
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Fiddle GMS
Plant Site Haul Road Incidental
Midnight Creek
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Diversion
Plant Outfall
Plant Site
Plant Site Stockpile
Garnet Creek
Rabbit Creek
Transmission Line Corridor
Garnet Creek Restoration
Plant Site Construction Laydown
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Incidental
MC6
Hangar Flats Stockpile
HF1
Fire Water Tank
TSF ADT Road
Burntlog Route
Security Building
Water Treatment Plant Site
MC5
Meadow Creek Restoration Area
TSF Incidental
Aggregate Storage
MC4/BC3
Hangar Flats Haul Road
TSF Diversion
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
Workers Housing GMS
TSF Alluvial Stockpile
Blowout Access Road
Workers Housing
TSF
Blowout Creek Rock Drain
TSF Diversion
East Fork Meadow Creek
Meadow Creek

Perpetua Resources

TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

EOY 20

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Pond
West End Diversion
Yellow Pine Construction Laydown
West End Pit Incidental
EFSFSR Outlet
Stibnite Lake
West End ADT Road
West End Pit Lake
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit
West End Restoration
West End Diversion
Yellow Pine Pit
EF3
West End Pit
West End Creek
Yellow Pine Pit Incidental
West End Pit Backfill
West End Pit Incidental
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End ADT Road
West End Creek Outfall
Yellow Pine ADT Road
Plant Site Haul Road
Hennessy Creek
Midnight Creek
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site
Plant Site Stockpile
Garnet Creek
Garnet Creek Restoration
Rabbit Creek
Plant Site Construction Laydown
Transmission Line Corridor
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Stockpile
MC6
Fire Water Tank
Hangar Flats Incidental
HF1
Burntlog Route
Security Building
TSF ADT Road
Meadow Creek Restoration Area
MC5
Aggregate Storage
TSF Incidental
Water Treatment Plant Site
MC4/BC3
Hangar Flats Haul Road
TSF Diversion
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
Workers Housing GMS
Workers Housing
Blowout Access Road
TSF
TSF Alluvial Stockpile
Blowout Creek Rock Drain
TSF Diversion
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 21

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Yellow Pine Pit Incidental
Sugar Creek
West End Pond
West End Diversion
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
West End Pit Lake
West End ADT Road
West End Restoration
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit
West End Pit
West End Diversion
Yellow Pine Pit
EF3
Yellow Pine Pit Incidental
West End Creek
West End Pit Backfill
West End Pit Incidental
West End ADT Road
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
Yellow Pine ADT Road
Hennessy Creek
Plant Site Haul Road
Plant Haul Road Incidental
Midnight Creek
Fiddle GMS
Plant Site Access Road
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site
Garnet Creek
Plant Site Stockpile
Transmission Line Corridor
Garnet Creek Restoration
Rabbit Creek
Plant Site Construction Laydown
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Stockpile
MC6
Fire Water Tank
Hangar Flats Incidental
HF1
TSF ADT Road
Meadow Creek Restoration Area
Burntlog Route
Security Building
MC5
Water Treatment Plant Site
TSF Incidental
Aggregate Storage
MC4/BC3
Hangar Flats Haul Road
TSF Diversion
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
Workers Housing GMS
Blowout Access Road
Workers Housing
TSF
TSF Alluvial Stockpile
Blowout Creek Rock Drain
TSF Diversion
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 22

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Yellow Pine Pit Incidental
West End Pond
West End Diversion
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
West End Pit Lake
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit
West End Restoration
West End Pit
West End Diversion
EF3
Yellow Pine Pit
Yellow Pine Pit Incidental
West End Creek
West End Pit Backfill
West End Pit Incidental
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End Creek Outfall
West End ADT Road
Yellow Pine ADT Road
Hennessy Creek
Plant Site Haul Road
Fiddle GMS
Plant Site Access Road
Plant Site Haul Road Incidental
Midnight Creek
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site
Garnet Creek
Plant Site Stockpile
GC1
Garnet Creek Restoration
Rabbit Creek
Transmission Line Corridor
Plant Site Construction Laydown
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Incidental
MC6
Hangar Flats Stockpile
HF1
Fire Water Tank
TSF ADT Road
Meadow Creek Restoration Area
Burntlog Route
Security Building
MC5
TSF Incidental
Water Treatment Plant Site
Aggregate Storage
Hangar Flats Haul Road
MC4/BC3
TSF Diversion
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
MC2
Workers Housing GMS
MC1C
MC1E
Blowout Access Road
Workers Housing
TSF
TSF Alluvial Stockpile
Blowout Creek Rock Drain
TSF Diversion
MC1D
MC1B
MC1A
Meadow Creek
East Fork Meadow Creek

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 23

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

Sugar Creek
Hennessy Creek
West End Creek
Midnight Creek
Garnet Creek
Rabbit Creek
Meadow Creek
East Fork Meadow Creek

Yellow Pine Pit Incidental
West End Pond
West End Diversion
West End Pit Incidental
Yellow Pine Construction Laydown
EFSFSR Outlet
Stibnite Lake
West End Pit Lake
West End ADT Road
Yellow Pine Access Road
Yellow Pine Pit Backfill
Yellow Pine Pit
Yellow Pine Pit
West End Restoration
West End Pit
EF3
Yellow Pine Pit Incidental
West End Diversion
West End Pit Backfill
West End Pit Incidental
Tunnel Area
EFSFSR Inlet
Midnight Diversion
Midnight Pond
West End ADT Road
Yellow Pine ADT Road
West End Creek Outfall
Plant Site Haul Road
FC2
Fiddle GMS
Plant Site Access Road
Plant Site Haul Road Incidental
Plant Haul Road Incidental
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site
Plant Site Stockpile
GC1
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Truck Shop
Hangar Flats Incidental
MC6
Hangar Flats Stockpile
HF1
Fire Water Tank
TSF ADT Road
Meadow Creek Restoration Area
Burntlog Route
Water Treatment Plant Site
MC5
TSF Incidental
Hangar Flats Haul Road
MC4/BC3
Security Building
TSF Diversion
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
MC2
Workers Housing GMS
MC1C
MC1E
Blowout Access Road
Workers Housing
TSF
TSF Alluvial Stockpile
Blowout Creek Rock Drain
TSF Diversion
MC1D
MC1B
MC1A

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 24

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

West End Creek
Sugar Creek
Hennessy Creek
Midnight Creek
Garnet Creek
Rabbit Creek
Meadow Creek
East Fork Meadow Creek

West End Diversion
Yellow Pine Construction Laydown
Yellow Pine Pit
West End Pond
EFSFSR Outlet
West End ADT Road
West End Restoration
Yellow Pine Pit Backfill
West End Pit
West End Diversion
Yellow Pine Pit
EF3
Yellow Pine Pit Incidental
West End Pit Incidental
West End Pit Backfill
Yellow Pine Access Road
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
Yellow Pine ADT Road
FC2
Plant Haul Road Incidental
Fiddle GMS
Plant Site Access Road
Plant Site Haul Road Incidental
Plant Site Haul Road
Plant Site
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Stockpile
GC1
Garnet Creek Restoration
Plant Site Construction Laydown
Transmission Line Corridor
Hangar Flats Haul Road
Scout Portal
EF1
Hangar Flats Pit
Hangar Flats Stockpile
Hangar Flats Incidental
Truck Shop
Hangar Flats Stockpile
MC6
HF1
Fire Water Tank
Burntlog Route
TSF ADT Road
MC5
TSF Incidental
Water Treatment Plant Site
Meadow Creek Restoration Area
MC4/BC3
TSF Diversion
CL Basin
MC4
Blowout Borrow
Explosive Magazine Storage
TSF Buttress
MC2
MC1C
MC1E
Workers Housing GMS
Workers Housing
Blowout Access Road
TSF
TSF Alluvial Stockpile
Blowout Creek Rock Drain
CL Basin
TSF Diversion
MC1D
MC1B
MC1A

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence
EOY 40

629000 630000 631000 632000 633000 634000

4978000 4977000 4976000 4975000 4974000 4973000 4972000 4971000 4970000

- Culvert
- Ditch
- Diversion Ditch - Lined
- Diversion Ditch - Unlined
- Diversion Pipe
- Diversion Tunnel - Entrance / Exit
- Drain Pipe
- Drain Pipe - Perforated
- Existing Stream - Ephemeral
- Existing Stream - Intermittent/Ephemeral
- Existing Stream - Intermittent
- Existing Stream - Perennial
- Enhanced Stream - Perennial
- Reconstructed Stream - Intermittent
- Reconstructed Stream - Perennial
- Reclaimed Area
- Open Pit
- Ore Stockpile*
- DRSF/Pit Backfill
- TSF (including Liner Install)
- SODA
- Borrow
- Laydown
- Plant and Infrastructure
- Mining Road
- Growth Media Stockpile
- Restored Wetland and Stream (where GM/SBM is placed)
- Pit Lake/Pond
- Diversion
- Transmission Line ROW
- Incidental
- Other

*Low-grade Ore

Date: 4/15/2021
Projection: NAD83 UTM Zone 11N (meter)

West End Creek
Sugar Creek
Hennessy Creek
Midnight Creek
Garnet Creek
Rabbit Creek
Meadow Creek
East Fork Meadow Creek

Yellow Pine Construction Laydown
Yellow Pine Pit
West End Pond
West End Diversion
EFSFSR Outlet
West End ADT Road
West End Restoration
Yellow Pine Pit Backfill
West End Diversion
West End Pit
Yellow Pine Pit
EF3
Yellow Pine Pit Incidental
West End Pit Incidental
West End Pit Backfill
Yellow Pine Access Road
West End Pit Incidental
Tunnel Area
Midnight Diversion
EFSFSR Inlet
Midnight Pond
West End Creek Outfall
Yellow Pine ADT Road
FC2
Plant Haul Road Incidental
Fiddle GMS
Plant Site Access Road
Plant Site Haul Road
Plant Haul Road Incidental
Plant Site
Plant Site Pond
Plant Outfall
Plant Diversion
Plant Site Stockpile
GC1
Transmission Line Corridor
Garnet Creek Restoration
Plant Site Construction Laydown
Hangar Flats Haul Road
EF1
Scout Portal
Hangar Flats Pit
Hangar Flats Stockpile
Hangar Flats Incidental
Truck Shop
MC6
Hangar Flats Stockpile
HF1
Fire Water Tank
Burntlog Route
TSF Incidental
MC5
TSF ADT Road
TSF Diversion
Meadow Creek Restoration Area
MC4/BC3
MC4
Blowout Borrow
CL Basin
Explosive Magazine Storage
TSF Buttress
MC2
MC1C
MC1E
Workers Housing GMS
Workers Housing
Blowout Access Road
TSF
TSF Alluvial Stockpile
Blowout Creek Rock Drain
CL Basin
TSF Diversion
MC1D
MC1B
MC1A

Perpetua Resources
TETRA TECH

0 500 1,000 2,000 3,000 4,000 Feet

N

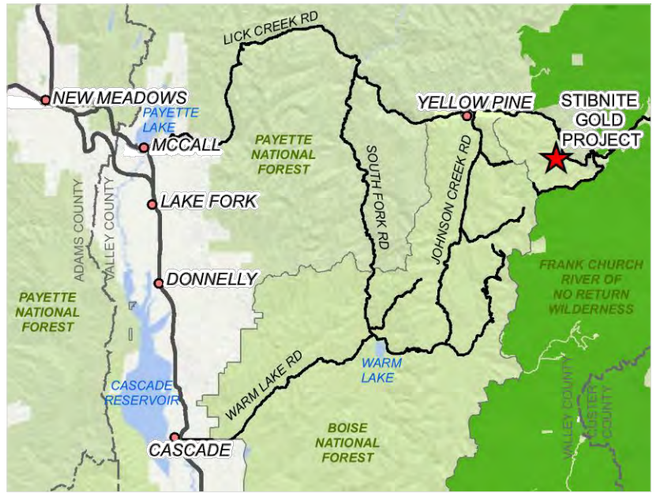
STIBNITE GOLD PROJECT
VALLEY COUNTY, IDAHO

End of Year Project Site Disturbance and Reclamation Sequence

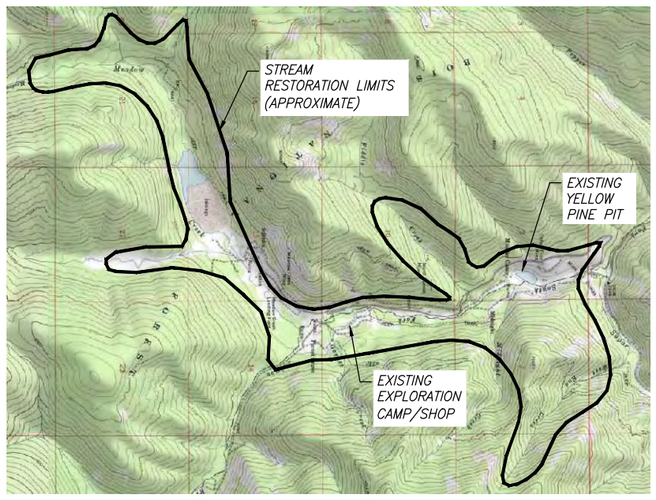
EOY 42

Appendix D: Restoration Design Sheets

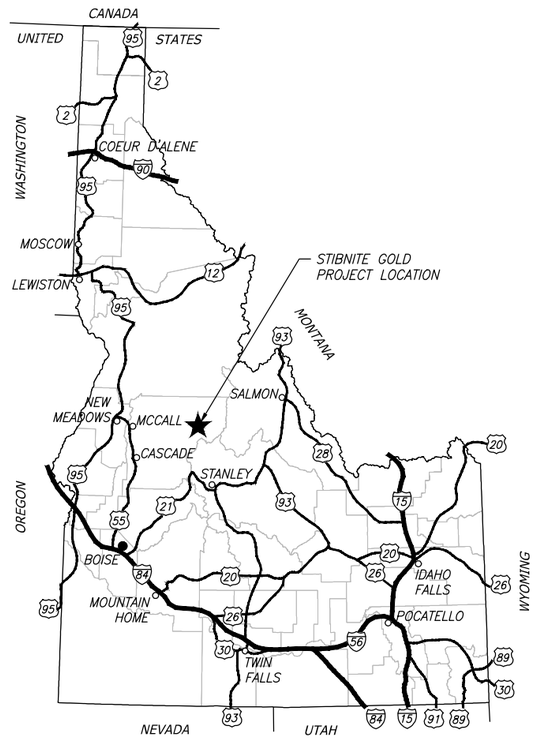
STIBNITE GOLD PROJECT
MODPRO2 DRAWINGS
VALLEY COUNTY, IDAHO



VICINITY MAP
1" = 14 MILES



PROJECT MAP
1" = 3,000'



LOCATION MAP

PREPARED FOR:
PERPETUA RESOURCES IDAHO, INC.
405 S. 8TH ST.
SUITE 201
BOISE, ID 83702

Perpetua Resources

PREPARED BY:
RIO APPLIED SCIENCE & ENGINEERING
3380 AMERICANA TERRACE
SUITE 390
BOISE, ID 83706

TETRA TECH
3380 AMERICANA TERRACE
SUITE 201
BOISE, ID 83706

SHEET INDEX

SHEET COUNT	DRAWING NUMBER	SHEET TITLE
1	G–1	Cover Sheet
2	G–2	General Notes
3	G–3	General Wetland Notes
4	G–4	Proposed Stream Reaches
5	G–5	Proposed Floodplain Wetland Areas
6	G–6	General Legend and Abbreviations
7	MC1A–1	MC1A Overview Sheet – 1
8	MC1A–2	MC1A Overview Sheet – 2
9	MC1A–3	MC1A Typical Plan and Profile
10	MC1A–4	MC1A Quantities
11	MC1A–5	MC1A Wetland Overview Sheet – 1
12	MC1A–6	MC1A Wetland Planting Sheet – 1
13	MC1A–7	MC1A Wetland Overview Sheet – 2
14	MC1A–8	MC1A Wetland Planting Sheet – 2
15	MC1B–1	MC1B Overview Sheet
16	MC1B–2	MC1B Typical Plan and Profile
17	MC1B–3	MC1B Quantities
18	MC1B–4	MC1B Wetland Overview Sheet
19	MC1B–5	MC1B Wetland Planting Sheet
20	MC1C–1	MC1C Overview Sheet
21	MC1C–2	MC1C Typical Plan and Profile
22	MC1C–3	MC1C Quantities
23	MC1C–4	MC1C Wetland Overview Sheet
24	MC1C–5	MC1C Wetland Planting Sheet
25	MC1D–1	MC1D Overview Sheet
26	MC1D–2	MC1D Typical Plan and Profile
27	MC1D–3	MC1D Quantities
28	MC1D–4	MC1D Wetland Overview Sheet
29	MC1D–5	MC1D Wetland Planting Sheet
30	MC1E–1	MC1E Overview Sheet – 1
31	MC1E–2	MC1E Overview Sheet – 2
32	MC1E–3	MC1E Typical Plan and Profile
33	MC1E–4	MC1E Quantities
34	MC1E–5	MC1E Wetland Overview Sheet
35	MC1E–6	MC1E Wetland Planting Sheet
36	MC2–1	MC2 Overview Sheet
37	MC2–2	MC2 Typical Plan and Profile
38	MC2–3	MC2 Quantities
39	MC2–4	MC2 Wetland Overview Sheet
40	MC2–5	MC2 Wetland Planting Sheet
41	MC3–1	MC3 Overview Sheet
42	MC3–2	MC3 Quantities
43	MC4–1	MC4 Overview Sheet
44	MC4–2	MC4 Typical Plan and Profile
45	MC4–3	MC4 Quantities
46	MC4–4	MC4 & BC3 Wetland Overview Sheet
47	MC4–5	MC4 & BC3 Wetland Planting Sheet
48	MC5–1	MC5 Overview Sheet
49	MC5–2	MC5 Typical Plan and Profile
50	MC5–3	MC5 Quantities
51	MC5–4	MC5 Wetland Overview Sheet
52	MC5–5	MC5 Wetland Planting Sheet
53	HF1–1	HF1 Overview Sheet
54	HF1–2	HF1 Quantities
55	HF1–3	HF1 Wetland Overview Sheet
56	HF1–4	HF1 Wetland Planting Sheet
57	MC6–1	MC6 Overview Sheet
58	MC6–2	MC6 Typical Plan and Profile
59	MC6–3	MC6 Quantities
60	MC6–4	MC6 Wetland Overview Sheet
61	MC6–5	MC6 Wetland Planting Sheet
62	BC1–1	BC1 Overview Sheet
63	BC1–2	BC1 Quantities
64	BC1–3	BC1 Wetland Overview Sheet
65	BC1–4	BC1 Wetland Planting Sheet
66	BC2–1	BC2 Overview Sheet
67	BC2–2	BC2 Typical Plan and Profile
68	BC2–3	BC2 Quantities
69	BC3–1	BC3 Overview Sheet
70	BC3–2	BC3 Typical Plan and Profile
71	BC3–3	BC3 Quantities
72	EF1–1	EF1 Wetland Overview Sheet
73	EF1–2	EF1 Wetland Planting Sheet
74	EF1–3	EF1 Quantities
75	EF2–1	EF2 Overview Sheet – 1
76	EF2–2	EF2 Overview Sheet – 2
77	EF2–3	EF2 Overview Sheet – 3
78	EF2–4	EF2 Quantities
79	EF3–1	EF3 Overview Sheet
80	EF3–2	EF3 Typical Plan and Profile
81	EF3–3	EF3 Quantities
82	EF3–4	EF3 Wetland Overview Sheet
83	EF3–5	EF3 Wetland Planting Sheet
84	EF4–1	EF4 Overview Sheet
85	EF4–2	EF4 Quantities
86	FC2–1	FC2 Overview Sheet – 1
87	FC2–2	FC2 Typical Plan and Profile
88	FC2–3	FC2 Quantities
89	FC2–4	FC2 Wetland Overview Sheet
90	FC2–5	FC2 Wetland Planting Sheet
91	MNC1–1	MNC1 Overview Sheet
92	MNC1–2	MNC1 Typical Plan and Profile
93	MNC1–3	MNC1 Quantities
94	MNC2–1	MNC2 Overview Sheet
95	MNC2–2	MNC2 Typical Plan and Profile
96	MNC2–3	MNC2 Quantities
97	HC1&2–1	HC1&2 Overview Sheet
98	HC1&2–2	HC1&2 Typical Plan and Profile
99	HC1&2–3	HC1&2 Quantities
100	GC1–1	GC1 Overview Sheet
101	GC1–2	GC1 Typical Plan and Profile
102	GC1–3	GC1 Quantities
103	GC1–4	GC1 Wetland Overview Sheet
104	GC1–5	GC1 Wetland Planting Sheet
105	GC2–1	GC2 Overview Sheet
106	GC2–2	GC2 Typical Plan and Profile
107	GC2–3	GC2 Quantities
108	WE2–1	WE2 Overview Sheet
109	WE2–2	WE2 Quantities
110	WE3–1	WE3 Overview Sheet
111	WE3–2	WE3 Quantities
112	D–1	Typical Details – 1
113	D–2	Typical Details – 2
114	D–3	Typical Details – 3
115	D–4	Typical Details – 4
116	D–5	Typical Details – 5
117	D–6	Typical Details – 6
118	D–7	Typical Details – 7
119	D–8	Typical Details – 8
120	D–9	Typical Details – 9
121	D–10	Typical Details – 10
122	D–11	Typical Details – 11
123	D–12	Typical Details – 12
124	D–13	Typical Details – 13
125	D–14	Typical Details – 14
126	D–15	Typical Details – 15
127	D–16	Typical Details – 16
128	D–17	Typical Details – 17
129	D–18	Typical Details – 18
130	D–19	Typical Details – 19
131	D–20	Typical Details – 20
132	D–21	Typical Details – 21
133	D–22	Wetland Detail Sheet – 1
134	D–23	Wetland Detail Sheet – 2
135	D–24	Wetland Detail Sheet – 3
136 – 142	D–25 to 31	**Culvert/Bridge Typical Sheets**

Rio Applied Science & Engineering

TETRA TECH

Stibnite Gold Project
ModPRO2
Cover Sheet
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: ––

Drawing Name
Cover Sheet

Drawing No.
G–1

LOCATION: R:\PROJECTS\SF_SALMON_JHJ\GIS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\A_COVER_GENERALS.DWG PLOT DATE: 3/5/2021

STIBNITE GOLD PROJECT STREAM RESTORATION GOALS, OBJECTIVES AND APPROACH:

1. PROJECT GOAL IS TO RESTORE STREAMS AND ASSOCIATED RIPARIAN CORRIDORS WITHIN THE STIBNITE MINE TO BETTER THAN EXISTING CONDITIONS POST MINING OPERATIONS.
2. STREAM DESIGN OBJECTIVES INCLUDE:
   - REMOVAL OF YELLOW PINE PIT BARRIER TO RESTORE FISH PASSAGE AND MAKE APPROXIMATELY 29,500 LINEAL FEET OF THE EAST FORK SOUTH FORK SALMON RIVER (EFSFSR) AND MEADOW CREEK ACCESSIBLE TO ANADROMOUS FISH FOR THE FIRST TIME SINCE 1938.
   - RESTORE AND ENHANCE ROUGHLY 14.5 MILES OF PERENNIAL AND NON-PERENNIAL STREAM AND RIPARIAN HABITAT.
3. THE OVERALL STREAM ENHANCEMENT AND RESTORATION APPROACH IS TO RESTORE PERMANENT FISH PASSAGE ABOVE THE EXISTING YELLOW PINE PIT BARRIER BY FILLING THE PIT AND BUILDING A NEW STREAM CHANNEL OVER THE TOP OF THE FILL, RESTORE HIGH-QUALITY STREAM CHANNELS OVER THE TOP OF AREAS THAT WILL BE IMPACTED BY FUTURE MINING OPERATIONS, AND ENHANCE CERTAIN STREAMS THAT WILL BE OTHERWISE UNAFFECTED BY MINING.
   - ENHANCE = IMPROVE PHYSICAL CHANNEL PROCESSES AND HABITAT WITHIN THE EXISTING STREAM CHANNEL.
   - RESTORE = CREATE A NEW STREAM CHANNEL WHERE THE NATURAL CHANNEL HAS BEEN FILLED OR OTHERWISE ALTERED BY MINING-RELATED ACTIVITIES.

CONCEPTUAL DESIGN PHILOSOPHY:

1. THIS CONCEPTUAL DESIGN SHOWS PROPOSED CONDITIONS AT POST MINING OPERATIONS.
2. THE PROJECT AREA HAS BEEN DIVIDED INTO MULTIPLE REACHES FOR EACH STREAM CHANNEL.
3. STREAMS HAVE BEEN DIVIDED INTO REACHES BY VARIATION IN CHANNEL SLOPE, CHANGES IN DRAINAGE AREA (TRIBUTARY CONNECTION), AND CHANGES FROM RESTORATION TO ENHANCEMENT.
4. EACH STREAM REACH DESIGN INCLUDES ONE OR MORE PLAN VIEW SHEETS DEPICTING THE CHANNEL PATTERN AND ASSOCIATED FLOODPLAIN WIDTH. THESE PLAN VIEW SHEETS SHOW THE PROPOSED OR EXISTING CHANNEL ALIGNMENT AND PROVIDE METRICS INCLUDING PROPOSED VALLEY LENGTH, PROPOSED CHANNEL LENGTH, PROPOSED CHANNEL SINUOUSITY, PROPOSED VALLEY SLOPE AND PROPOSED CHANNEL SLOPE ON A PER REACH BASIS.
5. FOLLOWING EACH REACH'S PLAN VIEW DESIGN SHEETS IS A TYPICAL DIMENSIONS SHEET THAT REPRESENTS APPROXIMATELY ONE FULL MEANDER WAVE LENGTH. THESE SHEETS PROVIDE A TYPICAL RANGE IN DIMENSIONS FOR CHANNEL SHAPE IN SECTION, PLANFORM AND VERTICAL PROFILE. CONCEPTUAL SECTIONS INCLUDE A TYPICAL SECTION AT A RIFFLE AND A TYPICAL SECTION AT A POOL. THE TYPICAL PROFILE SHOWS TYPICAL RIFFLE-POOL SEQUENCING OR STEP POOL SEQUENCING DEPENDING ON CHANNEL SLOPE.
6. IT IS INTENDED THAT THE ASSOCIATED RANGES IN CHANNEL DIMENSIONS BE UTILIZED AND THESE SECTIONS AND PROFILES WILL BE REPEATED FOR THE PROPOSED CHANNEL ALIGNMENT SHOWN IN THE PLAN SHEETS WITH SMOOTH TRANSITIONS BETWEEN RIFFLE AND POOL SECTIONS. TYPICAL SECTIONS FOR RUNS AND GLIDES WILL BE ADDED TO THE DRAWINGS FOR ADDITIONAL DETAIL IN A FUTURE DESIGN PHASE.
7. THE CHANNEL SHAPE WILL VARY WITHIN THE ALLOWABLE RANGE TO ALLOW FOR NATURAL VARIATION WITHIN THE CHANNEL AND FLOODPLAIN INCREASING THE HYDRAULIC DIVERSITY AND ASSOCIATED AQUATIC HABITAT WITHIN EACH RESTORED CHANNEL.
8. FOLLOWING THE TYPICAL PLAN AND PROFILE SHEET IS A QUANTITIES SHEET FOR EACH REACH. THIS QUANTITIES SHEET INCLUDES ASSOCIATED BANK TREATMENTS, LOG HABITAT STRUCTURES, CONSTRUCTED RIFFLES, PLANTING ZONES AND ASSOCIATED AREAS. THESE QUANTITIES WILL ALLOW FOR FUTURE ACCURATE IMPLEMENTATION, ESTIMATING, AND QUANTIFICATION OF CERTAIN METRICS ASSOCIATED WITH WATERSHED CONDITION INDICATOR (WCI) SCORING.
9. AT THE END OF THE CONCEPTUAL PLAN SET IS A NUMBER OF TYPICAL DETAILS RANGING FROM TYPICAL BANK TREATMENTS, RIFFLE CONSTRUCTION, VARIOUS WOOD HABITAT STRUCTURES, PLANTING PLAN AND SCHEDULE, ETC. EACH OF THESE DETAILS INCLUDES NOTES ON APPLICATION FREQUENCY, AND PROVIDES REPRESENTATIVE PHOTOS FOR CONCEPTUAL REFERENCE.

GENERAL NOTES:

1. THESE DESIGNS AND DRAWINGS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE OF MIDAS GOLD IDAHO, INC. AND THEIR REPRESENTATIVE AUTHORIZED AGENTS. NO OTHER PARTY MAY RELY ON THE PRODUCT OF OUR SERVICES UNLESS RIO APPLIED SCIENCE AND ENGINEERING AND TETRA TECH AGREE IN WRITING IN ADVANCE OF SUCH USE.
2. THESE PLANS ARE INTENDED FOR CONCEPTUAL USE ONLY AND ARE NOT INTENDED FOR CONSTRUCTION.
3. THE ENHANCEMENT DESIGNS DEPICTED HEREIN ARE APPROXIMATE AND ARE INTENDED TO EXPRESS THE OVERALL DESIGN INTENT OF THE PROJECT.
4. DRAWING HORIZONTAL COORDINATES ARE REFERENCED TO IDAHO STATE PLANE WEST, US FEET, USING THE NORTH AMERICAN DATUM OF 1983.
5. VERTICAL ELEVATION IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
6. THESE DESIGN DRAWINGS WERE ORIGINALLY PRODUCED IN COLOR.
7. THESE PLANS DO NOT SHOW LOCATIONS OF INDIVIDUAL WOOD STRUCTURES. HOWEVER, APPROPRIATE REACHES (IDENTIFIED IN THE BASIS OF DESIGN REPORT) WILL INCLUDE WOOD STRUCTURES TO MEET DESIGN OBJECTIVES AND MINIMUM WOOD LOADING RATES.
8. FOR THE SGP STREAM DESIGN NON-PERENNIAL REFER TO A STREAM WITH DISTINCT BED AND BANKS THAT EXHIBITS SURFACE FLOW DURING ONLY A PORTION OF THE YEAR (I.E. NOT PERENNIAL).

CONCEPT DESIGN RESTORED AND ENHANCED CHANNEL LENGTH SUMMARY

MINE FEATURE	STREAM NAME	STREAM REACH(S)	REACH DRAWING(S)	PERENNIAL CHANNEL LENGTH (FT)**	NON-PERENNIAL CHANNEL LENGTH (FT)**	TRANSITIONAL PERENNIAL CHANNEL LENGTH** (FT)	TRANSITIONAL NON-PERENNIAL CHANNEL LENGTH** (FT)
TAILINGS STORAGE FACILITY (TSF)	MEADOW CREEK AND TRIBUTARIES	MC1A, MC1B, MC1C, MC1D, & MC1E	MC1A-1 TO MC1A-2, MC1B-1, MC1C-1, MC1D-1, & MC1E-1 TO MC1E-2	19,926	9,204	812	159
HANGAR FLATS DEVELOPMENT ROCK STORAGE FACILITY (TSF BUTTRESS)	MEADOW CREEK	MC2 & MC3	MC2-1 & MC3-1	4,238	0	481	0
HANGAR FLATS PIT	MEADOW CREEK	MC4, MC5, HF1, & MC6A	MC4-1, MC5-1, HF1-1 & MC6-1	7,874	6,324	0	5,418
	MEADOW CREEK[E]	MC6B	MC6-1	924	0	0	0
	BLOWOUT CREEK	BC3	BC3-1	685	0	0	0
BLOWOUT CREEK RESTORATION	BLOWOUT CREEK	BC1 & BC2	BC1-1 & BC2-1	4,767	0	0	0
PROCESSING FACILITY	GARNET CREEK	GC1	GC1-1	3,800	0	193	1,185
FIDDLE DRSF	FIDDLE CREEK	FC2	FC2-1	1,798	0	0	0
YELLOW PINE PIT / YELLOW PINE DRSF	EFSFSR	EF3	EF3-1	3,368	1,958	0	0
	EFSFSR[E]	EF2 & EF4	EF2-1 TO EF2-3 & EF4-1	11,836	0	0	0
	HENNESSY CREEK	HC1 & HC2	HC1&2-1	1,345	0	692	0
YELLOW PINE PIT / YELLOW PINE DRSF	MIDNIGHT CREEK	MNC1 & MNC2	MNC1-1 & MNC2-1	1,331	0	2,549	0
WEST END PIT / WEST END DRSF	WEST END CREEK*	WE2, & WE3	WE2-1 & WE3-1	0	1,690	0	0
			TOTAL STREAM RESTORATION LENGTH	49,132	19,176	4,727	6,762
			TOTAL STREAM ENHANCEMENT LENGTH	12,760	0	0	0
			TOTAL STREAM MITIGATION LENGTH (RESTORATION AND ENHANCEMENT)	61,892	19,176	4,727	6,762

E = ENHANCEMENT OF EXISTING STREAM CHANNEL (REMOVE FISH PASSAGE BARRIERS, ENHANCE HABITAT, IMPROVE RIPARIAN CONDITIONS WITHOUT CHANGES TO CHANNEL'S GENERAL LINE AND GRADE). ALL OTHER STREAMS ARE PLANNED FOR RESTORATION.

* WEST END CREEK IS ASSUMED TO REMAIN INTERMITTENT UPSTREAM OF THE PIT LAKE AND DOWNSTREAM OF THE PIT LAKE. WE3 IS DESIGNED AS AN OUTFLOW FOR THE PROPOSED WEST END PIT LAKE IN THE EVENT THAT IT FILLS AND OCCASIONALLY SPILLS.

** PERENNIAL CHANNEL LENGTH REPORTED ON THIS SHEET AND THE OVERVIEW SHEETS INCLUDES THE LENGTH OF THE MAIN STEM AND PERENNIAL SIDE CHANNELS INCLUDED IN THE PROPOSED DESIGN. THE PROPOSED CHANNEL LENGTH REPORTED ON THE OVERVIEW SHEETS INCLUDES THE LENGTH OF ONLY THE MAIN STEM PERENNIAL CHANNEL TO SUPPORT SINUOSITY AND GRADIENT CALCULATIONS.

*** EXISTING STREAM LENGTH DOES NOT INCLUDE STREAM LENGTH THROUGH THE EXISTING YELLOW PINE PIT LAKE.

**** PROPOSED STREAM LENGTH DOES NOT INCLUDE STREAM LENGTH THROUGH THE PROPOSED YELLOW PINE PIT LAKE LIKE FEATURE.

STIBNITE GOLD PROJECT IMPACTS VERSUS PROPOSED TREATMENTS CHANNEL LENGTH SUMMARY

DRAINAGE	STIBNITE GOLD PROJECT STREAM IMPACTS			
	PERENNIAL CHANNEL LENGTH** (FT)	NON-PERENNIAL CHANNEL LENGTH** (FT)	TRANSITIONAL PERENNIAL CHANNEL LENGTH** (FT)	TRANSITIONAL NON-PERENNIAL CHANNEL LENGTH** (FT)
BLOWOUT CREEK (EAST FORK MEADOW CREEK)****	5,452	0	0	0
EAST FORK SOUTH FORK SALMON RIVER***	15,204	1,958	0	0
FIDDLE CREEK	1,798	0	0	0
GARNET CREEK	3,800	0	193	1,185
HENNESSY CREEK	1,345	0	692	0
MEADOW CREEK****	32,962	15,528	1,293	5,577
MIDNIGHT CREEK	1,331	0	2,549	0
WEST END CREEK	0	1,690	0	0
TOTAL	61,892	19,176	4,727	6,762

NOTE:

A COMPREHENSIVE STUDY OF THE PROPOSED MINE PLAN AND MINING RELATED IMPACTS TO STREAM CHANNELS IS IN DEVELOPMENT BY MIDAS GOLD INCLUDING MODIFICATIONS TO THE ORIGINAL PLAN OF RESTORATION AND OPERATIONS (MIDAS GOLD 2016) BASED ON FEEDBACK RECEIVED DURING MULTIPLE YEARS OF AGENCY CONSULTATION AND THE NEPA EIS PROCESS. THE STREAM DESIGN REPORTED HERE IS BASED ON THIS REVISED FEASIBILITY STUDY MINE PLAN (MIDAS GOLD PENDING PUBLICATION).

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
General Notes, Design Philosophy, Impacts Summary
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
General Notes

Drawing No.
G-2

LOCATION: R:\PROJECTS\SF_SALMON_HUSH\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\A_COVER_GENERALS.DWG PLOT DATE: 3/3/2021

SUMMARY TABLE OF WETLAND DESIGN ACREAGES

Conceptual Wetland Restoration by Stream Restoration Reach																				
Drainage	Mine Feature	Stream Reach ID	Proposed Year of Construction	Location	Riparian Fringe and Floodplain Wetlands				Blowout Creek Restored Wetlands			Valley Margin Wetlands			Other Wetlands				Total	Associated Functional Units
					PAB	PEM	PSS	PFO	PAB	PEM	PSS	PEM	PSS	PFO	PEM	PSS	PFO	PAB		
Meadow Creek	Tailings Storage Facility (TSF)	MC1a	23	Southernmost branch of creek on TSF	0.94	15.94	1.32	12.56	–	–	–	0.91	0.35	0.56	–	–	–		32.59	229.0
		MC1b	23	Middle branch of creek on TSF	0.16	2.54	3.48	3.84	–	–	–	0.56	0.54	0.52	0.76	0.26	0.18		12.84	91.2
		MC1c	23	Northern branch of creek on TSF	0.30	1.13	3.82	7.17	–	–	–	0.09	0.32	0.28	3.44	0.81	0.3		17.67	129.3
		MC1d	23	Trunk stream between middle branch and northern branch on TSF	0.31	-	0.47	6.01	–	–	–	–	–	–	–	–	–		6.79	52.2
		MC1e	23	Trunk stream below confluence of northern branch on TSF	0.49	-	1.00	11.98	–	–	–	-	–	–	–	–	–		13.47	104.0
	TSF Buttress	MC2	23	Area on TSF Upstream of Chute	0.41	-	–	4.97	–	–	–	–	–	–	–	–	–		5.38	41.0
	TSF Buttress DRSF (face)	MC3	-	Chute on face of DRSF	–	–	–	–	–	–	–	–	–	–	–	–	–		–	–
	TSF Buttress (toe)	MC4	3/18	Between Chute and Hangar Flats pit	0.10	2.52	8.61	25.43	–	–	–	–	–	–	-	-	-		36.66	281.9
	Hangar Flats Pit	MC5	3	Enhancement of existing channel below pit	0.36	-	0.72	6.73	–	–	–	–	–	–	–	–	–		7.80	60.0
	Hangar Flats Pit Backfill	HF1	17	Pit Backfill											20.04	2.55	14.46	-	37.05	266.1
Meadow Creek	Below Hangar Flats pit	MC6	3/4	Enhancement of existing channel below pit	–	-	1.19	3.86	–	–	–	–	–	–	–	–	–		5.05	39.3
Blowout Creek	Blowout Creek (Meadow)	BC1	1	Meadow channel upstream of boulder chute	–	–	–	–	4.34	1.03	3.28	–	–	–	–	–	–		8.64	15.4
Blowout Creek	Blowout Creek	BC3	12	Channel Joining MC4	–	–	–	–	–	–	–	–	–	–	-	–	–		Included in MC4	
Fiddle Creek	GMS	FC2	24	Fiddle Creek			1.35	1.27							–	-	-		2.61	20.1
EFSFSR		EF1	25	Former Townsite											0.89	2.80	1.2		4.89	36.5
EFSFSR	Plant Site	GC1	23	Plant Site											18.55	-	6.23		24.78	172.3
EFSFSR	Yellow Pine pit	EF3	11	Final stream segment replacing the temporary tunnel	0.07	2.26	0.80	16.70	–	–	–	–	–	–	–	–	–		19.83	152.5
TOTAL					**3.13**	**24.39**	**22.77**	**101.45**	**4.34**	**1.03**	**3.28**	**1.56**	**1.21**	**1.37**	**43.70**	**6.42**	**22.37**	**0**	**237.00**	**1,698.2**

Wetland Restoration Goals and Objectives

1. Project Goal is to design high quality replacement wetlands to be constructed over mine facilities and on adjacent lands to repair legacy impacts and replace the functions and values of wetlands removed during mine, mill, road and powerline construction.

2. Design goal is to design a complex mosaic of general wetland types which are generally classified as Riparian Fringe And Floodplain Wetlands, Valley Margin Wetlands, and other Wetlands. Restoration of wetlands presently located in Upper Blowout Creek and previously impacted by dam failure and headcutting is also a design goal.

3. Within each general wetland type described above, design a complex mosaic of wetland vegetation consisting of four general planting zones including the following:

1. *Palustrine Emergent (PEM)*
2. *Palustrine Shrub-Scrub (PSS)*
3. *Palustrine Forested (PFO)*
4. *Palustrine Aquatic Bed (PAB)*

Conceptual Design Philosophy

1. Design wetlands within lined reaches whose overall dimensions (floodplain width), configuration and location have been selected for restored stream reaches.

2. Design floodplain surface so as to be low enough so that the groundwater surface is within 12 inches of the finished floodplain elevation for all but 14 days out of the growing season in at least 5 out of 10 years. This philosophy exceeds Corps of Engineers' criteria for wetlands as defined in ERDC/EL 10-3. This results in an 'inset' floodplain surface that is in some instances lower the bankfull elevation of the stream within the floodplain.

3. Design wetlands generally outside lined stream reaches in areas where topography and water supply are sufficient to meet Corps of Engineer's criteria as defined in ERDC/EL 10-3.

4. The designs included herein are conceptual in nature and are not intended for use during construction.

Conceptual Design Philosophy (Cont.)

5. The design sheets presented herein generally consist of a wetlands overview sheet showing the locations, types and extents of a wetlands associated with a particular stream reach followed by a wetlands planting sheet that shows the desired planting zones and vegetation within each wetland.

TETRA TECH

Perpetua Resources

Stibnite Gold Project

Stream And Wetland Restoration Concept Design

General Wetland Notes

Valley County, Idaho

Draft

Date: MAR. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: —

Drawing Name
General Wetland Notes

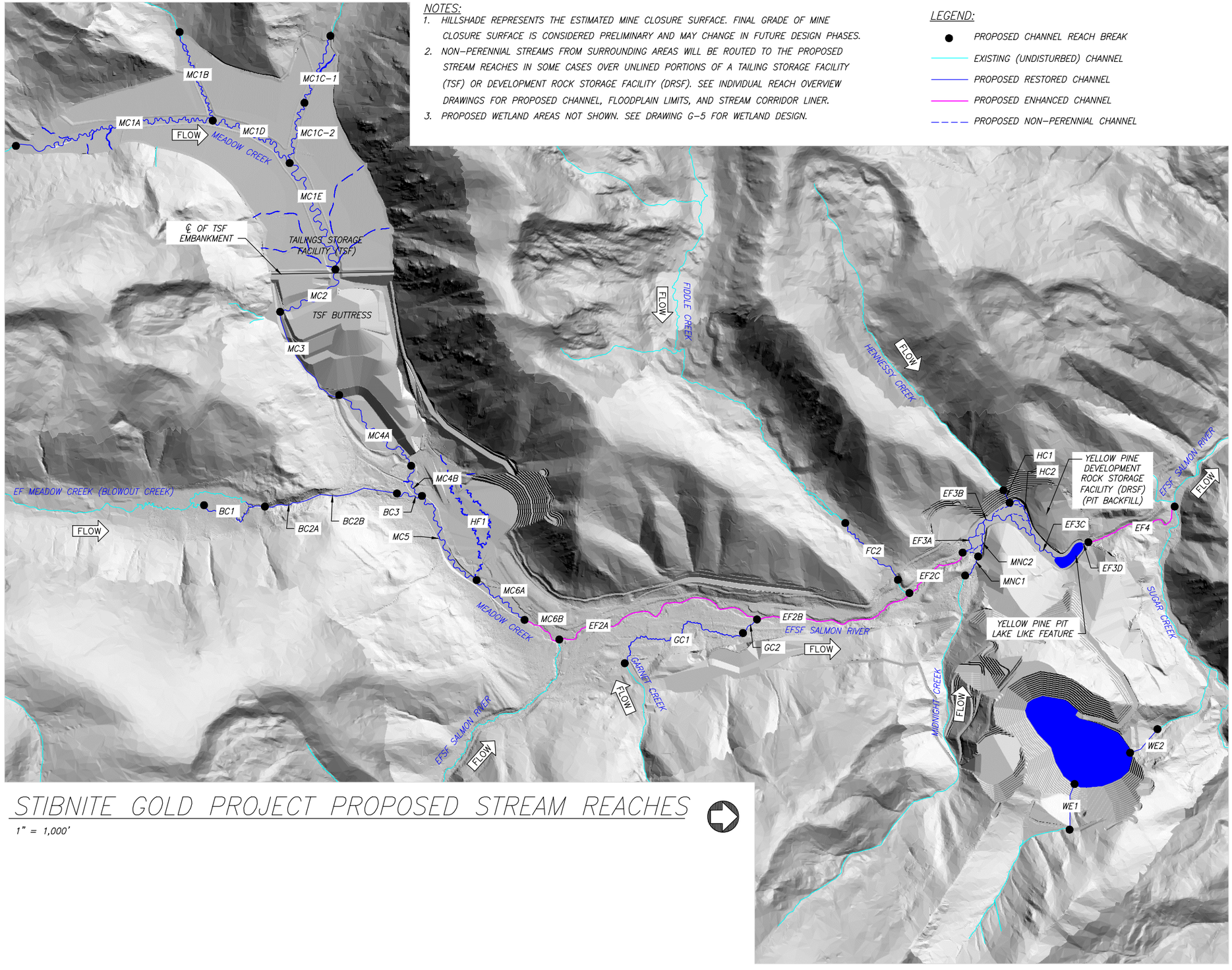
Drawing No.
G3

NOTES:

1. HILLSHADE REPRESENTS THE ESTIMATED MINE CLOSURE SURFACE. FINAL GRADE OF MINE CLOSURE SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES.
2. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED STREAM REACHES IN SOME CASES OVER UNLINED PORTIONS OF A TAILING STORAGE FACILITY (TSF) OR DEVELOPMENT ROCK STORAGE FACILITY (DRSF). SEE INDIVIDUAL REACH OVERVIEW DRAWINGS FOR PROPOSED CHANNEL, FLOODPLAIN LIMITS, AND STREAM CORRIDOR LINER.
3. PROPOSED WETLAND AREAS NOT SHOWN. SEE DRAWING G-5 FOR WETLAND DESIGN.

LEGEND:

- PROPOSED CHANNEL REACH BREAK
- EXISTING (UNDISTURBED) CHANNEL
- PROPOSED RESTORED CHANNEL
- PROPOSED ENHANCED CHANNEL
- PROPOSED NON-PERENNIAL CHANNEL



STIBNITE GOLD PROJECT PROPOSED STREAM REACHES

1" = 1,000'

Applied Science & Engineering

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Stibnite Gold Project
ModPRO2
Proposed Stream Reaches
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
Proposed Stream Reaches

Drawing No.
G-4

LOCATION: R:\PROJECTS\SF_SALMON_AU\09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\A_COVER_GENERALS.DWG PLOT DATE: 3/3/2021

NOTES:

1. HILLSHADE REPRESENTS THE ESTIMATED MINE CLOSURE SURFACE. FINAL GRADE OF MINE CLOSURE SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES.
2. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS NOT CURRENTLY SHOWN) WILL BE RE-ROUTED TO THE PROPOSED STREAM REACHES IN SOME CASES OVER UNLINED PORTIONS OF A TAILING STORAGE FACILITY (TSF) OR DEVELOPMENT ROCK STORAGE FACILITY (DRSF). SEE INDIVIDUAL REACH OVERVIEW DRAWINGS FOR PROPOSED CHANNEL, FLOODPLAIN LIMITS, AND STREAM CORRIDOR LINER.

LEGEND:

- PROPOSED CHANNEL REACH BREAK
- EXISTING (UNDISTURBED) CHANNEL
- PROPOSED RESTORED CHANNEL
- PROPOSED ENHANCED CHANNEL
- PROPOSED NON-PERENNIAL CHANNEL
- PROPOSED FLOODPLAIN WETLAND REACHES
- PROPOSED OTHER WETLANDS

MC1B
MC1C-1
MC1A
FLOW
MEADOW CREEK
MC1D
MC1C-2
MC1E
℄ OF TSF EMBANKMENT
TAILINGS STORAGE FACILITY (TSF)
MC2
TSF BUTTRESS
MC3
FLOW
FIDDLE CREEK
FLOW
HENNESSY CREEK
MC4A
HC1
HC2
YELLOW PINE PIT BACKFILL
EFSF SALMON RIVER
FLOW
EF MEADOW CREEK (BLOWOUT CREEK)
MC4B
EF3B
BC1
BC3
HF1
EF3C
EF4
FLOW
BC2A
BC2B
MC5
EF3A
FC2
MNC2
EF3D
MNC1
EF2C
MC6A
SUGAR CREEK
MEADOW CREEK
MC6B
EF2A
EF2B
EFSF SALMON RIVER
YELLOW PINE PIT LAKE LIKE FEATURE
GC1
GC2
FLOW
GARNET CREEK
FLOW
MIDNIGHT CREEK
FLOW
WE2
EFSF SALMON RIVER
FLOW
WE1

STIBNITE GOLD PROJECT PROPOSED FLOODPLAIN WETLAND AREAS

1" = 1,000'

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Proposed Floodplain Wetland Areas
Valley County, Idaho

Draft

Date:	March 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
Proposed Floodplain Wetland Areas

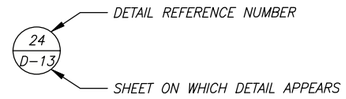
Drawing No.
G-5

LOCATION= C:\USERS\BRCK_STR\WORK\VISION7109_FILES\CHECKED\BIO\202203\BIO_MEMS_STREAM_RESTORATION\LAYOUT_FIGURES\SHEETS\20220308\PLPROD\LECTION\G5.DWG PLOT DATE: 3/3/2021

LEGEND:

- CHANNEL ALIGNMENT
- EXISTING CHANNEL
- EXISTING NON–PERENNIAL CHANNEL
- EXISTING MAJOR CONTOUR (25)
- EXISTING MINOR CONTOUR (5)
- EXISTING PEM WETLAND
- EXISTING PFO WETLAND
- EXISTING PSS WETLAND
- EXISTING RELIC DAM DEMOLITION
- EXISTING ROAD
- EXISTING SEEP
- FLOW DIRECTION (FLOW)
- MINE OPERATIONAL DISTURBANCE LIMITS
- MINE OPERATIONAL FEATURE LIMITS
- PROPOSED ENHANCEMENT REACH ALTERNATING BANK JOG JAMS
- PROPOSED ENHANCEMENT REACH EXISTING FEATURE
- PROPOSED ENHANCEMENT REACH CHANNEL GRADING
- PROPOSED ENHANCEMENT REACH WHOLE TREE
- PROPOSED ENHANCED CHANNEL
- PROPOSED ENHANCED/RESTORED WETLAND
- PROPOSED ENERGY DISSIPATION BASIN
- PROPOSED FLOODPLAIN LIMITS (FP FP FP)
- PROPOSED HIGH FLOW NON–PERENNIAL CHANNEL
- PROPOSED LAKE WATER SURFACE
- PROPOSED NON–PERENNIAL CHANNEL
- PROPOSED PAB WETLAND
- PROPOSED PEM WETLAND
- PROPOSED PFO WETLAND
- PROPOSED PSS WETLAND
- PROPOSED WETLAND MITIGATION AREA
- PROPOSED OTHER WETLAND
- PROPOSED RIPARIAN FRINGE/FLOODPLAIN WETLAND
- PROPOSED BLOWOUT CREEK RESTORED WETLAND
- PROPOSED REACH BREAK
- PROPOSED RESTORED CHANNEL
- PROPOSED RESTORED CHANNEL (SEE REFERENCED SHEET)
- PROPOSED ROCK GRADE CONTROL STRUCTURE
- PROPOSED STREAM CORRIDOR LINER LIMITS
- PROPOSED SURFACE WATER DIVERSION
- PROPOSED TUNNEL AND PORTAL

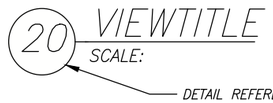
DETAIL AND SECTION REFERENCING:



MATCHLINE SHEET 1 STA X+00.00 — SPECIFIES STATIONING AND SHEET NUMBER FOR CONTINUING ALIGNMENT ON NEXT OR PERVIOUS SHEET



SPECIFIES LOCATION OF THE SECTION, ORIENTATION AND VIEW DIRECTION



VIEWTITLE — ON DRAWINGS WHERE ONLY A TITLE IS REQUIRED

ABBREVIATIONS:

AC	ACRE
APPROX	APPROXIMATE
BMP	BEST MANAGEMENT PRACTICE
CF	CUBIC FOOT OR FEET
CFS	CUBIC FEET PER SECOND
℄	CENTERLINE
CP	CONTROL POINT
CY	CUBIC YARD
DIAM	DIAMETER
DRSF	DEVELOPMENT ROCK STORAGE FACILITY
EA	EACH
EL, EI	ELEVATION
EXST	EXISTING
FG	FINISHED GRADE OR GROUND
FT	FOOT OR FEET
LF	LINEAR FOOT OR FEET
LiDAR	LIGHT DETECTION AND RANGING
LS	LUMP SUM
MIN	MINUMUM
MAX	MAXIMUM
N	NORTH
NO.	NUMBER
NTS	NOT TO SCALE
OG	ORIGINAL GRADE OR GROUND
PAB	PALUSTRINE AQUATIC BED
PEM	PALUSTRINE EMERGENT
PFO	PALUSTRINE FORESTED
PLS	PURE LIVE SEED
PROP	PROPOSED
PSS	PALUSTRINE SHRUB–SCRUB
SF	SQUARE FEET
STA	STATION
SWPPP	STORM WATER POLLUTION PREVENTION PLAN
SY	SQUARE YARD OR YARDS
TSF	TAILINGS STORAGE FACILITY
TYP	TYPICAL
WL	WETLAND
"	INCH
'	FOOT OR FEET
°	DEGREE

LOCATION: R:\PROJECTS\SF_SALMON_HUCRP\STIBNITE_RESTORATION_MDA\CAD\PRODUCTION\A_LEGEND.DWG PLOT DATE: 3/3/2021

Applied Science & Engineering

Perpetua Resources

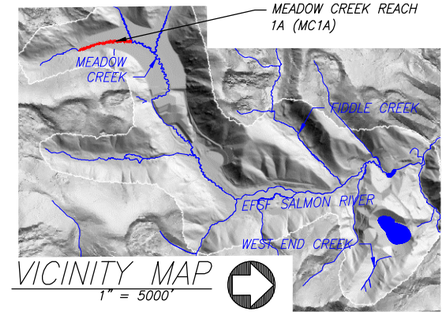
Stibnite Gold Project
ModPRO2
General Legend and Abbreviations
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
General Legend and Abbreviations

Drawing No.
G–6



VICINITY MAP
1" = 5000'

MC1A PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC1A	3,988	6,125	1.5	0.96	0.63

MC1A PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC1A	6,180	1,885

TSF LIMIT
MAXIMUM DISTURBANCE LIMITS
EXISTING PSS WETLAND, TYP
TAILINGS STORAGE FACILITY (TSF)
MATCHLINE SHEET MC1A-2 STA 35+00
FLOODPLAIN WIDTH
STREAM CORRIDOR LINER LIMITS (24 / D-13)
SURFACE WATER DIVERSION ABANDONED FOLLOWING TSF AND DRSF CLOSURE
PROPOSED MEADOW CREEK CHANNEL ALIGNMENT MC1A
34 / D-17 TRANSITIONAL CHANNEL
32 / D-17 NON-PERENNIAL SWALE
EXISTING MEADOW CREEK CHANNEL ALIGNMENT
MEADOW CREEK EXISTING ALIGNMENT
FLOW
EXISTING NON-PERENNIAL CHANNEL, TYP
EXISTING SEEP, TYP
EXISTING PFO WETLAND, TYP
EXISTING PEM WETLAND, TYP
MAXIMUM DISTURBANCE LIMITS

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEETS MC1A-5 THROUGH MC1A-8 FOR WETLAND DESIGN.

MEADOW CREEK REACH 1A – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley County, Idaho

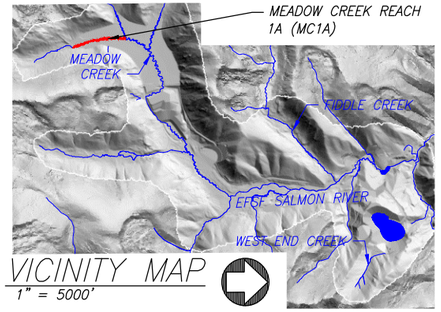
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1A Overview Sheet – 1

Drawing No.
MC1A–1

LOCATION: R:\PROJECTS\SF_SALMON_AU\DOCS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC1A_HANDRAFT\SF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

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MEADOW CREEK REACH 1A – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley County, Idaho

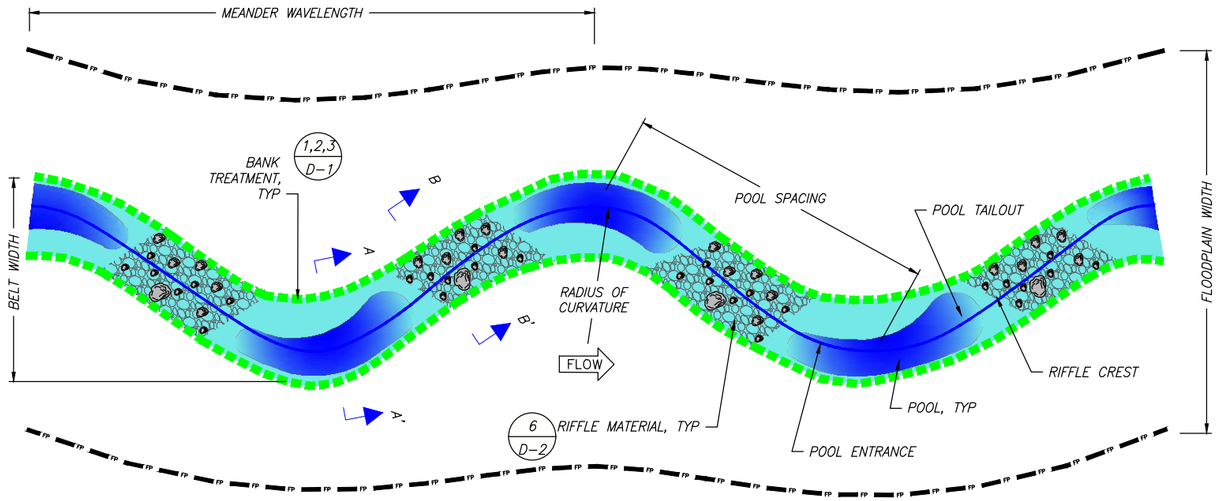
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1A Overview Sheet – 2

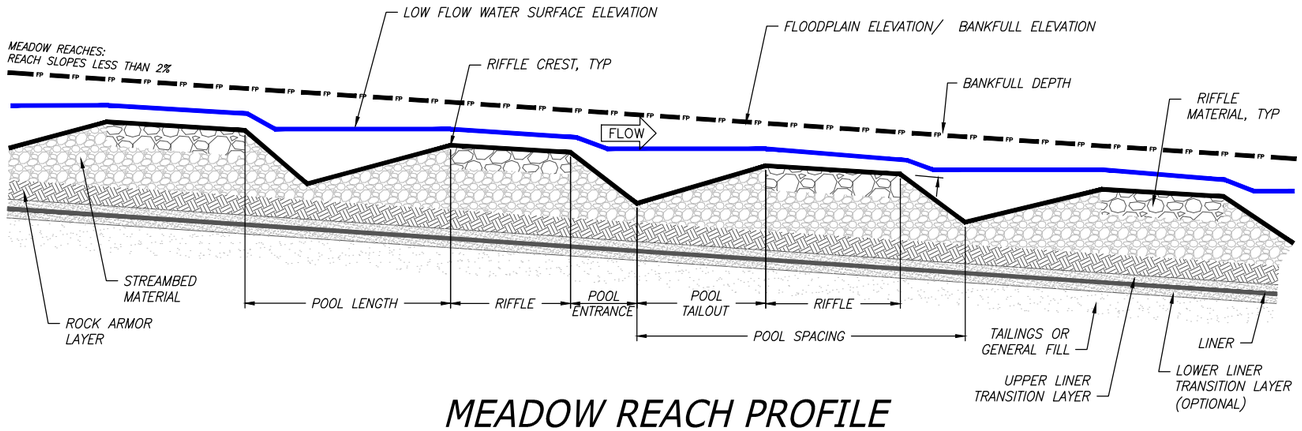
Drawing No.
MC1A-2

LOCATION: R:\PROJECTS\SF_SALMON_JHUDAY\STIBNITE_RESTORATION_MPIAS\CAD\PRODUCTION\MC1A_HANGARFLATSTSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



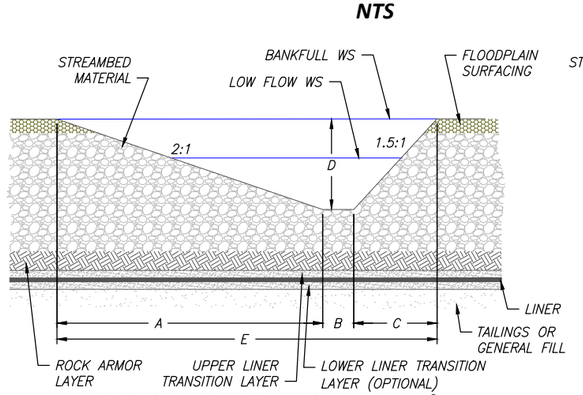
MEADOW REACH PLAN VIEW

NTS



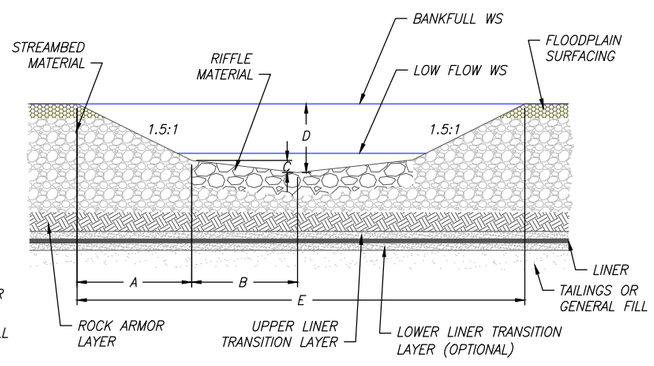
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC1A – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC1A	41	10	8	1.2	95 - 125	50 - 105	15 - 60	40 - 125	130

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC1A	15 - 115	10 - 25	38 - 45	19 - 45

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC1A								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	6.0	0.5	4.5	3.0	11.0
RIFFLE SECTION B - B'	2.3	3.0	0.2	1.7	10.0

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1A Typical Plan and Profile

Drawing No.
MC1A–3

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MDAS\CAD\PRODUCTION\MC1A_JIANGARFLATSTSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of cost pre-tax, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMPs and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	190	CY	Transition channel construction
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	8,452	CY	6125 LF of new channel; 3 FT streambed thickness;
Sorting and Stockpiling [3]	36,301	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	27,849	CY	6" thick layer over the liner area
Ephemeral Swale Channel Material [3]	160	CY	1726 LF of new channel; 0.5 FT gravel thickness; 5 FT top width;
General Fill	169,489	CY	Fill outside channel width; above liner
Filter Material	55,698	CY	12" thickness within Liner Area over TSF
Topsoil/ Growth Media [3]	53,110	CY	12" thickness within Liner Area
Liner	1,503,854	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	Assume $5/linear foot cost
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	6,125	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	12,250	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	12,250	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	4,083	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	24,500	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	1,838	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	3,675	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	515	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	2,266	LF	channel
Brushlayer Live Cuttings	4,531	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	317	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	110	EA	2 per channel meander wave length
Riffle Material	105	CY	No. of riffles x 10 FT length x 5 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	28	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	83	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	55	CY	2 CY per structure
Racking Material	55	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	111	EA	1 per 55 linear feet of new channel
Log with Rootwad	111	EA	1 per structure
Retaining Log	111	EA	1 per structure
Tight Radius Jam Structure	9	EA	1 every 6 channel meander wave lengths
Foundation Logs	64	EA	3 per structure
Log with Rootwad	55	EA	3 per structure
Small Woody Debris	120	CY	7 CY per structure
Racking Material	129	EA	7 per structure
Bend Jam Structure	18	EA	1 every 3 channel meander wave lengths
Foundation Logs	37	EA	2 per structure
Log with Rootwad	55	EA	3 per structure
Whole Tree	37	EA	1 per structure
Small Woody Debris	239	CY	13 CY per structure
Racking Material	276	EA	15 per structure
Sweeper Log Structure	14	EA	1 every 4 channel meander wave lengths
Whole Tree	14	EA	1 per structure
Small Woody Debris	41	CY	3 CY per structure
Racking Material	41	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	14	EA	1 every 4 channel meander wave lengths
Log with Rootwad	55	EA	4 per structure
Small Woody Debris	41	CY	3 CY per structure
Racking Material	41	EA	3 per structure
Turning Log Structure	9	EA	1 every 6 channel meander wave lengths
Log with Rootwad	37	EA	4 per structure
Small Woody Debris	28	CY	3 CY per structure
Racking Material	28	EA	3 per structure
Boulders	18	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	10,237	EA	10890 plants per acre, intended for anually wet areas
Zone 2	82,915	EA	4840 plants per acre
Zone 3	7,483	EA	3825 plants per acre
Zone 4	63,501	EA	4840 plants per acre
Transitional Channel	846	EA	4784 plants per acre
Seeding			
Zone 2	17.13	AC	3.12 pure live seed/AC
Zone 3	1.96	AC	3.56 pure live seed/AC
Zone 4	13.12	AC	19.02 pure live seed/AC
Transitional Channel	0.18	AC	17.28 pure live seed/AC

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Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley County, Idaho

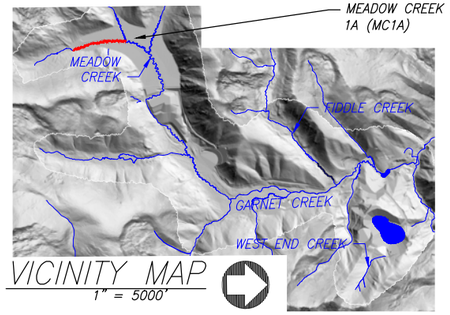
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1A Quantities

Drawing No.
MC1A-4

LOCATION: R:\PROJECTS\SF_SALMON_HUB\00\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC1A_HANGARFLATSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6

MEADOW CREEK REACH 1A – RESTORATION REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley Creek, Idaho

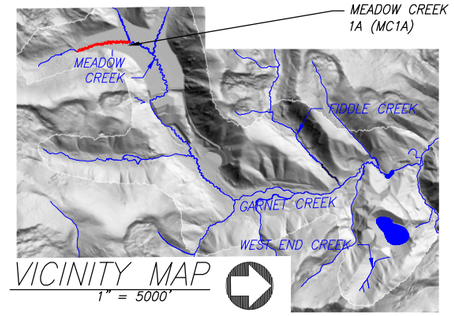
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	##

Drawing Name
MC1A Wetland Overview Sheet – 1

Drawing No.
MC1A–5

LOCATION: C:\USERS\RICK.STRIKER\DESKTOP\109-FILES\CHEURFECH\DWG\09092021\DRC-MEDAS_STREAM_RESTORATION_LAYOUT_ERSMET.MXD\SHEETS\20200904\PRODUCTION\MC1A_WETLANDS.DWG PLOT DATE: 3/3/2021



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3. SEE LEGEND SHEET G6

MEADOW CREEK REACH 1A – RESTORATION REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley County, Idaho

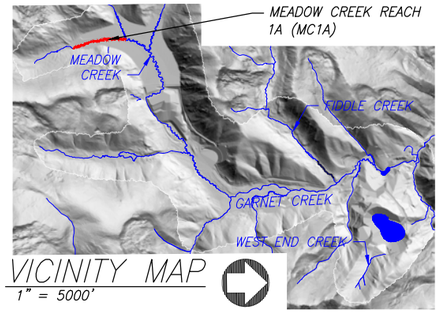
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	---

Drawing Name
MC1A Wetland Planting Sheet – 1

Drawing No.
MC1A–6

LOCATION: C:\USERS\RICK.STROKER\DESKTOP\09a-REVOHO\SECTOR\REVOHO\2020\09-MIDAS_STREAM_RESTORATION\LAYOUT_ENGINEERING\SHEETS\2020090609_PRODUCTION\MC1A_WETLANDS.DWG PLOT DATE: 1/7/2021



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3. SEE LEGEND SHEET G6.
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

MEADOW CREEK REACH 1A – RESTORATION REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley County, Idaho

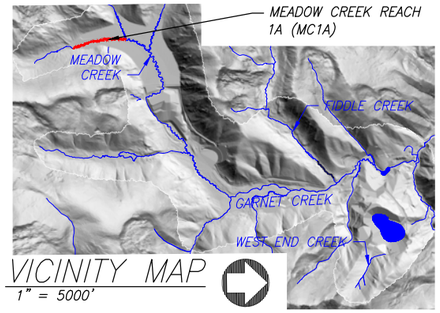
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
MC1A Wetland Overview Sheet – 2

Drawing No.
MC1A–7

LOCATION: C:\USERS\RICK.STROVER\DESKTOP\09-FILEXCHG\RECOVER\R0009220\R0\--MEDIA_STREAM_RESTORATION\LAYOUT_EXPANFILANDSHEETS\R0009220R0_GRADUATION\MC1A_WETLANDS.DWG PLOT DATE: 3/3/2021



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2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6.
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

MEADOW CREEK REACH 1A – RESTORATION REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1A
Valley County, Idaho

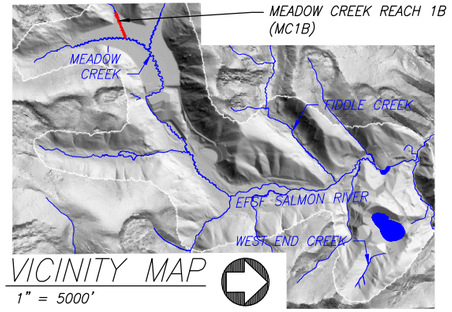
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	---

Drawing Name
MC1A Wetland Planting Sheet – 2

Drawing No.
MC1A–8

LOCATION: C:\USERS\RICK.STRICKER\DESKTOP\09-PLEXHOLDER\REVIEW\R0090200\ROJ-MC1A-S_STREAM_RESTORATIONLAYOUT_FORMETLANDSHEETS\20200624\PRODUCTION\MC1A_WETLANDS.DWG PLOT DATE: 3/1/2021



VICINITY MAP

1" = 5000'

MC1B PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC1B	1,903	2,572	1.4	1.53	1.13

MC1B PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC1B	3,017	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEETS MC1B-4 AND MC1B-5 FOR WETLAND DESIGN.

MEADOW CREEK REACH 1B - RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1B
Valley County, Idaho

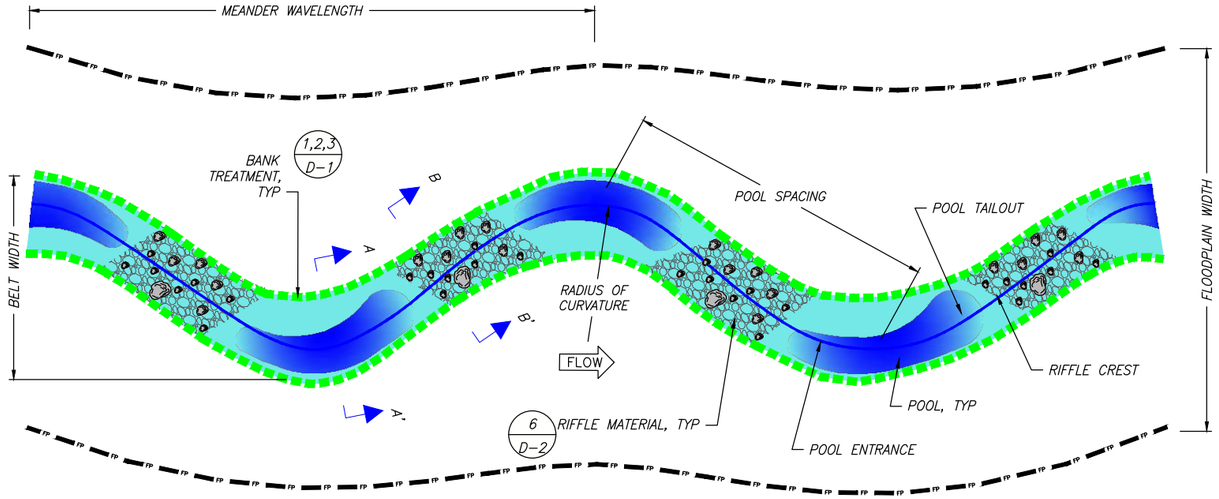
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1B Overview Sheet

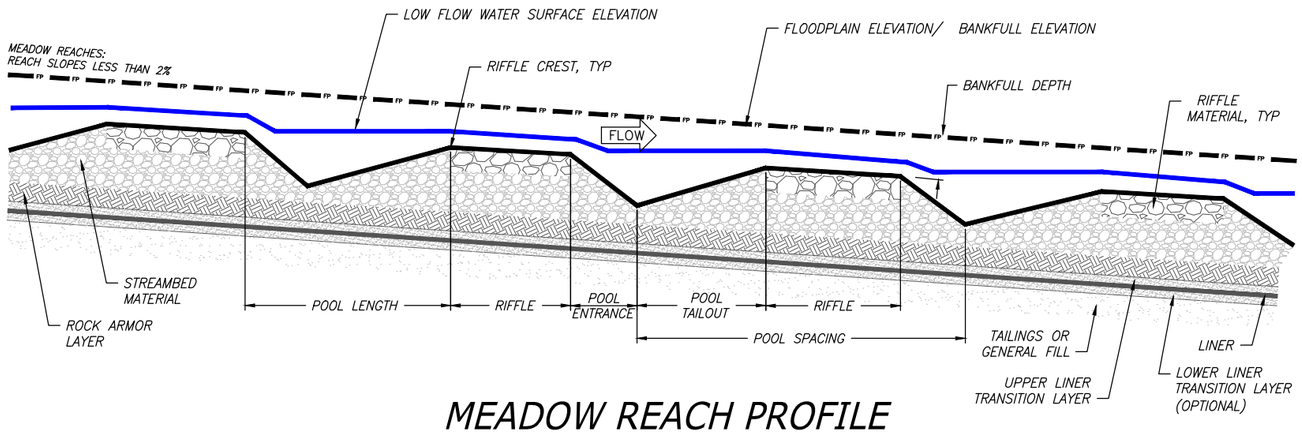
Drawing No.
MC1B-1

LOCATION: R:\PROJECTS\SF_SALMON_HUQ90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC1B_JIANGMPLA\TSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



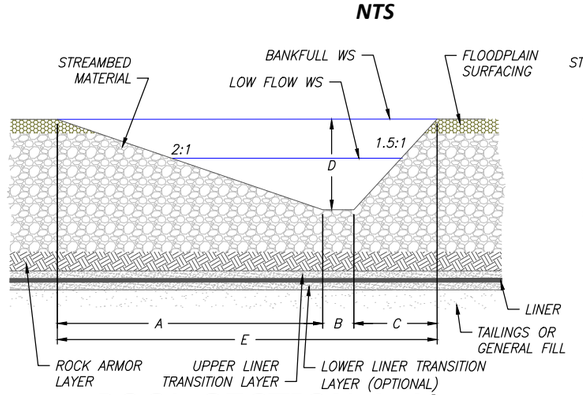
MEADOW REACH PLAN VIEW

NTS



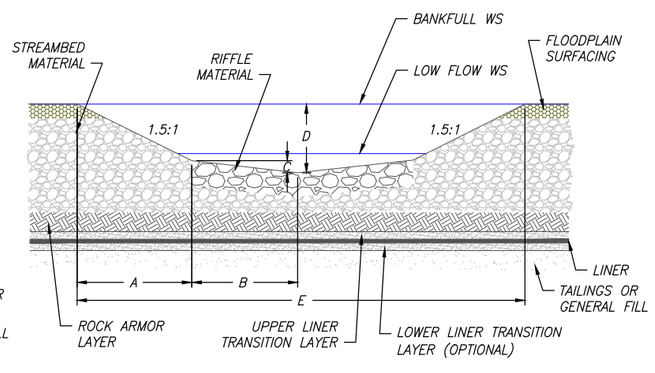
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC1B – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC1B	19	6	7	0.9	60 - 80	30 - 70	10 - 40	25 - 80	90

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC1B	10 - 75	5 - 15	44 - 45	22 - 53

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC1B								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	4.5	0.2	3.4	2.3	8.1
RIFFLE SECTION B - B'	1.8	2.0	0.2	1.4	6.4

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1B
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1B Typical Plan and Profile

Drawing No.
MC1B–2

LOCATION: R:\PROJECTS\SF_SALMON_JAG\05\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MITIG_HANGAR\LATEST\F_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	90	CY	Transition channel construction
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	2,112	CY	2806 LF of new channel; 2.25 FT streambed thickness;
Sorting and Stockpiling [3]	12,964	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	10,852	CY	6" thick layer over the liner area
Ephemeral Swale Channel Material	0	CY	
General Fill	44,619	CY	Fill outside channel width; above liner
Filter Material	21,705	CY	12" thickness within Liner Area over TSF
Topsoil/ Growth Media [3]	21,039	CY	12" thickness within Liner Area
Liner	586,024	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	Assume $5/linear foot cost
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	2,806	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	5,612	LF	2 soil lifts ; 15-foot roll width
C125BN (Fine Coir ECB)	5,612	LF	2 soil lifts ; 15-foot roll width
1"x2"x18" Stake	1,871	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	11,224	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	842	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	1,684	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	236	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	1,264	LF	channel
Brushlayer Live Cuttings	2,528	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	177	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	79	EA	2 per channel meander wave length
Riffle Material	42	CY	No. of riffles x 6.4 FT length x 3.2 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	20	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	59	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	40	CY	2 CY per structure
Racking Material	40	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	51	EA	1 per 55 linear feet of new channel
Log with Rootwad	51	EA	1 per structure
Retaining Log	51	EA	1 per structure
Tight Radius Jam Structure	5	EA	1 every 8 channel meander wave lengths
Foundation Logs	35	EA	3 per structure
Log with Rootwad	30	EA	3 per structure
Small Woody Debris	64	CY	7 CY per structure
Racking Material	69	EA	7 per structure
Bend Jam Structure	7	EA	1 every 6 channel meander wave lengths
Foundation Logs	13	EA	2 per structure
Log with Rootwad	20	EA	3 per structure
Whole Tree	13	EA	1 per structure
Small Woody Debris	86	CY	13 CY per structure
Racking Material	99	EA	15 per structure
Sweeper Log Structure	7	EA	1 every 6 channel meander wave lengths
Whole Tree	7	EA	1 per structure
Small Woody Debris	20	CY	3 CY per structure
Racking Material	20	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	7	EA	1 every 6 channel meander wave lengths
Log with Rootwad	26	EA	4 per structure
Small Woody Debris	20	CY	3 CY per structure
Racking Material	20	EA	3 per structure
Turning Log Structure	7	EA	1 every 6 channel meander wave lengths
Log with Rootwad	26	EA	4 per structure
Small Woody Debris	20	CY	3 CY per structure
Racking Material	20	EA	3 per structure
Boulders	13	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	1,742	EA	10890 plants per acre, intended for anually wet areas
Zone 2	19,306	EA	4840 plants per acre
Zone 3	16,864	EA	3825 plants per acre
Zone 4	21,974	EA	4840 plants per acre
Transitional Channel	834	EA	4784 plants per acre
Seeding			
Zone 2	3.99	AC	3.12 pure live seed/AC
Zone 3	4.41	AC	3.56 pure live seed/AC
Zone 4	4.54	AC	19.02 pure live seed/AC
Transitional Channel	0.17	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1B
Valley County, Idaho

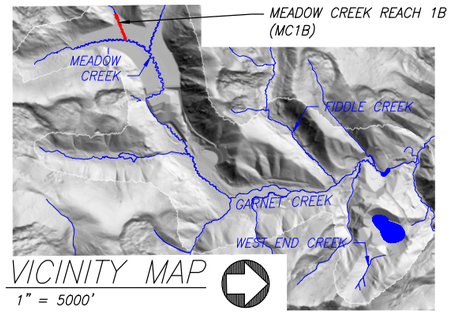
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1B Quantities

Drawing No.
MC1B–3

LOCATION: R:\PROJECTS\SF_SALMON_JAC\GIS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC1B_HANGAR\LATEST\F_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP

1" = 5000'

SURFACE WATER DIVERSION ABANDONED FOLLOWING TSF AND TSF BUTTRESS CLOSURE

TSF LIMITS

STREAM CORRIDOR LIMITS & FLOODPLAIN LIMITS COINCIDENT IN THIS AREA

MAXIMUM DISTURBANCE LIMITS

FLOODPLAIN WIDTH

EXISTING PEM WETLAND, TYP

PROPOSED NON-FLOODPLAIN WETLAND

PROPOSED MEADOW CREEK CHANNEL ALIGNMENT MC1B

EXISTING MEADOW CREEK CHANNEL ALIGNMENT MC1B

MEADOW CREEK EXISTING ALIGNMENT

TRANSITIONAL CHANNEL

EXISTING MEADOW CREEK TRIBUTARY CHANNEL ALIGNMENT

TSF

MATCHLINE SHEET MC1D-4
MATCHLINE SHEET MC1A-7

FLOW

7400 7375 7350 7325 7300 7275 7250 7225 7200 7175 7100 7125 7150 7175 7200 7225 7250 7075

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF AND TSF BUTTRESS IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, DRSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

MEADOW CREEK REACH 1B – RESTORATION REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1B
Valley County, Idaho

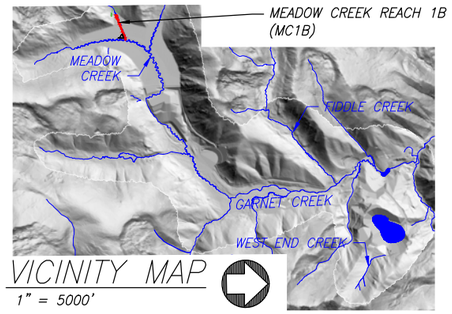
Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
MC1B Wetland Overview Sheet

Drawing No.
MC1B-4

LOCATION: C:\USERS\NICK.STRYKER\DESKTOP\20a-FILES\NICK\DRES\HEY_BIO\20201201\BIO_MXD\AS_STREAM_RESTORATION_LAYOUT_ERWMETLANDSHEETS\20200904\PRODUCTION\MC1B_WETLANDS.DWG PLOT DATE: 1/4/2021



VICINITY MAP

1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF AND TSF BUTTRESS IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, DRSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

MEADOW CREEK REACH 1B – RESTORATION REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1B
Valley County, Idaho

Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

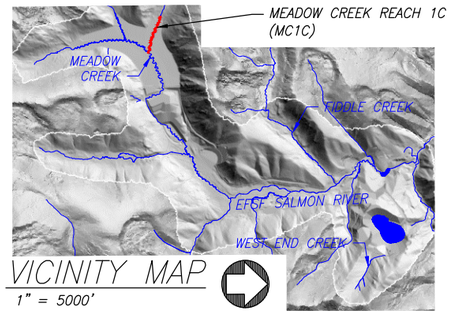
Drawing Name
MC1B Wetland Planting Sheet

Drawing No.
MC1B–5

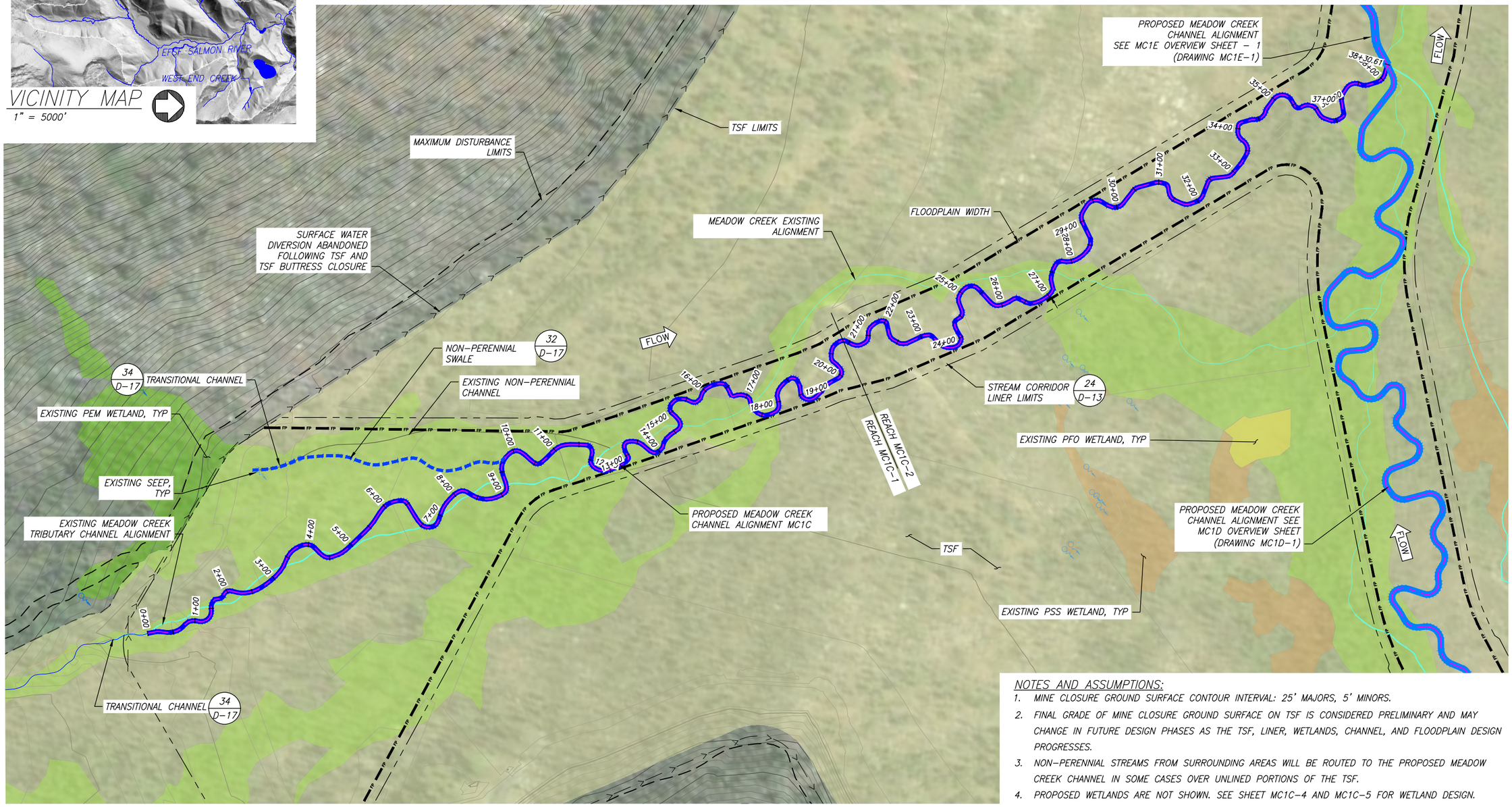
LOCATION: C:\USERS\NICK.STRYKER\DESKTOP\20a-FILES\NICK\DRES\HEY\190925\01\190-MP0AS_STREAM_RESTORATION_LAYOUT_ERWMET_ANDSHEETS\20200909\PRODUCTION\MC1B_WETLANDS.DWG PLOT DATE: 3/1/2021

MC1C PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC1C-1	1,481	2,094	1.4	1.79	1.26
MC1C-2	1,190	1,736	1.5	0.45	0.31

MC1C PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC1C	4,376	515



VICINITY MAP
1" = 5000'



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEET MC1C-4 AND MC1C-5 FOR WETLAND DESIGN.

MEADOW CREEK REACH 1C – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

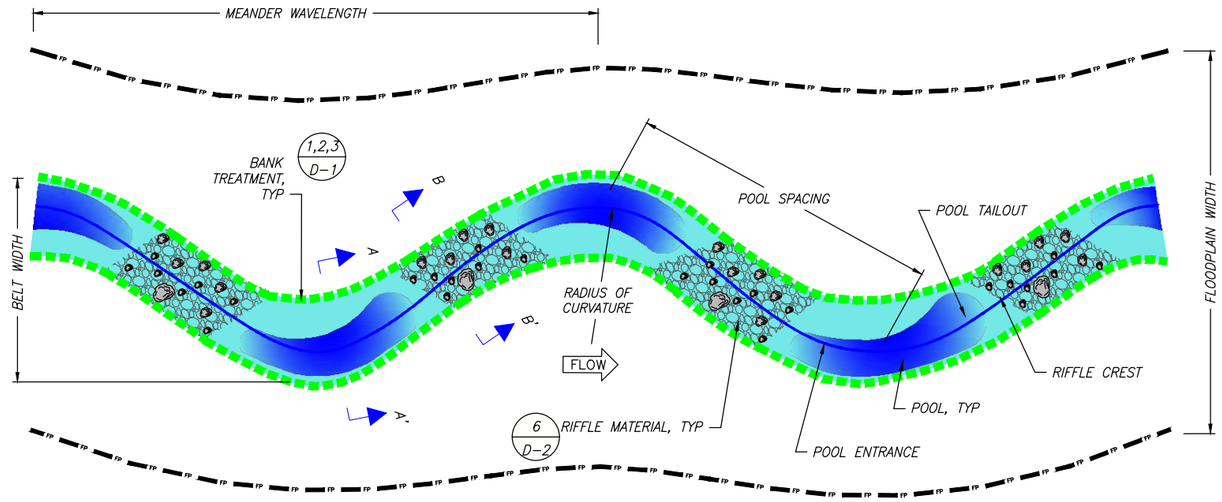
Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1C
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

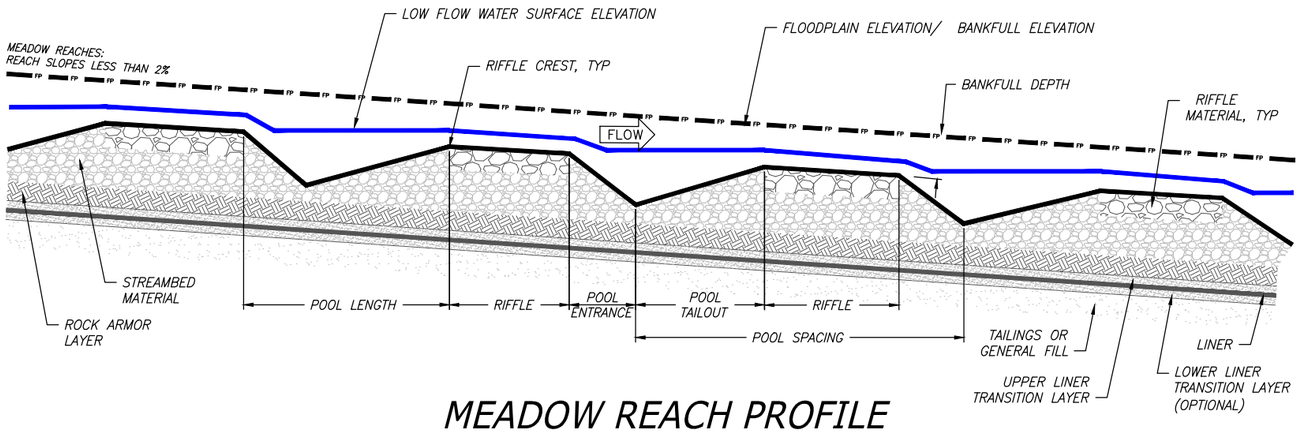
Drawing Name
MC1C Overview Sheet

Drawing No.
MC1C-1



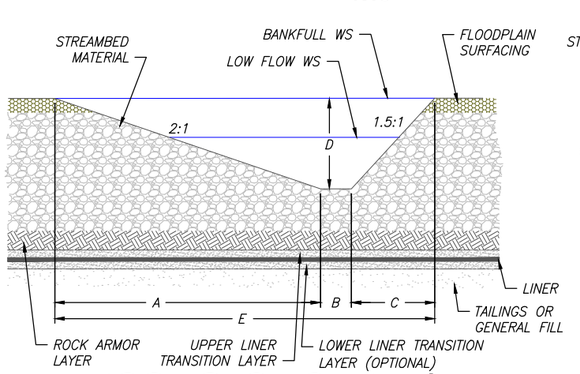
MEADOW REACH PLAN VIEW

NTS



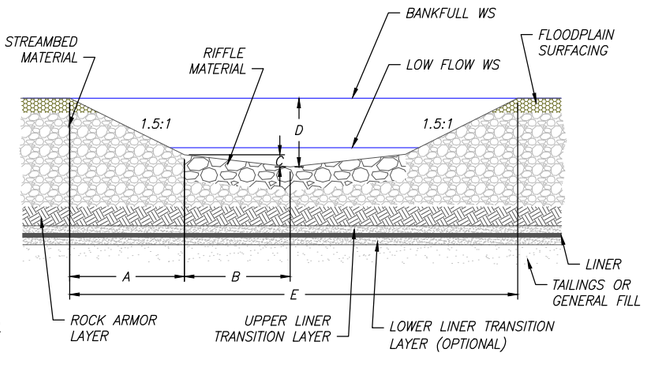
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC1C – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC1C-1	30	8	8	1.0	80 - 105	40 - 80	10 - 50	35 - 105	100
MC1C-2	30	9	8	1.2	90 - 115	45 - 105	10 - 50	35 - 115	130

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC1C-1	15 - 95	10 - 20	38 - 45	19 - 45
MC1C-2	15 - 105	10 - 20	41 - 45	20 - 49

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC1C-1								
MC1C-2								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
MC1C-1 POOL SECTION A - A'	5.0	0.4	3.8	2.5	9.1
MC1C-1 RIFFLE SECTION B - B'	1.9	2.4	0.2	1.5	8.3
MC1C-2 POOL SECTION A - A'	6.0	0.6	4.5	3.0	11.1
MC1C-2 RIFFLE SECTION B - B'	2.2	2.5	0.3	1.7	9.2

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1C
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1C Typical Plan and Profile

Drawing No.
MC1C-2

LOCATION: R:\PROJECTS\SF_SALMON_JHJ\GIS\STIBNITE_RESTORATION_MPJAS\CAD\PRODUCTION\MC1C_JHANDRPLA\TSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	369	CY	Transition channel construction
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	4,756	CY	3830 LF of new channel; 2.875 FT streambed thickness;
Sorting and Stockpiling [3]	18,917	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	14,161	CY	6" thick layer over the liner area
Ephemeral Swale Channel Material [3]	48	CY	515 LF of new channel; 0.5 FT gravel thickness; 5 FT top width;
General Fill	78,422	CY	Fill outside channel width; above liner
Filter Material	28,322	CY	12" thickness within Liner Area over TSF
Topsoil/ Growth Media [3]	27,049	CY	12" thickness within Liner Area
Liner	764,683	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	Assume $5/linear foot cost
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	3,830	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	7,660	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	7,660	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	2,553	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	15,320	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	1,149	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	2,298	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	322	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	2,241	LF	channel
Brushlayer Live Cuttings	4,482	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	314	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	80	EA	2 per channel meander wave length
Riffle Material	64	CY	No. of riffles x 8.3 FT length x 4.15 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	20	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	60	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	40	CY	2 CY per structure
Racking Material	40	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	70	EA	1 per 55 linear feet of new channel
Log with Rootwad	70	EA	1 per structure
Retaining Log	70	EA	1 per structure
Tight Radius Jam Structure	7	EA	1 every 6 channel meander wave lengths
Foundation Logs	46	EA	3 per structure
Log with Rootwad	40	EA	3 per structure
Small Woody Debris	86	CY	7 CY per structure
Racking Material	93	EA	7 per structure
Bend Jam Structure	10	EA	1 every 4 channel meander wave lengths
Foundation Logs	20	EA	2 per structure
Log with Rootwad	30	EA	3 per structure
Whole Tree	20	EA	1 per structure
Small Woody Debris	129	CY	13 CY per structure
Racking Material	149	EA	15 per structure
Sweeper Log Structure	7	EA	1 every 6 channel meander wave lengths
Whole Tree	7	EA	1 per structure
Small Woody Debris	20	CY	3 CY per structure
Racking Material	20	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	10	EA	1 every 4 channel meander wave lengths
Log with Rootwad	40	EA	4 per structure
Small Woody Debris	30	CY	3 CY per structure
Racking Material	30	EA	3 per structure
Turning Log Structure	7	EA	1 every 6 channel meander wave lengths
Log with Rootwad	27	EA	4 per structure
Small Woody Debris	20	CY	3 CY per structure
Racking Material	20	EA	3 per structure
Boulders	13	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	3,267	EA	10890 plants per acre, intended for anually wet areas
Zone 2	23,408	EA	4840 plants per acre
Zone 3	19,608	EA	3825 plants per acre
Zone 4	37,510	EA	4840 plants per acre
Transitional Channel	2,159	EA	4784 plants per acre
Seeding			
Zone 2	4.84	AC	3.12 pure live seed/AC
Zone 3	5.13	AC	3.56 pure live seed/AC
Zone 4	7.75	AC	19.02 pure live seed/AC
Transitional Channel	0.45	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1C
Valley County, Idaho

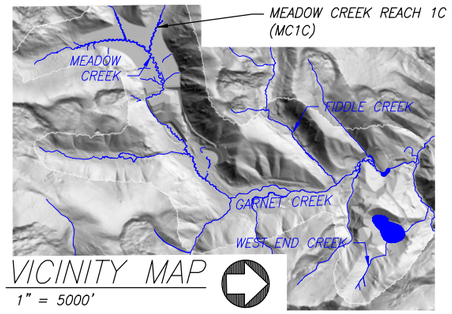
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1C Quantities

Drawing No.
MC1C-3

LOCATION: K:\PROJECTS\SF_SALMON_JH\GIS\STIBNITE_RESTORATION_MPIA\CAD\PRODUCTION\MC1C_HANGAR\LATEST\SF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP

1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

0 200 400 Feet

MEADOW CREEK REACH 1C – RESTORATION REACH WETLAND OVERVIEW SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1C
Valley County, Idaho

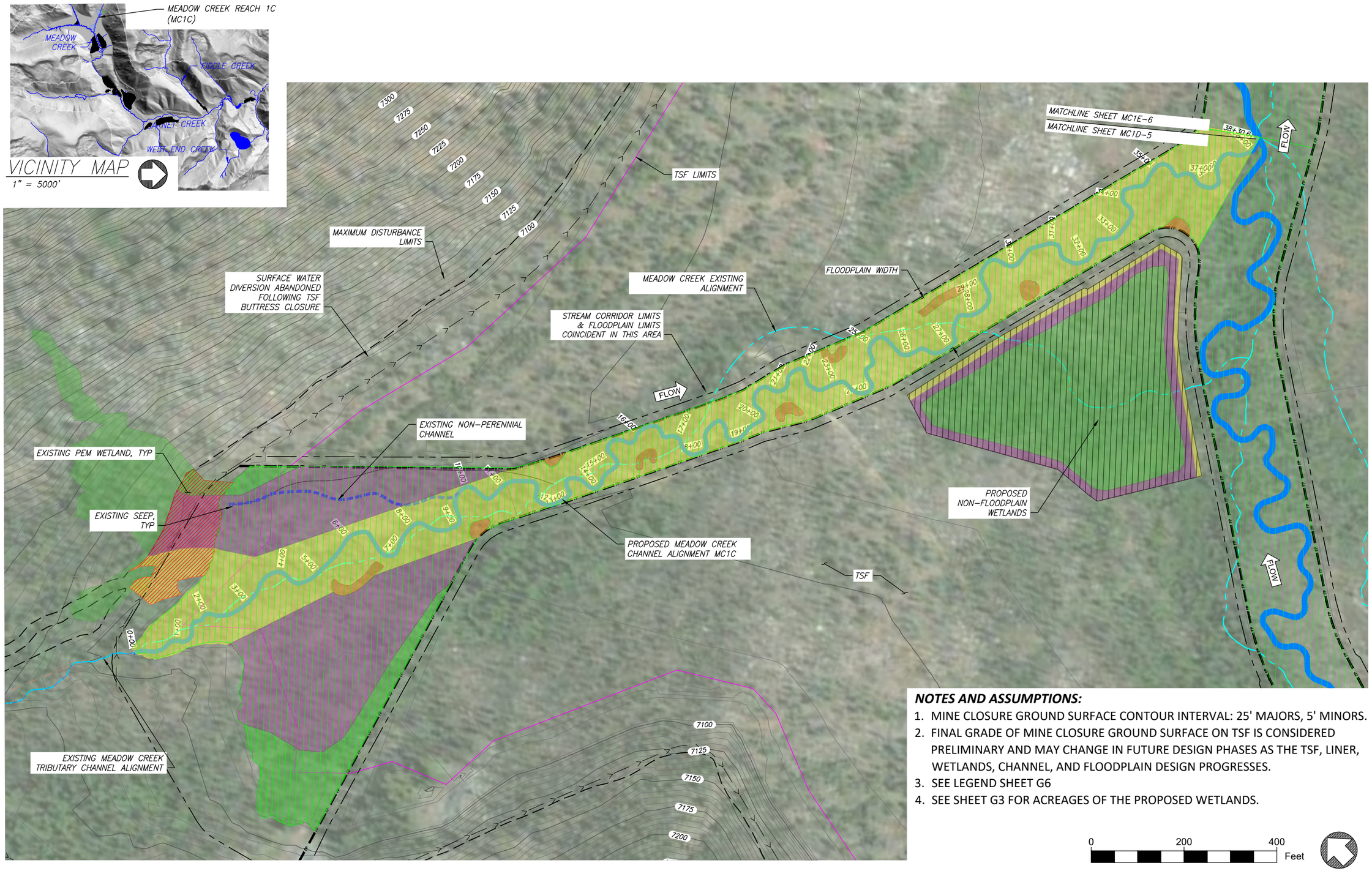
Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
MC1C Wetland Overview Sheet

Drawing No.
MC1C-4

LOCATION: C:\USERS\BROX.STRIKER\DESKTOP\09-FI\EXCHG\BROX\EVKO\810092020\810092020_RIO-MEWS_STREAM_RESTORATIONLAYOUT_FISHWETLANDSHEETS\20200908\PRODUCTION\MC1C_WETLANDS.DWG PLOT DATE: 3/4/2021



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MEADOW CREEK REACH 1C – RESTORATION REACH WETLAND OVERVIEW SHEET

TETRA TECH

Perpetua Resources

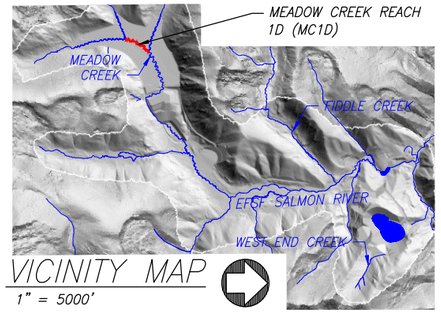
Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1C
Valley County, Idaho

Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
MC1C Wetland Planting Sheet

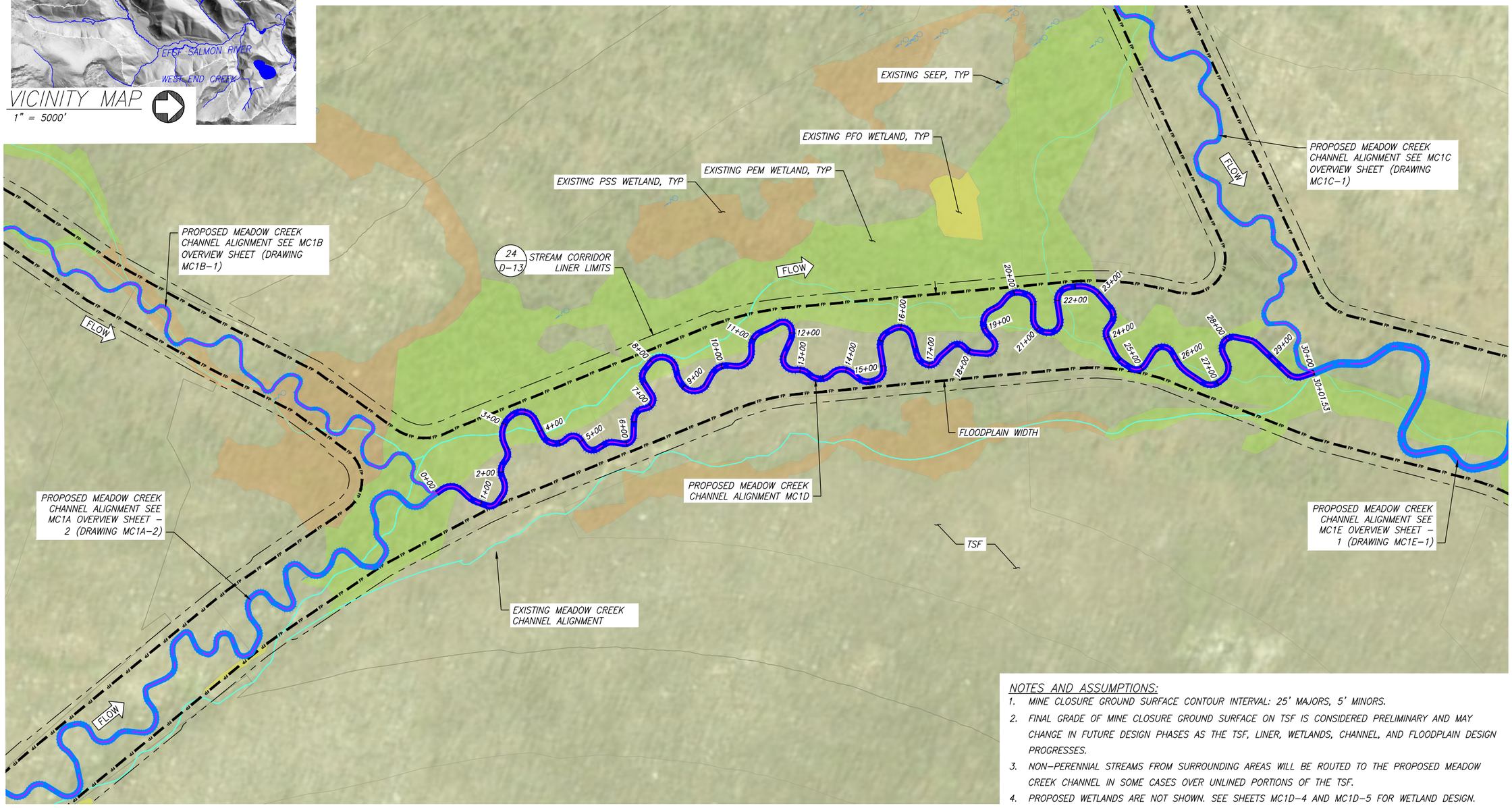
Drawing No.
MC1C-5



VICINITY MAP
1" = 5000'

MC1D PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC1D	1,790	3,002	1.7	0.30	0.18

MC1D PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC1D	3,002	0



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEETS MC1D-4 AND MC1D-5 FOR WETLAND DESIGN.

MEADOW CREEK REACH 1D – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

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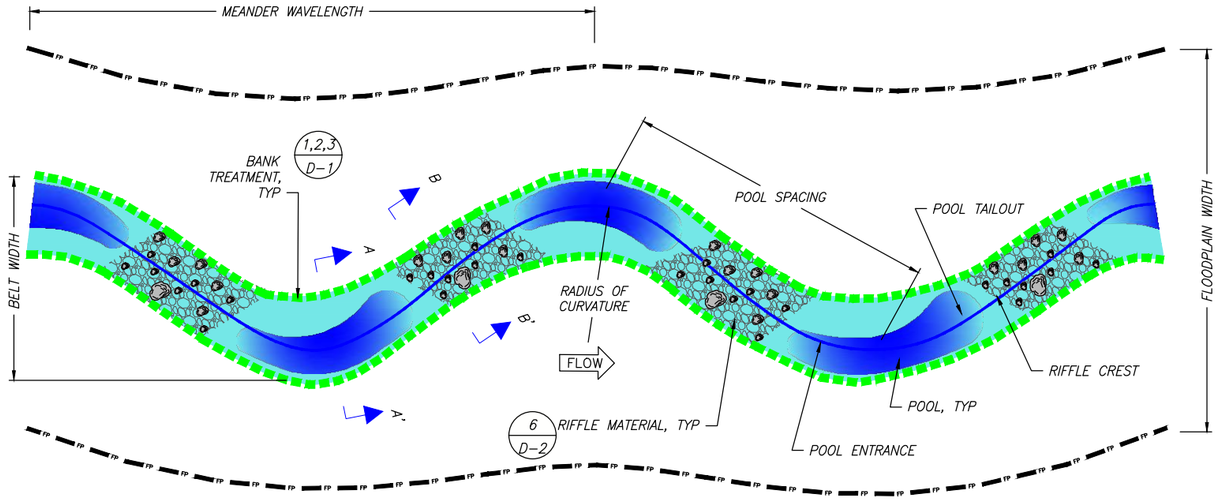
Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1D
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

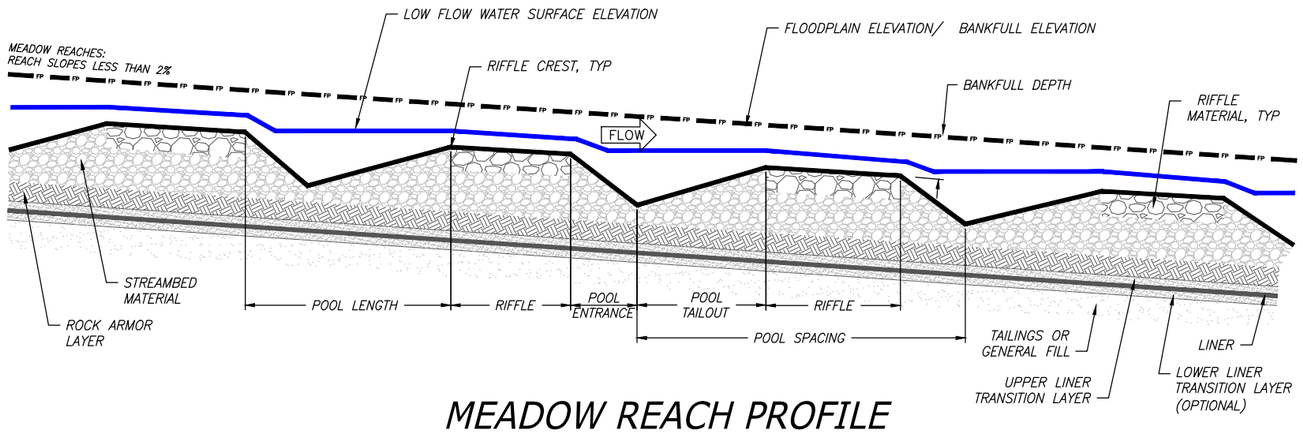
Drawing Name
MC1D Overview Sheet

Drawing No.
MC1D-1



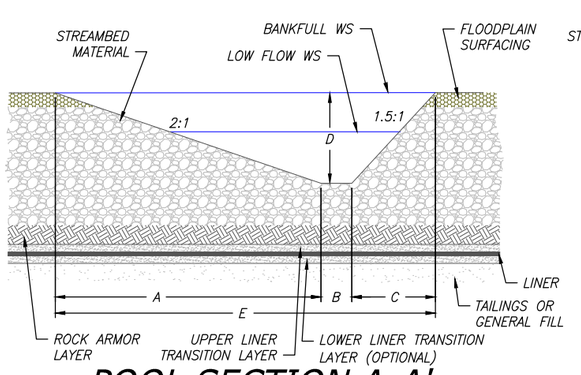
MEADOW REACH PLAN VIEW

NTS



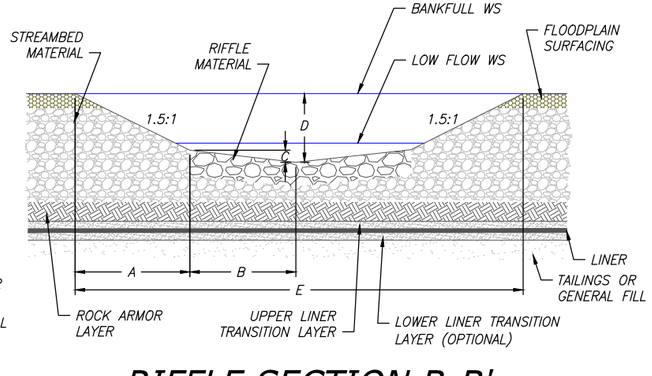
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC1D – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE

REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC1D	44	12	8	1.4	110 - 145	55 - 135	15 - 70	45 - 145	170

PROFILE TABLE

REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC1D	20 - 130	10 - 30	38 - 45	19 - 46

MATERIALS TABLE

REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC1D								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE

SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	7.0	0.4	5.3	3.5	12.7
RIFFLE SECTION B - B'	2.7	3.1	0.3	2.1	11.5

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1D
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1D Typical Plan and Profile

Drawing No.
MC1D-2

LOCATION: R:\PROJECTS\SF_SALMON_RIVER\STIBNITE_RESTORATION_MDMAS\CAD\PRODUCTION\MC1D_HANGARFLATS.TSF -CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	Transition channel construction
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	5,254	CY	3002 LF of new channel; 3.5 FT streambed thickness;
Sorting and Stockpiling [3]	12,040	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	6,787	CY	6" thick layer over the liner area
Ephemeral Swale Channel Material	0	CY	
General Fill	47,173	CY	Fill outside channel width; above liner
Filter Material	13,574	CY	12" thickness within Liner Area over TSF
Topsoil/ Growth Media [3]	12,295	CY	12" thickness within Liner Area
Liner	366,496	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	Assume $5/linear foot cost
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	3,002	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	6,004	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	6,004	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	2,001	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	12,008	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	901	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	1,801	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	252	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	901	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	1,801	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	126	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	47	EA	2 per channel meander wave length
Riffle Material	21	CY	No. of riffles x 11.5 FT length x 5.75 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	12	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	35	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	24	CY	2 CY per structure
Racking Material	24	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	55	EA	1 per 55 linear feet of new channel
Log with Rootwad	55	EA	1 per structure
Retaining Log	55	EA	1 per structure
Tight Radius Jam Structure	4	EA	1 every 6 channel meander wave lengths
Foundation Logs	27	EA	3 per structure
Log with Rootwad	24	EA	3 per structure
Small Woody Debris	51	CY	7 CY per structure
Racking Material	55	EA	7 per structure
Bend Jam Structure	6	EA	1 every 4 channel meander wave lengths
Foundation Logs	12	EA	2 per structure
Log with Rootwad	18	EA	3 per structure
Whole Tree	12	EA	1 per structure
Small Woody Debris	77	CY	13 CY per structure
Racking Material	88	EA	15 per structure
Sweeper Log Structure	4	EA	1 every 6 channel meander wave lengths
Whole Tree	4	EA	1 per structure
Small Woody Debris	12	CY	3 CY per structure
Racking Material	12	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	6	EA	1 every 4 channel meander wave lengths
Log with Rootwad	24	EA	4 per structure
Small Woody Debris	18	CY	3 CY per structure
Racking Material	18	EA	3 per structure
Turning Log Structure	4	EA	1 every 6 channel meander wave lengths
Log with Rootwad	16	EA	4 per structure
Small Woody Debris	12	CY	3 CY per structure
Racking Material	12	EA	3 per structure
Boulders	8	EA	2 per structure
Backwater Alcove	3	EA	No. varies by reach
Log with Rootwad	30	EA	10 per Alcove
Oxbow Backwater Alcove	1	EA	No. varies by reach
Log with Rootwad	25	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	3,376	EA	10890 plants per acre, intended for anually wet areas
Zone 2	667	EA	4840 plants per acre
Zone 3	2,325	EA	3825 plants per acre
Zone 4	29,088	EA	4840 plants per acre
Transitional Channel	0.00	EA	4784 plants per acre
Seeding			
Zone 2	0.14	AC	3.12 pure live seed/AC
Zone 3	0.61	AC	3.56 pure live seed/AC
Zone 4	6.01	AC	19.02 pure live seed/AC
Transitional Channel	0.00	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1D
Valley County, Idaho

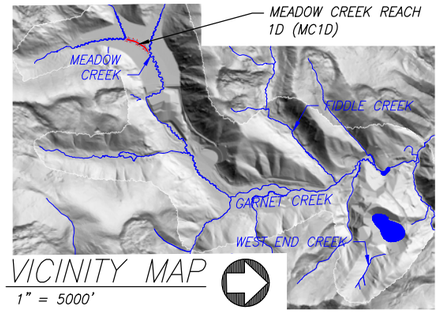
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1D Quantities

Drawing No.
MC1D-3

LOCATION: R:\PROJECTS\SF_SALMON_JAC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC1D_HANGARFLATSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP

1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MEADOW CREEK REACH 1D – RESTORATION REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1D
Valley County, Idaho

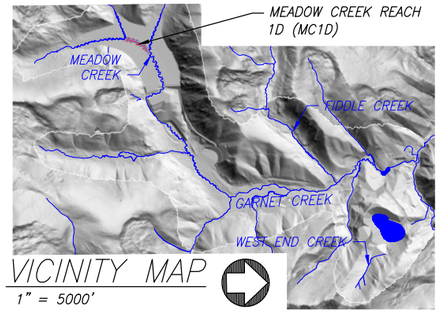
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
MC1D Wetland Overview Sheet

Drawing No.
MC1D-4

LOCATION: C:\USERS\BROX.STRIKER\DESKTOP\09-FILEXCHG\BROX\GIS\2020\RIO-MEMS_STREAM_RESTORATION\LAYOUT_FRAMES\MXDS\PRODUCTION\MC1D_WETLANDS.DWG PLOT DATE: 3/4/2021



VICINITY MAP

1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MEADOW CREEK REACH 1D – RESTORATION REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1D
Valley County, Idaho

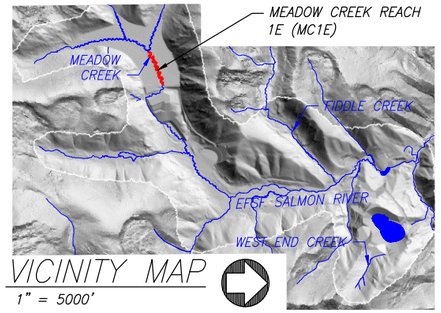
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	---

Drawing Name
MC1D Wetland Planting Sheet

Drawing No.
MC1D–5

LOCATION: C:\USERS\RICK.STRIKER\DESKTOP\09-FLEXHO\BEFORE\MEDIUM\20200220\BIG_MEDIA\5_STREAM_RESTORATION\LAYOUT_FORMETLANDS\SHEETS\20200924\PRODUCTION\MC1D_WETLANDS.DWG PLOT DATE: 3/4/2021



VICINITY MAP
1" = 5000'

MC1E PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC1E	2,330	4,164	1.8	0.23	0.13

MC1E PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC1E	4,164	6,963

MATCHLINE SHEET MC1E-2

FLOODPLAIN WIDTH

FLOW

PROPOSED MEADOW CREEK CHANNEL ALIGNMENT MC1E

PROPOSED MEADOW CREEK CHANNEL ALIGNMENT SEE MC2 OVERVIEW SHEET (DRAWING MC2-1)

24 D-13 STREAM CORRIDOR LINER LIMITS

EXISTING PSS WETLAND, TYP

EXISTING PEM WETLAND, TYP

EXISTING MEADOW CREEK CHANNEL ALIGNMENT

32 D-17 NON-PERENNIAL SWALE

EXISTING PFO WETLAND, TYP

PROPOSED MEADOW CREEK TRIBUTARY CHANNEL ALIGNMENT SEE MC1C OVERVIEW SHEET (DRAWING MC1C-1)

EXISTING NON-PERENNIAL CHANNEL, TYP

PROPOSED MEADOW CREEK CHANNEL ALIGNMENT SEE MC1D OVERVIEW SHEET (DRAWING MC1D-1)

TSF

TAILINGS STORAGE FACILITY (TSF)

TSF DAM AND TSF BUTTRESS

MAXIMUM DISTURBANCE LIMITS

SURFACE WATER DIVERSION ABANDONED FOLLOWING TSF AND TSF BUTTRESS CLOSURE

TSF LIMIT

28 D-15

NOTES AND ASSUMPTIONS:

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2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGNS PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEETS MC1E-5 AND MC1E-6 FOR WETLAND DESIGN.

MEADOW CREEK REACH 1E – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1E
Valley County, Idaho

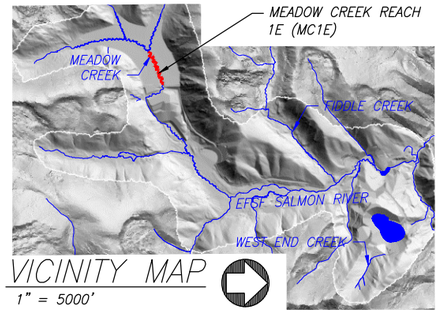
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1E Overview Sheet – 1

Drawing No.
MC1E-1

LOCATION: R:\PROJECTS\SF_SALMON_JAI\GIS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MXTE_HANGAR\LAYTSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP

1" = 5000'

MC1E PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC1E	2,330	4,164	1.8	0.23	0.13

MC1A PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC1E	4,164	6,963

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
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3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEETS MC1E-5 AND MC1E-6 FOR WETLAND DESIGN.

MEADOW CREEK REACH 1E – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1E
Valley County, Idaho

Applied Science & Engineering

Perpetua Resources

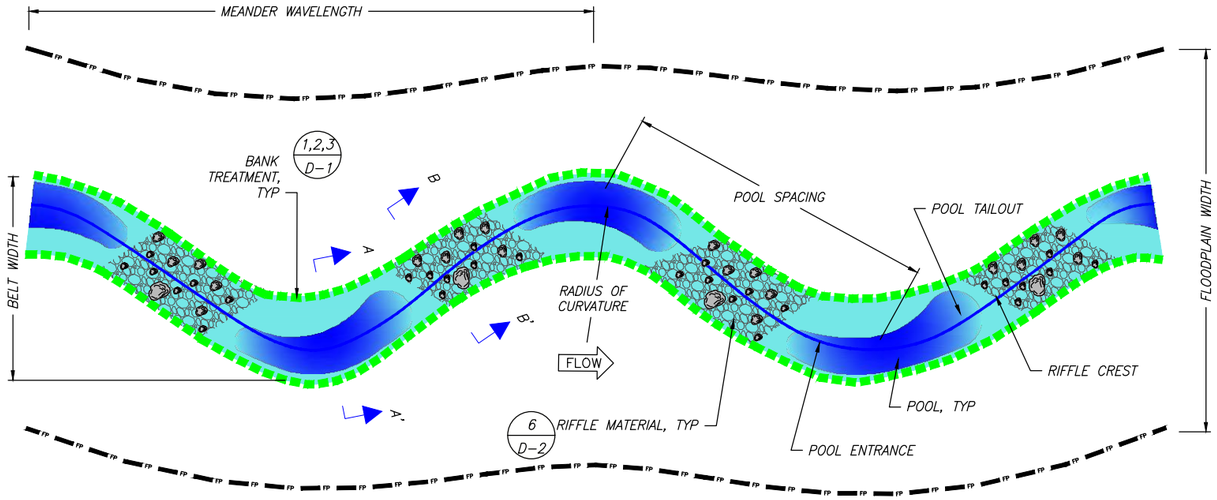
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1E Overview Sheet – 2

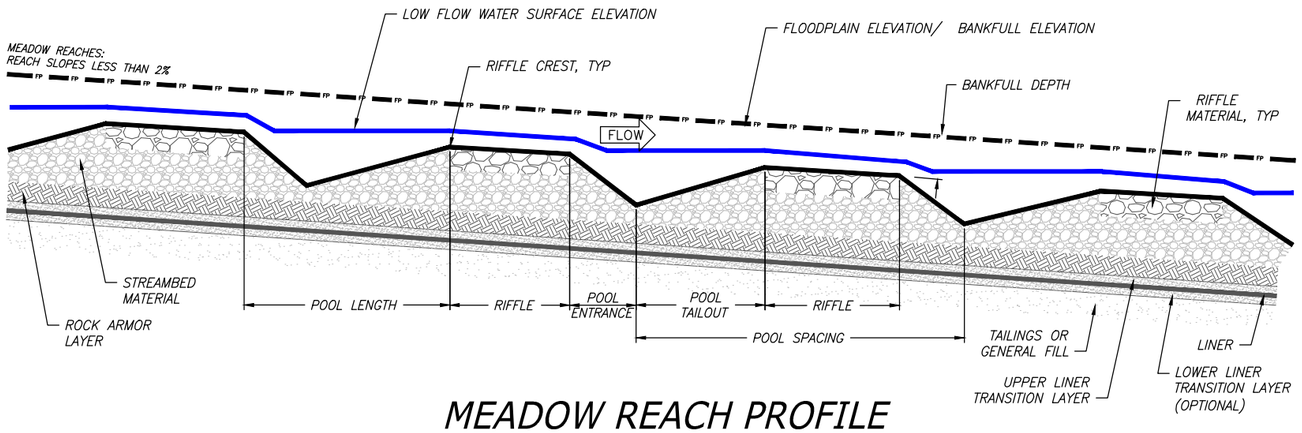
Drawing No.
MC1E-2

LOCATION: R:\PROJECTS\SF_SALMON_AU\09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC1E_HANDARLATSTSF_CONCEPTDESIGN.DWG PLOT DATE:3/3/2021



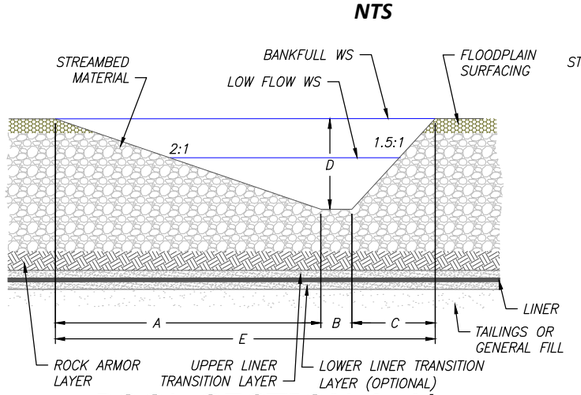
MEADOW REACH PLAN VIEW

NTS



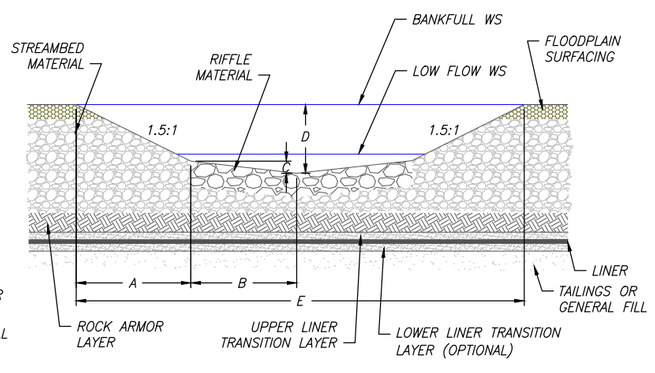
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC1E – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC1E	67	15	9	1.8	150 - 190	80 - 195	25 - 90	60 - 190	250

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC1E	25 - 175	15 - 35	37 - 45	18 - 44

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC1E								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	9.0	1.2	6.8	4.5	16.9
RIFFLE SECTION B - B'	3.3	2.2	0.2	2.4	15.4

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1E
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1E Typical Plan and Profile

Drawing No.
MC1E-3

LOCATION: R:\PROJECTS\SF_SALMON_JAIG90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MXTF_HANGARLATSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	Transition channel construction
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	12,076	CY	4164 LF of new channel; 4.5 FT streambed thickness;
Sorting and Stockpiling [3]	24,489	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	12,413	CY	6" thick layer over the liner area
Ephemeral Swale Channel Material [3]	645	CY	6963 LF of new channel; 0.5 FT gravel thickness; 5 FT top width;
General Fill	118,250	CY	Fill outside channel width; above liner
Filter Material	24,827	CY	12" thickness within Liner Area over TSF
Topsoil/ Growth Media [3]	21,162	CY	12" thickness within Liner Area
Liner	670,319	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	Assume $5/linear foot cost
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	4,164	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	8,328	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	8,328	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	2,776	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	16,656	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	1,249	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	2,498	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	350	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	1,249	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	2,498	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	175	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	49	EA	2 per channel meander wave length
Riffle Material	35	CY	No. of riffles x 15.4 FT length x 7.7 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	12	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	37	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	24	CY	2 CY per structure
Racking Material	24	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	76	EA	1 per 55 linear feet of new channel
Log with Rootwad	76	EA	1 per structure
Retaining Log	76	EA	1 per structure
Tight Radius Jam Structure	4	EA	1 every 6 channel meander wave lengths
Foundation Logs	28	EA	3 per structure
Log with Rootwad	24	EA	3 per structure
Small Woody Debris	53	CY	7 CY per structure
Racking Material	57	EA	7 per structure
Bend Jam Structure	8	EA	1 every 3 channel meander wave lengths
Foundation Logs	16	EA	2 per structure
Log with Rootwad	24	EA	3 per structure
Whole Tree	16	EA	1 per structure
Small Woody Debris	106	CY	13 CY per structure
Racking Material	122	EA	15 per structure
Sweeper Log Structure	4	EA	1 every 6 channel meander wave lengths
Whole Tree	4	EA	1 per structure
Small Woody Debris	12	CY	3 CY per structure
Racking Material	12	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	8	EA	1 every 3 channel meander wave lengths
Log with Rootwad	32	EA	4 per structure
Small Woody Debris	24	CY	3 CY per structure
Racking Material	24	EA	3 per structure
Turning Log Structure	4	EA	1 every 6 channel meander wave lengths
Log with Rootwad	16	EA	4 per structure
Small Woody Debris	12	CY	3 CY per structure
Racking Material	12	EA	3 per structure
Boulders	8	EA	2 per structure
Backwater Alcove	4	EA	No. varies by reach
Log with Rootwad	40	EA	10 per Alcove
Oxbow Backwater Alcove	2	EA	No. varies by reach
Log with Rootwad	50	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	5,336	EA	10890 plants per acre, intended for anually wet areas
Zone 2	925	EA	4840 plants per acre
Zone 3	4,556	EA	3825 plants per acre
Zone 4	57,983	EA	4840 plants per acre
Transitional Channel	0.00	EA	4784 plants per acre
Seeding			
Zone 2	0.19	AC	3.12 pure live seed/AC
Zone 3	1.19	AC	3.56 pure live seed/AC
Zone 4	11.98	AC	19.02 pure live seed/AC
Transitional Channel	0.00	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1E
Valley County, Idaho

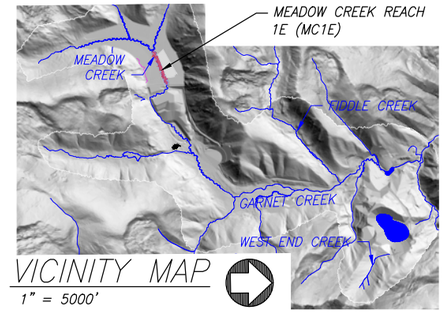
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC1E Quantities

Drawing No.
MC1E-4

LOCATION: R:\PROJECTS\SF_SALMON_JAC\90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MXTF_HANGARLATSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

FLOODPLAIN WIDTH
PROPOSED MEADOW CREEK CHANNEL ALIGNMENT MC1E
MATCHLINE SHEET MC2-4
FLOW
FLOW
FLOW
STREAM CORRIDOR LINER LIMITS
EXISTING MEADOW CREEK CHANNEL ALIGNMENT
MATCHLINE SHEET MC1C-4
MATCHLINE SHEET MC1D-4
NON-PERENNIAL SWALE
TAILINGS STORAGE FACILITY (TSF)
TSF BUTTRESS
NON-PERENNIAL SWALE
TSF
EXISTING NON-PERENNIAL CHANNEL, TYP
MAXIMUM DISTURBANCE LIMITS
TSF LIMIT
SURFACE WATER DIVERSION ABANDONED FOLLOWING TSF AND TSF BUTTRESS CLOSURE
7075
7100
7125
7150

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

0 200 400 Feet

MEADOW CREEK REACH 1E – RESTORATION REACH WETLAND OVERVIEW SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1E
Valley County, Idaho

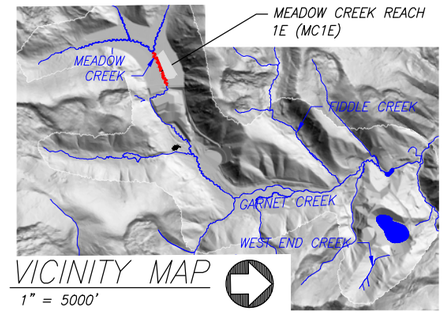
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	---

Drawing Name
MC1E Wetland Overview Sheet

Drawing No.
MC1E-5

LOCATION: C:\USERS\RICK.STRICKER\DESKTOP\09-FLEXHO-BEFS\MEDIUM\09000200\BIG-MEDIA\5_STREAM_RESTORATION\LAYOUT_FORMET_LANDSHEETS\20200624\PRODUCTION\MC1E_WETLANDS.DWG PLOT DATE: 3/4/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

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3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

0 200 400 Feet

MEADOW CREEK REACH 1E – RESTORATION REACH WETLAND PLANTING SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - TSF - Reach MC1E
Valley County, Idaho

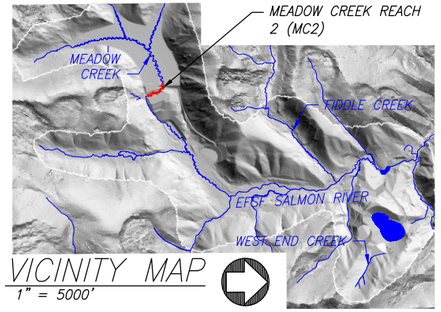
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
MC1E Wetland Planting Sheet

Drawing No.
MC1E-6

LOCATION= C:\USERS\BRCK_STR\WORK\VISION\TOPOS\EXCHG\BRCKEVCH\BG0920220\RO-MDWS_STREAM_RESTORATION\LAYOUT_FIGURES_AND\SHEETS\20200908\PRODUCTION\MCTF_WETLANDS.DWG PLOT DATE: 1/7/2021



VICINITY MAP
1" = 5000'

MC2 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC2	1,404	1,839	1.3	2.60	1.98

MC2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC2	1,839	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF AND TSF BUTTRESS IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, TSF BUTTRESS, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEETS MC2–4 AND MC2–5 FOR WETLAND DESIGN.

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MEADOW CREEK REACH 2 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hanger Flats DRSF
Valley County, Idaho

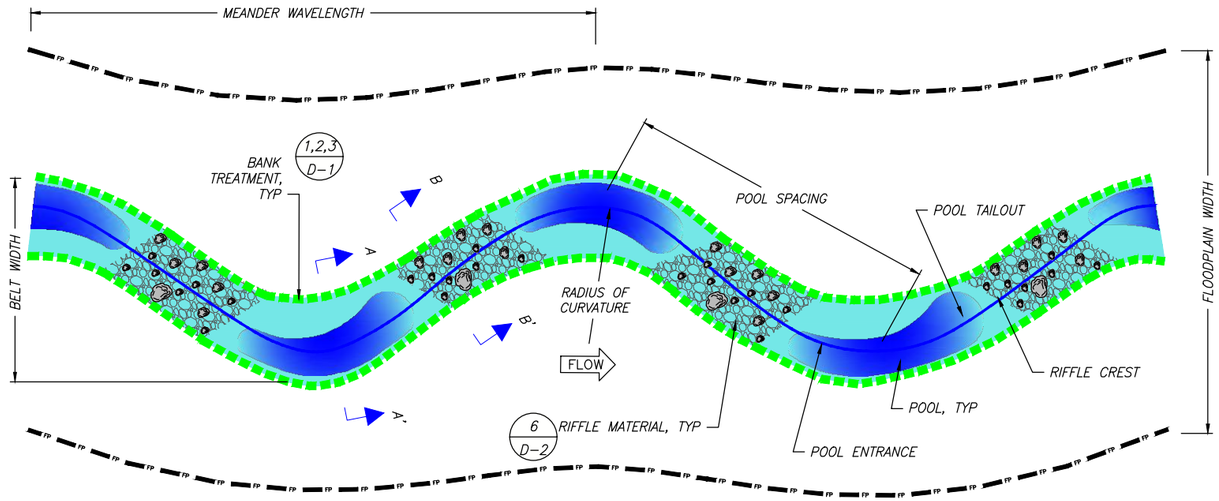
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC2 Overview Sheet

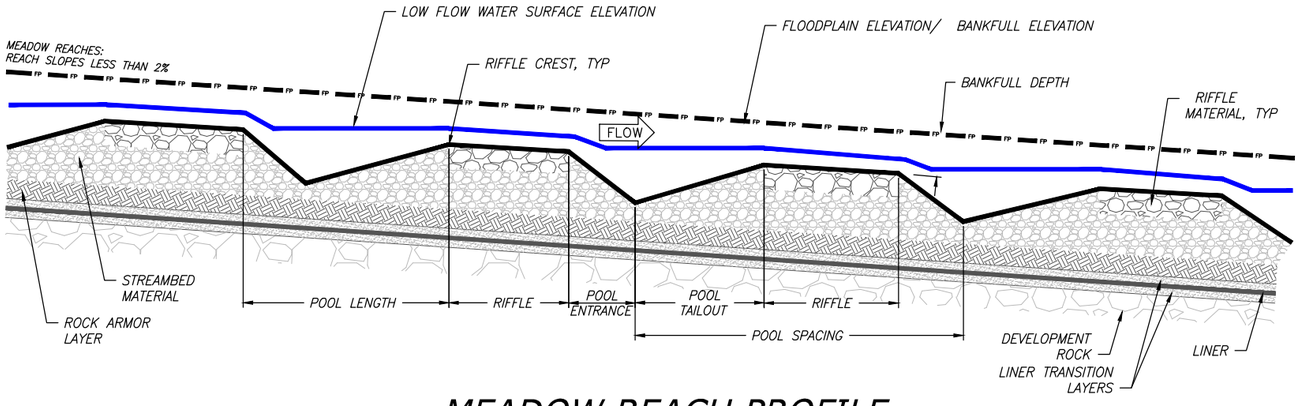
Drawing No.
MC2–1

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC2_HANGARFLATSDRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



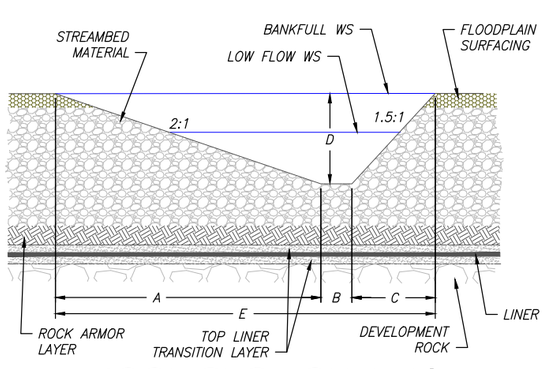
MEADOW REACH PLAN VIEW

NTS



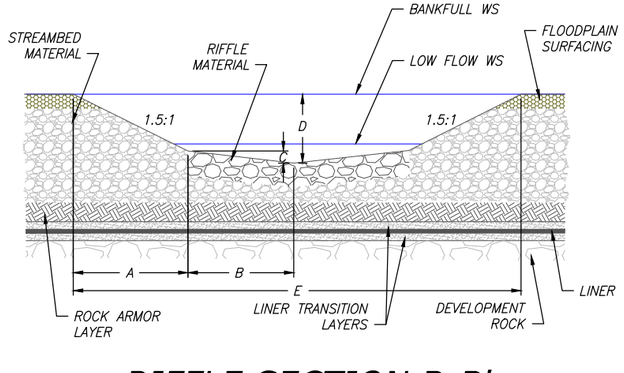
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D–1 AND D–2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D–3 THROUGH D–10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D–1 AND D–21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D–13 THROUGH D–14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC2 – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLANT TABLE

REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC2	84	14	10	1.4	130 - 170	70 - 135	20 - 80	55 - 170	170

PROFILE TABLE

REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC2	20 - 155	15 - 30	32 - 45	16 - 39

MATERIALS TABLE

REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC2								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE

SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	7.0	2.6	5.3	3.5	14.9
RIFFLE SECTION B - B'	2.3	4.7	0.5	2.0	13.5

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Stibnite Gold Project
ModPRO2
Meadow Creek - Hanger Flats DRSF - Reach MC2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC2 Typical Plan and Profile

Drawing No.
MC2–2

LOCATION: R:\PROJECTS\SF_SALMON_AU\OPS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC2_HANGARFLATSDRSF_CONCEPTDESIGN.DWG PLOT DATE: 1/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	3,695	CY	1839 LF of new channel; 3.5 FT streambed thickness;
Sorting and Stockpiling [3]	9,424	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	5,729	CY	(1) grade control structure; floodplain width x 30' x max scour depth
Ephemeral Swale Channel Material	0	CY	
General Fill	32,341	CY	Fill outside channel width; above liner
Filter Material	18,669	CY	2 FT thickness within Liner Area
Topsoil/ Growth Media [3]	8,415	CY	12" thickness within Liner Area
Liner	252,027	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	1,839	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	3,678	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	3,678	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	1,226	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	7,356	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	552	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	1,103	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	154	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	552	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	1,103	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	77	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	25	EA	2 per channel meander wave length
Riffle Material	161	CY	No. of riffles x 13.5 FT length x 6.75 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	2	EA	1 every 6 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	6	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	4	CY	2 CY per structure
Racking Material	4	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	31	EA	1 per 60 linear feet of new channel
Log with Rootwad	31	EA	1 per structure
Retaining Log	31	EA	1 per structure
Tight Radius Jam Structure	2	EA	1 every 8 channel meander wave lengths
Foundation Logs	11	EA	3 per structure
Log with Rootwad	9	EA	3 per structure
Small Woody Debris	20	CY	7 CY per structure
Racking Material	21	EA	7 per structure
Bend Jam Structure	2	EA	1 every 8 channel meander wave lengths
Foundation Logs	3	EA	2 per structure
Log with Rootwad	5	EA	3 per structure
Whole Tree	3	EA	1 per structure
Small Woody Debris	20	CY	13 CY per structure
Racking Material	23	EA	15 per structure
Sweeper Log Structure	2	EA	1 every 8 channel meander wave lengths
Whole Tree	2	EA	1 per structure
Small Woody Debris	5	CY	3 CY per structure
Racking Material	5	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	2	EA	1 every 8 channel meander wave lengths
Log with Rootwad	6	EA	4 per structure
Small Woody Debris	5	CY	3 CY per structure
Racking Material	5	EA	3 per structure
Turning Log Structure	2	EA	1 every 6 channel meander wave lengths
Log with Rootwad	8	EA	4 per structure
Small Woody Debris	6	CY	3 CY per structure
Racking Material	6	EA	3 per structure
Boulders	4	EA	2 per structure
Backwater Alcove	4	EA	No. varies by reach
Log with Rootwad	40	EA	10 per Alcove
Oxbow Backwater Alcove	2	EA	No. varies by reach
Log with Rootwad	50	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	4,465	EA	10890 plants per acre, intended for anually wet areas
Zone 2	409	EA	4840 plants per acre
Zone 3	323	EA	3825 plants per acre
Zone 4	24,055	EA	4840 plants per acre
Transitional Channel	0.00	EA	4784 plants per acre
Seeding			
Zone 2	0.08	AC	3.12 pure live seed/AC
Zone 3	0.08	AC	3.56 pure live seed/AC
Zone 4	4.97	AC	19.02 pure live seed/AC
Transitional Channel	0.00	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hanger Flats DRSF - Reach MC2
Valley County, Idaho

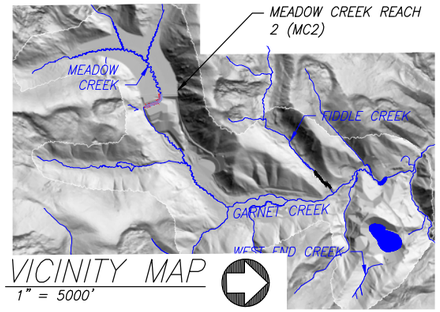
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC2 Quantities

Drawing No.
MC2-3

LOCATION: R:\PROJECTS\SF_SALMON_HUGH\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC2_HANGARFLATSDRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MEADOW CREEK REACH 2 – RESTORATION REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hanger Flats DRSF - Reach MC2
Valley County, Idaho

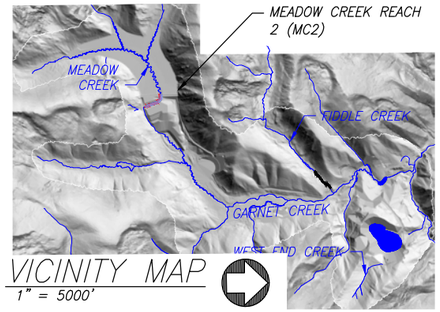
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
MC2 Wetland Overview Sheet

Drawing No.
MC2-4

LOCATION: C:\USERS\RICK.STREVER\DESKTOP\GIS-FILES\PROJECTS\2020\008\PRODUCTION\MC2_WETLANDS.DWG PLOT DATE: 3/1/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MEADOW CREEK REACH 2 – RESTORATION REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hanger Flats DRSF - Reach MC2
Valley County, Idaho

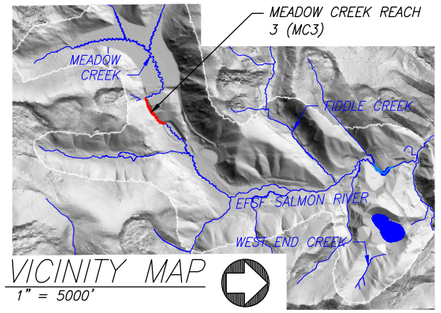
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	---

Drawing Name
MC2 Wetland Planting Sheet

Drawing No.
MC2-5

LOCATION: C:\USERS\RICK.STREWER\DESKTOP\09a-FILEXCHG\RSTREWER\EVFD\810092020\810-MDVS_STREAM_RESTORATION\LAYOUT FIGS\WETLAND\SHEETS\20200806_PRODUCTION\MC2_WETLANDS.DWG PLOT DATE: 3/1/2021



VICINITY MAP
1" = 5000'

MC3 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC3	2,399	2,399	1.0	17.77	17.77

MC3 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC3	2,880	0

EXISTING PFO WETLAND, TYP
TSF BUTTRESS
EXISTING PSS WETLAND, TYP
EXISTING SEEP, TYP
FLOW
PROPOSED MEADOW CREEK CHANNEL ALIGNMENT SEE MC2 OVERVIEW SHEET (DRAWING MC2-1)
31 D-16 ROCK GRADE CONTROL STRUCTURE
34 D-17 ROUTE PERENNIAL CHANNEL TO MC3 CHANNEL, TRANSITIONAL CHANNEL
FLOODPLAIN WIDTH
35 D-18 ENERGY DISSIPATION BASIN
PROPOSED MEADOW CREEK CHANNEL ALIGNMENT SEE MC4-1 - MC4 OVERVIEW SHEET (DRAWING MC4-1)
DOWNSTREAM EXTENT OF STREAM CORRIDOR LINER
SURFACE WATER DIVERSION ABANDONED FOLLOWING TSF AND TSF BUTTRESS CLOSURE
PROPOSED MEADOW CREEK CHANNEL ALIGNMENT MC3
STREAM CORRIDOR LINER LIMITS 24 D-13
LINED RIPRAP CHUTE 29 D-16
STREAM CORRIDOR ROUGH GRADING DURING MINE OPERATIONS VIA SELECTIVE PLACEMENT OF ROCK IN FINAL LIFT OF TSF BUTTRESS
MAXIMUM DISTURBANCE LIMITS
TSF BUTTRESS LIMITS

NOTES AND ASSUMPTIONS:
1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF AND TSF BUTTRESS IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, TSF BUTTRESS, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL IN SOME CASES OVER UNLINED PORTIONS OF THE TSF.

MEADOW CREEK REACH 3 - RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hanger Flats DRSF - Reach MC3
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC3 Overview Sheet

Drawing No.
MC3-1

LOCATION: R:\PROJECTS\SF_SALMON_HUSKY\STIBNITE_RESTORATION_MDA\CAD\PRODUCTION\MC3_HANGARFLATSDRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	5,567	CY	2399 LF of new channel; 3.5 FT streambed thickness;
Sorting and Stockpiling [3]	8,402	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	2,836	CY	(2) grade control structures; floodplain width x 30' x max scour depth
Perennial Swale Channel Material	45	CY	481 LF of new channel; 0.5 FT gravel thickness;
General Fill	10,510	CY	Fill outside channel width; above liner
Filter Material	17,023	CY	4 FT thickness within Liner Area
Topsoil/ Growth Media	2,754	CY	12" thickness within Liner Area
Liner	114,903	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	2	EA	No. varies by reach
Boulders	159	EA	Based on bankfull width
Dissipation Pool Streambed Material	9	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris / Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	0	EA	None
Foundation Logs	0	EA	0 per structure
Log with Rootwad	0	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris / Slash	0	CY	2 CY per structure
Racking Material	0	EA	2 per structure

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Meadow Creek - Hanger Flats DRSF - Reach MC3
Valley County, Idaho

Draft

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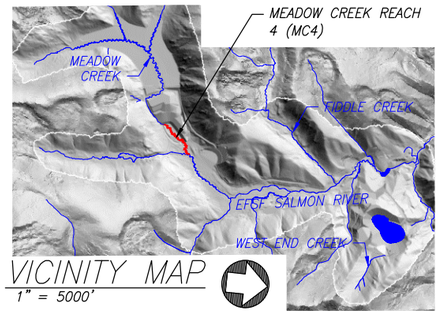
Checked: RR
Approved: --

Drawing Name
MC3 Quantities

Drawing No.
MC3-2



VICINITY MAP
1" = 5000'

MC4 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC4A	1,928	2,596	1.3	1.12	0.84
MC4B	656	908	1.4	1.52	1.10

MC4 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC4	3,504	587

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING DRSF AND HANGAR FLATS PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF BUTTRESS, HANGAR FLATS PIT, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEET MC4-4 FOR WETLAND DESIGN.

MEADOW CREEK REACH 4 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC4
Valley County, Idaho

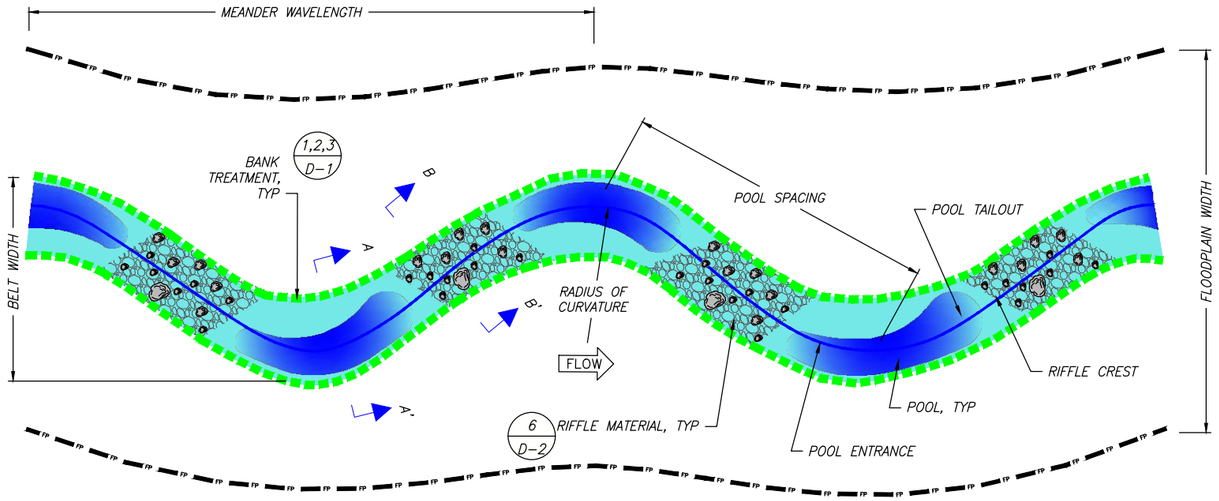
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC4 Overview Sheet

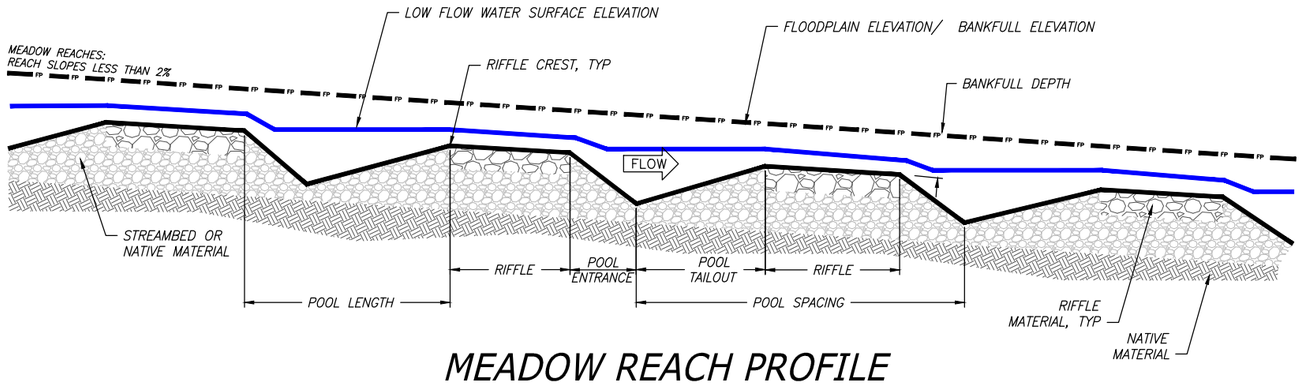
Drawing No.
MC4-1

LOCATION: R:\PROJECTS\SF_SALMON_JAI\GIS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC4_PRO_HANGARFLATSDRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/5/2021



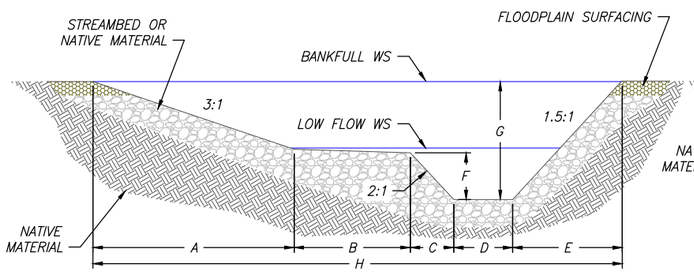
MEADOW REACH PLAN VIEW

NTS



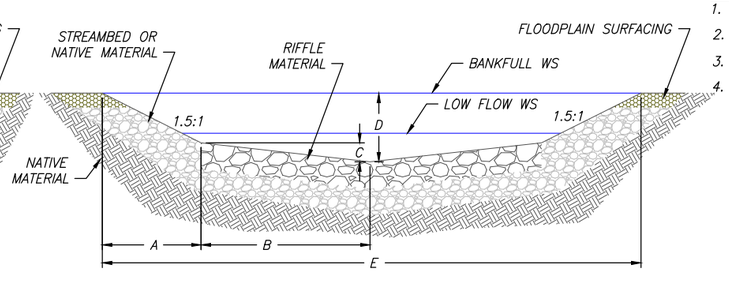
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC4 – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC4A	89	16	13	1.3	155 - 200	85 - 120	25 - 95	65 - 200	150
MC4B	89	16	13	1.3	155 - 200	85 - 120	25 - 95	65 - 200	120 - 240

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC4A	25 - 185	15 - 40	35 - 45	18 - 42
MC4B	25 - 185	15 - 40	35 - 45	18 - 42

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC4A								
MC4B								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

	SECTIONS TABLE								
	SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)	H (FT)
MC4A	POOL SECTION A - A'	3.4	0.0	6.8	8.9	6.8	3.4	4.6	25.9
MC4B		3.4	3.0	6.8	5.9	6.8	3.4	4.6	25.9
MC4A	RIFFLE SECTION B - B'	1.8	6.0	0.6	1.8	16.2			
MC4B		1.8	6.0	0.6	1.8	16.2			

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC4
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC4 Typical Plan and Profile

Drawing No.
MC4-2

LOCATION: R:\PROJECTS\SF_SALMON_JAI\09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC4_PRO_HANGARFLATSRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

LOCATION: R:\PROJECTS\SF_SALMON_JH\PDW\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC4_PRO_HANGARFLATSDRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

Applied Science & Engineering

Perpetua Resources

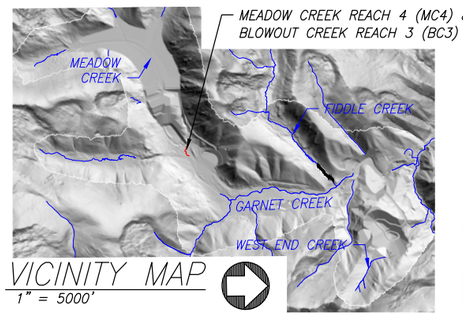
Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC4
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC4 Quantities

Drawing No.
MC4-3



VICINITY MAP
1" = 5000'

SURFACE WATER DIVERSION CHANNEL

MATCHLINE SHEET MC5-4

FLOODPLAIN WIDTH

PROPOSED MEADOW CREEK DIVERSION CHANNEL MC5

FLOW

PROPOSED MEADOW CREEK DIVERSION CHANNEL MC4D

EF MEADOW CREEK (BLOWOUT CREEK) BC3 EXISTING ALIGNMENT

MAXIMUM DISTURBANCE LIMITS

ENERGY DISSIPATION BASIN

PROPOSED EF MEADOW CREEK (BLOWOUT CREEK) BC2 CHANNEL ALIGNMENT

PROPOSED UNLINED FLOODPLAIN WETLANDS

EXISTING NON-PERENNIAL CHANNEL, TYP

FLOW

ENERGY DISSIPATION BASIN

MEADOW CREEK EXISTING ALIGNMENT & SURFACE WATER DIVERSION CHANNEL

6750 6725 6700 6675 6650 6625 6600 6575

MEADOW CREEK REACH 4 & BLOWOUT CREEK REACH 3 WETLAND OVERVIEW SHEET

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC4 & BC3
Valley County, Idaho

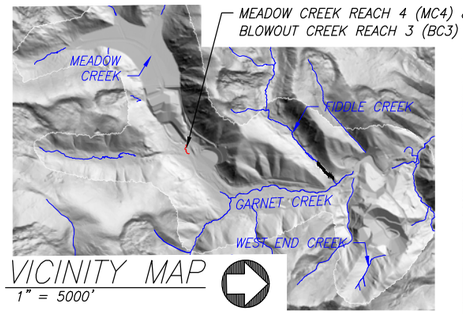
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	---

Drawing Name
MC4 & BC3 Wetland Overview Sheet

Drawing No.
MC4-4

LOCATION: C:\USERS\RICK.STRAYER\DESKTOP\09-FLEXHQ\RECFLVER\R0009220\R0_MXD\MC4_STREAM_RESTORATION\LAYOUT_EXHIBIT\LANDSAT\20200604\R0009220_MC4_BC3_WETLANDS.DWG PLOT DATE: 3/3/2021



MEADOW CREEK REACH 4 (MC4) & BLOWOUT CREEK REACH 3 (BC3)

VICINITY MAP
1" = 5000'

SURFACE WATER DIVERSION CHANNEL

MATCHLINE SHEET MC5-5

PROPOSED MEADOW CREEK DIVERSION CHANNEL MC5

FLOW

PROPOSED MEADOW CREEK DIVERSION CHANNEL MC4

PROPOSED EF MEADOW CREEK (BLOWOUT CREEK) BC3 EXISTING ALIGNMENT

MAXIMUM DISTURBANCE LIMITS

ENERGY DISSIPATION BASIN

NON-PERENNIAL CHANNEL

PROPOSED EF MEADOW CREEK (BLOWOUT CREEK) BC2 CHANNEL ALIGNMENT

ENERGY DISSIPATION BASIN

MEADOW CREEK EXISTING ALIGNMENT & SURFACE WATER DIVERSION CHANNEL

MEADOW CREEK REACH 4 & BLOWOUT CREEK REACH 3 WETLAND PLANTING SHEET

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC4 & BC3
Valley County, Idaho

Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

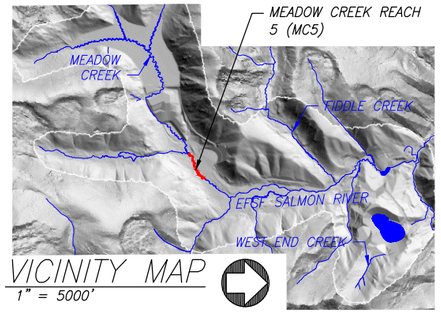
Drawing Name
MC4 & BC3 Wetland Planting Sheet

Drawing No.
MC4-5

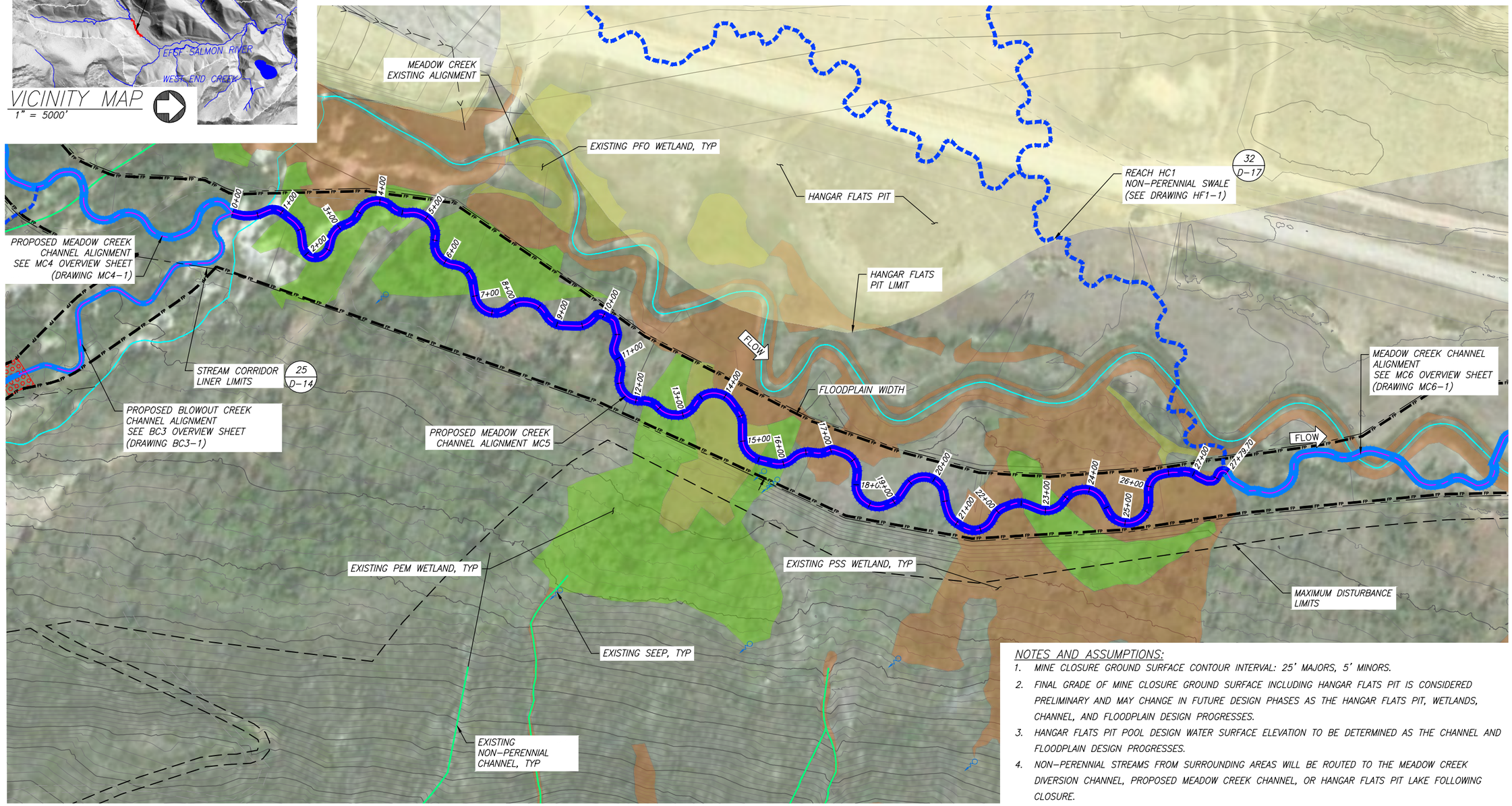
LOCATION: C:\USERS\BCK_STR\VER\DESKTOP\OB-PLEX\PACKAGES\EVE\1-BIO\0202\01-BIO-MITIAS_STREAM_RECTIFICATION\LAYOUT_FORMETS_MAPSHEETS\0202000\0202000\PRODUCTION\MC4_&_BC3_WETLANDS.DWG PLOT DATE: 3/3/2021

MC5 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC5	2,009	2,780	1.4	1.38	1.00

MC5 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC5	2,780	0



VICINITY MAP
1" = 5000'



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING HANGAR FLATS PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE HANGAR FLATS PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. HANGAR FLATS PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.
4. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE MEADOW CREEK DIVERSION CHANNEL, PROPOSED MEADOW CREEK CHANNEL, OR HANGAR FLATS PIT LAKE FOLLOWING CLOSURE.

MEADOW CREEK REACH 5 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

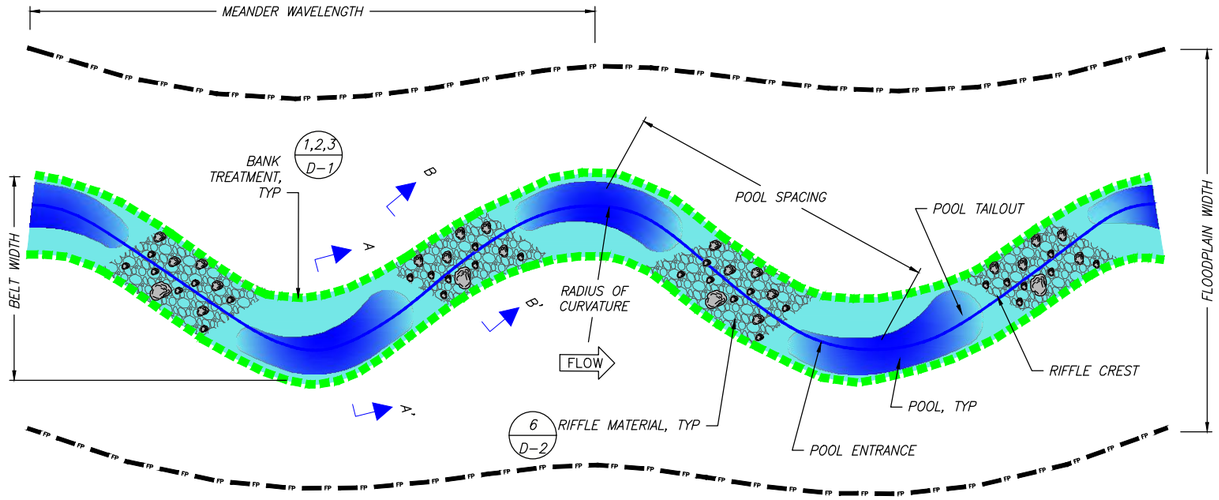
Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC5
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

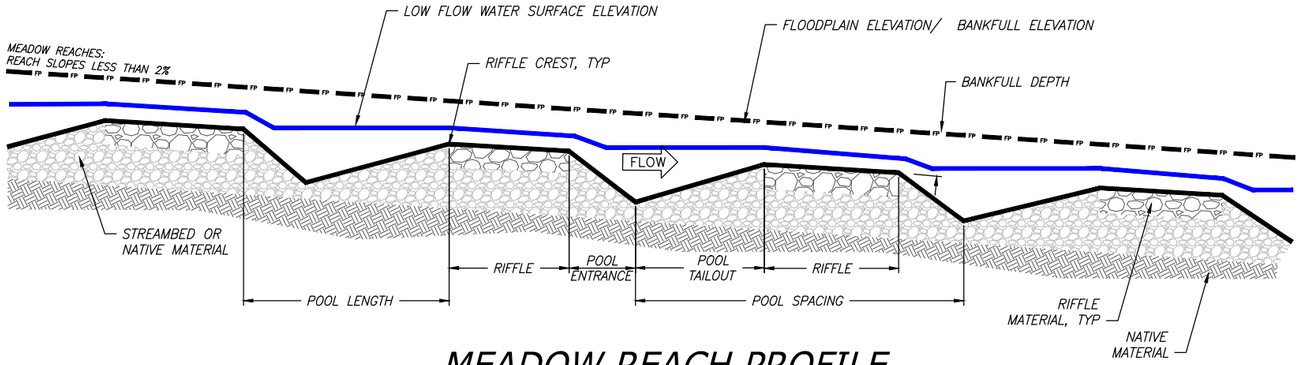
Drawing Name
MC5 Overview Sheet

Drawing No.
MC5-1



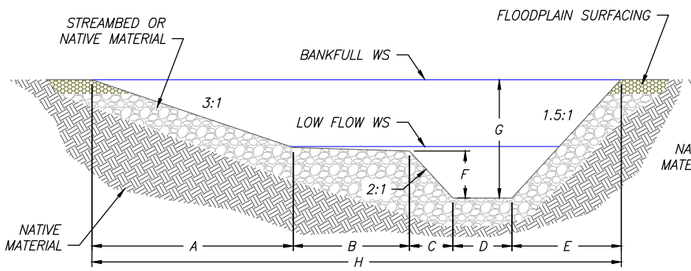
MEADOW REACH PLAN VIEW

NTS



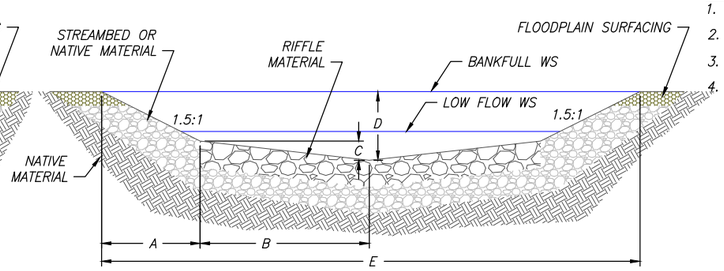
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC5 – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC5	108	16	10	1.5	150 - 195	80 - 150	25 - 95	60 - 195	150 - 150

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC5	25 - 180	15 - 35	42 - 45	21 - 51

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC5								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE								
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)	H (FT)
POOL SECTION A - A'	3.9	1.9	7.9	3.4	7.9	3.9	5.3	25.0
RIFFLE SECTION B - B'	2.4	6.0	0.6	2.2	15.6			

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC5
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC5 Typical Plan and Profile

Drawing No.
MC5–2

LOCATION: R:\PROJECTS\SF_SALMON_JH\09\STIBNITE_RESTORATION_MPJAS\CAD\PRODUCTION\MC5_PRO_HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

LOCATION: R:\PROJECTS\SF_SALMON_JH\PDW\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MC5_PRO_HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

Applied Science & Engineering

Perpetua Resources

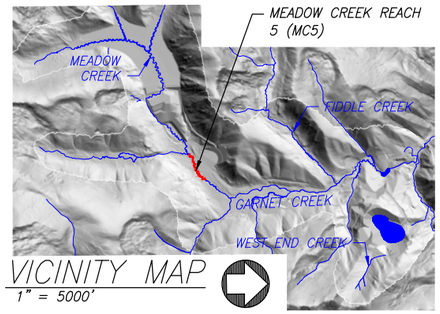
Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC5
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC5 Quantities

Drawing No.
MC5-3



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MEADOW CREEK REACH 5 – RESTORATION REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC5
Valley County, Idaho

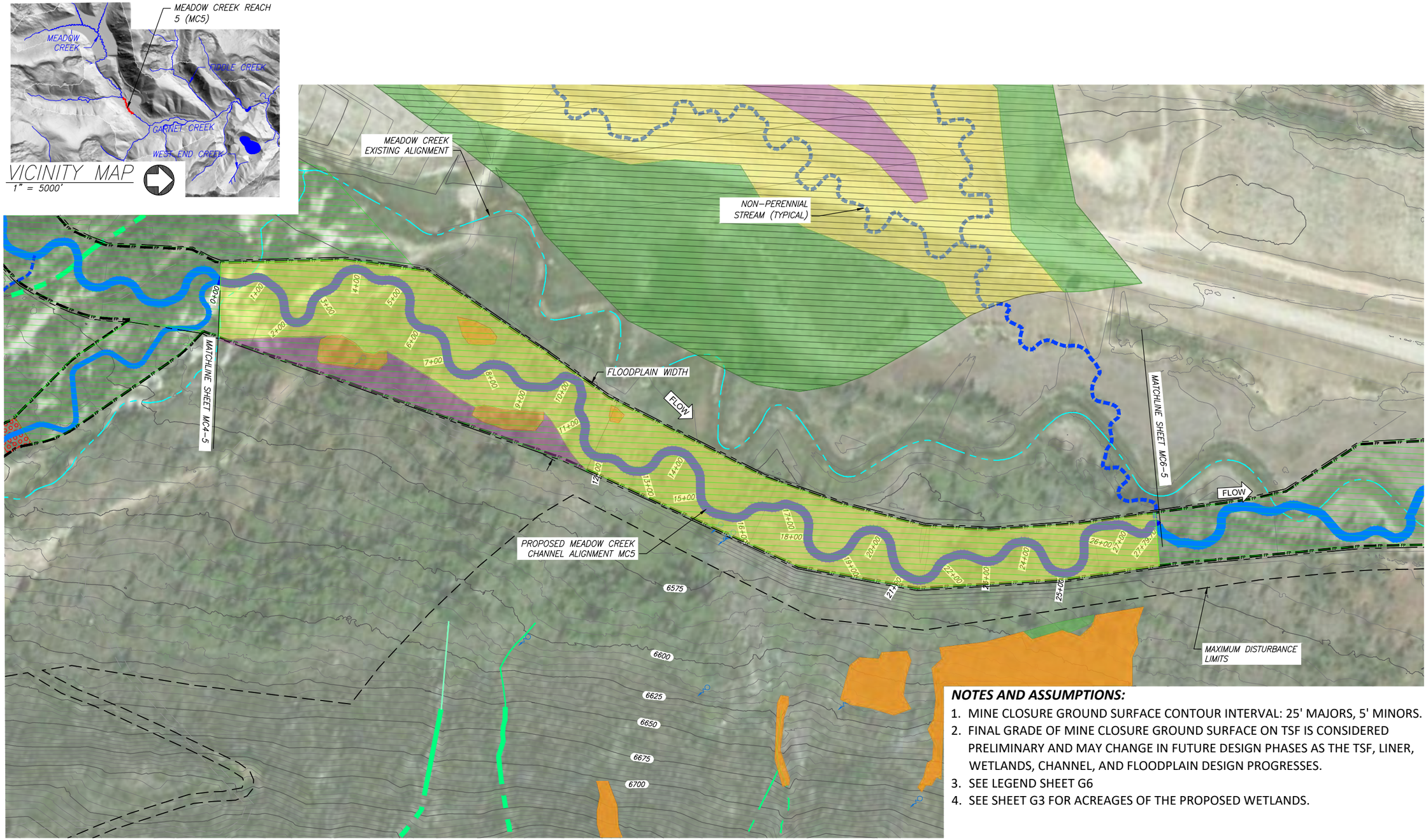
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
MC5 Wetland Overview Sheet

Drawing No.
MC5-4

LOCATION: C:\USERS\NICK.STRIKER\DESKTOP\09-FILE\NOVEMBER\REVISED\ROS\20201130\ROS_MEDIAS_STREAM_RESTORATION_LAYOUT_FORMATTED\MXDSHEETS\20200924\PRODUCTION\MC4_MET_MAPS.DWG PLOT DATE: 3/1/2021



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MEADOW CREEK REACH 5 – RESTORATION REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

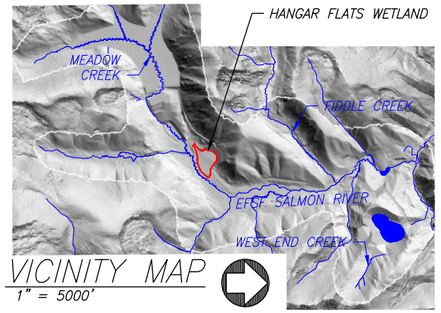
Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC5
Valley County, Idaho

Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
MC5 Wetland Planting Sheet

Drawing No.
MC5-5



VICINITY MAP
1" = 5000'

FLOW
TRANSITIONAL CHANNEL 34/D-17
HANGAR FLATS PIT
MAXIMUM DISTURBANCE LIMITS
32/D-17 REACH HF1 NON-PERENNIAL SWALE
EXISTING NON-PERENNIAL CHANNEL, TYP
ROUTE TERTIARY TREATMENT EFFLUENT TO HF1 CHANNEL, TRANSITIONAL CHANNEL
34/D-17
FLOW
32/D-17 REACH HF1 NON-PERENNIAL SWALE
FLOW
EXISTING PFO WETLAND, TYP
STREAM DIVERSION CHANNEL ABANDONED FOLLOWING CLOSURE OF TSF AND TSF BUTTRESS
PROPOSED MEADOW CREEK CHANNEL ALIGNMENT MC5
MEADOW CREEK CHANNEL ALIGNMENT SEE MC6 OVERVIEW SHEET (DRAWING MC6-1)
HANGAR FLATS PIT LIMIT
TSF BUTTRESS
MEADOW CREEK EXISTING ALIGNMENT
MEADOW CREEK CHANNEL ALIGNMENT SEE MC5 OVERVIEW SHEET (DRAWING MC5-1)
EXISTING PSS WETLAND, TYP
FLOODPLAIN WIDTH
FLOW
FLOW
EXISTING SEEP, TYP
MEADOW CREEK CHANNEL ALIGNMENT SEE MC4 OVERVIEW SHEET (DRAWING MC4-1)
FLOW
PROPOSED BLOWOUT CREEK CHANNEL ALIGNMENT SEE BC3 OVERVIEW SHEET (DRAWING BC3-1)
EXISTING PEM WETLAND, TYP

HANGAR FLATS PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
HF-1	0	11,155

HANGAR FLATS – RESTORATION REACH SITE OVERVIEW PLAN

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING HANGAR FLATS PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE HANGAR FLATS PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. HANGAR FLATS PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.
4. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE MEADOW CREEK DIVERSION CHANNEL, PROPOSED MEADOW CREEK CHANNEL, OR HANGAR FLATS PIT LAKE FOLLOWING CLOSURE.

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Hangar Flats Pit - Reach HF1-1
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
HF1 Overview Sheet

Drawing No.
HF1-1

LOCATION: R:\PROJECTS\SF_SALMON_HUC6\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of cost pre-tax, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water managment
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	1,033	CY	Channel ex including transitional channel and streambed material
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	0	CY	
Sorting and Stockpiling [3]	0	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	0	CY	6" thick layer over the liner area
Ephemeral Swale Channel Material [3]	1,033	CY	11155 LF of new channel;0.5 FT gravel thickness ; 5' SF XS
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	23,329	CY	12" thickness in Zone 4
Liner	0	SF	
Transitional Channels			
Abandon and Restore In Place	0	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	channel
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bank full width
Dissipation Pool Streambed Material	0	CY	Based on bank full width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	0	EA	None
Foundation Logs	0	EA	0 per structure
Log with Rootwad	0	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	0	CY	2 CY per structure
Racking Material	0	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	0	EA	None
Log with Rootwad	0	EA	1 per structure
Retaining Log	0	EA	1 per structure
Tight Radius Jam Structure	0	EA	None
Foundation Logs	0	EA	3 per structure
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	7 CY per structure
Racking Material	0	EA	7 per structure
Bend Jam Structure	0	EA	None
Foundation Logs	0	EA	2 per structure
Log with Rootwad	0	EA	3 per structure
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	13 CY per structure
Racking Material	0	EA	15 per structure
Sweeper Log Structure	0	EA	None
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Turning Log Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Boulders	0	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	96,994	EA	4840 plants per acre
Zone 3	9,754	EA	3825 plants per acre
Zone 4	69,986	EA	4840 plants per acre
Transitional Channel	0	EA	
Seeding			
Zone 2	20.04	AC	3.12 pure live seed/AC
Zone 3	2.55	AC	3.56 pure live seed/AC
Zone 4	14.46	AC	19.02 pure live seed/AC
Transitional Channel	0.00	AC	

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Hangar Flats Pit - Reach HF1-1
Valley County, Idaho

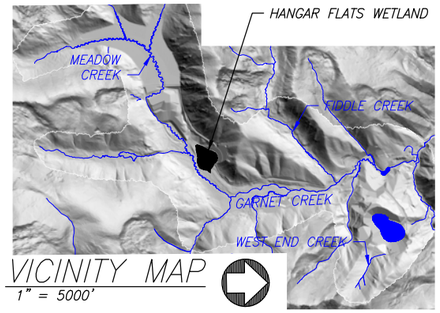
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
HF1 Quantities

Drawing No.
HF1–2

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

EXISTING NON–PERENNIAL CHANNEL, TYP

FLOW

HANGAR FLATS PIT

REACH HF1 NON–PERENNIAL SWALE

MAXIMUM DISTURBANCE LIMITS

6725
6700
6675
6650
6625
6600
6575
6550

REACH HF1 NON–PERENNIAL SWALE

EXISTING PFO WETLAND, TYP

MEADOW CREEK CHANNEL ALIGNMENT SEE MC6 OVERVIEW SHEET (DRAWING MC6–1)

MEADOW CREEK EXISTING ALIGNMENT

MEADOW CREEK CHANNEL ALIGNMENT SEE MC5 OVERVIEW SHEET (DRAWING MC5–1)

HANGAR FLATS PIT LIMIT

EXISTING PSS WETLAND, TYP

FLOODPLAIN WIDTH

EXISTING SEEP, TYP

MEADOW CREEK CHANNEL ALIGNMENT SEE MC4 OVERVIEW SHEET (DRAWING MC4–1)

PROPOSED BLOWOUT CREEK CHANNEL ALIGNMENT SEE BC3 OVERVIEW SHEET (DRAWING BC3–1)

EXISTING PEM WETLAND, TYP

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING HANGAR FLATS PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE HANGAR FLATS PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. HANGAR FLATS PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.
4. NON–PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE MEADOW CREEK DIVERSION CHANNEL, PROPOSED MEADOW CREEK CHANNEL, OR HANGAR FLATS PIT LAKE FOLLOWING CLOSURE.

0 200 400 Feet

HANGAR FLATS – RESTORATION REACH WETLANDS OVERVIEW SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Hangar Flats Pit - Reach HF1-1
Valley County, Idaho

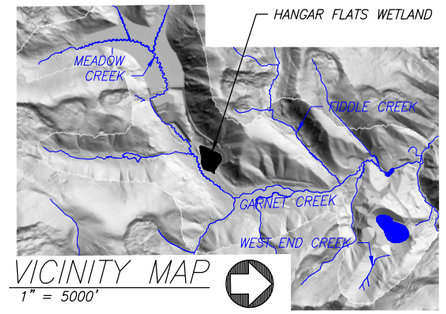
Draft

Date: Mar. 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
HF1 Wetlands Overview Sheet

Drawing No.
HF1–3

LOCATION: C:\USERS\BCK_STREWER\DESKTOP\OB-FLEX\ACAD\RECEIVED\800\02\01\800-MP04S_STREAM_RECTIFIER\LAYOUT_FORMET_MP04SHEETS\02\02\800\PLOT\HF1_WETLANDS.DWG PLOT DATE: 1/1/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING HANGAR FLATS PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE HANGAR FLATS PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. HANGAR FLATS PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.
4. NON–PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE MEADOW CREEK DIVERSION CHANNEL, PROPOSED MEADOW CREEK CHANNEL, OR HANGAR FLATS PIT LAKE FOLLOWING CLOSURE.

HANGAR FLATS – RESTORATION REACH WETLANDS PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Hangar Flats Pit - Reach HF1-1
Valley County, Idaho

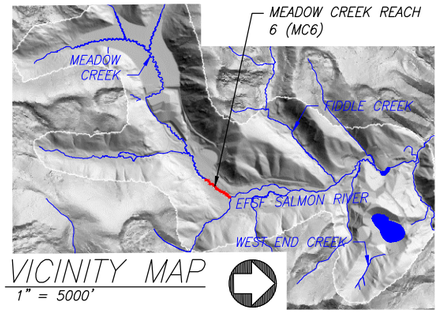
Draft

Date: Mar. 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
HF1 Wetlands Planting Sheet

Drawing No.
HF1–4

LOCATION: C:\USERS\RICK.STRAWSER\DESKTOP\09–FILE FACHCURFES\HF1\BRO\09092021\BRO–MEP&S_STREAM_RESTORATION_LAYOUT_ENHMET_ANDSHEETS20200908\PRODUCTION\HF1_WETLANDS.DWG PLOT DATE: 1/1/2021



VICINITY MAP
1" = 5000'

MC6 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MC6A	1,242	1,590	1.3	1.96	1.53
MC6B	829	924	1.1	2.75	2.46

MC6 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MC6	2,514	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. REACH MC6B IS AN ENHANCEMENT-ONLY REACH CONSISTING OF HABITAT ENHANCEMENT BY MEANS OF INDIVIDUAL HABITAT LOGS AND BOULDERS (NOT SHOWN) DISTRIBUTED THROUGHOUT REACH (KEYED IN, ANCHORED, OR BRACED) TO MEET HABITAT AND LARGE WOODY DEBRIS LOADING OBJECTIVES.
3. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
4. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING HANGAR FLATS PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE HANGAR FLATS PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
5. HANGAR FLATS PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.
6. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE EXISTING MEADOW CREEK CHANNEL.

MEADOW CREEK REACH 6 - ENHANCEMENT REACH SITE OVERVIEW PLAN

0 200 400 Feet

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Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC6
Valley County, Idaho

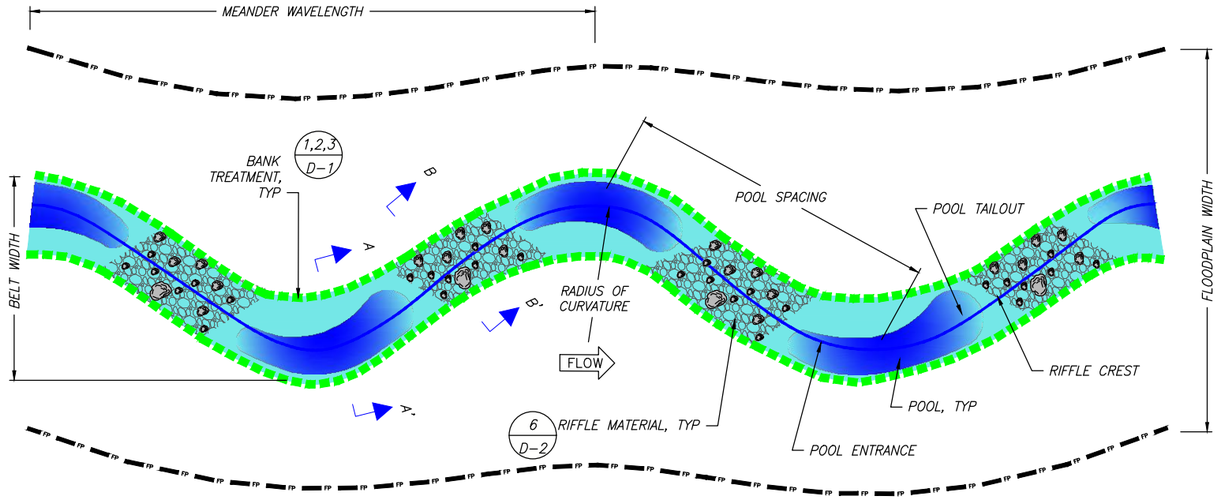
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC6 Overview Sheet

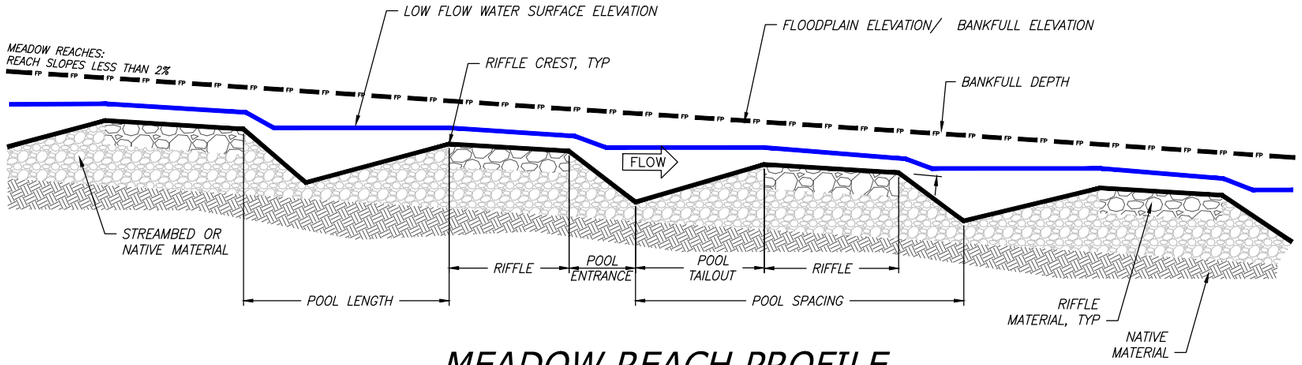
Drawing No.
MC6-1

LOCATION: R:\PROJECTS\SF_SALMON_JHUPON\STIBNITE_RESTORATION_MPIAS\CAD\PRODUCTION\MC6_PRO_HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



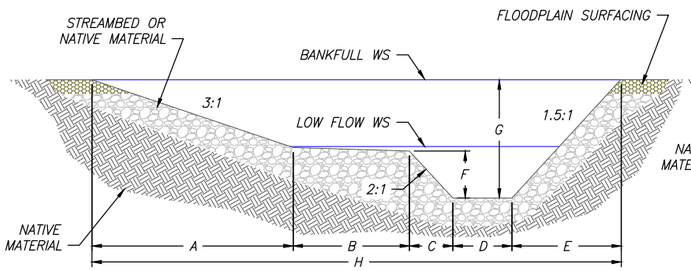
MEADOW REACH PLAN VIEW

NTS



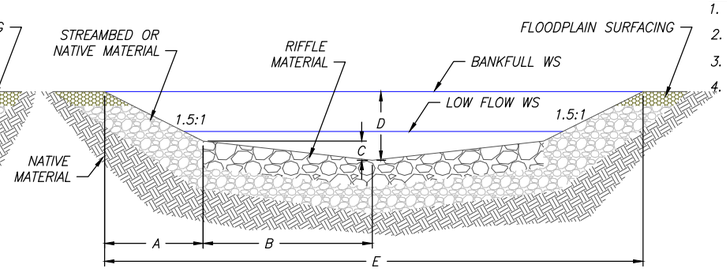
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

MC6 – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MC6A	111	15	10	1.5	150 - 190	80 - 150	25 - 90	60 - 190	150 - 300

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MC6A	25 - 175	15 - 35	43 - 45	21 - 51

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MC6A								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE								
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)	H (FT)
POOL SECTION A - A'	3.9	4.0	7.9	1.0	7.9			
RIFFLE SECTION B - B'	1.8	7.0	0.7	1.9	15.4			

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC6
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC6 Typical Plan and Profile

Drawing No.
MC6–2

LOCATION: R:\PROJECTS\SF_SALMON_JH\09\STIBNITE_RESTORATION_MPJA\5\CAD\PRODUCTION\MC6_PRO_HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	3,843	CY	2514 LF of new channel; 3.625 FT streambed thickness;
Sorting, and Stockpiling [3]	8,093	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	4,250	CY	6" thick layer over the liner area
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	31,829	CY	Fill outside channel width; above liner
Filter Material	17,000	CY	2 FT thickness within Liner Area
Topsoil/ Growth Media [3]	7,773	CY	12" thickness within Liner Area, 6" thickness of planting zone area
Liner	229,500	SF	Includes all material and labor
Transitional Channels			
Abandon and Restore In Place	0	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	1,590	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	3,180	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	3,180	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	1,060	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	4,770	EA	Live Stakes 1 per 3 linear feet of bank treatment
Brushlayer Live Cuttings	6,360	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	477	LF	Assumes 25% of total length of bank treatment
Brushlayer Live Cuttings	954	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	134	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	477	LF	Assumes 25% of total length of bank treatment
Brushlayer Live Cuttings	954	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	67	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	19	EA	2 per channel meander wave length
Riffle Material	132	CY	No. of riffles x 16.8 FT length x 8.4 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	5	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	16	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	11	CY	2 CY per structure
Racking Material	11	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	47	EA	1 per 55 linear feet of new channel
Log with Rootwad	47	EA	1 per structure
Retaining Log	47	EA	1 per structure
Tight Radius Jam Structure	3	EA	1 every 5 channel meander wave lengths
Foundation Logs	18	EA	3 per structure
Log with Rootwad	16	EA	3 per structure
Small Woody Debris	34	CY	7 CY per structure
Racking Material	37	EA	7 per structure
Bend Jam Structure	3	EA	1 every 4 channel meander wave lengths
Foundation Logs	6	EA	2 per structure
Log with Rootwad	9	EA	3 per structure
Whole Tree	6	EA	1 per structure
Small Woody Debris	40	CY	13 CY per structure
Racking Material	46	EA	15 per structure
Sweeper Log Structure	10	EA	1 every 1 channel meander wave lengths
Whole Tree	10	EA	1 per structure
Small Woody Debris	30	CY	3 CY per structure
Racking Material	30	EA	3 per structure
Channel Spanning Jam	4	EA	None
Log with Rootwad	12	EA	3 per structure
Small Woody Debris	12	CY	3 CY per structure
Racking Material	12	EA	3 per structure
Wood Habitat Structure	5	EA	1 every 2 channel meander wave lengths
Log with Rootwad	22	EA	4 per structure
Small Woody Debris	16	CY	3 CY per structure
Racking Material	16	EA	3 per structure
Turning Log Structure	2	EA	1 every 6 channel meander wave lengths
Log with Rootwad	9	EA	4 per structure
Small Woody Debris	7	CY	3 CY per structure
Racking Material	7	EA	3 per structure
Boulders	5	EA	2 per structure
Backwater Alcove	3	EA	None
Log with Rootwad	30	EA	10 per Alcove
Oxbow Backwater Alcove	1	EA	None
Log with Rootwad	25	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	421	EA	4840 plants per acre
Zone 3	4,884	EA	3825 plants per acre
Zone 4	19,764	EA	4840 plants per acre
Transitional Channel	0	EA	4784 plants per acre
Seeding			
Zone 2	0.09	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	1.28	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	4.08	AC	16' width each side of channel; 19.02 pure live seed/AC
Transitional Channel	0.00	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC6
Valley County, Idaho

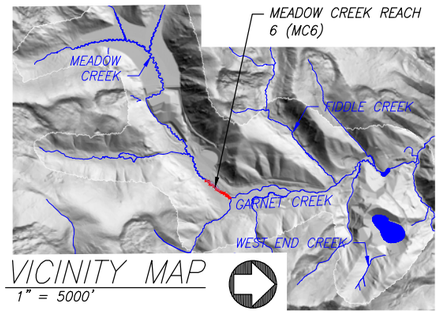
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MC6 Quantities

Drawing No.
MC6-3

LOCATION: R:\PROJECTS\SF_SALMON_JAC\GIS\STIBNITE_RESTORATION_MXDS\CAD\PRODUCTION\MC6_PRO_HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

MAXIMUM DISTURBANCE LIMITS
6700
6675
6650
6625
6600
6575
6550
6550
6550
6550
6500
6525
TIE PROPOSED FLOODPLAIN INTO EXISTING FLOODPLAIN
PROPOSED EFSFSR CHANNEL ALIGNMENT EF2
FLOW
MATCHLINE SHEET EF2
EXISTING EFSFSR CHANNEL ALIGNMENT EF1
FLOW
FLOW
MATCHLINE SHEET MC5-4
DIVERSION CHANNEL FLOODPLAIN WIDTH
MEADOW CREEK EXISTING ALIGNMENT
PROPOSED MEADOW CREEK DIVERSION CHANNEL ALIGNMENT MC6
TIE PROPOSED FLOODPLAIN INTO EXISTING FLOODPLAIN
PROPOSED MEADOW CREEK DIVERSION CHANNEL ALIGNMENT MC5

MEADOW CREEK REACH 6 – ENHANCEMENT REACH
WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC6
Valley County, Idaho

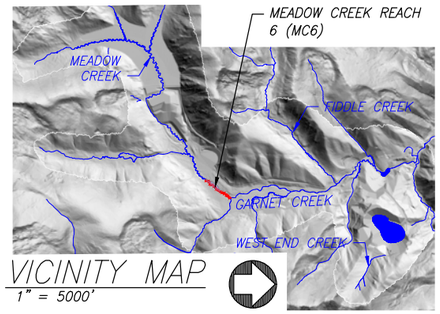
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
MC6 Wetland Overview Sheet

Drawing No.
MC6-4

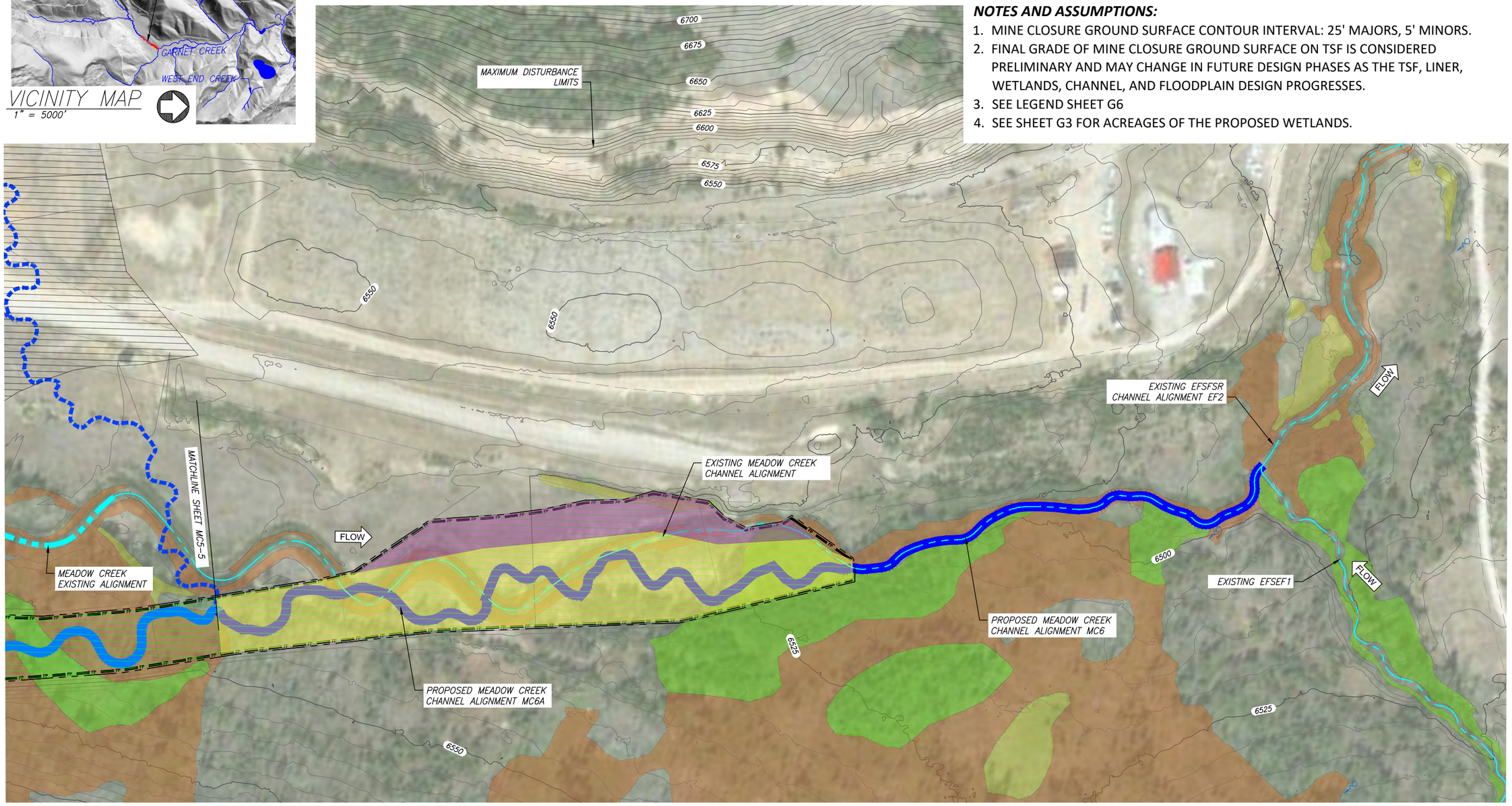
LOCATION: C:\USERS\NICK.STRYKER\DESKTOP\20a-ELKO\HORSE\HDY\ 8X20\20201210\RO-MXAS_STREAM_RESTORATION\LAYOUT_ERWMET\ANSHEETS\20200904\PRODUCTION\MC6_MET\ANRS.DWG PLOT DATE: 1/5/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON TSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE TSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.



MEADOW CREEK REACH 6 – ENHANCEMENT REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

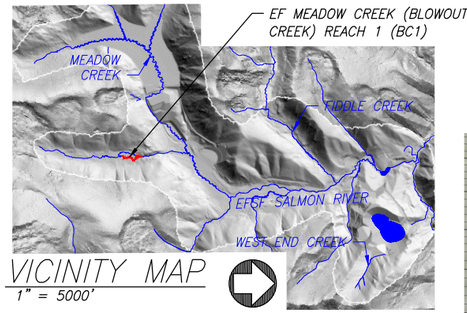
Stibnite Gold Project
ModPRO2
Meadow Creek - Hangar Flats Pit - Reach MC6
Valley County, Idaho

Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
MC6 Wetland Planting Sheet

Drawing No.
MC6-5



VICINITY MAP
1" = 5000'

BC1 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
BC1	1,670	1,912	1.1	0.95	0.83

BC1 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
BC1	2,098	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE EF MEADOW CREEK (BLOWOUT CREEK) PRE-CLOSURE GROUND SURFACE, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. REACH BC1 IS A RESTORATION REACH CONSISTING OF PLACEMENT OF AN IMPERMEABLE GRADE CONTROL STRUCTURE AT THE DOWNSTREAM REACH BREAK. THE STRUCTURE WILL RESTORE THE HISTORICAL WATER SURFACE ELEVATION, FUNCTION SIMILAR TO A BEAVER-DAM IMPOUNDED SYSTEM, AND SLOWLY FILL THE EXISTING INCISED CHANNEL WITH SEDIMENT OVER TIME.

EF MEADOW CREEK (BLOWOUT CREEK) REACH 1 - RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - Reach BC1
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC1 Overview Sheet

Drawing No.
BC1-1

LOCATION: R:\PROJECTS\SF_SALMON_AUTO\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\BC1_BLOWOUTRESTORATION_CONCEPTDESIGN.DWG PLOT DATE:3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Medium complexity for water management
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	High complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	0	CY	
Sorting and Stockpiling [3]	0	CY	
Rock Armoring/ Grade Control [3]	2,000	CY	Grade control structure at BC1 outlet
Ephemeral Swale Channel Material	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	0	CY	
Liner	0	SF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	17	EA	1 every 1 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	52	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	34	CY	2 CY per structure
Racking Material	34	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	42	EA	1 per 50 linear feet of new channel
Log with Rootwad	42	EA	1 per structure
Retaining Log	42	EA	1 per structure
Tight Radius Jam Structure	3	EA	1 every 6 channel meander wave lengths
Foundation Logs	20	EA	3 per structure
Log with Rootwad	17	EA	3 per structure
Small Woody Debris	37	CY	7 CY per structure
Racking Material	40	EA	7 per structure
Bend Jam Structure	3	EA	1 every 6 channel meander wave lengths
Foundation Logs	6	EA	2 per structure
Log with Rootwad	9	EA	3 per structure
Whole Tree	6	EA	1 per structure
Small Woody Debris	37	CY	13 CY per structure
Racking Material	43	EA	15 per structure
Sweeper Log Structure	4	EA	1 every 4 channel meander wave lengths
Whole Tree	4	EA	1 per structure
Small Woody Debris	13	CY	3 CY per structure
Racking Material	13	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	4	EA	1 every 4 channel meander wave lengths
Log with Rootwad	17	EA	4 per structure
Small Woody Debris	13	CY	3 CY per structure
Racking Material	13	EA	3 per structure
Turning Log Structure	3	EA	1 every 6 channel meander wave lengths
Log with Rootwad	11	EA	4 per structure
Small Woody Debris	9	CY	3 CY per structure
Racking Material	9	EA	3 per structure
Boulders	6	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	47,283	EA	10890 plants per acre, Intended for anually wet areas
Zone 2	5,027	EA	4840 plants per acre
Zone 3	12,579	EA	3825 plants per acre
Zone 4	0	EA	4840 plants per acre
Seeding			
Zone 2	1.04	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	3.29	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.00	AC	16' width each side of channel; 19.02 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - Reach BC1
Valley County, Idaho

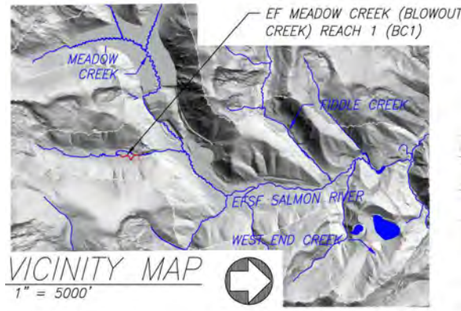
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC1 Quantities

Drawing No.
BC1-2

LOCATION: K:\PROJECTS\SF_SALMON_JAC\GIS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\BC1_BLOWOUTRESTORATION_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

PROPOSED EF MEADOW CREEK ENHANCED/RESTORED FLOODPLAIN WETLAND

PROPOSED EF MEADOW CREEK (BLOWOUT CREEK) PONDED AREA – DRAFT

PROPOSED EF MEADOW CREEK CHANNEL (BLOWOUT CREEK) ALIGNMENT – BC2

EF MEADOW CREEK (BLOWOUT CREEK) EXISTING ALIGNMENT

EXISTING INCISED EF MEADOW CREEK (BLOWOUT CREEK) CHANNEL ALIGNMENT BC1

ROCK GRADE CONTROL STRUCTURE, PLACED ABOVE EXISTING CHANNEL INVERT

FLOW

FLOW

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE EF MEADOW CREEK (BLOWOUT CREEK) PRE-CLOSURE GROUND SURFACE, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. REACH BC1 IS A RESTORATION REACH CONSISTING OF PLACEMENT OF AN IMPERMEABLE GRADE CONTROL STRUCTURE AT THE DOWNSTREAM REACH BREAK. THE STRUCTURE WILL RESTORE THE HISTORICAL WATER SURFACE ELEVATION, FUNCTION SIMILAR TO A BEAVER-DAM IMPOUNDED SYSTEM, AND SLOWLY FILL THE EXISTING INCISED CHANNEL WITH SEDIMENT OVER TIME.
4. SEE LEGEND SHEET G6
5. SEE SHEET G3 FOR ACERAGES OF PROPOSED WETLANDS.

0 200 400 Feet

EF MEADOW CREEK (BLOWOUT CREEK) REACH 1 – ENHANCEMENT REACH WETLAND OVERVIEW SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
Stream And Wetland Restoration Concept Design
Blowout Creek - BC Restoration - Reach BC1
Valley County, Idaho

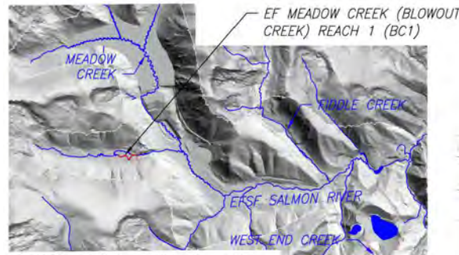
DRAFT

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
BC1 Wetland OverviewSheet

Drawing No.
BC1–3

LOCATION: C:\USERS\RICK.STRICKER\DESKTOP\09-PLEXHO\REFS\WETLAND\20200320\BC-MAPS\5_STREAM_RESTORATION\LAYOUT_FORMETLANDSHEET\20200324\PRODUCTION\BC1_WETLANDS_POND.DWG PLOT DATE: 3/25/2021



VICINITY MAP
1" = 5000'

PROPOSED EF MEADOW CREEK ENHANCED/RESTORED FLOODPLAIN WETLAND

PROPOSED EF MEADOW CREEK (BLOWOUT CREEK) PONDED AREA – DRAFT

PROPOSED EF MEADOW CREEK CHANNEL (BLOWOUT CREEK) ALIGNMENT – BC2

FLOW

EF MEADOW CREEK (BLOWOUT CREEK) EXISTING ALIGNMENT

EXISTING INCISED EF MEADOW CREEK (BLOWOUT CREEK) CHANNEL ALIGNMENT BC1

ROCK GRADE CONTROL STRUCTURE, PLACED ABOVE EXISTING CHANNEL INVERT

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE EF MEADOW CREEK (BLOWOUT CREEK) PRE-CLOSURE GROUND SURFACE, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. REACH BC1 IS A RESTORATION REACH CONSISTING OF PLACEMENT OF AN IMPERMEABLE GRADE CONTROL STRUCTURE AT THE DOWNSTREAM REACH BREAK. THE STRUCTURE WILL RESTORE THE HISTORICAL WATER SURFACE ELEVATION, FUNCTION SIMILAR TO A BEAVER-DAM IMPOUNDED SYSTEM, AND SLOWLY FILL THE EXISTING INCISED CHANNEL WITH SEDIMENT OVER TIME.
4. SEE LEGEND SHEET G6
5. SEE SHEET G3 FOR ACERAGES OF PROPOSED WETLANDS.

0 200 400 Feet

EF MEADOW CREEK (BLOWOUT CREEK) REACH 1 – ENHANCEMENT REACH WETLAND PLANTING SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
Stream And Wetland Restoration Concept Design
Blowout Creek - BC Restoration - Reach BC1
Valley County, Idaho

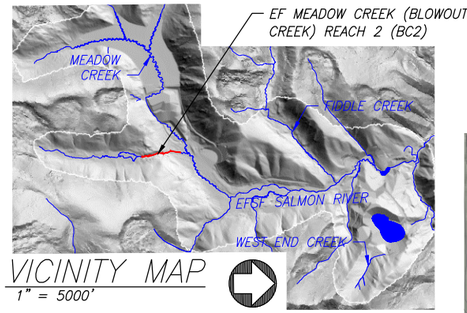
DRAFT

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
BC1 Wetland Planting Sheet

Drawing No.
BC1–4

LOCATION: C:\USERS\RICK.STRIKER\DESKTOP\09-PLEXHO\REFS\WETLAND\2020\03\BC-MAPS\5_STREAM_RESTORATION\LAYOUT_FORMETLANDSHEETS\20200624\PRODUCTION\BC1_WETLANDS_PLNTG.DWG PLOT DATE: 3/1/2021



VICINITY MAP
1" = 5000'

BC2 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
BC2A	1,009	1,040	1.0	15.26	14.80
BC2B	1,580	1,629	1.0	15.11	14.66

BC2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
BC2	2,669	0

NOTES AND ASSUMPTIONS:
1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE EF MEADOW CREEK (BLOWOUT CREEK) PRE-CLOSURE GROUND SURFACE, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. THE EXISTING EF MEADOW CREEK (BLOWOUT CREEK) CHANNEL MAY BE RELOCATED DURING MINE OPERATIONS TO ACCOMMODATE MINE FACILITIES.

EF MEADOW CREEK (BLOWOUT CREEK) REACH 2 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - Reach BC2
Valley County, Idaho

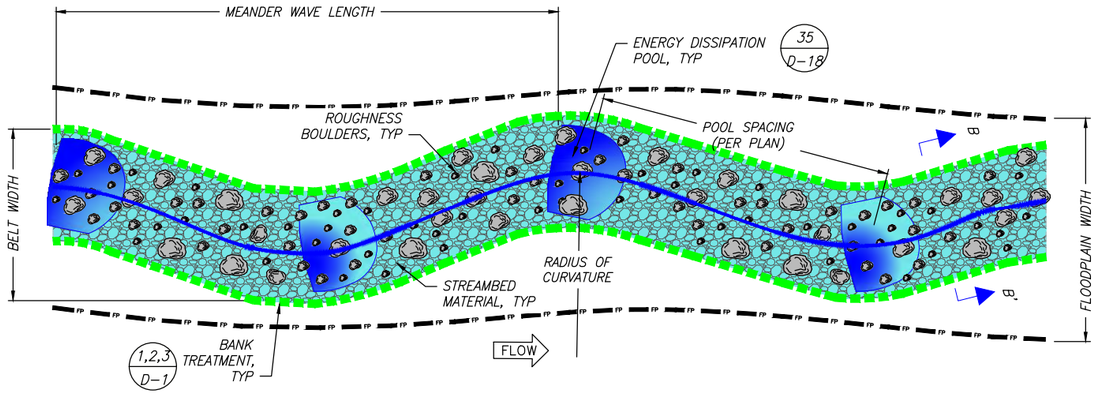
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC2 Overview Sheet

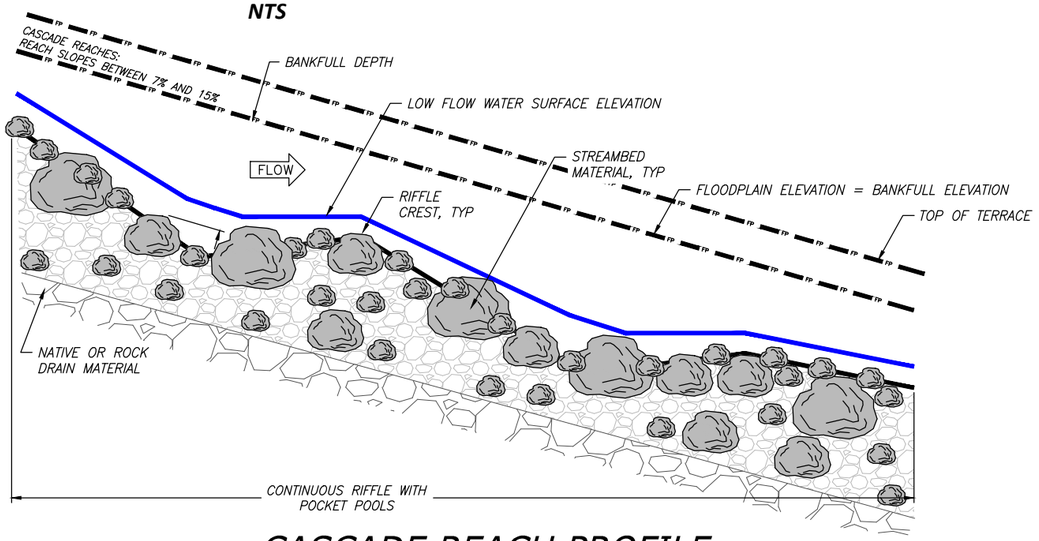
Drawing No.
BC2-1

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\BC2_PRO_BLOWOUTRESTORATION_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



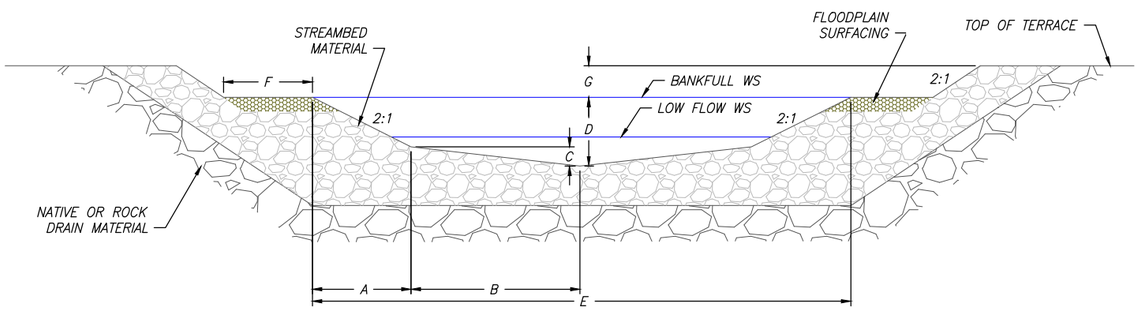
CASCADE REACH PLAN VIEW

NTS



CASCADE REACH PROFILE

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. CASCADE REACHES ARE NOT EXPECTED TO HAVE BANK TREATMENT TYPES OR HABITAT STRUCTURES.
4. SEE SHEET D–18 FOR DISSIPATION POOL DETAILS.
5. LOCATION OF CASCADE REACH DISSIPATION POOLS ARE SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS. ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D–1 AND D–21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.

BC2 – CASCADE REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE

REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
BC2A	37	13	13	1.0	NA	NA	NA	NA	NA
BC2B	38	13	13	1.0	130 - 165	65 - 40	20 - 80	55 - 165	40 - 50

PROFILE TABLE

REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
BC2A	NA	NA	NA	NA
BC2B	20 - 150	15 - 30	NA	NA

NOTES

1. RIFFLE LENGTH INDICATED IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. SEE DISSIPATION POOL DETAILS FOR POOL LENGTH AND ASSOCIATED DIMENSIONS.

MATERIALS TABLE

REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTION TABLE

SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)
RIFFLE SECTION B - B'	1.6	2.5	0.3	1.3	12.9	5.0	2.0
	1.4	4.7	0.5	1.4	13.2	5.0	2.0

NOTE

1. SEE DISSIPATION POOL DETAILS FOR POOL LENGTH AND ASSOCIATED DIMENSIONS.

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - Reach BC2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC2 Typical Plan and Profile

Drawing No.
BC2–2

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\BC2_PRO_BLOWOUTRESTORATION_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water management
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	13,684	CY	thickness;
Sorting and Stockpiling [3]	14,834	CY	
Rock Armoring/ Grade Control [3]	0	CY	
Rock Drain Material [3]	1,150	CY	
Ephemeral Swale Channel Material	0	CY	
General Fill	12,100	CY	
Gravel Surfacing Material	650	CY	Transition layer; 0.5 FT thickness
Topsoil/ Growth Media [3]	603	CY	
Liner	0	SF	
Geotextile	20,800	SF	20' width; for Rock Drain Material separation
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	1	EA	None
Boulders	66	EA	Based on bankfull width
Dissipation Pool Streambed Material	3	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	0	EA	None
Foundation Logs	0	EA	0 per structure
Log with Rootwad	0	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	0	CY	2 CY per structure
Racking Material	0	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	23	EA	None
Log with Rootwad	23	EA	1 per structure
Retaining Log	23	EA	1 per structure
Tight Radius Jam Structure	0	EA	None
Foundation Logs	0	EA	3 per structure
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	7 CY per structure
Racking Material	0	EA	7 per structure
Bend Jam Structure	0	EA	None
Foundation Logs	0	EA	2 per structure
Log with Rootwad	0	EA	3 per structure
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	13 CY per structure
Racking Material	0	EA	15 per structure
Sweeper Log Structure	0	EA	None
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Turning Log Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Boulders	0	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Live Stakes	8,320	EA	4 per LF of channel
Exposed Valley Slopes	3,405	EA	681 plants per acre
Zone 1	0	EA	3825 plants per acre, Intended for anually wet areas
Zone 2	362	EA	4840 plants per acre
Zone 3	286	EA	3825 plants per acre
Zone 4	1,810	EA	4840 plants per acre
Seeding			
Surface Channel Floodplain	1	AC	19.02 pure live seed/AC
Exposed Valley Slopes	5	AC	19.02 pure live seed/AC
Zone 2	0.07	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.07	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.37	AC	5' width each side of channel; 19.02 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - Reach BC2
Valley County, Idaho

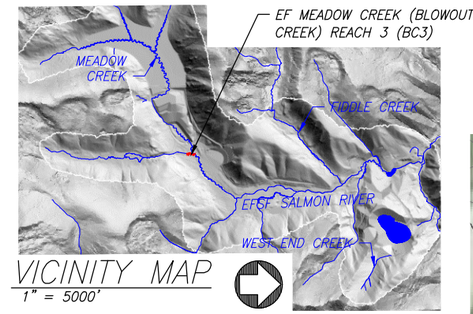
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC2 Quantities

Drawing No.
BC2-3

LOCATION: R:\PROJECTS\SF_SALMON_HUC6\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\BC2_PRO_BLOWOUTRESTORATION_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

BC3 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
BC3	535	685	1.3	2.62	2.04

BC3 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
BC3	685	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING THE HANGAR FLATS PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE HANGAR FLATS PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. THE EXISTING EF MEADOW CREEK (BLOWOUT CREEK) CHANNEL MAY BE RELOCATED DURING MINE OPERATIONS.
4. HANGAR FLATS PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.
5. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED MEADOW CREEK CHANNEL OR EF MEADOW CREEK (BLOWOUT CREEK) CHANNEL.

EF MEADOW CREEK (BLOWOUT CREEK) REACH 3 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - Reach BC3
Valley County, Idaho

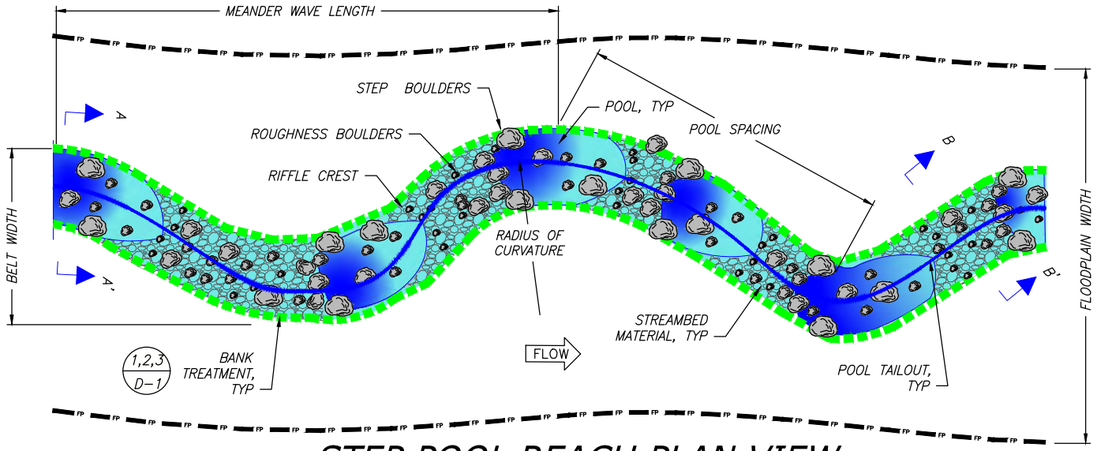
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC3 Overview Sheet

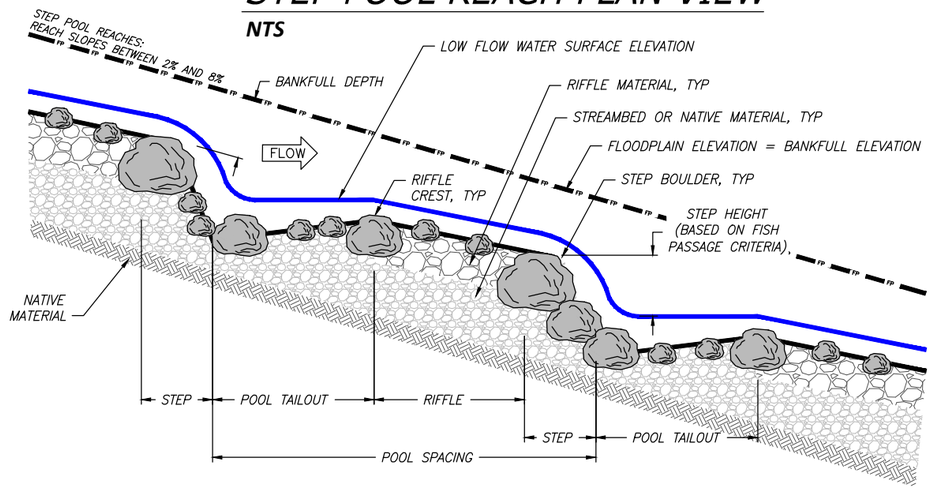
Drawing No.
BC3-1

LOCATION: R:\PROJECTS\SF_SALMON_MJOSR\STIBNITE_RESTORATION_MINAS\CAD\PRODUCTION\BC3_PRO_HANGARFLATS_CONCEPTDESIGN.DWG PLOT DATE:3/3/2021



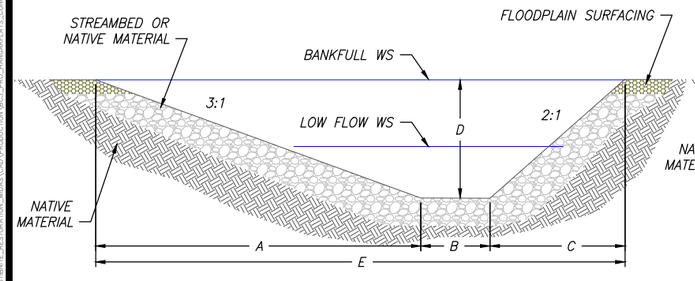
STEP POOL REACH PLAN VIEW

NTS



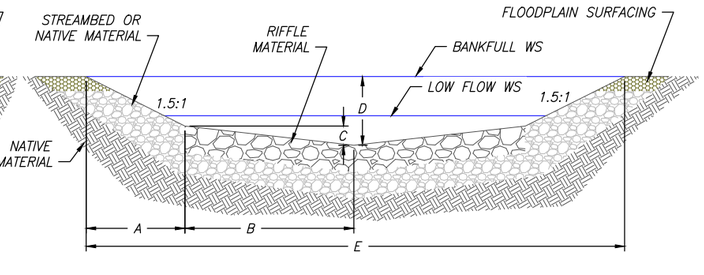
STEP POOL REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

BC3 – STEP POOL REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
BC3	38	12	13	0.9	115 - 145	60 - 70	20 - 70	45 - 145	70 - 135

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
BC3	20 - 135	10 - 30	24 - 45	12 - 29

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
BC3								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	6.8	1.6	4.5	2.3	12.9
RIFFLE SECTION B - B'	1.4	4.7	0.5	1.4	11.7

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - Reach BC3
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC3 Typical Plan and Profile

Drawing No.
BC3-2

LOCATION: R:\PROJECTS\SF_SALMON_JHJ\GIS\STIBNITE_RESTORATION_MTDA\CAD\PRODUCTION\BC3_PRO_HANGARS_ATS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity for water management
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	8,080	CY	Channel ex including transitional channel and streambed material
Floodplain Excavation (Cut)	863	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	782	CY	685 LF of new channel; 2.25 FT streambed thickness;
Sorting and Stockpiling [3]	782	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	0	CY	
Liner	0	SF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	274	LF	Assumes 20% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	548	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	548	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	183	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	1,096	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 8" Brushlayer	548	LF	Assumes 40% of total length of bank treatment
Brushlayer Live Cuttings	1,096	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	77	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	23	EA	1 per step pool
Riffle Material	85	CY	No. of riffles x 11.7 FT length x 5.85 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	3	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	8	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	5	CY	2 CY per structure
Racking Material	5	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	15	EA	1 per 45 linear feet of new channel
Log with Rootwad	15	EA	1 per structure
Retaining Log	15	EA	1 per structure
Tight Radius Jam Structure	1	EA	1 every 8 channel meander wave lengths
Foundation Logs	5	EA	3 per structure
Log with Rootwad	4	EA	3 per structure
Small Woody Debris	9	CY	7 CY per structure
Racking Material	9	EA	7 per structure
Bend Jam Structure	1	EA	1 every 6 channel meander wave lengths
Foundation Logs	2	EA	2 per structure
Log with Rootwad	3	EA	3 per structure
Whole Tree	2	EA	1 per structure
Small Woody Debris	11	CY	13 CY per structure
Racking Material	13	EA	15 per structure
Sweeper Log Structure	3	EA	1 every 2 channel meander wave lengths
Whole Tree	3	EA	1 per structure
Small Woody Debris	8	CY	3 CY per structure
Racking Material	8	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	2	EA	1 every 3 channel meander wave lengths
Log with Rootwad	7	EA	4 per structure
Small Woody Debris	5	CY	3 CY per structure
Racking Material	5	EA	3 per structure
Turning Log Structure	1	EA	1 every 6 channel meander wave lengths
Log with Rootwad	4	EA	4 per structure
Small Woody Debris	3	CY	3 CY per structure
Racking Material	3	EA	3 per structure
Boulders	2	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, Intended for anually wet areas
Zone 2	152	EA	4840 plants per acre
Zone 3	120	EA	3825 plants per acre
Zone 4	0	EA	4840 plants per acre
Seeding			
Zone 2	0.03	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.03	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.00	AC	16' width each side of channel; 19.02 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Blowout Creek - BC Restoration - F
Valley County, Idaho

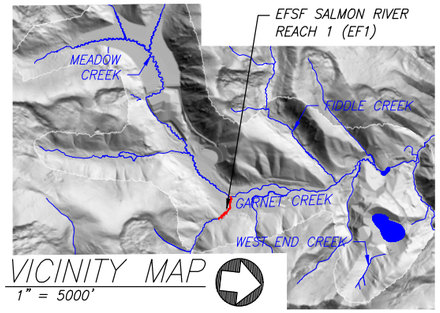
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
BC3 Quantities

Drawing No.
BC3-3

LOCATION: R:\PROJECTS\SF_SALMON_JAG\GIS\STIBNITE_RESTORATION_MXDS\CAD\PRODUCTION\BC3_PRO_HANDARTLATE_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
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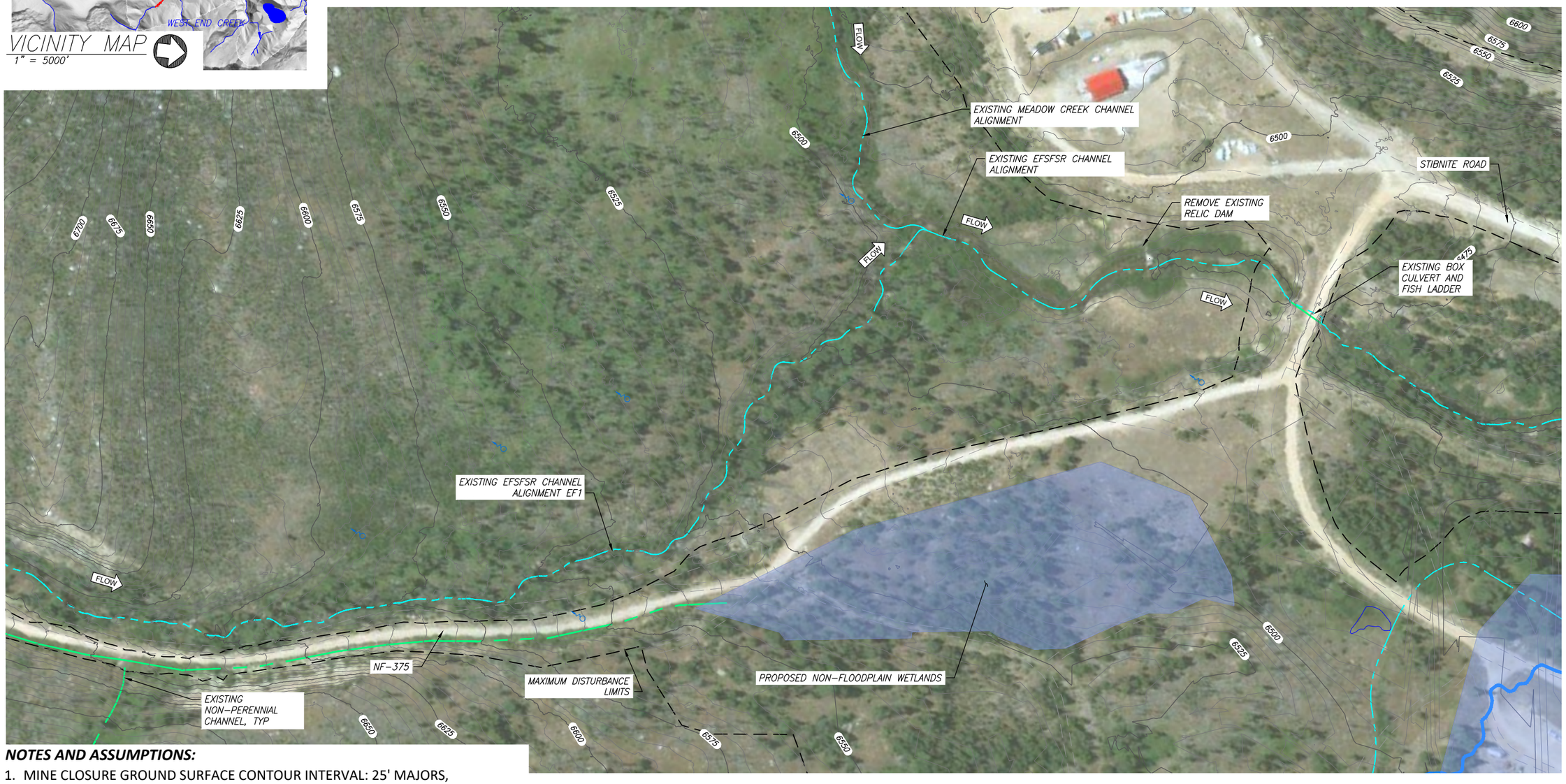


NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

EFSF SALMON RIVER REACH 1 – ENHANCEMENT REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Processing Facility - Reach EF1
Valley County, Idaho

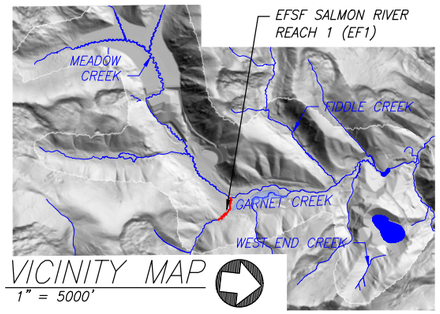
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
EF1 Wetland OverviewSheet

Drawing No.
EF1-1

LOCATION: C:\USERS\NICK.STRYKER\DESKTOP\JOB-FILES\NOV\DRFES\HDY\BIO\20201\BIO-MXD\AS_STREAM_RESTORATION\LAYOUT_EF\WETLANDS\SHEETS\20200909\PRODUCTION\EF1_WETLANDS.DWG PLOT DATE: 1/7/2021



VICINITY MAP
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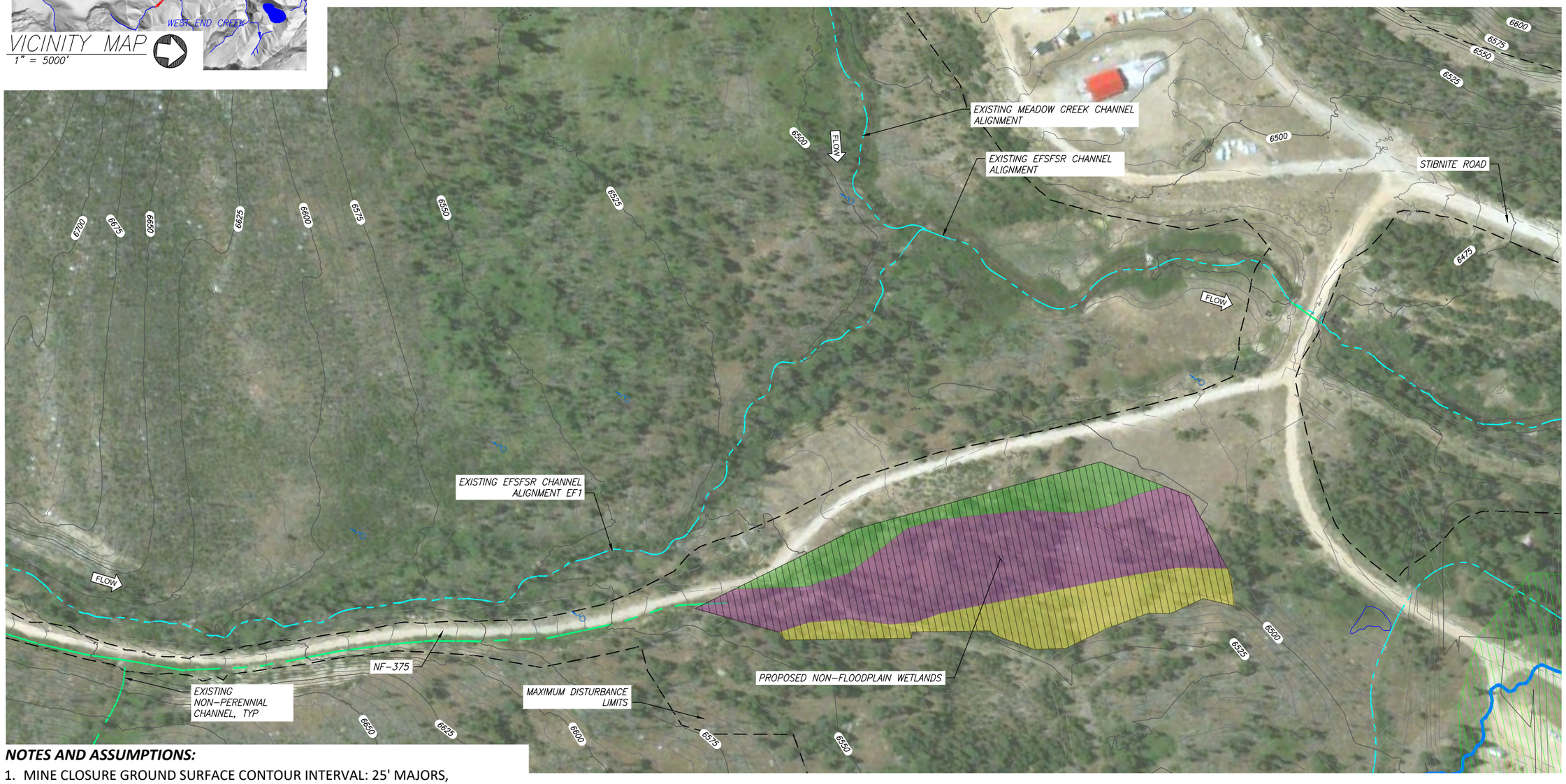

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

EFSF SALMON RIVER REACH 1 – ENHANCEMENT REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Processing Facility - Reach EF1
Valley County, Idaho

Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
EF1 Wetland Planting Sheet

Drawing No.
EF1–2

LOCATION: C:\USERS\NICK.STRYKER\DESKTOP\20-FILES\NOV\SHEETS\BROSHEETS\BRO-MISAS_STREAM_RESTORATION\LAYOUT_EF\WETLANDS\WETLANDSHEETS\2020\09\EF\PRODUCTION\EF1_WETLANDS.DWG PLOT DATE: 1/7/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	0	CY	
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	0	CY	
Sorting and Stockpiling [3]	0	CY	
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	15,996	CY	6" thichness of planting zone area
Liner	0	SF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	0	EA	None
Foundation Logs	0	EA	0 per structure
Log with Rootwad	0	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	0	CY	2 CY per structure
Racking Material	0	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	0	EA	None
Log with Rootwad	0	EA	1 per structure
Retaining Log	0	EA	1 per structure
Tight Radius Jam Structure	0	EA	None
Foundation Logs	0	EA	3 per structure
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	7 CY per structure
Racking Material	0	EA	7 per structure
Bend Jam Structure	0	EA	None
Foundation Logs	0	EA	2 per structure
Log with Rootwad	0	EA	3 per structure
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	13 CY per structure
Racking Material	0	EA	15 per structure
Sweeper Log Structure	0	EA	None
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Turning Log Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Boulders	0	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	21,018	EA	10890 plants per acre, intended for anually wet areas
Zone 2	10,938	EA	4840 plants per acre
Zone 3	3,060	EA	3825 plants per acre
Zone 4	71,826	EA	4840 plants per acre
Seeding			
Zone 2	2.26	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.80	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	14.84	AC	16' width each side of channel; 19.02 pure live seed/AC

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Stibnite Gold Project
ModPRO2
EFSFSR - Processing Facility - Reach EF1
Valley County, Idaho

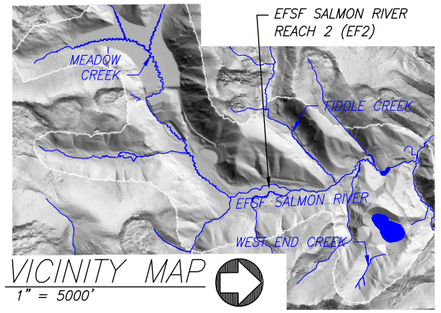
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF1 Quantities

Drawing No.
EF1-3

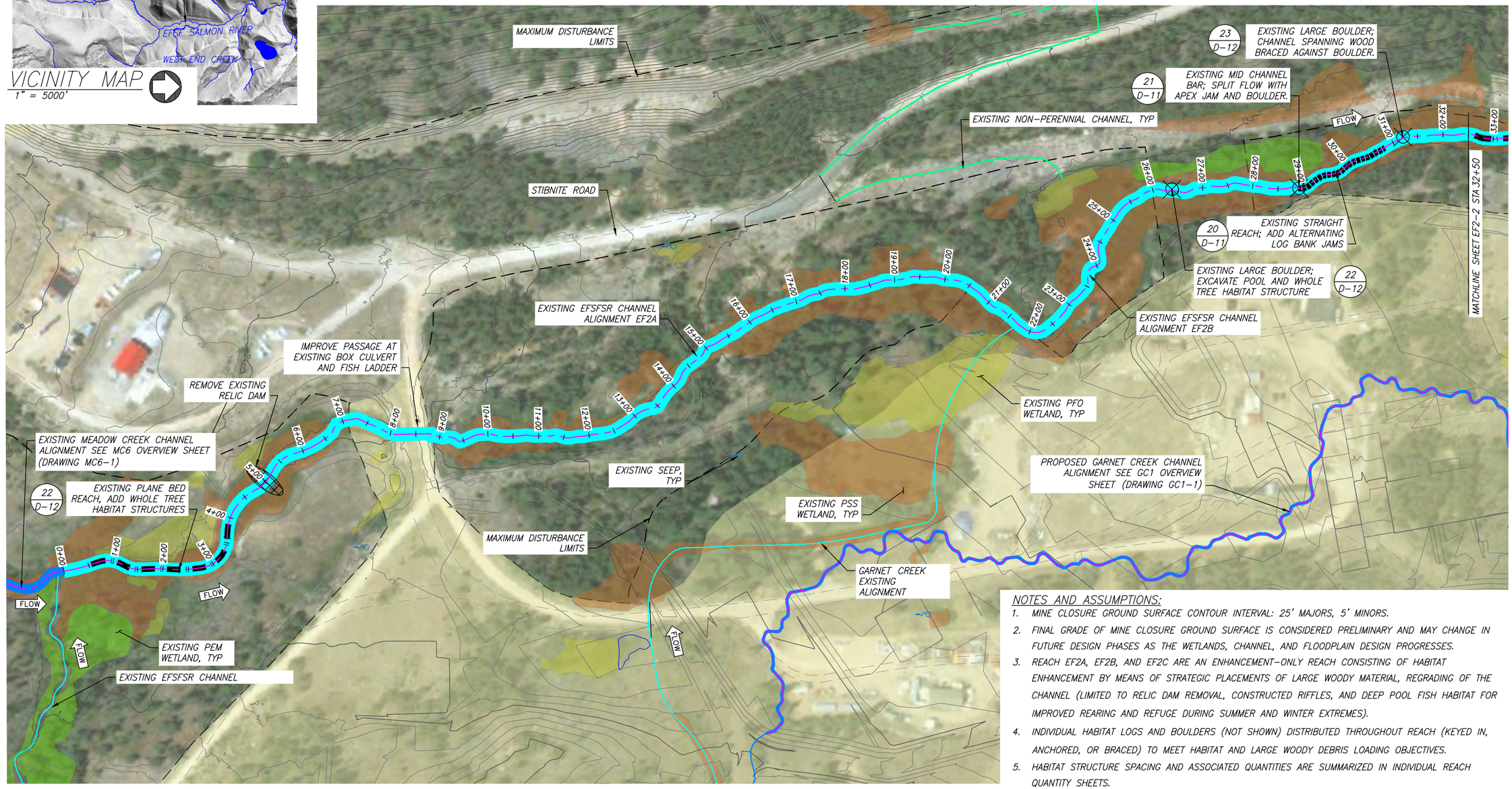
LOCATION: K:\PROJECTS\SF_SALMON_JH\GIS\STIBNITE_RESTORATION_MINAS\CAD\PRODUCTION\EF1_PROCESSINGFACILITY_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

EF2 EXISTING CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
EF2A	4,458	4,610	1.0	2.83	2.73
EF2B	3,161	3,435	1.1	3.19	2.94
EF2C	1,369	1,517	1.1	6.69	6.04

EF2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
EF2	9,562	0



22 D-12
21 D-11
23 D-12
20 D-11
22 D-12

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. REACH EF2A, EF2B, AND EF2C ARE AN ENHANCEMENT-ONLY REACH CONSISTING OF HABITAT ENHANCEMENT BY MEANS OF STRATEGIC PLACEMENTS OF LARGE WOODY MATERIAL, REGRADING OF THE CHANNEL (LIMITED TO RELIC DAM REMOVAL, CONSTRUCTED RIFFLES, AND DEEP POOL FISH HABITAT FOR IMPROVED REARING AND REFUGE DURING SUMMER AND WINTER EXTREMES).
4. INDIVIDUAL HABITAT LOGS AND BOULDERS (NOT SHOWN) DISTRIBUTED THROUGHOUT REACH (KEYED IN, ANCHORED, OR BRACED) TO MEET HABITAT AND LARGE WOODY DEBRIS LOADING OBJECTIVES.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.

EFSF SALMON RIVER REACH 2 - ENHANCEMENT REACH SITE OVERVIEW PLAN

0 200 400 Feet

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Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF2
Valley County, Idaho

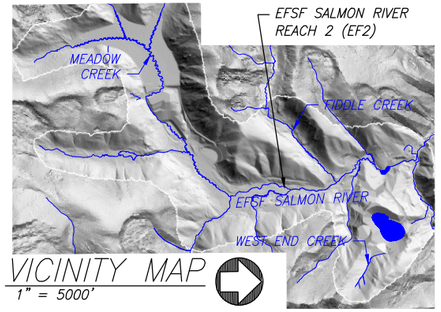
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF2 Overview Sheet - 1

Drawing No.
EF2-1

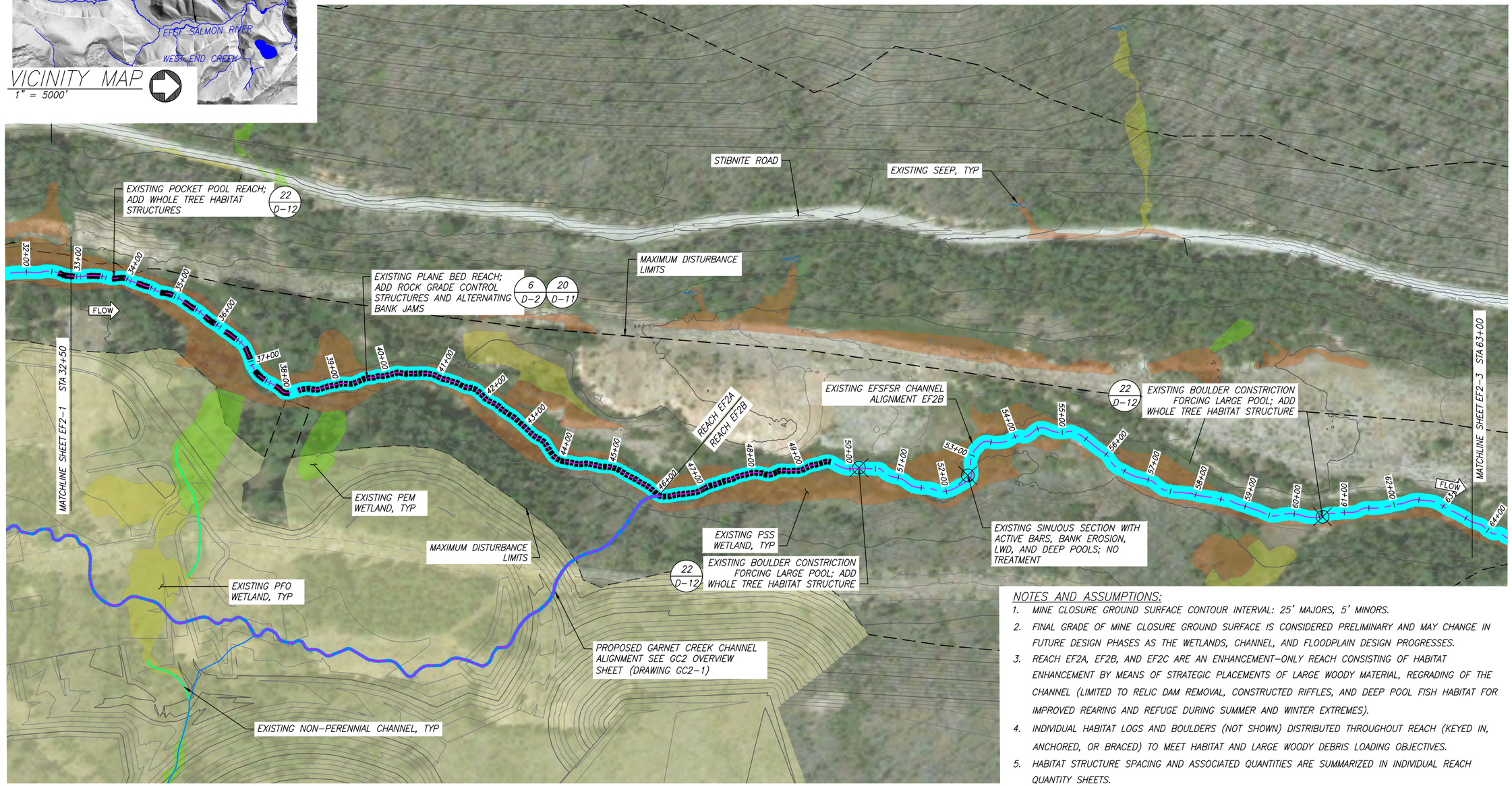
LOCATION: R:\PROJECTS\SF_SALMON_HUYON\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF2_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE:3/3/2021



VICINITY MAP
1" = 5000'

EF2 EXISTING CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
EF2A	4,458	4,610	1.0	2.83	2.73
EF2B	3,161	3,435	1.1	3.19	2.94
EF2C	1,369	1,517	1.1	6.69	6.04

EF2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
EF2	9,562	0



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. REACH EF2A, EF2B, AND EF2C ARE AN ENHANCEMENT-ONLY REACH CONSISTING OF HABITAT ENHANCEMENT BY MEANS OF STRATEGIC PLACEMENTS OF LARGE WOODY MATERIAL, REGRADING OF THE CHANNEL (LIMITED TO RELIC DAM REMOVAL, CONSTRUCTED RIFFLES, AND DEEP POOL FISH HABITAT FOR IMPROVED REARING AND REFUGE DURING SUMMER AND WINTER EXTREMES).
4. INDIVIDUAL HABITAT LOGS AND BOULDERS (NOT SHOWN) DISTRIBUTED THROUGHOUT REACH (KEYED IN, ANCHORED, OR BRACED) TO MEET HABITAT AND LARGE WOODY DEBRIS LOADING OBJECTIVES.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.

EFSF SALMON RIVER REACH 2 – ENHANCEMENT REACH SITE OVERVIEW PLAN

0 200 400 Feet

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Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF2
Valley County, Idaho

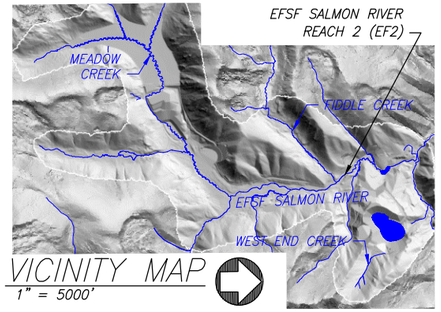
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF2 Overview Sheet – 2

Drawing No.
EF2-2

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF2_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

EF2 EXISTING CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
EF2A	4,458	4,610	1.0	2.83	2.73
EF2B	3,161	3,435	1.1	3.19	2.94
EF2C	1,369	1,517	1.1	6.69	6.04

EF2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
EF2	9,562	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. REACH EF2A, EF2B, AND EF2C ARE AN ENHANCEMENT-ONLY REACH CONSISTING OF HABITAT ENHANCEMENT BY MEANS OF STRATEGIC PLACEMENTS OF LARGE WOODY MATERIAL, REGRADING OF THE CHANNEL (LIMITED TO RELIC DAM REMOVAL, CONSTRUCTED RIFFLES, AND DEEP POOL FISH HABITAT FOR IMPROVED REARING AND REFUGE DURING SUMMER AND WINTER EXTREMES).
4. INDIVIDUAL HABITAT LOGS AND BOULDERS (NOT SHOWN) DISTRIBUTED THROUGHOUT REACH (KEYED IN, ANCHORED, OR BRACED) TO MEET HABITAT AND LARGE WOODY DEBRIS LOADING OBJECTIVES.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.

EFSF SALMON RIVER REACH 2 - ENHANCEMENT REACH SITE OVERVIEW PLAN

0 200 400 Feet

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Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
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Checked: RR
Approved: --

Drawing Name
EF2 Overview Sheet - 3

Drawing No.
EF2-3

LOCATION: R:\PROJECTS\SF_SALMON_JV\DOCS\STIBNITE_RESTORATION_MDM\CAD\PRODUCTION\EF2-YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE:3/3/2021

DETAILED QUANTITIES (EF2A, EF2B, EF2C)

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Medium complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Medium complexity of access
Haul Route Crossing Restoration			
Site Work	1	LS	High complexity
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	5,312	CY	Assumes pool excavation every 4 bankfull widths
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	3,559	CY	Assumes 67% of the excavation gets replaced elsewhere on the channel
Engineered Streambed Material [3]	0	CY	
Sorting and Stockpiling [3]	0	CY	
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	1,377	CY	6" thickness in Zone 4
Liner	0	SF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	24	EA	1 every 4 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	72	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	48	CY	2 CY per structure
Racking Material	48	EA	2 per structure
Log Floodplain Roughness Structure	0	EA	None
Log with Rootwad	0	EA	1 per structure
Retaining Log	0	EA	1 per structure
Tight Radius Jam Structure	19	EA	1 every 8 channel meander wave lengths
Foundation Logs	131	EA	3 per structure
Log with Rootwad	112	EA	3 per structure
Small Woody Debris	243	CY	7 CY per structure
Racking Material	261	EA	7 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Bend Jam Structure	24	EA	1 every 4 channel meander wave lengths
Foundation Logs	48	EA	2 per structure
Log with Rootwad	72	EA	3 per structure
Whole Tree	48	EA	1 per structure
Small Woody Debris	311	CY	13 CY per structure
Racking Material	358	EA	15 per structure
Sweeper Log Structure	48	EA	1 every 2 channel meander wave lengths
Whole Tree	48	EA	1 per structure
Small Woody Debris	149	CY	3 CY per structure
Racking Material	143	EA	3 per structure
Channel Spanning Jam	4	EA	No. varies by reach
Log with Rootwad	12	EA	3 per structure
Small Woody Debris	12	CY	3 CY per structure
Racking Material	12	EA	3 per structure
Wood Habitat Structure	48	EA	1 every 2 channel meander wave lengths
Log with Rootwad	191	EA	4 per structure
Small Woody Debris	143	CY	3 CY per structure
Racking Material	143	EA	3 per structure
Turning Log Structure	24	EA	1 every 4 channel meander wave lengths
Log with Rootwad	96	EA	4 per structure
Small Woody Debris	72	CY	3 CY per structure
Racking Material	72	EA	3 per structure
Boulders	48	EA	2 per structure
Backwater Alcove	2	EA	No. varies by reach
Log with Rootwad	20	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Split Flow Side Channel	0	EA	None
Log with Rootwad	0	EA	4 per structure
Side Channel	0	EA	None
Log with Rootwad	0	EA	4 per structure
Alternating Bank Jam Structure	7	EA	No. varies by reach
Log with Rootwad	27	EA	4 per structure
Small Woody Debris	20	CY	3 CY per structure
Racking Material	20	EA	3 per structure
Existing Boulder Apex Jam	2	EA	No. varies by reach
Log with Rootwad	6	EA	3 per structure
Small Woody Debris	6	CY	3 CY per structure
Racking Material	6	EA	3 per structure
Whole Tree Habitat Structure	7	EA	No. varies by reach
Whole Tree	7	EA	1 per structure
Small Woody Debris	22	CY	3 CY per structure
Racking Material	22	EA	3 per structure
Existing boulder Channel Spanning Jam	2	EA	No. varies by reach
Log with Rootwad	6	EA	3 per structure
Small Woody Debris	6	CY	3 CY per structure
Racking Material	6	EA	3 per structure
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	517	EA	4840 plants per acre
Zone 3	408	EA	3825 plants per acre
Zone 4	8,285	EA	4840 plants per acre
Seeding			
Zone 2	0.11	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.11	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	1.71	AC	16' width each side of channel; 19.02 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF2
Valley County, Idaho

Draft

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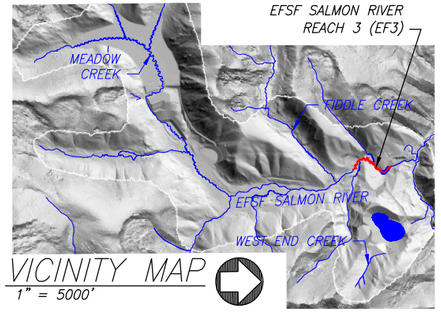
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF2 Quantities

Drawing No.
EF2-4

LOCATION: R:\PROJECTS\SF_SALMON_JAC\GIS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF2_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

EF3 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
EF3A	749	924	1.2	5.64	4.57
EF3B	1,079	1,464	1.4	6.24	4.60
EF3C	668	811	1.2	5.53	4.55
EF3D	164	169	1.0	4.30	4.17

EF3 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
EF3	3,368	1,958

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING THE YELLOW PINE PIT BACKFILL GRADING IS CONSIDERED PRELIMINARY AND WILL CHANGE IN FUTURE DESIGN PHASES AS THE YELLOW PINE PIT BACKFILL, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED EFSFSR, HENNESSY CREEK, OR MIDNIGHT CREEK CHANNELS.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEET EF3-4 AND EF3-5 FOR WETLAND DESIGN.

EAST FORK SOUTH FORK SALMON RIVER REACH 3 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

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Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF3
Valley County, Idaho

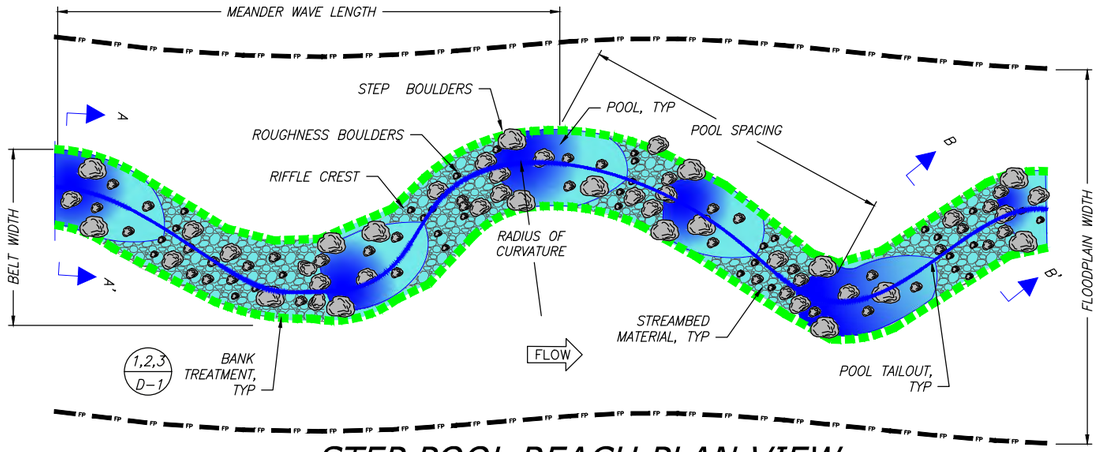
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF3 Overview Sheet

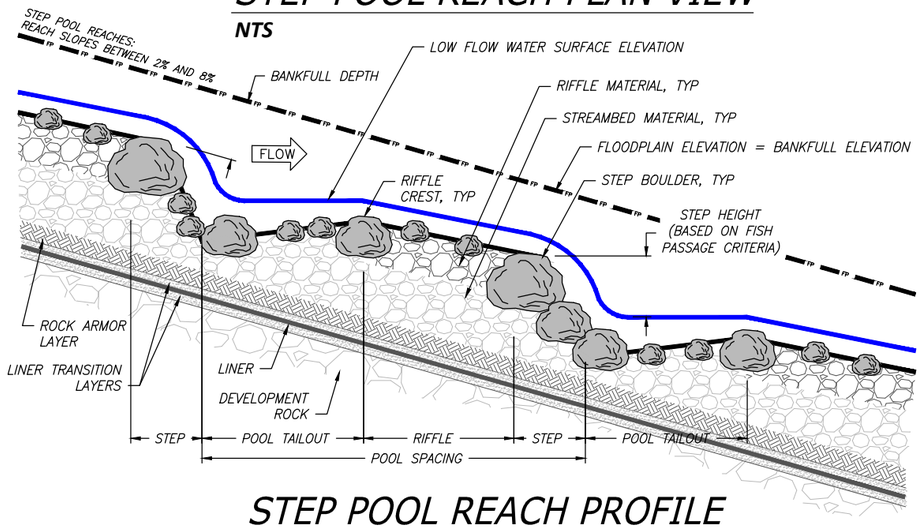
Drawing No.
EF3-1

LOCATION: R:\PROJECTS\SF_SALMON_HUGH\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF3_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE:3/5/2021



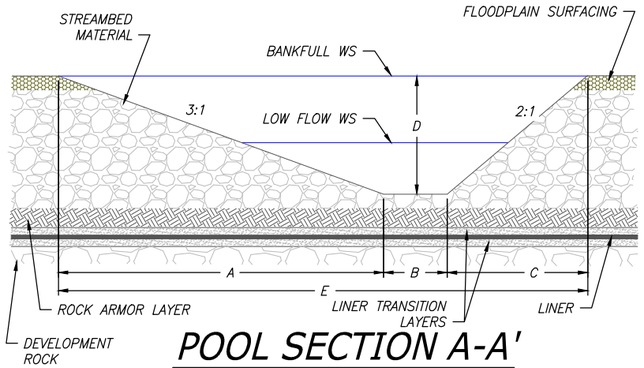
STEP POOL REACH PLAN VIEW

NTS



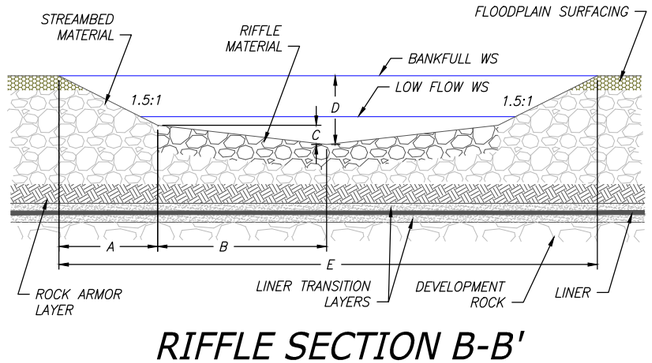
STEP POOL REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.
2. ROCK ARMOR LAYER TO SPAN CHANNEL WIDTH, AS SHOWN, CONTINUOUSLY ALONG LONGITUDINAL PROFILE.
3. ROCK ARMOR LAYER TO SPAN VALLEY WIDTH, AS SHOWN, AT STRATEGIC LOCATIONS (TBD) ALONG LONGITUDINAL PROFILE.

EF3 – STEP POOL REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE

REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
EF3A	215	27	16	1.7	265 - 340	150 - 180	40 - 165	110 - 340	180 - 360
EF3B	227	28	16	1.7	270 - 345	150 - 180	40 - 165	110 - 345	180 - 360
EF3C	234	28	16	1.7	270 - 350	155 - 180	40 - 165	110 - 350	180 - 360
EF3D	235	28	16	1.7	270 - 350	155 - 180	40 - 165	110 - 350	180 - 360

PROFILE TABLE

REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
EF3A	45 - 310	25 - 65	20 - 45	10 - 24
EF3B	45 - 315	30 - 65	19 - 45	10 - 23
EF3C	45 - 320	30 - 65	19 - 45	10 - 23
EF3D	45 - 320	30 - 65	19 - 45	10 - 23

MATERIALS TABLE

REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
EF3A								
EF3B								
EF3C								
EF3D								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE

REACH ID	SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
EF3A	POOL SECTION A - A'	12.8	8.6	8.5	4.3	29.8
EF3B		12.8	9.1	8.5	4.3	30.4
EF3C		12.8	9.4	8.5	4.3	30.7
EF3D		12.8	9.4	8.5	4.3	30.7
EF3A	RIFFLE SECTION B - B'	2.2	11.1	0.7	2.2	27.1
EF3B		2.1	11.9	0.8	2.2	27.6
EF3C		2.0	12.6	0.8	2.2	27.9
EF3D		2.0	27.6	1.8	3.2	27.9

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF3
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF3 Typical Plan and Profile

Drawing No.
EF3-2

LOCATION: R:\PROJECTS\SF_SALMON_JHJ09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF3_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/5/2021

DETAILED QUANTITIES

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF3
Valley County, Idaho

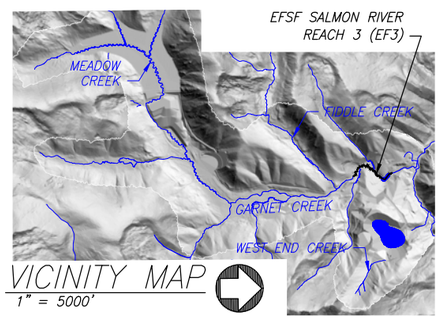
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF3 Quantities

Drawing No.
EF3-3

LOCATION: R:\PROJECTS\SF_SALMON_HUCKO\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF3_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE:3/5/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

EFSFSR DIVERSION TUNNEL ABANDONED FOLLOWING CLOSURE OF YELLOW PINE DRSF
HENNESSY CREEK EXISTING ALIGNMENT
PROPOSED HENNESSY CREEK CHANNEL ALIGNMENT SEE HC1&2 OVERVIEW SHEET (DRAWING HC1&2-1)
ENERGY DISSIPATION BASIN
STIBNITE ROAD
PROPOSED EFSFSR CHANNEL ALIGNMENT EF3A
PROPOSED EFSFSR CHANNEL ALIGNMENT EF3B
HIGH FLOW NON-PERENNIAL CHANNEL, TYP
STREAM CORRIDOR LINER LIMIT
MAXIMUM DISTURBANCE LIMITS
MATCHLINE SHEET EF4-1
FLOODPLAIN WIDTH
PROPOSED EFSFSR CHANNEL ALIGNMENT EF4C
PROPOSED EFSFSR CHANNEL ALIGNMENT EF3C
EXISTING YELLOW PINE PIT LAKE
HIGH FLOW NON-PERENNIAL CHANNEL, TYP
MATCHLINE SHEET EF2-3
EFSFSR EXISTING ALIGNMENT
TIE PROPOSED FLOODPLAIN INTO EXISTING FLOODPLAIN
PROPOSED MIDNIGHT CREEK CHANNEL ALIGNMENT MNC2
TIE PROPOSED FLOODPLAIN INTO EXISTING FLOODPLAIN, TYP
EXISTING NON-PERENNIAL CHANNEL, TYP
ENERGY DISSIPATION BASIN
EXISTING SEEP, TYP
MIDNIGHT CREEK EXISTING ALIGNMENT
EFSFSR EXISTING ALIGNMENT
PROPOSED MIDNIGHT CREEK CHANNEL ALIGNMENT SEE MNC1
YELLOW PINE PIT LAKE LIKE FEATURE
FLOW

EAST FORK SOUTH FORK SALMON RIVER REACH 3 – RESTORATION REACH WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF3
Valley County, Idaho

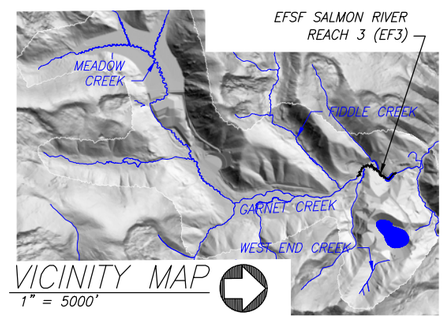
Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
EF3 Wetland Overview Sheet

Drawing No.
EF3-4

LOCATION: C:\USERS\NICK.STRYKER\DESKTOP\20-FILES\NICK\DRIVE\SITE\01-BIO\20201201-BIO-MRAS_STREAM_RESTORATION\LAYOUT_EF\WETLANDS\SHEETS\20200908\PRODUCTION\EF3_WETLANDS.DWG PLOT DATE: 1/1/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

HENNESSY CREEK EXISTING ALIGNMENT
ENERGY DISSIPATION BASIN
PROPOSED HENNESSY CREEK CHANNEL ALIGNMENT HC1 & 2
MAXIMUM DISTURBANCE LIMITS
STIBNITE ROAD
HIGH FLOW NON–PERENNIAL CHANNEL, TYP
PROPOSED EFSFSR CHANNEL ALIGNMENT EF3B
MATCHLINE SHEET EF2-3
TIE PROPOSED FLOODPLAIN INTO EXISTING FLOODPLAIN
HIGH FLOW NON–PERENNIAL CHANNEL, TYP
EXISTING YELLOW PINE PIT LAKE
FLOODPLAIN WIDTH
PROPOSED EFSFSR CHANNEL ALIGNMENT EF3
MATCHLINE SHEET EF4-1
EFSFSR EXISTING ALIGNMENT
PROPOSED MIDNIGHT CREEK CHANNEL ALIGNMENT SEE MNC2 OVERVIEW SHEET (SHEET MNC2–1)
TIE PROPOSED FLOODPLAIN INTO EXISTING FLOODPLAIN, TYP
ENERGY DISSIPATION BASIN
MIDNIGHT CREEK EXISTING ALIGNMENT
EFSFSR EXISTING ALIGNMENT
PROPOSED MIDNIGHT CREEK CHANNEL ALIGNMENT SEE MNC1 OVERVIEW SHEET (SHEET MNC1–1)
YELLOWPINE PIT LAKE–LIKE FEATURE

EAST FORK SOUTH FORK SALMON RIVER REACH 3 – RESTORATION REACH WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF3
Valley County, Idaho

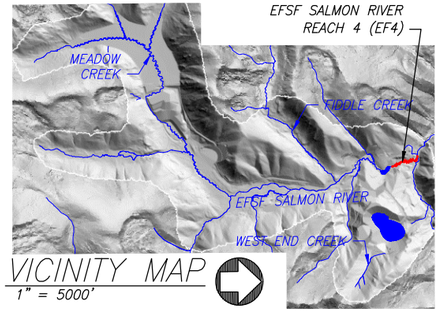
Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
EF3 Wetland Planting Sheet

Drawing No.
EF3–5

LOCATION: C:\USERS\BRICK.STRYKER.DESKTOP\ONEDRIVE - BIOMAS\2020\BIO-MP\AS_BUILTS\AM_BESTSHEETS\2020\BIOMAS PRODUCTION\EF3_WETLANDS.DWG PLOT DATE: 1/1/2021



VICINITY MAP
1" = 5000'

EF4 EXISTING CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
EF4	2,070	2,274	1.1	4.66	4.24

EF4 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
EF4	2,274	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING THE YELLOW PINE PIT GRADING IS CONSIDERED PRELIMINARY AND WILL CHANGE IN FUTURE DESIGN PHASES AS THE YELLOW PINE PIT BACKFILL, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. REACH EF4 IS AN ENHANCEMENT-ONLY REACH CONSISTING OF HABITAT ENHANCEMENT BY MEANS OF STRATEGIC REGRADING OF THE CHANNEL (LIMITED TO THE ADDITION OF CONSTRUCTED RIFFLES, DEEP POOL FISH HABITAT FOR IMPROVED REARING AND REFUGE DURING SUMMER AND WINTER EXTREMES), AND FLOODPLAIN REGRADING.
4. INDIVIDUAL HABITAT LOGS AND BOULDERS (NOT SHOWN) DISTRIBUTED THROUGHOUT REACH (KEYED IN, ANCHORED, OR BRACED) TO MEET HABITAT AND LARGE WOODY DEBRIS LOADING OBJECTIVES.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.

0 200 400 Feet

EFSF SALMON RIVER REACH 4 – ENHANCEMENT REACH SITE OVERVIEW PLAN

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF4
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF4 Overview Sheet

Drawing No.
EF4-1

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF4_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	High complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	1,263	CY	Assumes pool excavation every 4 bankfull widths
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	846	CY	
Engineered Streambed Material [3]	0	CY	
Sorting and Stockpiling [3]	0	CY	
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	421	CY	6" thichness in Zone 4
Liner	0	SF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	5	EA	1 every 4 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	15	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	10	CY	2 CY per structure
Racking Material	10	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	0	EA	None
Log with Rootwad	0	EA	1 per structure
Retaining Log	0	EA	1 per structure
Tight Radius Jam Structure	5	EA	1 every 4 channel meander wave lengths
Foundation Logs	36	EA	3 per structure
Log with Rootwad	31	EA	3 per structure
Small Woody Debris	67	CY	7 CY per structure
Racking Material	72	EA	7 per structure
Bend Jam Structure	10	EA	1 every 2 channel meander wave lengths
Foundation Logs	21	EA	2 per structure
Log with Rootwad	31	EA	3 per structure
Whole Tree	21	EA	1 per structure
Small Woody Debris	133	CY	13 CY per structure
Racking Material	154	EA	15 per structure
Sweeper Log Structure	21	EA	1 every 1 channel meander wave lengths
Whole Tree	21	EA	1 per structure
Small Woody Debris	62	CY	3 CY per structure
Racking Material	62	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	5	EA	1 every 4 channel meander wave lengths
Log with Rootwad	21	EA	4 per structure
Small Woody Debris	15	CY	3 CY per structure
Racking Material	15	EA	3 per structure
Turning Log Structure	5	EA	1 every 4 channel meander wave lengths
Log with Rootwad	21	EA	4 per structure
Small Woody Debris	15	CY	3 CY per structure
Racking Material	15	EA	3 per structure
Boulders	10	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	158	EA	4840 plants per acre
Zone 3	125	EA	3825 plants per acre
Zone 4	2,527	EA	4840 plants per acre
Seeding			
Zone 2	0.03	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.03	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.52	AC	16' width each side of channel; 19.02 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
EFSFSR - Yellow Pine Pit - Reach EF4
Valley County, Idaho

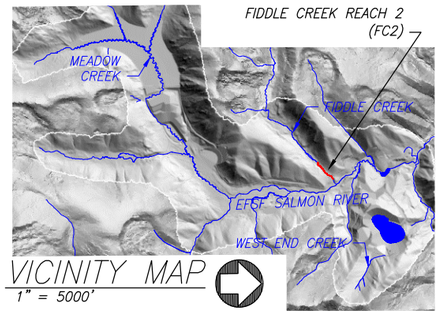
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
EF4 Quantities

Drawing No.
EF4-2

LOCATION: R:\PROJECTS\SF_SALMON_JHORV\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\EF4_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

FC2 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
FC2	1,544	1,798	1.2	9.20	7.90

FC2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
FC2	1,798	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. PORTIONS OF REACH FC1 MAY BE RELOCATED DURING MINE OPERATIONS TO ACCOMMODATE MINE FACILITIES.

FIDDLE CREEK REACH 2 - RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

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Stibnite Gold Project
ModPRO2
Fiddle Creek - Growth Media Stockpile - Reach FC2
Valley County, Idaho

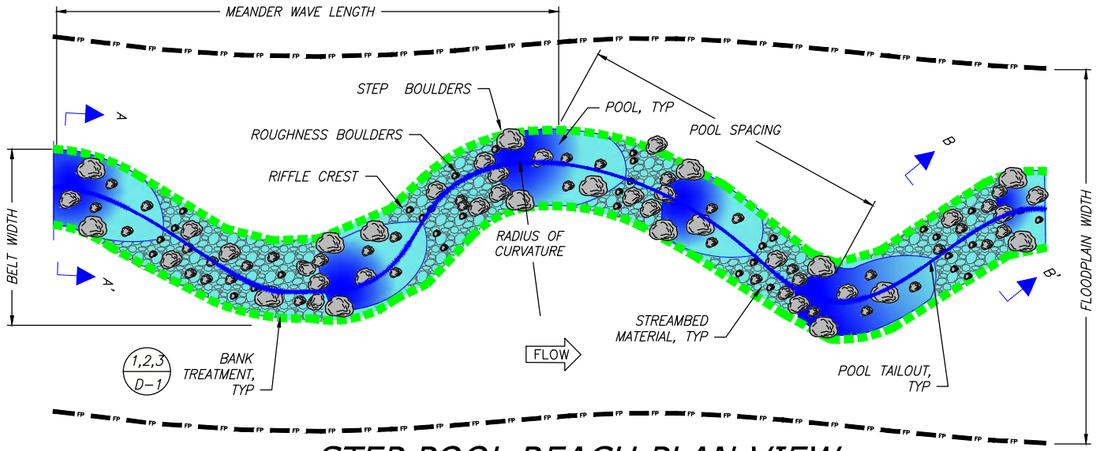
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
FC2 Overview Sheet - 1

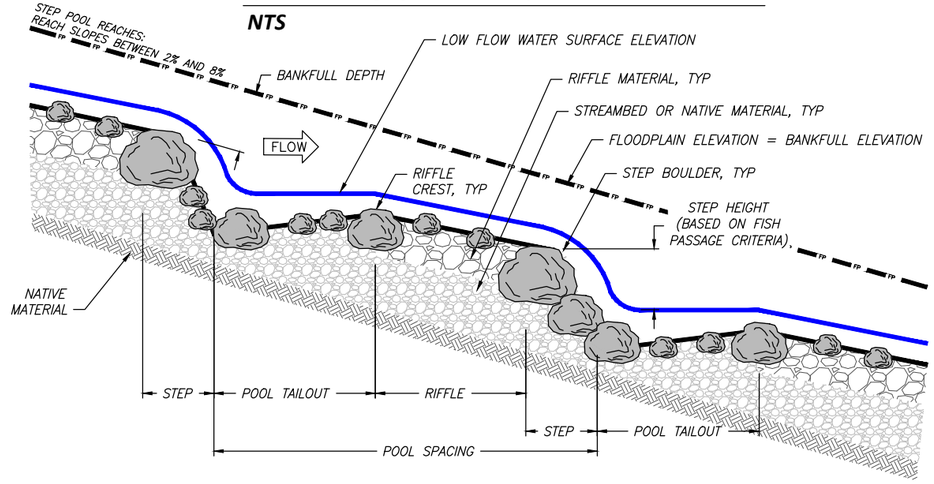
Drawing No.
FC2-1

LOCATION: R:\PROJECTS\SF_SALMON_JHJOB\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\FC2_FIDDLEDPSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



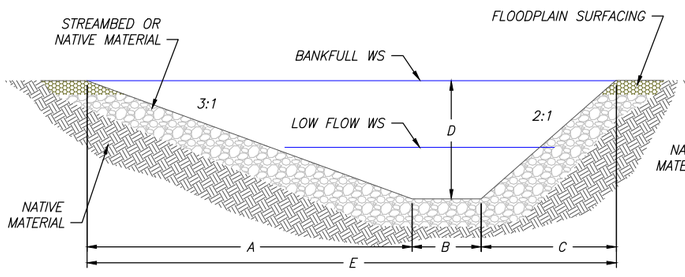
STEP POOL REACH PLAN VIEW

NTS



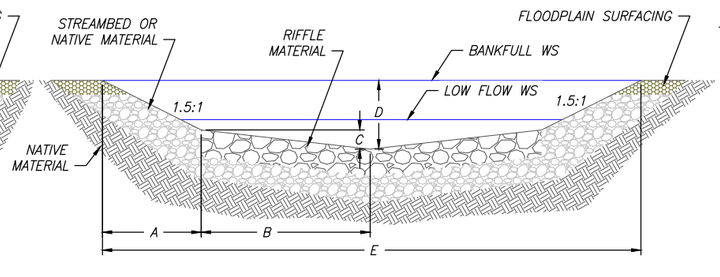
STEP POOL REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

FC2 – STEP POOL REACH
PROPOSED CHANNEL DEFINITION TABLES

TABLE – A

REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
FC2	16	9	12	0.7	90 - 115	45 - 45	15 - 55	35 - 115	70

TABLE – B

REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
FC2	15 - 105	10 - 20	24 - 45	12 - 29

NOTES

1. RIFFLE LENGTH INDICATED IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. SEE DISSIPATION POOL DETAILS FOR POOL LENGTH AND ASSOCIATED DIMENSIONS.

TABLE – C

REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING THICKNESS (FT)
FC2								

NOTES

1. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
2. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
3. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

TABLE – D

SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)	H (FT)
POOL SECTION A - A'	3.5	3.9	2.6	1.8	10.0			
RIFFLE SECTION B - B'	1.4	2.0	0.1	1.0	9.1			

NOTE

1. SEE DISSIPATION POOL DETAILS FOR POOL LENGTH AND ASSOCIATED DIMENSIONS.

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Fiddle Creek - Growth Media Stockpile - Reach FC2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
FC2 Typical Plan and Profile

Drawing No.
FC2-2

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\FC2_FIDDLEDRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 10% of cost pre-tax
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Haul Route Crossing Restoration			
Site Work	1	LS	Low complexity
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	1,951	CY	Channel ex including transitional channel and streambed material
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	1,294	CY	47 LF of new channel; 1.75 FT streambed thickness;
Sorting and Stockpiling [3]	1,294	CY	Includes Engineered Streambed Material and Rock Armoring/Grade Control
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	4,493	CY	12" thickness planting area
Liner	0	SF	
Transitional Channels			
Abandon and Restore In Place	0	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
Ct125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	2,158	LF	Assumes 60% of total length of bank treatment
Brushlayer Live Cuttings	4,315	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	604	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	719	LF	Assumes 20% of total length of bank treatment
Brushlayer Live Cuttings	1,438	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	101	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	36	EA	2 per channel meander wave length
Riffle Material	233	CY	No. of riffles x 101 FT length x 50.5 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	9	EA	1 every 2 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	27	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	18	CY	2 CY per structure
Racking Material	18	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	45	EA	1 per 40 linear feet of new channel
Log with Rootwad	45	EA	1 per structure
Retaining Log	45	EA	1 per structure
Tight Radius Jam Structure	3	EA	1 every 6 channel meander wave lengths
Foundation Logs	21	EA	3 per structure
Log with Rootwad	18	EA	3 per structure
Small Woody Debris	39	CY	7 CY per structure
Racking Material	42	EA	7 per structure
Bend Jam Structure	3	EA	1 every 6 channel meander wave lengths
Foundation Logs	6	EA	2 per structure
Log with Rootwad	9	EA	3 per structure
Whole Tree	6	EA	1 per structure
Small Woody Debris	39	CY	13 CY per structure
Racking Material	45	EA	15 per structure
Sweeper Log Structure	9	EA	1 every 2 channel meander wave lengths
Whole Tree	9	EA	1 per structure
Small Woody Debris	27	CY	3 CY per structure
Racking Material	27	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	3	EA	1 every 6 channel meander wave lengths
Log with Rootwad	12	EA	4 per structure
Small Woody Debris	9	CY	3 CY per structure
Racking Material	9	EA	3 per structure
Turning Log Structure	3	EA	1 every 6 channel meander wave lengths
Log with Rootwad	12	EA	4 per structure
Small Woody Debris	9	CY	3 CY per structure
Racking Material	9	EA	3 per structure
Boulders	6	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre
Zone 2	400	EA	4840 plants per acre
Zone 3	5,480	EA	3825 plants per acre
Zone 4	6,147	EA	4840 plants per acre
Transitional Channel	0	EA	4784 plants per acre
Seeding			
Zone 2	0.08	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	1.43	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	1.27	AC	16' width each side of channel; 19.02 pure live seed/AC
Transitional Channel	0.00	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Fiddle Creek - Growth Media Stockpile - Reach FC2
Valley County, Idaho

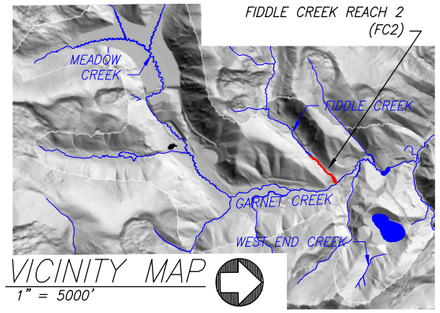
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
FC2 Quantities

Drawing No.
FC2-3

LOCATION: R:\PROJECTS\SF_SALMON_JACOBS\STIBNITE_RESTORATION_MDAS\CAD\PRODUCTION\FC2_FIDDLEDRSF_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

0 200 400 Feet

FIDDLE CREEK REACH 2 – RESTORATION REACH
WETLAND OVERVIEW SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Fiddle Creek - Growth Media Stockpile - Reach FC2
Valley County, Idaho

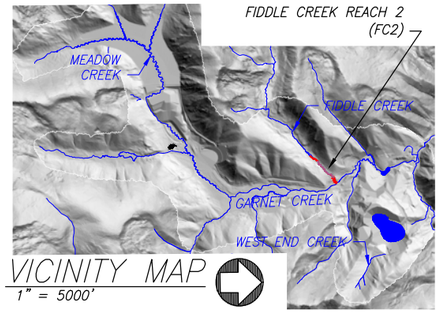
Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: ––

Drawing Name
FC2 Wetland Overview Sheet

Drawing No.
FC2–4

LOCATION: C:\USERS\BROX.STRIKER\DESKTOP\09-FI EXCHG\RECEIVED 8\20210720 RIO--MEMS_STREAM_RESTORATIONLAYOUT_FISHWETLANDSHEETS\20200806\PRODUCTION\FC2_WETLANDS.DWG PLOT DATE: 3/4/2021



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF PROPOSED WETLANDS.

0 200 400 Feet

FIDDLE CREEK REACH 2 – RESTORATION REACH WETLAND PLANTING SHEET

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Fiddle Creek - Growth Media Stockpile - Reach FC2
Valley County, Idaho

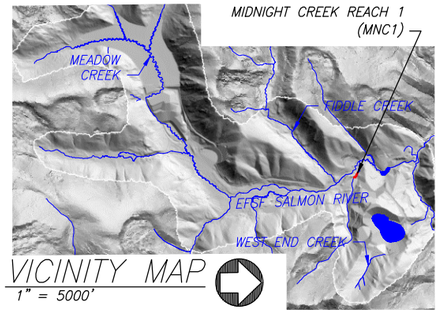
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	--

Drawing Name
FC2 Wetland Planting Sheet

Drawing No.
FC2-5

LOCATION: C:\USERS\BROX.STRYKER\DESKTOP\09-FISCHER\REVISED\01092021\RO-MEMS_STREAM_RESTORATIONLAYOUT_FISHER\EJMSHEETS\20200609\PRODUCTION\FC2_WETLANDS.DWG PLOT DATE: 3/4/2021



VICINITY MAP
1" = 5000'

MNC1 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MNC1	440	468	1.1	12.73	11.97

MNC1 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MNC1	3,017	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING THE YELLOW PINE PIT BACKFILL GRADING IS CONSIDERED PRELIMINARY AND WILL CHANGE IN FUTURE DESIGN PHASES AS THE YELLOW PINE PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED EFSFSR, OR MIDNIGHT CREEK CHANNELS.

0 200 400 Feet

MIDNIGHT CREEK REACH 1 - RESTORATION REACH SITE OVERVIEW PLAN

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Midnight Creek - Yellow Pine Pit - Reach MNC1
Valley County, Idaho

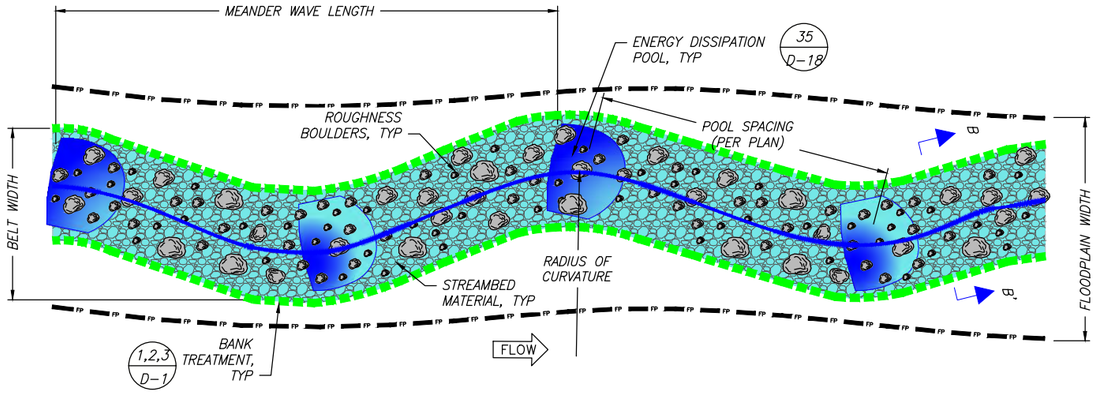
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MNC1 Overview Sheet

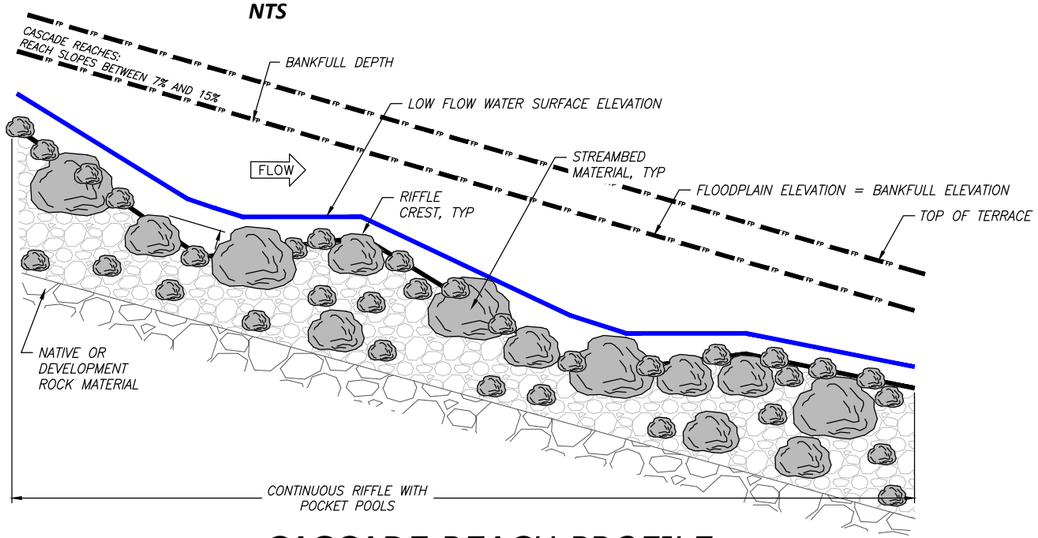
Drawing No.
MNC1-1

LOCATION: R:\PROJECTS\SF_SALMON_HUSKY\STIBNITE_RESTORATION_MDA\CAD\PRODUCTION\MNC1_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



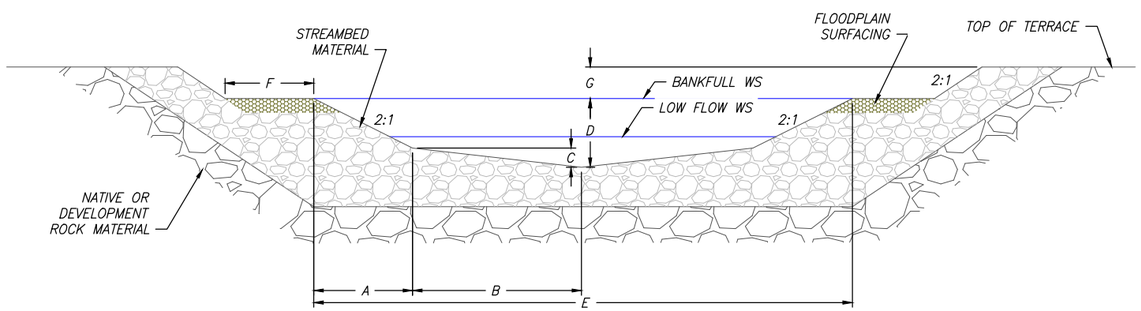
CASCADE REACH PLAN VIEW

NTS



CASCADE REACH PROFILE

NTS



RIFFLE SECTION B-B'

NTS

NOTES
1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. CASCADE REACHES ARE NOT EXPECTED TO HAVE BANK TREATMENT TYPES OR HABITAT STRUCTURES.
4. SEE SHEET D-18 FOR DISSIPATION POOL DETAILS.
5. LOCATION OF CASCADE REACH DISSIPATION POOLS ARE SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS. ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.

MNC1 – CASCADE REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE

REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MNC1	9	7	9	0.7	NA	NA	NA	NA	NA

PROFILE TABLE

REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MNC1	NA	NA	NA	NA

NOTES
1. RIFFLE LENGTH INDICATED IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. SEE DISSIPATION POOL DETAILS FOR POOL LENGTH AND ASSOCIATED DIMENSIONS.

MATERIALS TABLE

REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)

NOTES
1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTION TABLE

SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)
RIFFLE SECTION B - B'	1.2	2.0	0.1	0.9	6.5	5.0	2.0

NOTE
1. SEE DISSIPATION POOL DETAILS FOR POOL LENGTH AND ASSOCIATED DIMENSIONS.

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Midnight Creek - Yellow Pine Pit - Reach MNC1
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MNC1 Typical Plan and Profile

Drawing No.
MNC1–2

LOCATION: R:\PROJECTS\SF_SALMON_JAUSO\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MNC1_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of cost pre-tax, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	2,231	CY	Channel ex including transitional channel and streambed material
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	1,662	CY	468 LF of new channel; 1.75 FT streambed thickness;
Sorting and Stockpiling [3]	1,662	CY	Includes both Engineered Streambed Material and Rock Armoring
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	555	CY	12" thickness in Zone 4
Liner	0	SF	
Transitional Channels			
Abandon and Restore In Place	1,664	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	468	LF	Assumes 50% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	936	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	936	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	312	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	1,872	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	140	LF	Assumes 15% of total length of bank treatment
Brushlayer Live Cuttings	281	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	39	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	905	LF	Assumes 15% of total length of bank treatment (restoration and transitional)
Brushlayer Live Cuttings	1,810	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	127	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	13	EA	2 per channel meander wave length
Riffle Material	60	CY	No. of riffles x 6.5 FT length x 3.25 FT width; D100 thickness;
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	1	EA	1 every 8 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	2	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	2	CY	2 CY per structure
Racking Material	2	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	9	EA	1 per 50 linear feet of new channel
Log with Rootwad	9	EA	1 per structure
Retaining Log	9	EA	1 per structure
Tight Radius Jam Structure	0	EA	1 every 16 channel meander wave lengths
Foundation Logs	3	EA	3 per structure
Log with Rootwad	2	EA	3 per structure
Small Woody Debris	5	CY	7 CY per structure
Racking Material	6	EA	7 per structure
Bend Jam Structure	1	EA	1 every 8 channel meander wave lengths
Foundation Logs	2	EA	2 per structure
Log with Rootwad	2	EA	3 per structure
Whole Tree	2	EA	1 per structure
Small Woody Debris	11	CY	13 CY per structure
Racking Material	12	EA	15 per structure
Sweeper Log Structure	1	EA	1 every 8 channel meander wave lengths
Whole Tree	1	EA	1 per structure
Small Woody Debris	2	CY	3 CY per structure
Racking Material	2	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	1	EA	1 every 8 channel meander wave lengths
Log with Rootwad	3	EA	4 per structure
Small Woody Debris	2	CY	3 CY per structure
Racking Material	2	EA	3 per structure
Turning Log Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Boulders	0	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	104	EA	4840 plants per acre
Zone 3	82	EA	3825 plants per acre
Zone 4	1,664	EA	4840 plants per acre
Transitional Channel	10,078.03	EA	4784 plants per acre
Seeding			
Zone 2	0.02	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.02	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.34	AC	16' width each side of channel; 19.02 pure live seed/AC
Transitional Channel	2.11	AC	17.28 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Midnight Creek - Yellow Pine Pit - Reach MNC1
Valley County, Idaho

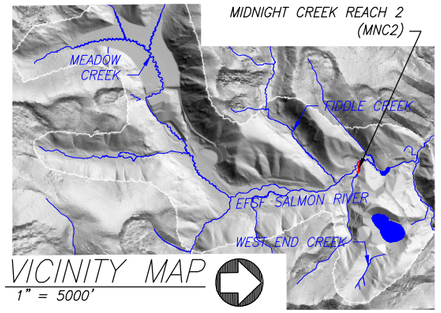
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MNC1 Quantities

Drawing No.
MNC1–3

LOCATION: R:\PROJECTS\SF_SALMON_JH\09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MNC1_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

MNC2 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
MNC2	749	863	1.2	5.24	4.57

MNC2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
MNC2	863	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING THE YELLOW PINE PIT BACKFILL GRADING IS CONSIDERED PRELIMINARY AND WILL CHANGE IN FUTURE DESIGN PHASES AS THE YELLOW PINE PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. NON-PERENNIAL STREAMS FROM SURROUNDING AREAS WILL BE ROUTED TO THE PROPOSED EFSFSR, HENNESSY CREEK, OR MIDNIGHT CREEK CHANNELS.
4. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEET EF3-4 THROUGH EF3-5 FOR WETLAND DESIGN.

0 200 400 Feet

MIDNIGHT CREEK REACH 2 - RESTORATION REACH SITE OVERVIEW PLAN

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Midnight Creek - Yellow Pine Pit - Reach MNC2
Valley County, Idaho

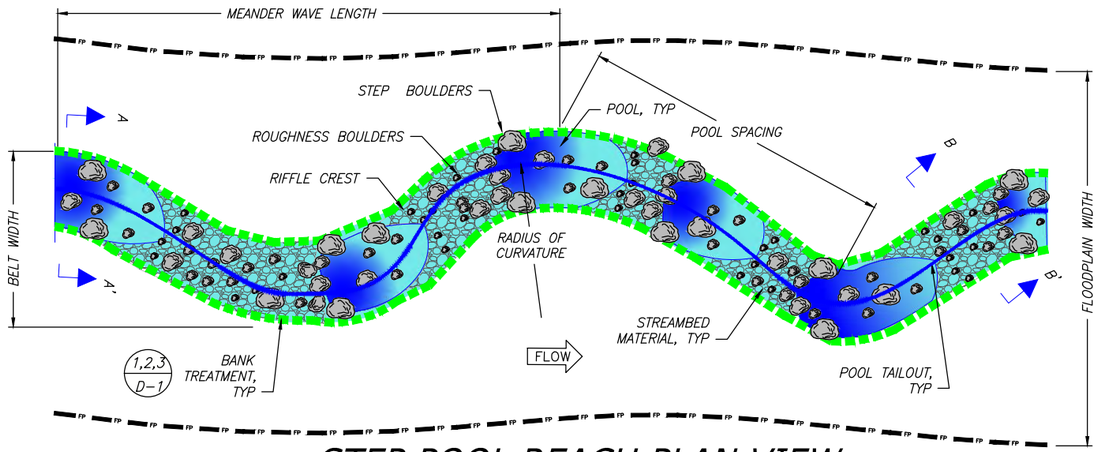
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MNC2 Overview Sheet

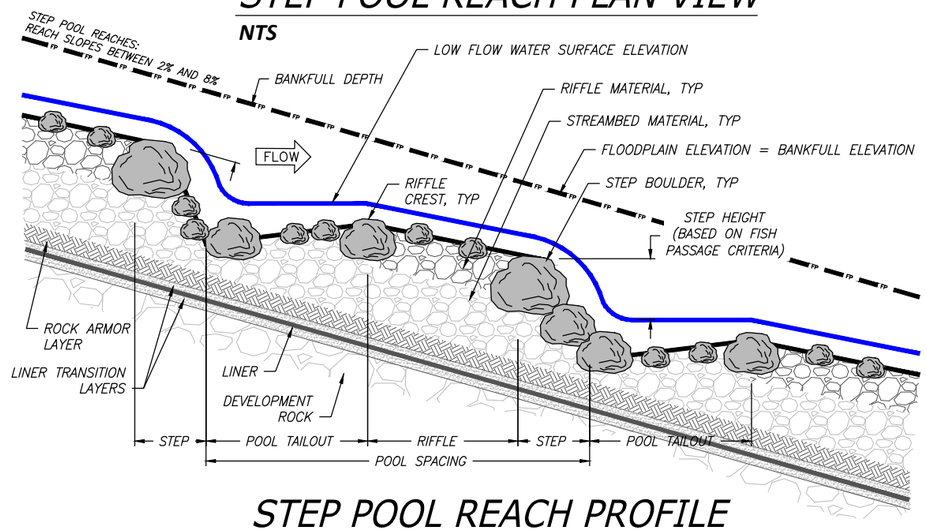
Drawing No.
MNC2-1

LOCATION: R:\PROJECTS\SF_SALMON_HUC90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MNC2_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



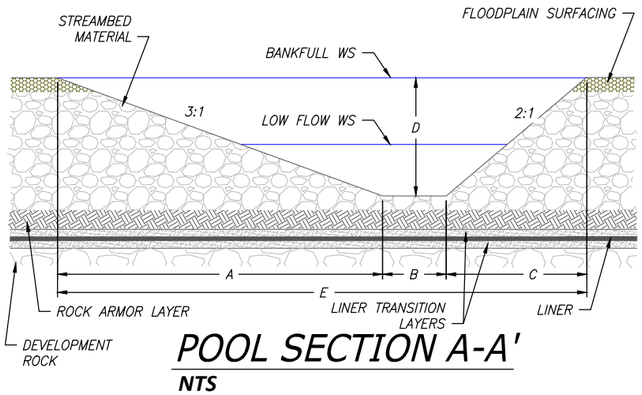
STEP POOL REACH PLAN VIEW

NTS



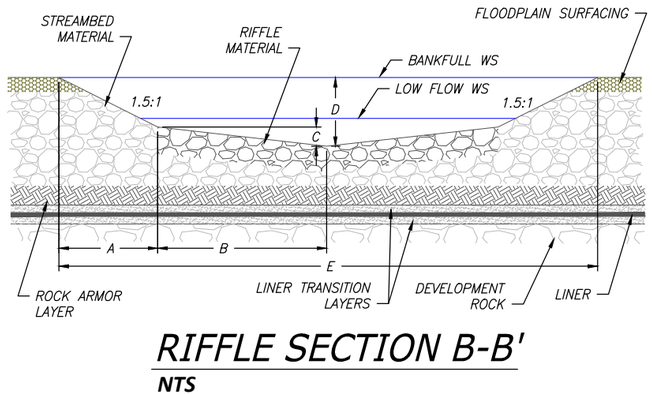
STEP POOL REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.
2. ROCK ARMOR LAYER TO SPAN CHANNEL WIDTH, AS SHOWN, CONTINUOUSLY ALONG LONGITUDINAL PROFILE.
3. ROCK ARMOR LAYER TO SPAN VALLEY WIDTH, AS SHOWN, AT STRATEGIC LOCATIONS (TBD) ALONG LONGITUDINAL PROFILE.

MNC2 – STEP POOL REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
MNC2	9	6	9	0.6	55 - 75	25 - 35	10 - 35	25 - 75	NA

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
MNC2	10 - 70	5 - 15	32 - 45	16 - 38

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
MNC2								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	3.0	0.5	3.0	1.5	6.5
RIFFLE SECTION B - B'	1.1	2.0	0.1	0.8	5.9

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Stibnite Gold Project
ModPRO2
Midnight Creek - Yellow Pine Pit - Reach MNC2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MNC2 Typical Plan and Profile

Drawing No.
MNC2-2

LOCATION: R:\PROJECTS\SF_SALMON_JHJ\09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MNC2_YELLOWPINE\T_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of cost pre-tax, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	527	CY	Channel ex including transitional channel and streambed material
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	379	CY	883 LF of new channel; 1.5 FT streambed thickness;
Sorting and Stockpiling [3]	379	CY	Includes both Engineered Streambed Material and Rock Armoring
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	0	CY	
Liner	0	SF	
Transitional Channels			
Abandon and Restore In Place	0	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	345	LF	Assumes 20% of total length of bank treatment
Brushlayer Live Cuttings	690	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	97	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	1,036	LF	Assumes 60% of total length of bank treatment
Brushlayer Live Cuttings	2,071	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	145	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	27	EA	2 per channel meander wave length
Riffle Material	35	CY	No. of riffles x 5.9 FT length x 2.95 FT width; D100 thickness;
Energy Dissipation Pool	1	EA	No. varies by reach
Boulders	30	EA	Based on bankfull width
Dissipation Pool Streambed Material	7	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	2	EA	1 every 8 channel meander wave lengths
Foundation Logs	0	EA	0 per structure
Log with Rootwad	5	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	3	CY	2 CY per structure
Racking Material	3	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	22	EA	1 per 40 linear feet of new channel
Log with Rootwad	22	EA	1 per structure
Retaining Log	22	EA	1 per structure
Tight Radius Jam Structure	1	EA	1 every 16 channel meander wave lengths
Foundation Logs	6	EA	3 per structure
Log with Rootwad	5	EA	3 per structure
Small Woody Debris	11	CY	7 CY per structure
Racking Material	12	EA	7 per structure
Bend Jam Structure	2	EA	1 every 8 channel meander wave lengths
Foundation Logs	3	EA	2 per structure
Log with Rootwad	5	EA	3 per structure
Whole Tree	3	EA	1 per structure
Small Woody Debris	22	CY	13 CY per structure
Racking Material	25	EA	15 per structure
Sweeper Log Structure	7	EA	1 every 2 channel meander wave lengths
Whole Tree	7	EA	1 per structure
Small Woody Debris	20	CY	3 CY per structure
Racking Material	20	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	2	EA	1 every 8 channel meander wave lengths
Log with Rootwad	7	EA	4 per structure
Small Woody Debris	5	CY	3 CY per structure
Racking Material	5	EA	3 per structure
Turning Log Structure	1	EA	1 every 16 channel meander wave lengths
Log with Rootwad	3	EA	4 per structure
Small Woody Debris	2	CY	3 CY per structure
Racking Material	2	EA	3 per structure
Boulders	2	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	192	EA	4840 plants per acre
Zone 3	152	EA	3825 plants per acre
Zone 4	0	EA	4840 plants per acre
Transitional Channel	0.00	AC	4784 plants per acre
Seeding			
Zone 2	0.04	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.04	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.00	AC	16' width each side of channel; 19.02 pure live seed/AC
Transitional Channel	0.00	AC	17.28 pure live seed/AC

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Midnight Creek - Yellow Pine Pit - Reach MNC2
Valley County, Idaho

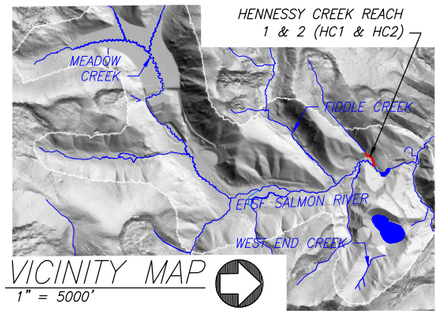
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
MNC2 Quantities

Drawing No.
MNC2-3

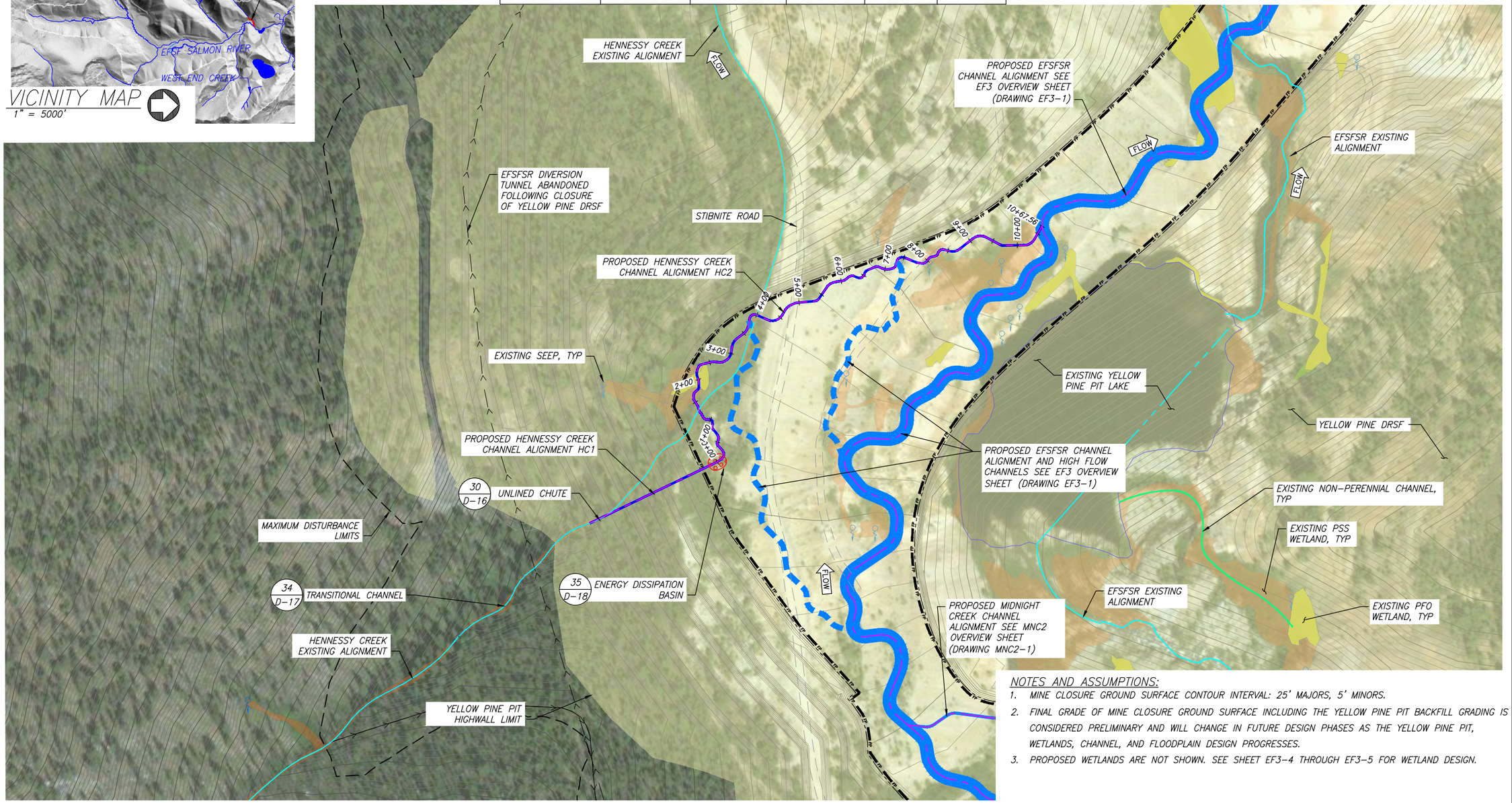
LOCATION: R:\PROJECTS\SF_SALMON_JAC\GIS\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\MNC2-YELLOWPINE\PIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

HC1 & HC2 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	CHANNEL SLOPE (%)
HC1	277	277	1.0	91.81	91.81
HC2	875	1,068	1.2	4.41	3.62

HC1 & HC2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
HC1	969	0
HC2	1,068	0



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE INCLUDING THE YELLOW PINE PIT BACKFILL GRADING IS CONSIDERED PRELIMINARY AND WILL CHANGE IN FUTURE DESIGN PHASES AS THE YELLOW PINE PIT, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. PROPOSED WETLANDS ARE NOT SHOWN. SEE SHEET EF3-4 THROUGH EF3-5 FOR WETLAND DESIGN.

HENNESSY CREEK REACH 1 & 2 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

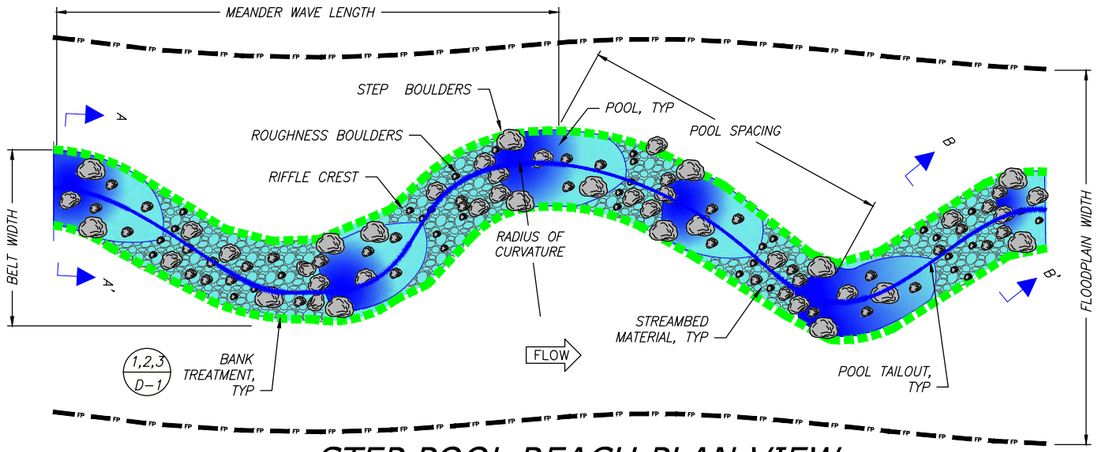
Stibnite Gold Project
ModPRO2
Hennessy Creek - Yellow Pine Pit - Reach HC1&2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

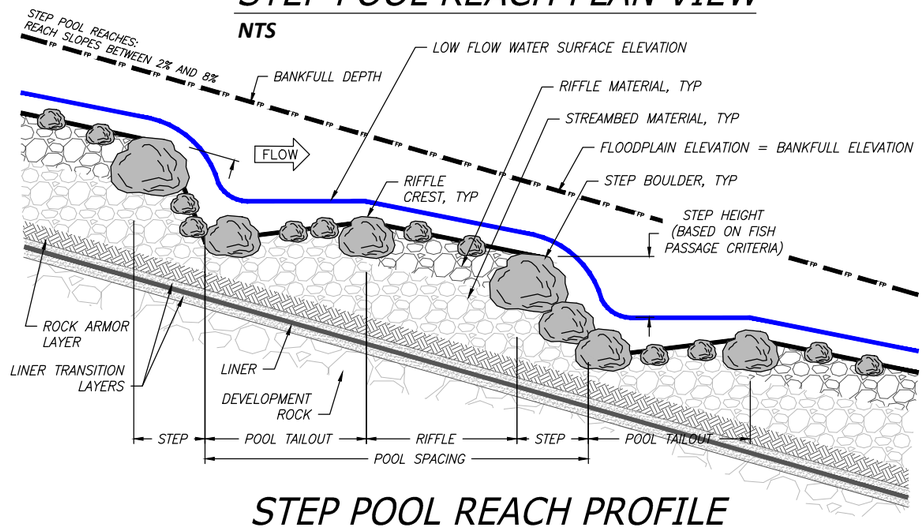
Drawing Name
HC1&2 Overview Sheet

Drawing No.
HC1&2-1



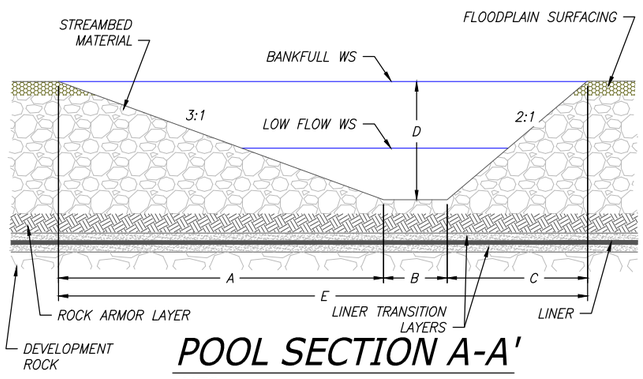
STEP POOL REACH PLAN VIEW

NTS



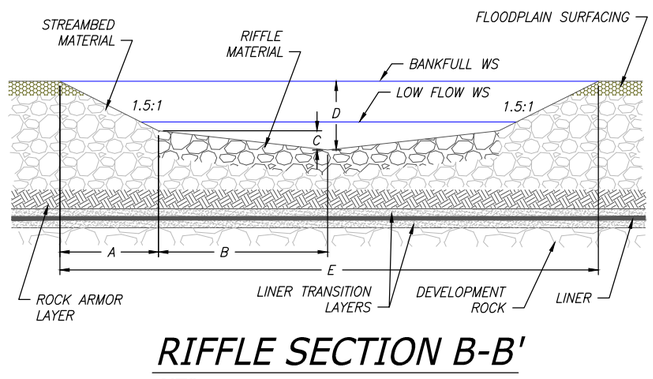
STEP POOL REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.
2. ROCK ARMOR LAYER TO SPAN CHANNEL WIDTH, AS SHOWN, CONTINUOUSLY ALONG LONGITUDINAL PROFILE.
3. ROCK ARMOR LAYER TO SPAN VALLEY WIDTH, AS SHOWN, AT STRATEGIC LOCATIONS (TBD) ALONG LONGITUDINAL PROFILE.

HC2 – STEP POOL REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
HC2	6	5	8	0.6	45 - 55	20 - 35	5 - 30	20 - 55	NA

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
HC2	5 - 55	5 - 10	41 - 45	20 - 49

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
HC2								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	3.0	-0.9	3.0	1.5	5.1
RIFFLE SECTION B - B'	1.1	2.0	0.1	0.8	4.6

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Perpetua Resources

Stibnite Gold Project
ModPRO2
Hennessy Creek - Yellow Pine Pit - Reach HC1&2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
HC1&2 Typical Plan and Profile

Drawing No.
HC1&2-2

LOCATION: R:\PROJECTS\SF_SALMON_JAUSO\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\HC2_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost pre-tax, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Haul Route Crossing Restoration			
Site Work	1	LS	Low complexity
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	603	CY	Channel Length * Top Width * (Depth + D100)
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	467	CY	1089 LF of new channel;1 FT streambed thickness;
Sorting and Stockpiling [3]	467	CY	Includes both Engineered Streambed Material and Rock Armoring
Rock Armoring/ Grade Control [3]	0	CY	
Ephemeral Swale Channel Material	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	0	CY	
Liner	0	SF	
Transitional Channels			
Abandon and Restore In Place	0	LF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	427	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	854	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	120	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	2,666	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	5,331	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	373	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	21	EA	1 per channel meander wave length
Riffle Material	11	CY	No. of riffles x 3.4 FT length x 1.7 FT width; D100 thickness;
Energy Dissipation Pool	1	EA	No. varies by reach
Boulders	11	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	3	EA	None
Foundation Logs	0	EA	0 per structure
Log with Rootwad	8	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	5	CY	2 CY per structure
Racking Material	5	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	12	EA	None
Log with Rootwad	12	EA	1 per structure
Retaining Log	12	EA	1 per structure
Tight Radius Jam Structure	2	EA	None
Foundation Logs	15	EA	3 per structure
Log with Rootwad	13	EA	3 per structure
Small Woody Debris	27	CY	7 CY per structure
Racking Material	29	EA	7 per structure
Bend Jam Structure	3	EA	None
Foundation Logs	7	EA	2 per structure
Log with Rootwad	10	EA	3 per structure
Whole Tree	7	EA	1 per structure
Small Woody Debris	45	CY	13 CY per structure
Racking Material	52	EA	15 per structure
Sweeper Log Structure	4	EA	None
Whole Tree	4	EA	1 per structure
Small Woody Debris	13	CY	3 CY per structure
Racking Material	13	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	3	EA	None
Log with Rootwad	14	EA	4 per structure
Small Woody Debris	10	CY	3 CY per structure
Racking Material	10	EA	3 per structure
Turning Log Structure	2	EA	None
Log with Rootwad	8	EA	4 per structure
Small Woody Debris	6	CY	3 CY per structure
Racking Material	6	EA	3 per structure
Boulders	4	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, Intended for anually wet areas
Zone 2	237	EA	4840 plants per acre
Zone 3	188	EA	3825 plants per acre
Zone 4	0	EA	4840 plants per acre
Transitional Channel	2,736	EA	plants per acre
Seeding		EA	
Zone 2	0.05	AC	1' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.05	AC	1' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.00	AC	16' width each side of channel; 19.02 pure live seed/AC
Transitional Channel	0.57	AC	pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Hennessy Creek - Yellow Pine Pit - Reach HC1&2
Valley County, Idaho

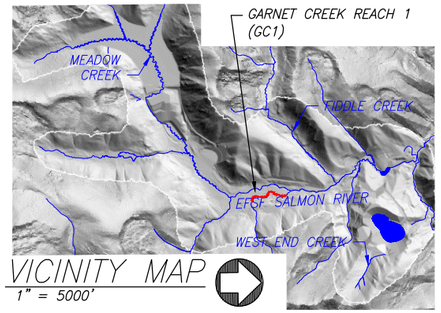
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
HC1&2 Quantities

Drawing No.
HC1&2-3

LOCATION: R:\PROJECTS\SF_SALMON_HUSKY\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\VIC2_YELLOWPINEPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

GC1 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
GC1	2,410	3,380	1.4	2.90	2.07

GC1 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
GC1	3,573	1,185

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. PORTIONS OF REACH GC1 MAY BE RELOCATED DURING MINE OPERATIONS TO ACCOMMODATE MINE FACILITIES.

GARNET CREEK REACH 1 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Garnet Creek - Processing Facility - Reach GC1
Valley County, Idaho

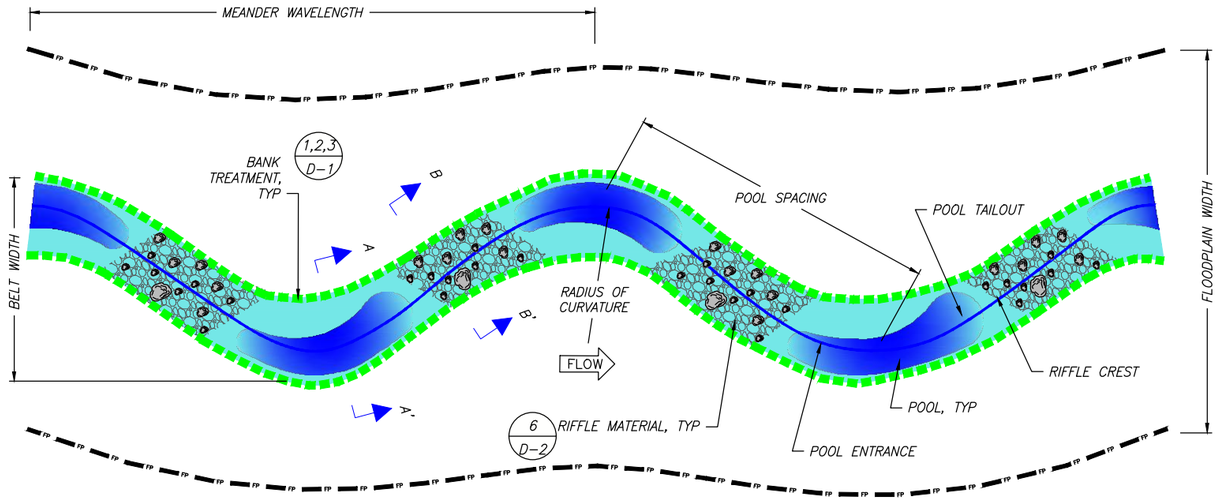
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
GC1 Overview Sheet

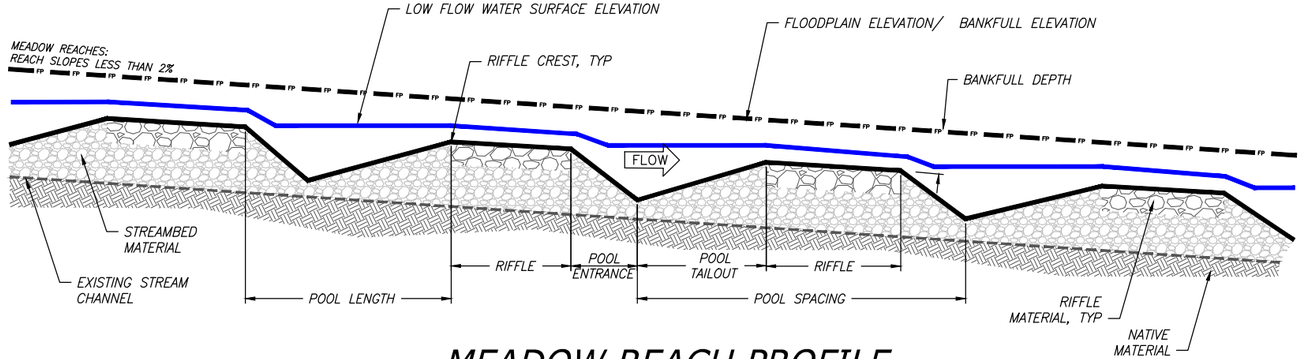
Drawing No.
GC1–1

LOCATION: R:\PROJECTS\SF_SALMON_JV\GIS\STIBNITE_RESTORATION_MINAS\CAD\PRODUCTION\GC1_PROCESSINGFACILITY_CONCEPTDESIGN.DWG PLOT DATE: 3/5/2021



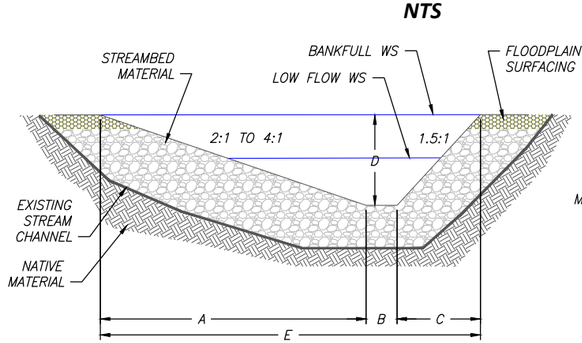
MEADOW REACH PLAN VIEW

NTS



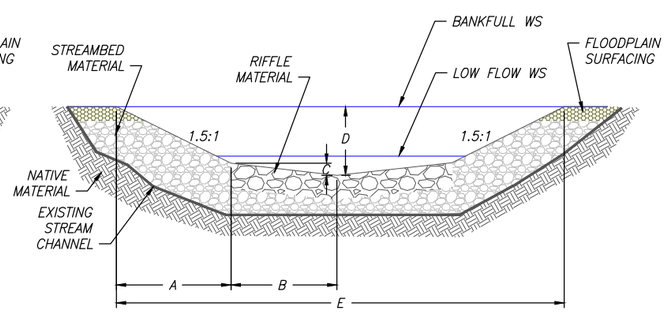
MEADOW REACH PROFILE

NTS



POOL SECTION A-A'

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. BANK TREATMENT TYPES ARE NOT DEPICTED IN THE TYPICAL POOL AND RIFFLE SECTIONS. SEE SHEETS D-1 AND D-2 FOR BANK TREATMENT DETAILS.
4. SEE SHEETS D-3 THROUGH D-10 FOR HABITAT STRUCTURE DETAILS.
5. HABITAT STRUCTURE SPACING AND ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.
7. SEE SHEETS D-13 THROUGH D-14 FOR TYPICAL FLOODPLAIN CROSS SECTIONS.

GC1 – MEADOW REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE									
REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
GC1	5	5	11	0.5	50 - 65	25 - 30	10 - 30	20 - 65	30 - 480

PROFILE TABLE				
REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
GC1	10 - 60	5 - 10	31 - 45	15 - 37

MATERIALS TABLE								
REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
GC1								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE					
SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	2.5	0.6	2.5	1.3	5.6
RIFFLE SECTION B - B'	0.6	2.0	0.2	0.6	5.1

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Garnet Creek - Processing Facility - Reach GC1
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
GC1 Typical Plan and Profile

Drawing No.
GC1–2

LOCATION: R:\PROJECTS\SF_SALMON_HUC\SOS\STIBNITE_RESTORATION_MDMS\CAD\PRODUCTION\GC1_PROCESSINGFACILITY_CONCEPTDESIGN.DWG PLOT DATE: 1/5/2021

DETAILED QUANTITIES

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Garnet Creek - Processing Facility - Reach GC1
Valley County, Idaho

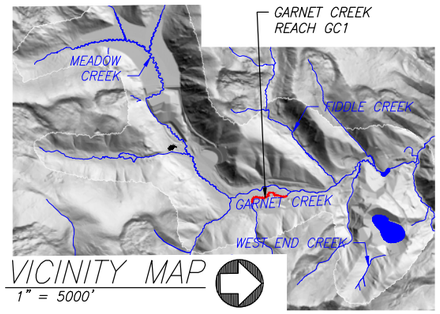
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

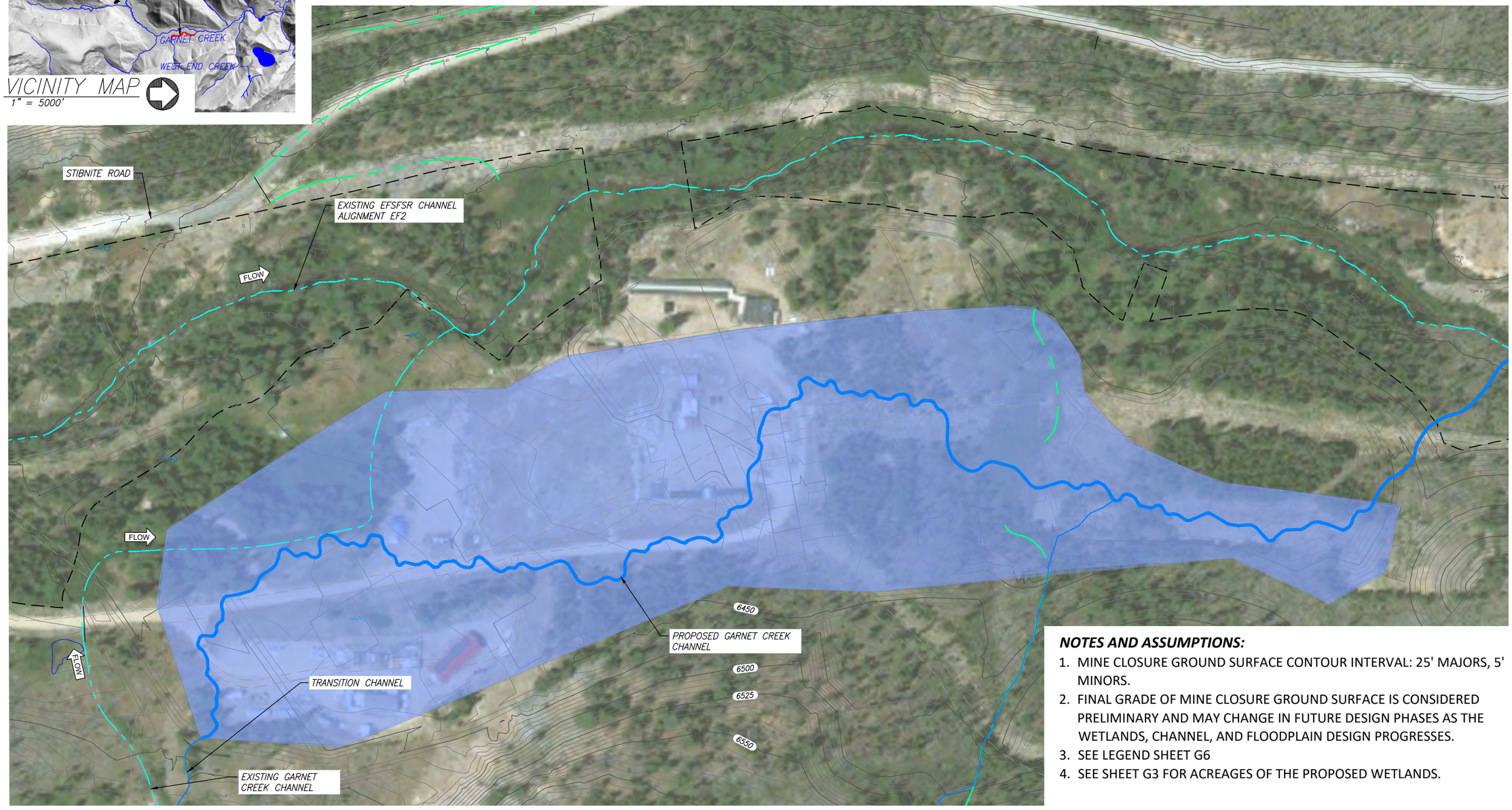
Drawing Name
GC1 Quantities

Drawing No.
GC1-3

LOCATION: R:\PROJECTS\SF_SALMON_JAG90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\GC1_PROCESSINGFACILITY_CONCEPTDESIGN.DWG PLOT DATE: 3/9/2021



VICINITY MAP
1" = 5000'



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

GARNET CREEK – REACH GC1
WETLAND OVERVIEW SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

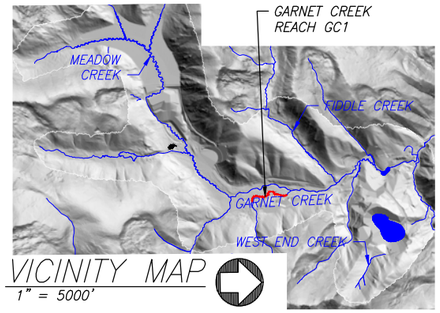
Stibnite Gold Project
ModPRO2
Garnet Creek - Reach GC1
Valley County, Idaho

Draft

Date: Mar. 2021
Designed: LC
Drawn: JHD
Checked: LC
Approved: --

Drawing Name
GC1 Wetland Overview Sheet

Drawing No.
GC1-4



VICINITY MAP
1" = 5000'

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. SEE LEGEND SHEET G6
4. SEE SHEET G3 FOR ACREAGES OF THE PROPOSED WETLANDS.

GARNET CREEK – REACH GC1
WETLAND PLANTING SHEET

0 200 400 Feet

TETRA TECH

Perpetua Resources

Stibnite Gold Project
ModPRO2
Garnet Creek - Reach GC1
Valley County, Idaho

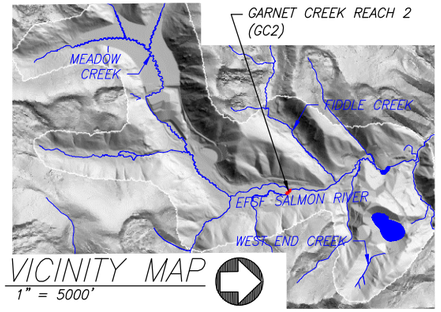
Draft

Date:	Mar. 2021
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	---

Drawing Name
GC1 Wetland Planting Sheet

Drawing No.
GC1-5

LOCATION: C:\USERS\RICK.STRICKER\DESKTOP\09-FLEXHO\REFSVER\BG0092020\BIO_MAPS\4_STREAM_RESTORATION\LAYOUT_FORMETLANDSHEETS\20200624\PRODUCTION\GC1_WETLANDS.DWG PLOT DATE: 3/1/2021



VICINITY MAP
1" = 5000'

GC2 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
GC2	402	420	1.0	12.49	11.95

GC2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
GC2	420	0

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. PORTIONS OF REACH GC2 MAY BE RELOCATED DURING MINE OPERATIONS TO ACCOMMODATE MINE FACILITIES.

GARNET CREEK REACH 2 - RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Garnet Creek - Processing Facility - Reach GC2
Valley County, Idaho

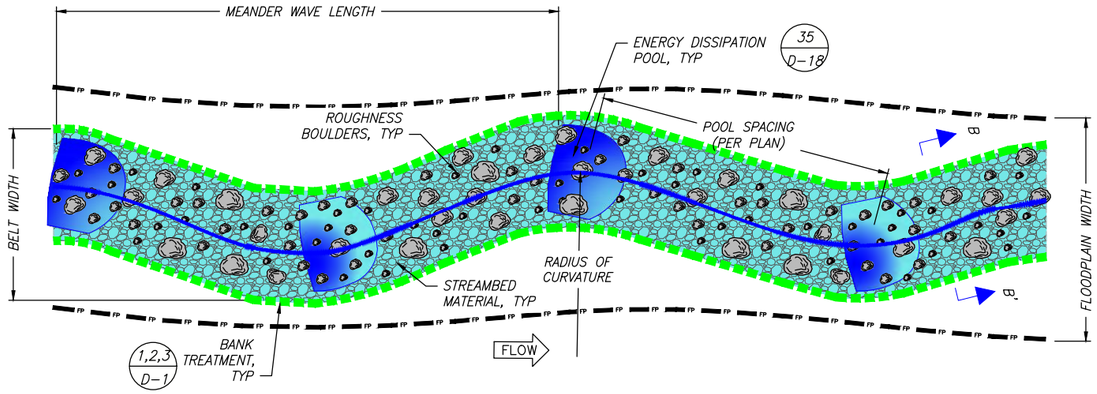
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
GC2 Overview Sheet

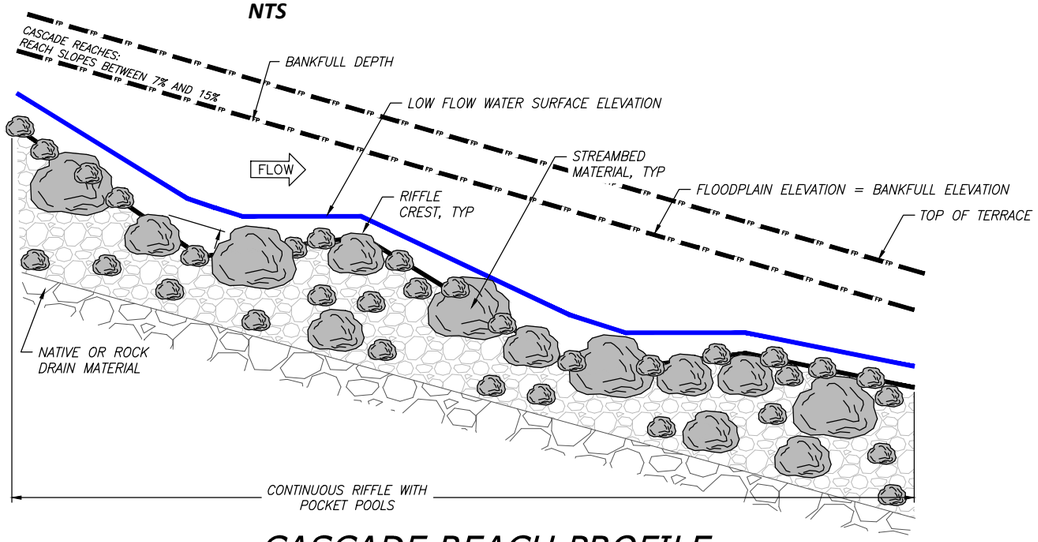
Drawing No.
GC2-1

LOCATION: R:\PROJECTS\SF_SALMON_HJ\GIS\STIBNITE_RESTORATION_MDA\GIS\CAD\PRODUCTION\GC2_PROCESSINGFACILITY_CONCEPTDESIGN.DWG PLOT DATE: 3/5/2021



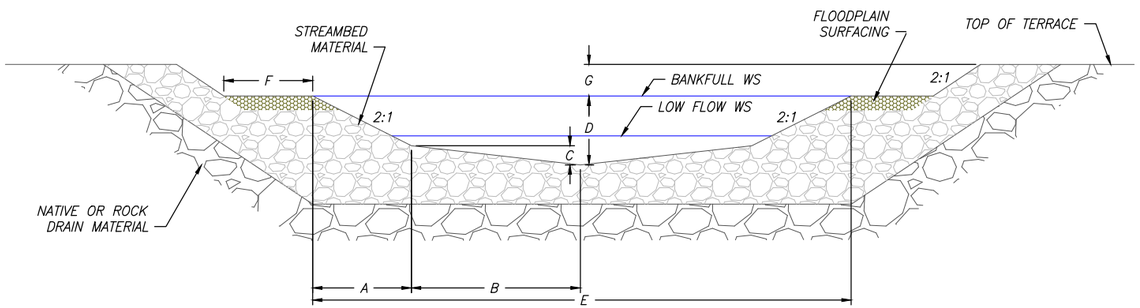
CASCADE REACH PLAN VIEW

NTS



CASCADE REACH PROFILE

NTS



RIFFLE SECTION B-B'

NTS

NOTES

1. CHANNEL AND FLOODPLAIN SHALL BE CONSTRUCTED TO THE DIMENSIONS IDENTIFIED IN THE CHANNEL DEFINITION TABLES AND AT THE LOCATIONS SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS.
2. CHANNEL SIZING FOR TYPICAL POOL AND RIFFLE CROSS SECTIONS IS BASED ON CHANNEL FORMING (BANKFULL) DESIGN FLOW. DETAILED TYPICAL SECTIONS FOR OTHER STREAM HABITATS WILL BE DEVELOPED IN A FUTURE DESIGN PHASE.
3. CASCADE REACHES ARE NOT EXPECTED TO HAVE BANK TREATMENT TYPES OR HABITAT STRUCTURES.
4. SEE SHEET D-18 FOR DISSIPATION POOL DETAILS.
5. LOCATION OF CASCADE REACH DISSIPATION POOLS ARE SHOWN IN INDIVIDUAL REACH OVERVIEW PLAN SHEETS. ASSOCIATED QUANTITIES ARE SUMMARIZED IN INDIVIDUAL REACH QUANTITY SHEETS.
6. SEE SHEETS D-1 AND D-21 FOR PLANTING AND SEEDING DETAILS AND PLANTING SCHEDULES.

GC2 – CASCADE REACH
PROPOSED CHANNEL DEFINITION TABLES

PLAN TABLE

REACH ID	BANKFULL FLOW (CFS)	BANKFULL WIDTH (FT)	WIDTH/ DEPTH RATIO	AVERAGE DEPTH AT BANKFULL (FT)	MEANDER WAVELENGTH (FT)	MEANDER BELT WIDTH (FT)	RADIUS OF CURVATURE (FT)	AVG POOL SPACING (FT)	FLOODPLAIN WIDTH (FT)
GC2	5	6	10	0.5	55 - 70	25 - 30	10 - 35	20 - 70	30 - 55

PROFILE TABLE

REACH ID	RIFFLE LENGTH (FT)	POOL LENGTH (FT)	POOL ENTRANCE SLOPE (%)	POOL TAILOUT SLOPE (%)
GC2	10 - 65	5 - 15	NA	NA

MATERIALS TABLE

REACH ID	STREAMBED MATERIAL TYPE	STREAMBED MATERIAL AVG THICKNESS (FT)	RIFFLE MATERIAL TYPE	RIFFLE MATERIAL AVG THICKNESS (FT)	FLOODPLAIN MATERIAL TYPE	FLOODPLAIN MATERIAL AVG THICKNESS (FT)	FLOODPLAIN SURFACING TYPE	FLOODPLAIN SURFACING AVG THICKNESS (FT)
GC2								

NOTES

1. MATERIALS TABLE TO BE DEVELOPED IN FUTURE DESIGN.
2. STREAMBED MATERIAL TYPES: S1 (D50 = XX"), S2 (D50 = XX"), S3 (D50 = XX").
3. RIFFLE MATERIAL TYPES: S1, S2, S3, R1 (D50 = XX"), R2 (D50 = XX").
4. FLOODPLAIN SURFACING MATERIAL TYPES: GROWTH MEDIA, ALGAE, HYDROMULCH, OR NONE.

SECTIONS TABLE

SECTION	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)
POOL SECTION A - A'	2.5	1.2	2.5	1.3	6.2
RIFFLE SECTION B - B'	0.8	1.0	0.1	0.6	5.6

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Garnet Creek - Processing Facility - Reach GC2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
GC2 Typical Plan and Profile

Drawing No.
GC2-2

LOCATION: R:\PROJECTS\SF_SALMON_JAC\PO\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\DC2_PROCESSINGFACILITY_CONCEPTDESIGN.DWG PLOT DATE:3/9/2021

DETAILED QUANTITIES

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Garnet Creek - Processing Facility - Reach GC2
Valley County, Idaho

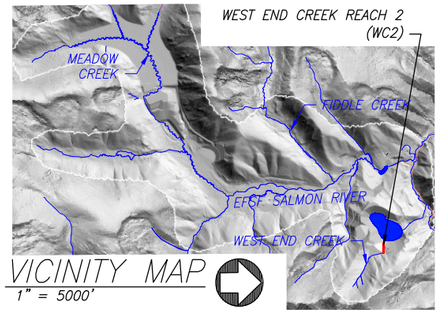
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
GC2 Quantities

Drawing No.
GC2-3

LOCATION: R:\PROJECTS\SF_SALMON_JAG\90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\GC2_PROCESSINGFACILITY_CONCEPTDESIGN.DWG PLOT DATE:3/9/2021



VICINITY MAP
1" = 5000'

WE2 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
WE2	904	934	1.0	75.22	72.81

WE2 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
WE2	0	934

NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON WEST END DRSF IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE DRSF, LINER, WETLANDS, CHANNEL, AND FLOODPLAIN DESIGN PROGRESSES.
3. WEST END PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGNS PROGRESS.

WEST END CREEK REACH 2 - RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
West end Creek - West End Pit - WE2
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
WE2 Overview Sheet

Drawing No.
WE2-1

LOCATION: R:\PROJECTS\SF_SALMON_JHUPOV\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\WE2_WESTENDPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost pre-tax, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Medium complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	154	CY	Channel ex including transitional channel and streambed material
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	125	CY	934 LF of new channel; 0.75 FT streambed thickness;
Sorting and Stockpiling [3]	680	CY	Includes both Engineered Stream Bed Material and Rock Armoring
Rock Armoring/ Grade Control [3]	556	CY	1 GCS, 650 LF rock armor; 2 FT streambed thickness;
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	0	CY	
Liner	0	SF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	0	EA	None
Boulders	0	EA	Based on bankfull width
Dissipation Pool Streambed Material	0	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	0	EA	None
Foundation Logs	0	EA	0 per structure
Log with Rootwad	0	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	0	CY	2 CY per structure
Racking Material	0	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	0	EA	None
Log with Rootwad	0	EA	1 per structure
Retaining Log	0	EA	1 per structure
Tight Radius Jam Structure	0	EA	None
Foundation Logs	0	EA	3 per structure
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	7 CY per structure
Racking Material	0	EA	7 per structure
Bend Jam Structure	0	EA	None
Foundation Logs	0	EA	2 per structure
Log with Rootwad	0	EA	3 per structure
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	13 CY per structure
Racking Material	0	EA	15 per structure
Sweeper Log Structure	0	EA	None
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Turning Log Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Boulders	0	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	0	EA	4840 plants per acre
Zone 3	0	EA	3825 plants per acre
Zone 4	0	EA	4840 plants per acre
Seeding			
Zone 2	0.00	AC	0' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.00	AC	0' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.00	AC	0' width each side of channel; 19.02 pure live seed/AC

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
West end Creek - West End Pit - WE2
Valley County, Idaho

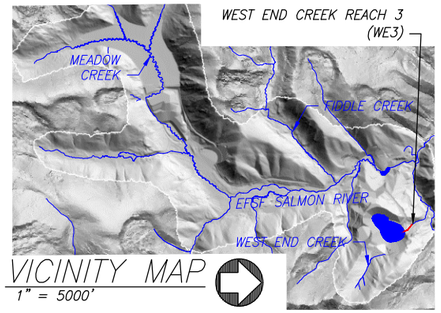
Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
WE2 Quantities

Drawing No.
WE2-2

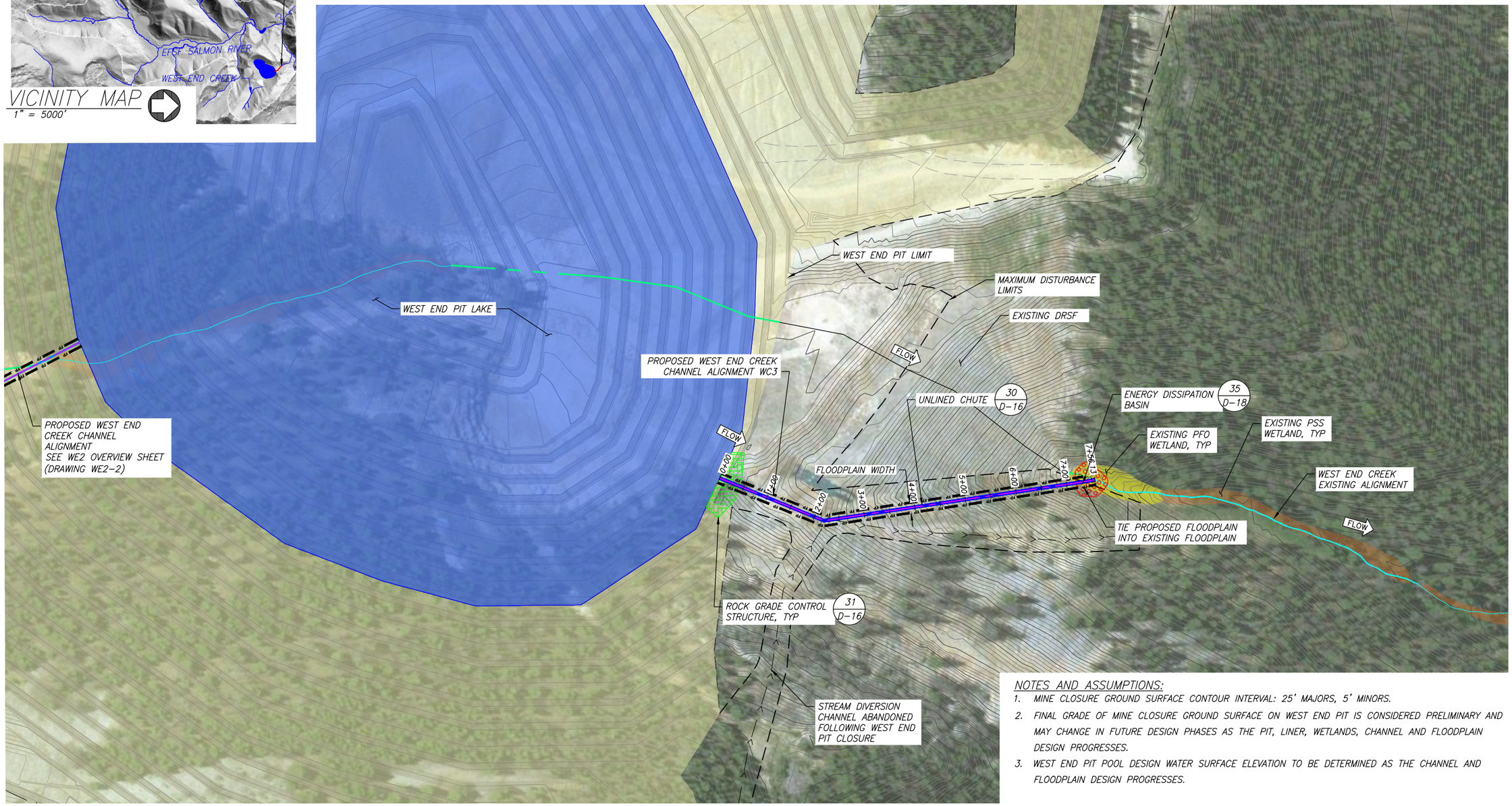
LOCATION: K:\PROJECTS\SF_SALMON_JAC\GIS\STIBNITE_RESTORATION_MXDS\CAD\PRODUCTION\WE2_WESTENDPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



VICINITY MAP
1" = 5000'

WE3 PROPOSED CHANNEL CHARACTERISTICS					
REACH ID	VALLEY LENGTH (FT)	CHANNEL LENGTH (FT)	SINUOSITY	VALLEY SLOPE (%)	REACH SLOPE (%)
WE3	756	756	1.0	37.70	37.70

WE3 PROPOSED STREAM TREATMENTS		
REACH ID	PERENNIAL CHANNEL LENGTH (FT)	NON-PERENNIAL CHANNEL LENGTH (FT)
WE3	0	756



NOTES AND ASSUMPTIONS:

1. MINE CLOSURE GROUND SURFACE CONTOUR INTERVAL: 25' MAJORS, 5' MINORS.
2. FINAL GRADE OF MINE CLOSURE GROUND SURFACE ON WEST END PIT IS CONSIDERED PRELIMINARY AND MAY CHANGE IN FUTURE DESIGN PHASES AS THE PIT, LINER, WETLANDS, CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.
3. WEST END PIT POOL DESIGN WATER SURFACE ELEVATION TO BE DETERMINED AS THE CHANNEL AND FLOODPLAIN DESIGN PROGRESSES.

WEST END CREEK REACH 3 – RESTORATION REACH SITE OVERVIEW PLAN

0 200 400 Feet

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Stibnite Gold Project
ModPRO2
West end Creek - West End Pit - WE3
Valley County, Idaho

Draft

Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
WE3 Overview Sheet

Drawing No.
WE3-1

DETAILED QUANTITIES

Item Description	Quantity	Units	Quantities Assumptions
General			
Mobilization and Demobilization			
Mobilization and Demobilization	1	LS	Approximately 8% of construction cost pre-tax, excluding earthwork
Cofferdams and Dewatering			
Cofferdams, Dewatering, Stream Bypass	1	LS	Low complexity of diversion channel, or pump and pipe (cleaner)
Stormwater Management			
BMP's and SWPPP	1	LS	
Site Access			
Stabilized Temporary Access Road	1	LS	Low complexity of access
Site Work - Earthwork			
Excavation (Cut)			
Channel Excavation (Cut)	354	CY	Channel ex including transitional channel and streambed material
Floodplain Excavation (Cut)	0	CY	
Placement (Fill)			
Channel Placement (Fill)	0	CY	
Floodplain Placement (Fill)	0	CY	
Engineered Streambed Material [3]	273	CY	756 LF of new channel; 1.25 FT streambed thickness;
Sorting and Stockpiling [3]	286	CY	Includes both Engineered Stream Bed Material and Rock Armoring
Rock Armoring/ Grade Control [3]	13	CY	1 grade control structure
Ephemeral Swale Channel Material [3]	0	CY	
General Fill	0	CY	
Filter Material	0	CY	
Topsoil/ Growth Media [3]	0	CY	
Liner	0	SF	
Site Work - Bank Treatments & Structures			
Bank Treatments			
Bank Treatment A - FESL	0	LF	Assumes 0% of total length of bank treatment
GeoCoir 700 (Coarse Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
C125BN (Fine Coir ECB)	0	LF	2 soil lifts; 15-foot roll width
1"x2"x18" Stake	0	EA	Dead Stakes 1 per 3 linear feet of bank treatment
Live Stake	0	EA	None
Brushlayer Live Cuttings	0	EA	4 willow cuttings per linear foot of treatment
Bank Treatment B - 12" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.28 CY per foot
Bank Treatment C - 6" Brushlayer	0	LF	Assumes 0% of total length of bank treatment
Brushlayer Live Cuttings	0	EA	2 willow cuttings per linear foot of treatment
Slash for Brushlayer	0	CY	0.14 CY per foot
Miscellaneous Structures			
Constructed Riffles	0	EA	None
Riffle Material	0	CY	
Energy Dissipation Pool	1	EA	No. varies by reach
Boulders	29	EA	Based on bankfull width
Dissipation Pool Streambed Material	1	CY	Based on bankfull width, length 2x width
Small Apex Jam	0	EA	None
Foundation Logs	0	EA	1 per structure
Log with Rootwad	0	EA	3 per structure
Log Piles	0	EA	2 per structure
Small Woody Debris/ Slash	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Toe Log Structure	0	EA	None
Foundation Logs	0	EA	0 per structure
Log with Rootwad	0	EA	3 per structure
Boulders	0	CY	0 CY per structure
Small Woody Debris/ Slash	0	CY	2 CY per structure
Racking Material	0	EA	2 per structure

Item Description	Quantity	Units	Quantities Assumptions
Miscellaneous Structures (Continued)			
Log Floodplain Roughness Structure	0	EA	None
Log with Rootwad	0	EA	1 per structure
Retaining Log	0	EA	1 per structure
Tight Radius Jam Structure	0	EA	None
Foundation Logs	0	EA	3 per structure
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	7 CY per structure
Racking Material	0	EA	7 per structure
Bend Jam Structure	0	EA	None
Foundation Logs	0	EA	2 per structure
Log with Rootwad	0	EA	3 per structure
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	13 CY per structure
Racking Material	0	EA	15 per structure
Sweeper Log Structure	0	EA	None
Whole Tree	0	EA	1 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Channel Spanning Jam	0	EA	None
Log with Rootwad	0	EA	3 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Wood Habitat Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Turning Log Structure	0	EA	None
Log with Rootwad	0	EA	4 per structure
Small Woody Debris	0	CY	3 CY per structure
Racking Material	0	EA	3 per structure
Boulders	0	EA	2 per structure
Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	10 per Alcove
Oxbow Backwater Alcove	0	EA	None
Log with Rootwad	0	EA	25 per Alcove
Revegetation (Excludes Revegetation Associated with Bank Treatments)			
Planting & Seeding			
Planting			
Zone 1	0	EA	10890 plants per acre, intended for anually wet areas
Zone 2	0	EA	4840 plants per acre
Zone 3	0	EA	3825 plants per acre
Zone 4	0	EA	4840 plants per acre
Seeding			
Zone 2	0.00	AC	0' width each side of channel; 3.12 pure live seed/AC
Zone 3	0.00	AC	0' width each side of channel; 3.56 pure live seed/AC
Zone 4	0.00	AC	0' width each side of channel; 19.02 pure live seed/AC

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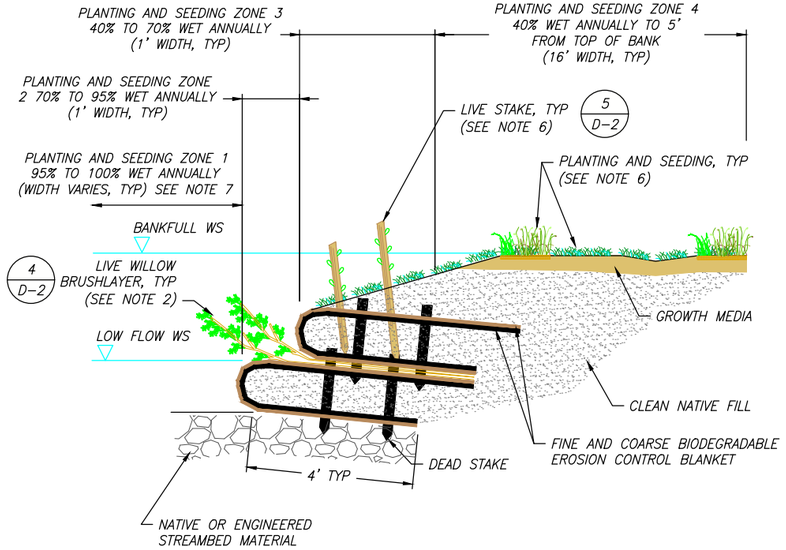
Drawing Name
WE3 Quantities

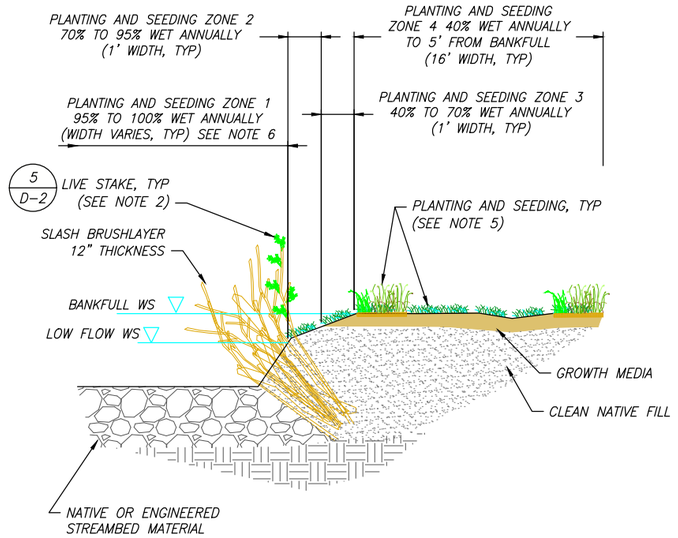
Drawing No.
WE3-2

LOCATION: R:\PROJECTS\SF_SALMON_JH\09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\WE3_WESTENDPIT_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021



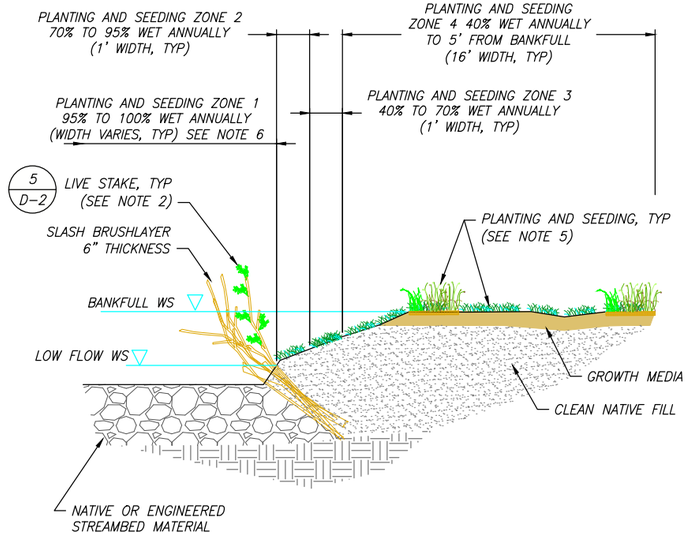
1 BANK TREATMENT A – FABRIC ENCAPSULATED SOIL LIFT (FESL) (SHOWN WITH LIVE BRUSHLAYER AND LIVE STAKES)

NTS



2 BANK TREATMENT B – 12 INCH SLASH BRUSHLAYER WITH LIVE STAKES

NTS



3 BANK TREATMENT C – 6 INCH SLASH BRUSHLAYER WITH LIVE STAKES

NTS



EXAMPLE: FESL INSTALLATION IN FALL DURING DORMANT SEASON

BANK TREATMENT A NOTES:

1. INSTALL BANK TREATMENT A AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED QUANTITY.
2. SEE BANK TREATMENT SCHEDULE ON SHEET D–20 FOR LOCATION AND DENSITY OF LIVE STAKES AND BRUSHLAYER. INSTALL LIVE STAKES AND LIVE BRUSHLAYER ACCORDING TO THE DETAILS WITHIN THE PLANS.
3. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR SPECIFIED QUANTITY OF BANK TREATMENT A AND ASSOCIATED MATERIAL QUANTITIES.
4. EXCAVATE SLOPE ACCORDING TO PLANS. PLACE FINE AND COARSE COIR EROSION CONTROL BLANKET AND BACKFILL WITH NATIVE SOIL TO FINISHED GRADES. USE A TEMPORARY FORM OR BUTTRESS (SEE EXAMPLE PHOTO) AT THE FACE OF EACH FESL LIFT TO ACHIEVE THE DIMENSIONS SHOWN. CONTRACTOR SHALL COMPACT BACKFILL TO APPROXIMATELY 80% OF MAXIMUM DENSITY. PULL EACH LAYER OF EROSION CONTROL BLANKET TIGHT AND ANCHOR WITH DEAD AND LIVE STAKES.
5. CONSTRUCT EACH FESL WITH 1' MAXIMUM THICKNESS USING AS MANY LIFTS AS NECESSARY TO ACHIEVE THE SPECIFIED BANK HEIGHT.
6. REVEGETATE BANK SLOPE AND TOP OF BANK AS SPECIFIED – SEE PLANTING AND SEEDING SCHEDULES ON SHEET D–21 FOR PLANT SPECIES, PLANT DENSITY, SEED MIX, AND APPLICATION RATES.
7. ZONE 1 PLANTING INTENDED FOR ANNUALLY WET AREAS LOCATED AWAY FROM THE MAIN CHANNEL OR IN ALCOVES.



EXAMPLE: SLASH BRUSHLAYER

BANK TREATMENT B AND C NOTES:

1. INSTALL BANK TREATMENT B AND C AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED QUANTITY.
2. SEE BANK TREATMENT SCHEDULE ON SHEETS D–20 FOR LOCATIONS AND DENSITY OF LIVE STAKES.
3. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR SPECIFIED QUANTITY OF BANK TREATMENT A AND ASSOCIATED MATERIAL QUANTITIES.
4. EXCAVATE BANK SLOPE, LAY LIVE STAKES AT SPECIFIED SPACING WITHIN TRENCH, COVER EACH LIVE STAKE WITH 2" OF CLEAN NATIVE FILL, AND LIGHTLY COMPACT. INSTALL SLASH MATERIAL TO THE SPECIFIED THICKNESS AND LAY UPPER LAYER OF LIVE STAKES AT THE SPECIFIED SPACING. FILL VOIDS OF SLASH MATERIAL BY WASHING–IN CLEAN NATIVE FILL. COMPLETE FINISH GRADING OF BANK BEHIND SLASH BRUSHLAYER.
5. REVEGETATE BANK SLOPE AND TOP OF BANK AS SPECIFIED – SEE PLANTING AND SEEDING SCHEDULES ON SHEET D–21 FOR PLANT SPECIES, PLANT DENSITY, SEED MIX, AND APPLICATION RATES.
6. ZONE 1 PLANTING INTENDED FOR ANNUALLY WET AREAS LOCATED AWAY FROM THE MAIN CHANNEL OR IN ALCOVES.

LOCATION: R:\PROJECTS\SF_SALMON_JUD\SOS\STIBNITE_RESTORATION_MDM\CAD\PRODUCTION\TYPICALDETAILS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

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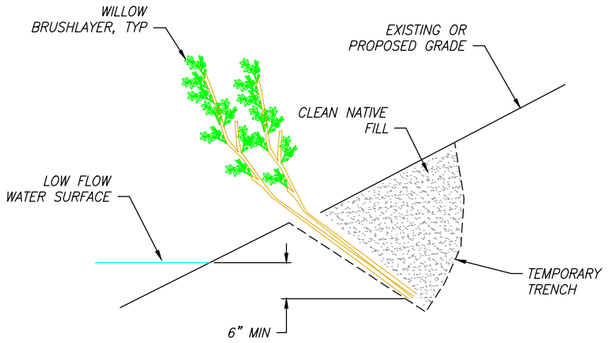
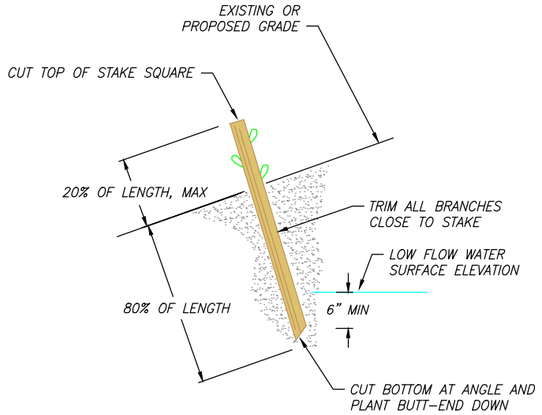
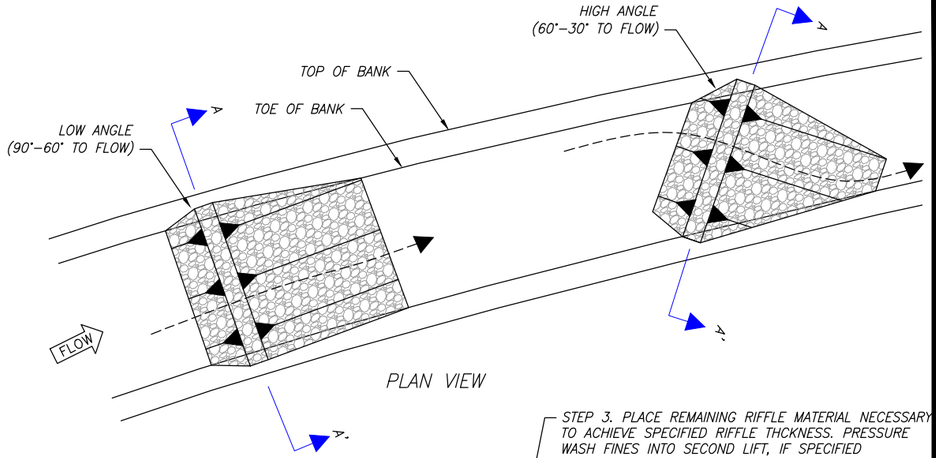
D–1



4 LIVE WILLOW TRENCH DETAIL
NTS



5 LIVE STAKE DETAIL
NTS



6 CONSTRUCTED RIFFLE
NTS



EXAMPLE: INSTALLED LIVE WILLOW TRENCH

LIVE WILLOW TRENCH NOTES:

1. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR QUANTITY OF WILLOW STAKES.
2. EXCAVATE TRENCH TO BELOW LOW WATER TABLE OR INSTALL WITHIN BANK OR STRUCTURE PRIOR TO BACKFILLING/ PLACING BANK MATERIALS
3. LAY LIVE CUTTINGS IN TRENCH AT SPECIFIED DENSITY OR QUANTITY
4. PLACE 6" LAYER OF CLEAN NATIVE FILL OVER LIVE CUTTINGS AND COMPACT WITH EXCAVATOR BUCKET
5. COMPLETE BACKFILL AND WATER THOROUGHLY WITHIN 4 HOURS OF INSTALLATION.



EXAMPLE: INSTALLED LIVE WILLOW STAKE

LIVE STAKE NOTES:

1. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF LIVE STAKES.
2. USE HEALTHY AND DORMANT SPECIES.
3. MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING CONSTRUCTION.
4. INSTALL USING PILOT BAR IN FIRM SOILS. ENSURE BUTT-END OF STAKE IS BELOW (6" MIN) LOW WATER TABLE ELEVATION.
5. TAMP SOIL AROUND INSTALLED STAKE AND WATER THOROUGHLY WITHIN 4 HOURS OF INSTALLATION.



EXAMPLE: CONSTRUCTED RIFFLE

CONSTRUCTED RIFFLE NOTES:

1. INSTALL CONSTRUCTED RIFFLES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.

STRUCTURE INTENT:

1. RIFFLE FEATURES ARE INTENDED TO MIMIC A NATURAL STREAM CHANNEL. RIFFLES ARE TO BE CONSTRUCTED TO BE STABLE AND TO PROVIDE HYDRAULIC ROUGHNESS, FLOODPLAIN ACTIVATION AND FISH RESTING AREAS THROUGH BACKWATER POOL DEVELOPMENT. RIFFLES ARE TO BE CONSTRUCTED SUCH THAT LOW FLOWS REMAIN ON THE SURFACE.
2. HIGH ANGLE CONSTRUCTED RIFFLE PROMOTE THALWEG DEVELOPMENT AND CHANNEL SINUOSITY.

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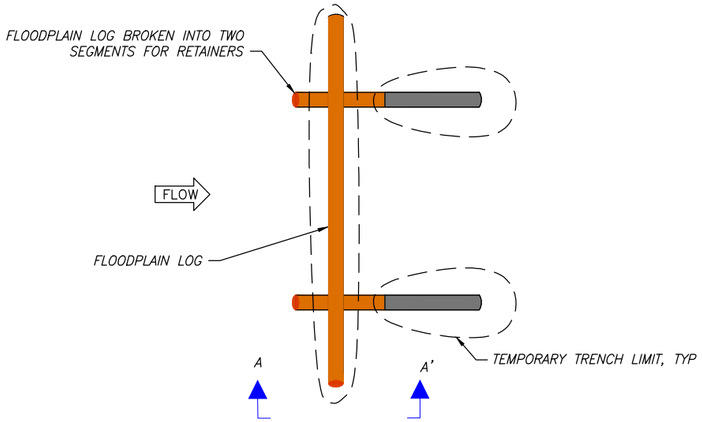
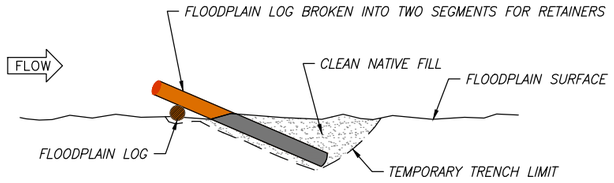


PLAN VIEW



SECTION A–A'

7 LOG FLOODPLAIN ROUGHNESS STRUCTURE

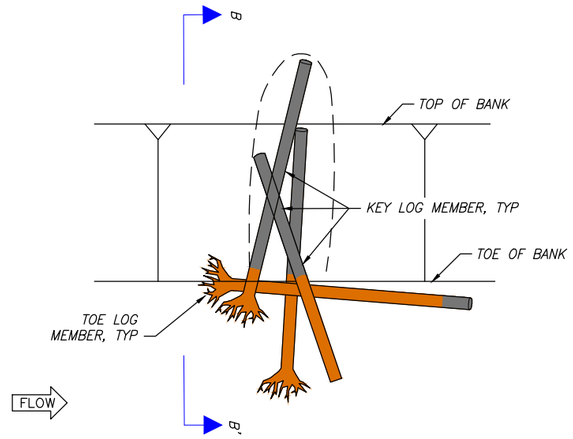
NTS



EXAMPLE: INSTALLED LOG FLOODPLAIN ROUGHNESS STRUCTURE

LOG FLOODPLAIN ROUGHNESS STRUCTURE NOTES:

1. INSTALL LOG FLOODPLAIN ROUGHNESS STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. BACKFILL USING NATIVE EXCAVATED MATERIAL UNLESS NATIVE MATERIAL IS UNSUITABLE FOR BACKFILL. PLACE BACKFILL IN 1–FOOT MAXIMUM LIFTS. COMPACT EACH LIFT USING MECHANICAL EQUIPMENT SUCH AS AN EXCAVATOR BUCKET OR EQUIPMENT TRACKING.



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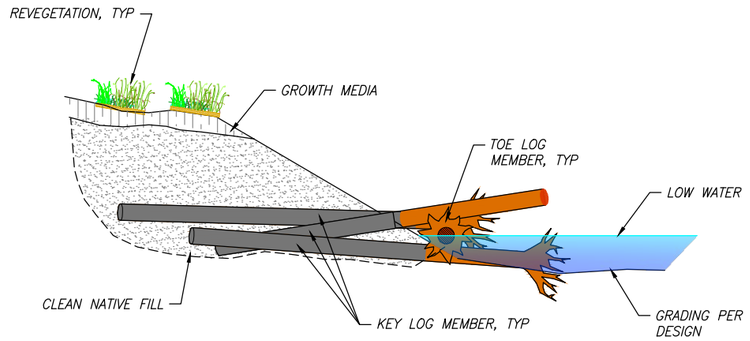

SECTION B–B'

8 TYPICAL TOE LOG STRUCTURE

NTS



EXAMPLE: INSTALLED TOE LOG STRUCTURE



EXAMPLE: INSTALLED TOE LOG STRUCTURE (FOREGROUND)

TOE LOG STRUCTURE NOTES:

1. INSTALL TOE LOG STRUCTURES AT LOCATIONS INDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. BACKFILL USING NATIVE EXCAVATED MATERIAL UNLESS NATIVE MATERIAL IS UNSUITABLE FOR BACKFILL. PLACE BACKFILL IN 1–FOOT MAXIMUM LIFTS. COMPACT EACH LIFT USING MECHANICAL EQUIPMENT SUCH AS AN EXCAVATOR BUCKET OR EQUIPMENT TRACKING.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.

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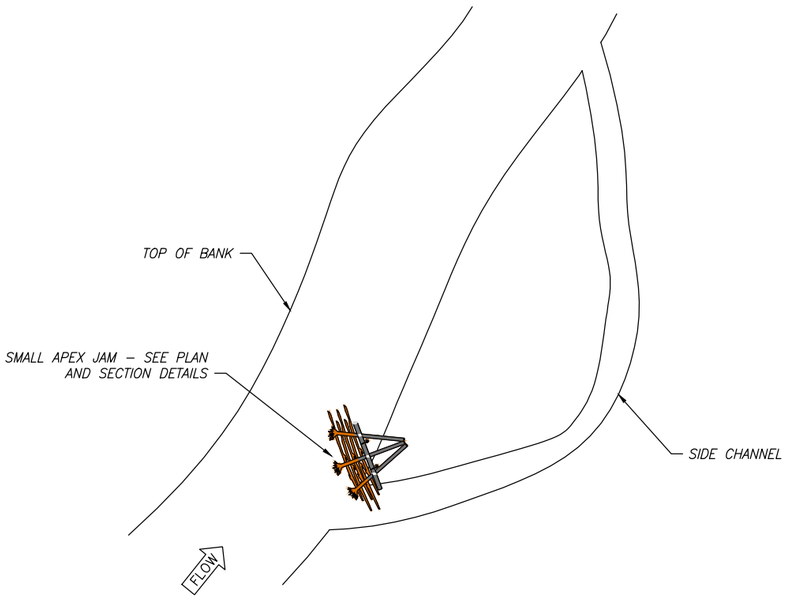

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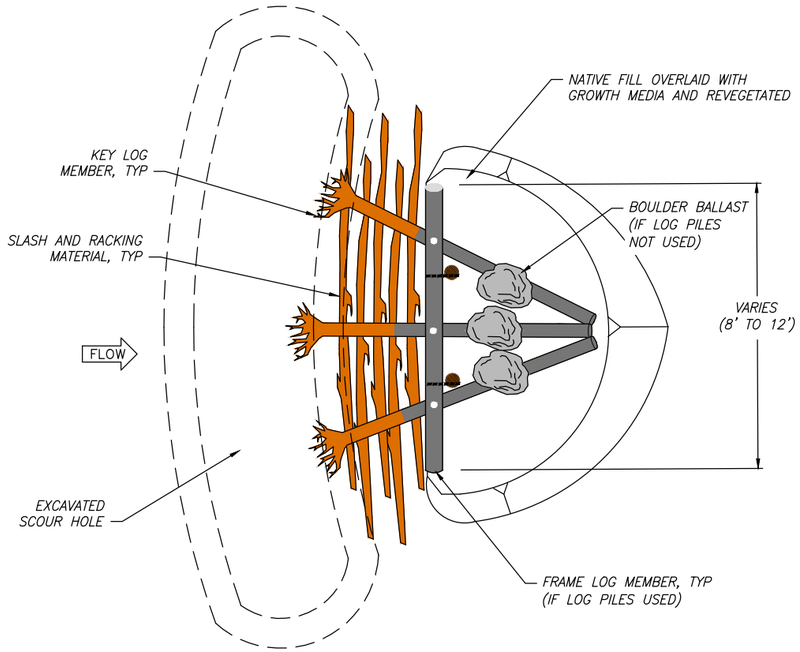

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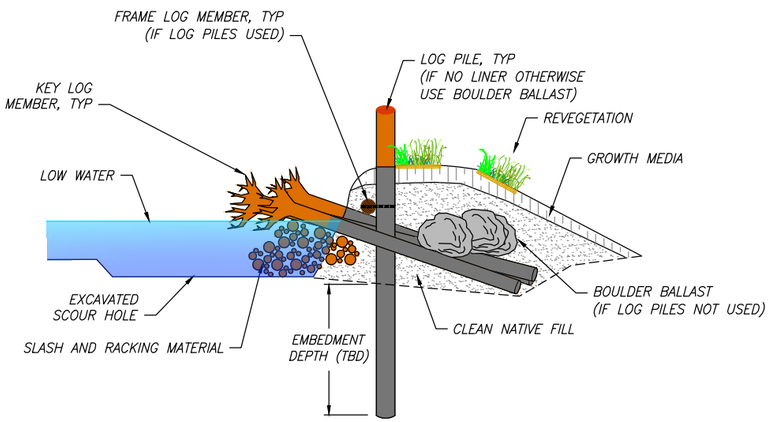

SECTION VIEW

9 TYPICAL SMALL APEX JAM STRUCTURE

NTS

SMALL APEX JAM STRUCTURE NOTES:

1. INSTALL SMALL APEX JAM STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. SMALL APEX JAM STRUCTURES ARE SCALEABLE TO THE SIZE OF STREAM AND MAY CONSIST OF FEWER OR MORE LOGS INCLUDING FEWER KEY LOGS.
4. BACKFILL USING NATIVE EXCAVATED MATERIAL UNLESS NATIVE MATERIAL IS UNSUITABLE FOR BACKFILL. PLACE BACKFILL IN 1–FOOT MAXIMUM LIFTS. COMPACT EACH LIFT USING MECHANICAL EQUIPMENT SUCH AS AN EXCAVATOR BUCKET OR EQUIPMENT TRACKING.
5. LOG PILES MAY BE USED IF NO CHANNEL LINER PRESENT, OTHERWISE USE BOULDER BALLAST.
6. STREAMS LESS THAN 10 FEET WIDE DO NOT REQUIRE PILES.



EXAMPLE: INSTALLED APEX LOG STRUCTURE



EXAMPLE: INSTALLED SINGLE LOG APEX STRUCTURE

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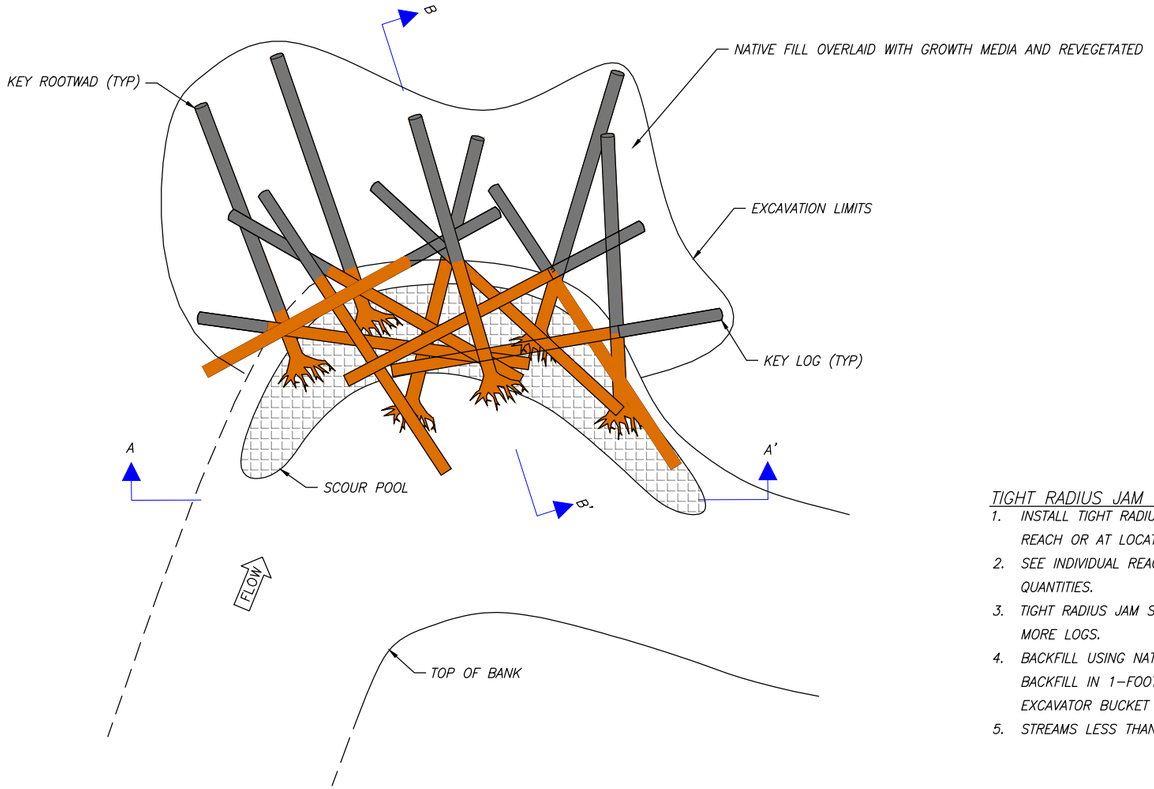

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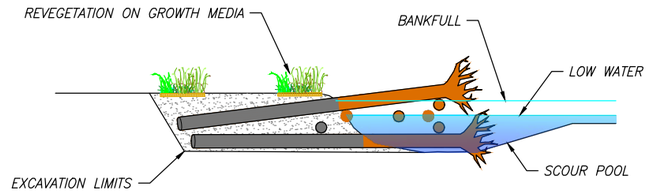
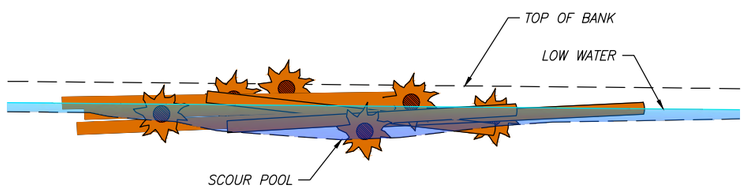


SECTION VIEW B–B'



SECTION VIEW A–A'

10 TYPICAL TIGHT RADIUS JAM STRUCTURE
NTS

TIGHT RADIUS JAM STRUCTURE NOTES:

1. INSTALL TIGHT RADIUS JAM STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. TIGHT RADIUS JAM STRUCTURES ARE SCALEABLE TO THE SIZE OF STREAM AND MAY CONSIST OF FEWER OR MORE LOGS.
4. BACKFILL USING NATIVE EXCAVATED MATERIAL UNLESS NATIVE MATERIAL IS UNSUITABLE FOR BACKFILL. PLACE BACKFILL IN 1–FOOT MAXIMUM LIFTS. COMPACT EACH LIFT USING MECHANICAL EQUIPMENT SUCH AS AN EXCAVATOR BUCKET OR EQUIPMENT TRACKING.
5. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.



EXAMPLE: INSTALLED TIGHT RADIUS JAM STRUCTURE



EXAMPLE: INSTALLED TIGHT RADIUS JAM STRUCTURE

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D–5

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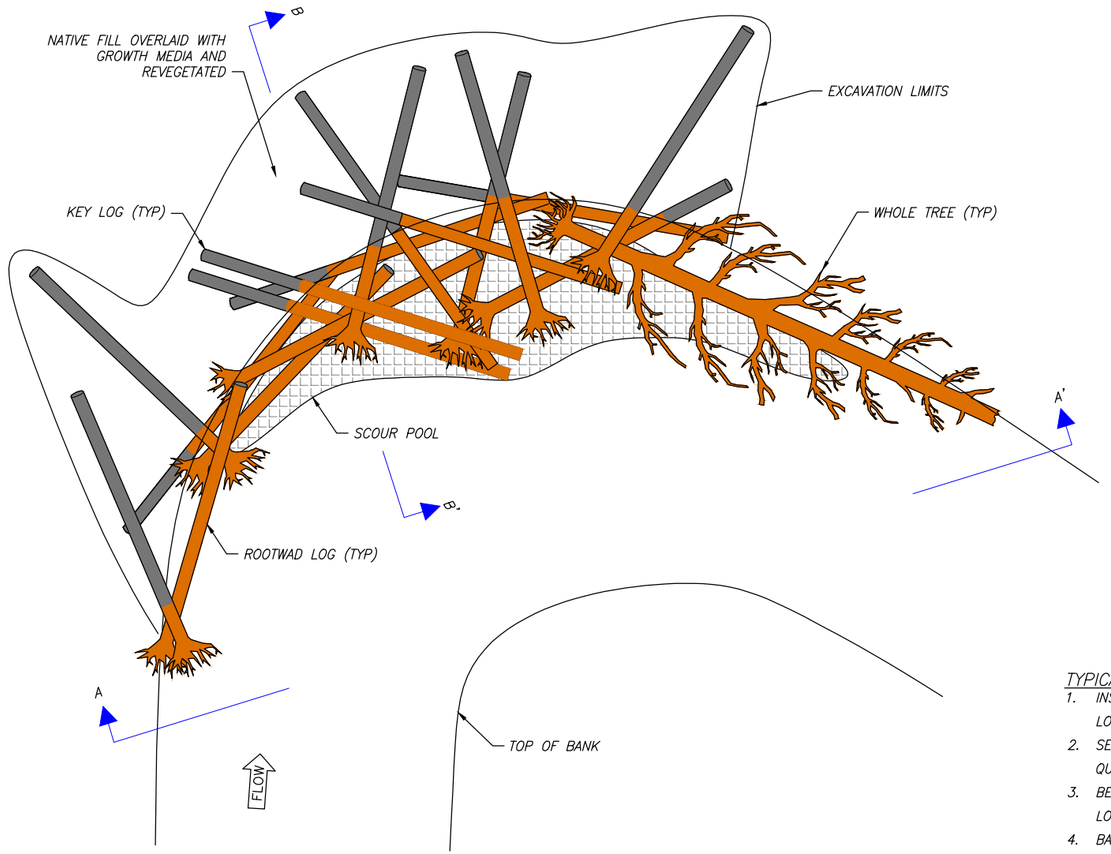
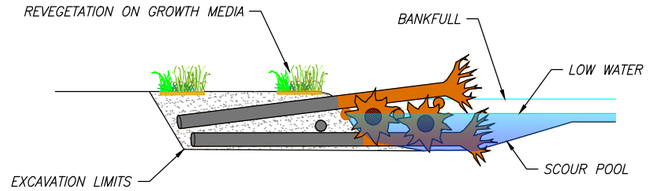
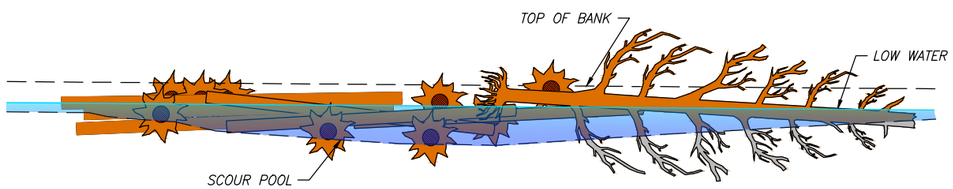


PLAN VIEW



SECTION VIEW B–B'



SECTION VIEW A–A'

11 TYPICAL BEND JAM STRUCTURE
NTS

TYPICAL BEND JAM STRUCTURE NOTES:

1. INSTALL BEND JAM STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. BEND JAM STRUCTURES ARE SCALEABLE TO THE SIZE OF STREAM AND MAY CONSIST OF FEWER OR MORE LOGS.
4. BACKFILL USING NATIVE EXCAVATED MATERIAL UNLESS NATIVE MATERIAL IS UNSUITABLE FOR BACKFILL. PLACE BACKFILL IN 1–FOOT MAXIMUM LIFTS. COMPACT EACH LIFT USING MECHANICAL EQUIPMENT SUCH AS AN EXCAVATOR BUCKET OR EQUIPMENT TRACKING.
5. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.



EXAMPLE: INSTALLED BEND JAM STRUCTURE



EXAMPLE: INSTALLED BEND JAM STRUCTURE

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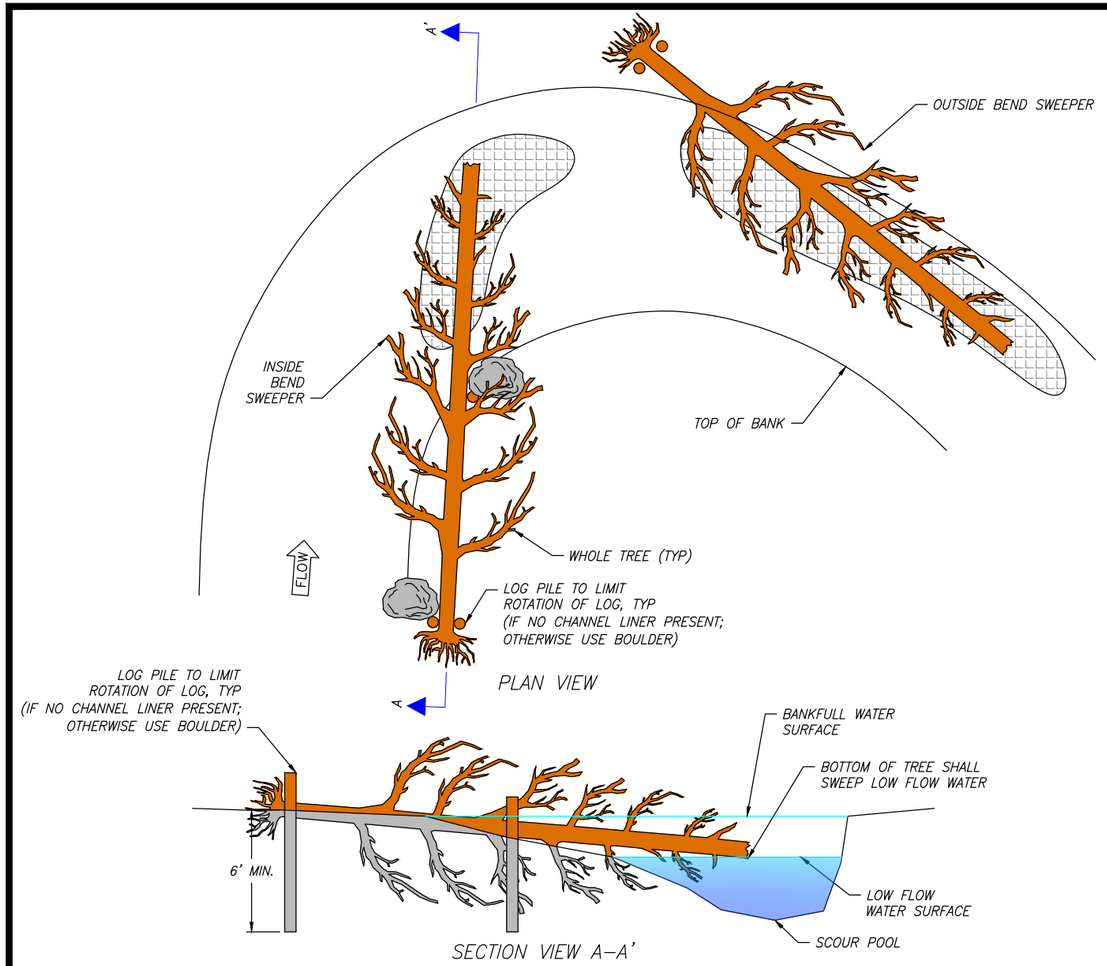
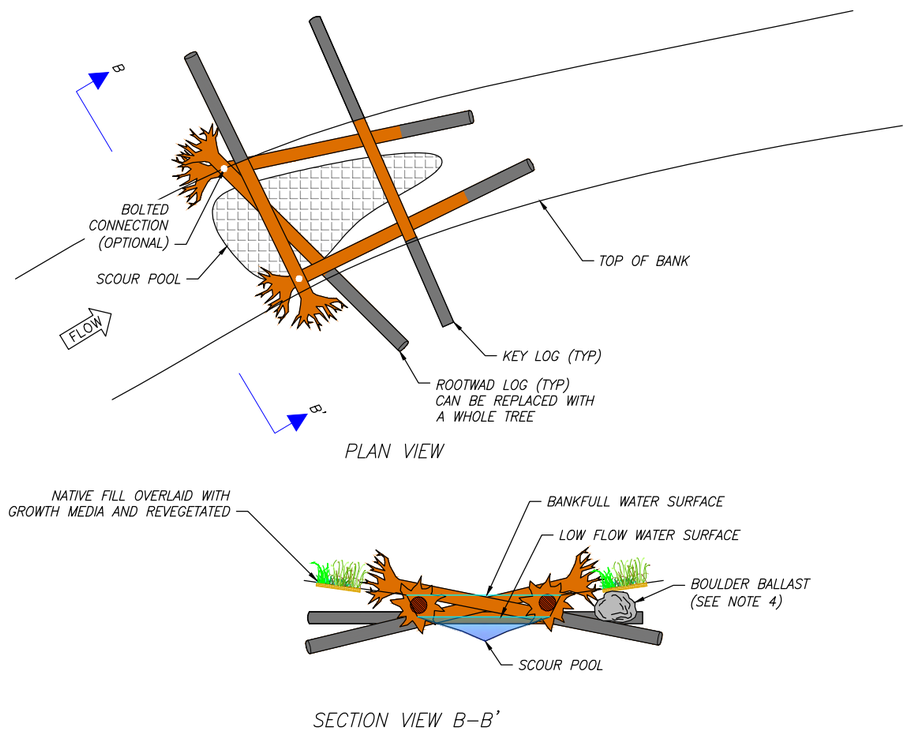


PLAN VIEW

SECTION VIEW A–A'



PLAN VIEW

SECTION VIEW B–B'



EXAMPLE: INSTALLED TYPICAL SWEEPER LOG STRUCTURE

TYPICAL SWEEPER LOG STRUCTURE NOTES:

1. INSTALL SWEEPER LOG STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. LOG PILES MAY BE USED IF NO CHANNEL LINER PRESENT, OTHERWISE USE BOULDER BRACING.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE WITHOUT PILES.

12 TYPICAL SWEEPER LOG STRUCTURE

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EXAMPLE: INSTALLED CHANNEL SPANNING JAM STRUCTURE

CHANNEL SPANNING JAM STRUCTURE NOTES:

1. INSTALL CHANNEL SPANNING JAM STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. PROVIDE BOLTED CONNECTIONS AT SPECIFIED LOCATIONS.
4. PROVIDE FOR BOULDER BALLAST IF SPECIFIED MINIMUM COVER OVER KEY LOGS NOT POSSIBLE.
5. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.

13 TYPICAL CHANNEL SPANNING JAM STRUCTURE

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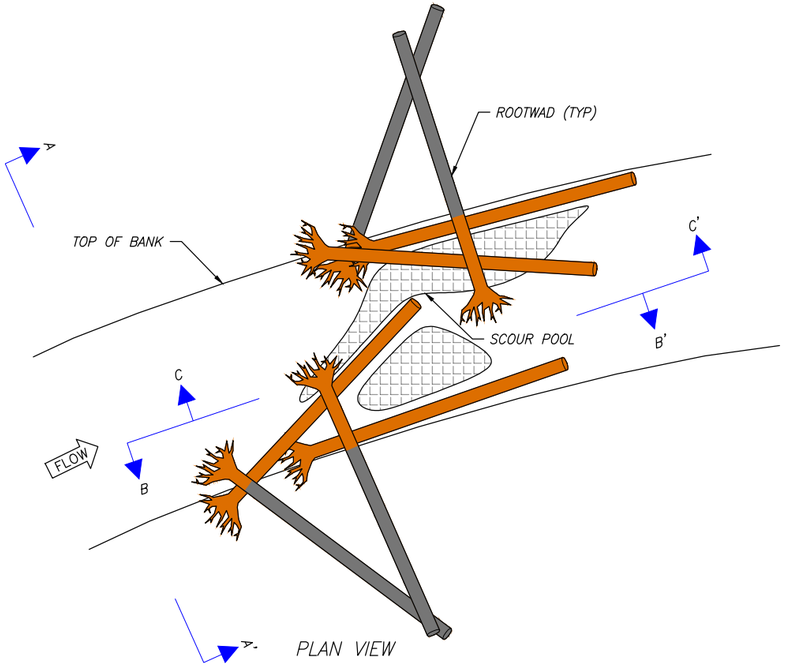
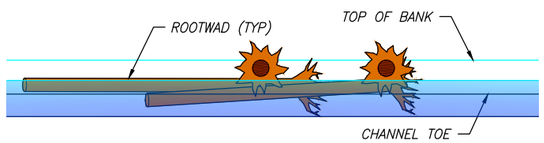
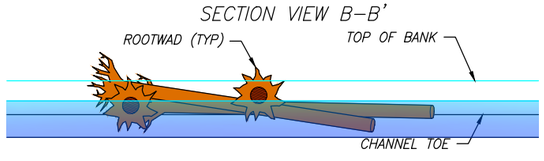


PLAN VIEW

SECTION VIEW A–A'



SECTION VIEW B–B'



SECTION VIEW C–C'

TYPICAL WOOD HABITAT STRUCTURE NOTES:

1. INSTALL WOOD HABITAT STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. PROVIDE FOR BOULDER BALLAST IF SPECIFIED MINIMUM COVER OVER KEY LOGS NOT POSSIBLE.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.

14 TYPICAL WOOD HABITAT STRUCTURE
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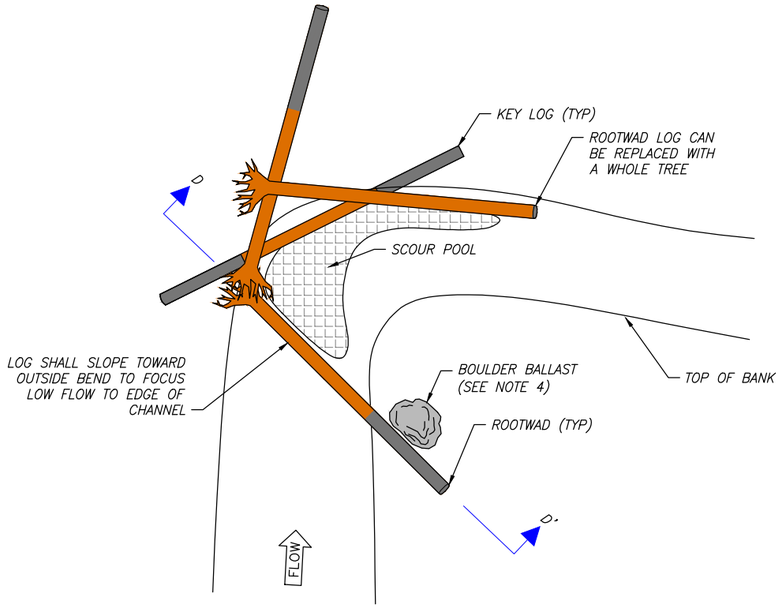
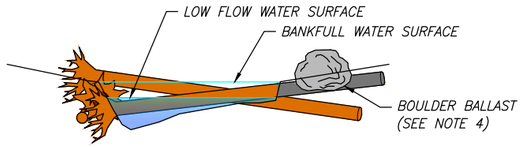


PLAN VIEW



SECTION VIEW D–D'



EXAMPLE: NATURAL TURNING LOG STRUCTURE

TYPICAL TURNING LOG STRUCTURE NOTES:

1. INSTALL TURNING LOG STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. PROVIDE FOR BOULDER BALLAST IF SPECIFIED MINIMUM COVER OVER KEY LOGS NOT POSSIBLE.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.

15 TYPICAL TURNING LOG STRUCTURE
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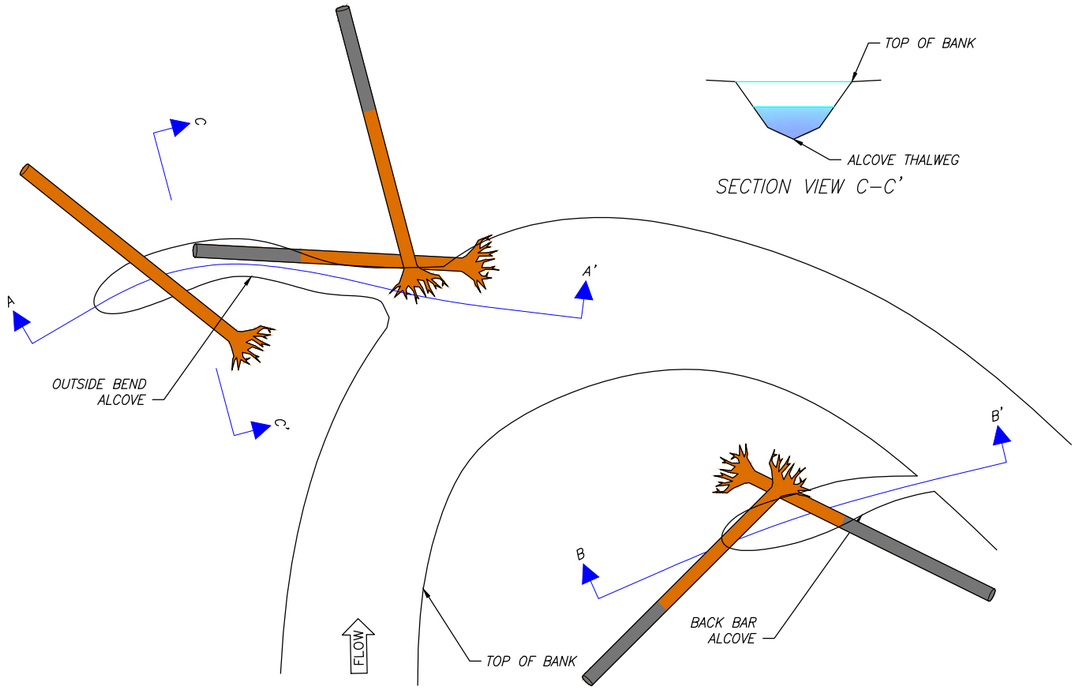

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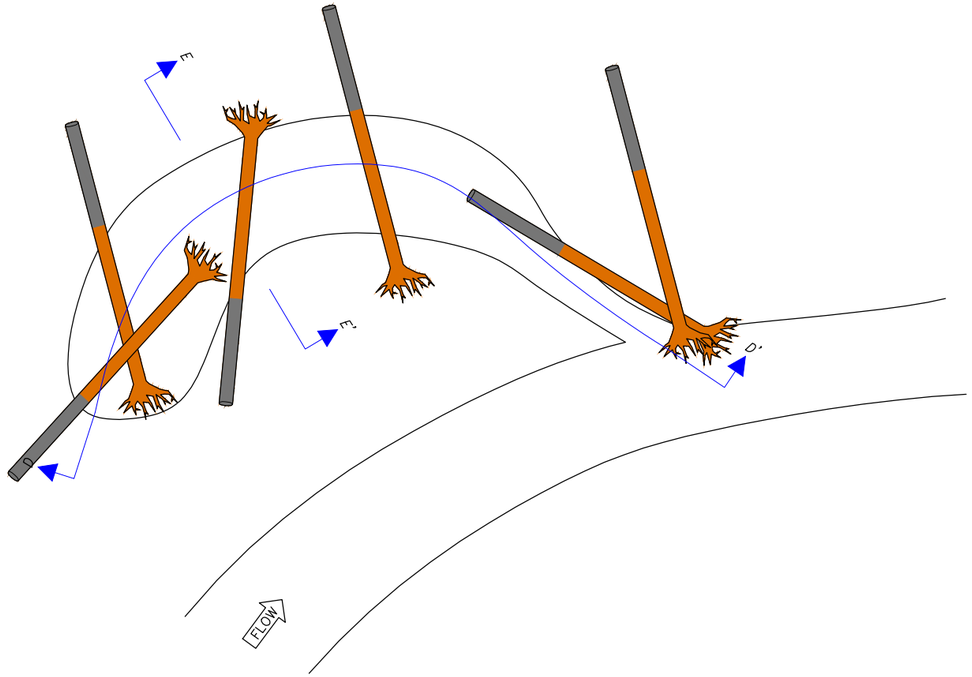

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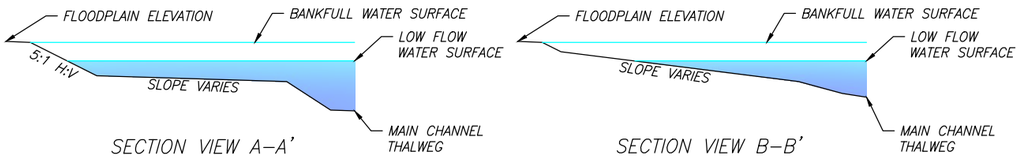

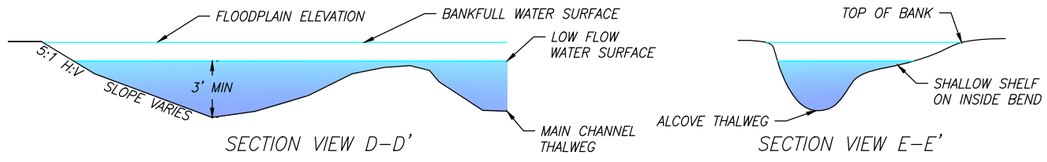



EXAMPLE: CONSTRUCTED BACKWATER ALCOVE

TYPICAL BACKWATER ALCOVE NOTES:

1. INSTALL BACKWATER ALCOVES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. BACKWATER ALCOVES SHALL BE INSTALLED PER THE APPROPRIATE SECTION VIEW (OUTSIDE BEND OR BACK BAR). MORE DETAIL (REACH SPECIFIC DIMENSIONS) WILL BE DETERMINED IN A FUTURE DESIGN PHASE.
4. STREAMS LESS THAN 10 FEET WIDE CAN HAVE LOGS PLACED ON TOP OF THE SURFACE OR BURIED INTO THE BANK.
5. BURIED LOGS CAN BE REPLACED WITH UNBURIED WHOLE TREES (INCLUDING BRANCHES AND LIMBS).

16 TYPICAL BACKWATER ALCOVE
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EXAMPLE: CONSTRUCTED BACKWATER ALCOVE

TYPICAL OXBOW BACKWATER ALCOVE NOTES:

1. INSTALL OXBOW BACKWATER ALCOVES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. OXBOW BACKWATER ALCOVES SHALL BE INSTALLED PER THE SECTION VIEW. MORE DETAIL (REACH SPECIFIC DIMENSIONS) WILL BE DETERMINED IN A FUTURE DESIGN PHASE.
4. STREAMS LESS THAN 10 FEET WIDE CAN HAVE LOGS PLACED ON TOP OF THE SURFACE OR BURIED INTO THE BANK.
5. BURIED LOGS CAN BE REPLACED WITH UNBURIED WHOLE TREES (INCLUDING BRANCHES AND LIMBS).

17 TYPICAL OXBOW BACKWATER ALCOVE
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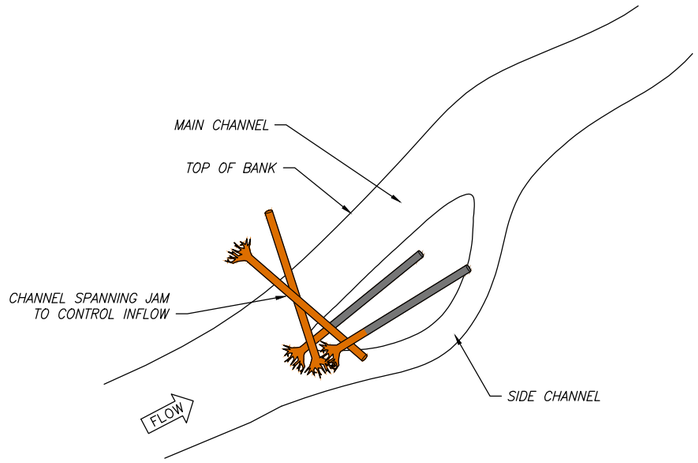

PLAN VIEW

EXAMPLE: CONSTRUCTED SPLIT SIDE CHANNEL

SPLIT FLOW SIDE CHANNEL NOTES:

1. TARGET FLOW IN SPLIT FLOW SIDE CHANNEL IS 40% OF TOTAL FLOW.
2. LENGTH OF SPLIT FLOW SIDE CHANNEL SHALL BE LESS THAN 4 BANKFULL WIDTHS.
3. INSTALL SPLIT FLOW SIDE CHANNELS AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
4. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
5. SPLIT FLOW SIDE CHANNELS SHALL HAVE A FLATTER GRADIENT THAN THE ADJACENT MAIN CHANNEL.
6. SPLIT FLOW SIDE CHANNELS CAN BE PERENNIAL OR DESIGNED TO ACTIVATE ONLY AT HIGH FLOW.
7. LENGTH OF SPLIT FLOW SIDE CHANNEL IS TYPICALLY LESS THAN SIDE CHANNEL ELEMENTS (SEE DETAIL THIS SHEET).

18 TYPICAL SPLIT FLOW SIDE CHANNEL

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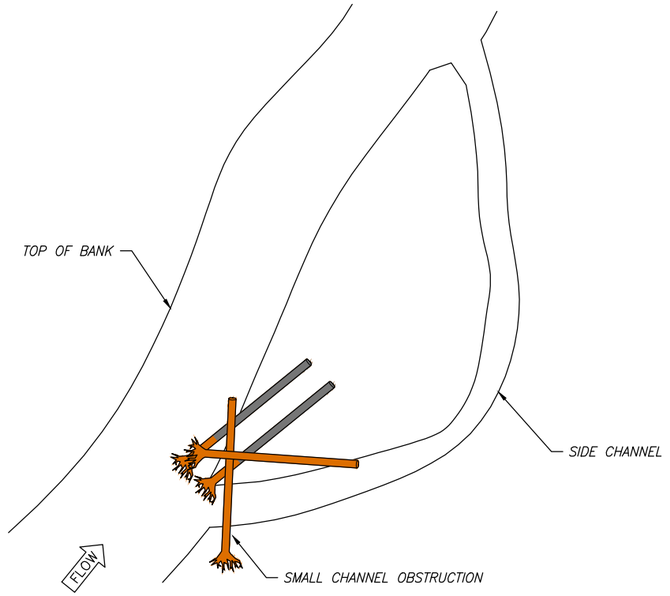

PLAN VIEW



EXAMPLE: CONSTRUCTED SIDE CHANNEL (MAIN CHANNEL IN BACKGROUND)

SIDE CHANNEL NOTES:

1. TARGET FLOW IN SIDE CHANNEL IS 20% OF TOTAL FLOW.
2. LENGTH OF SIDE CHANNEL SHALL BE LONGER THAN 4 BANKFULL WIDTHS.
3. INSTALL SIDE CHANNELS AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
4. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
5. SIDE CHANNELS SHALL HAVE A FLATTER GRADIENT THAN THE ADJACENT MAIN CHANNEL.
6. SIDE CHANNELS CAN BE DESIGNED TO BE PERENNIAL OR ACTIVATE ONLY AT HIGH FLOW.
7. LENGTH OF SIDE CHANNELS IS TYPICALLY GREATER THAN SPLIT FLOW SIDE CHANNEL ELEMENTS (SEE DETAIL THIS SHEET).

19 TYPICAL SIDE CHANNEL

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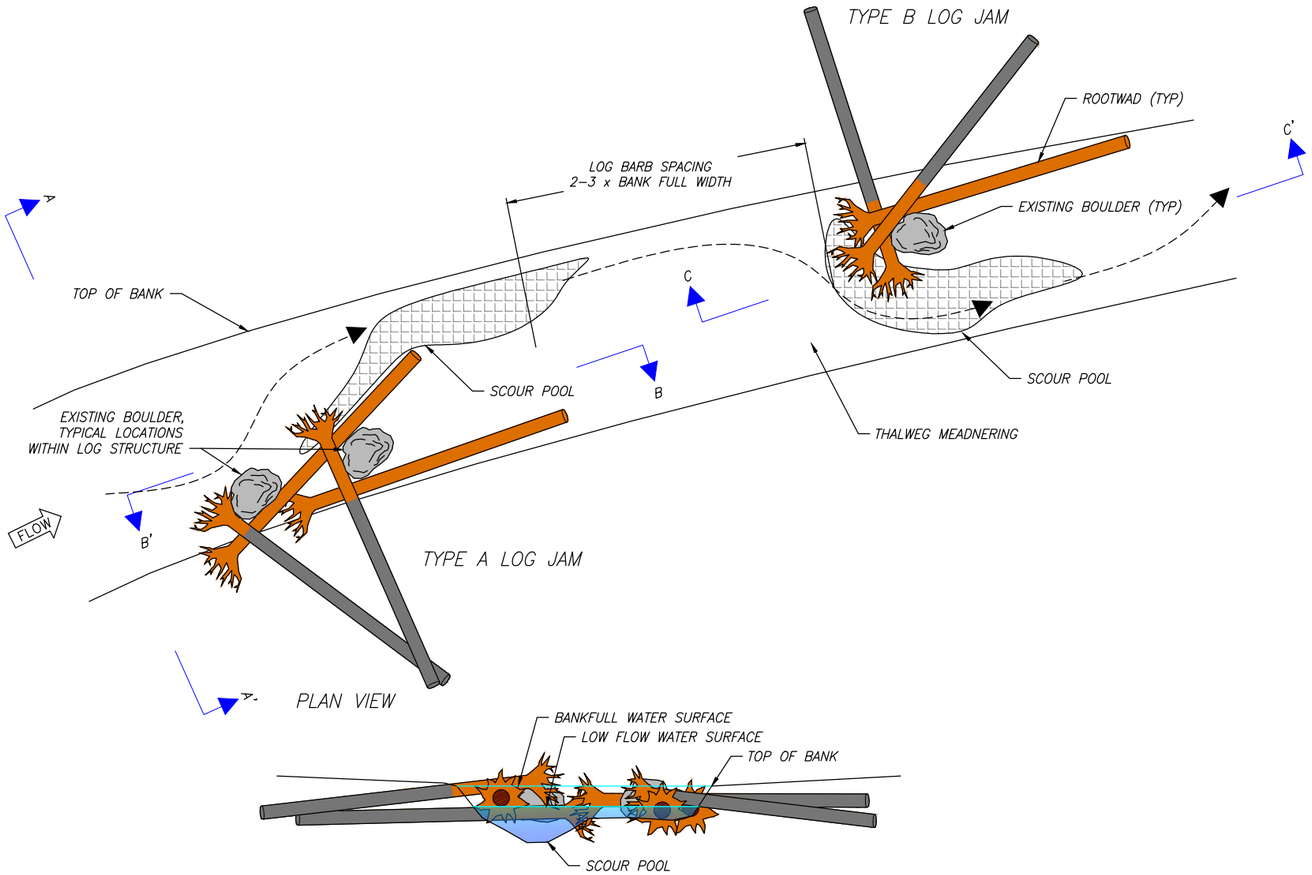
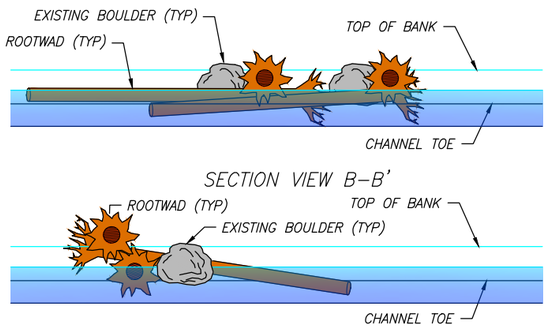


SECTION VIEW A–A'



SECTION VIEW B–B'

SECTION VIEW C–C'

TYPICAL LOG BANK JAM STRUCTURE NOTES:

1. INSTALL LOG BANK JAM STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. PROVIDE FOR BOULDER BALLAST IF SPECIFIED MINIMUM COVER OVER KEY LOGS NOT POSSIBLE.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.
5. LOG BARB SPACING 2–5 BANK FULL WIDTH.

STRUCTURE INTENT:

1. UTILIZE EXISTING BOULDERS AND/OR LIVE TREES TO STRATEGICALLY BRACE LOGS DEFINING THE THALWEG, FORCING POOL FORMATION, RETAINING GRAVEL, AND PROVIDING IN–STREAM VELOCITY REFUGE.
2. ALTERNATING BANK JAMS PROMOTE THALWEG DEVELOPMENT AND CHANNEL SINUOSITY.
3. TYPE A AND B STRUCTURES CAN BE INSTALLED ON EITHER LEFT OR RIGHT BANK.

20 TYPICAL ALTERNATING LOG BANK JAMS

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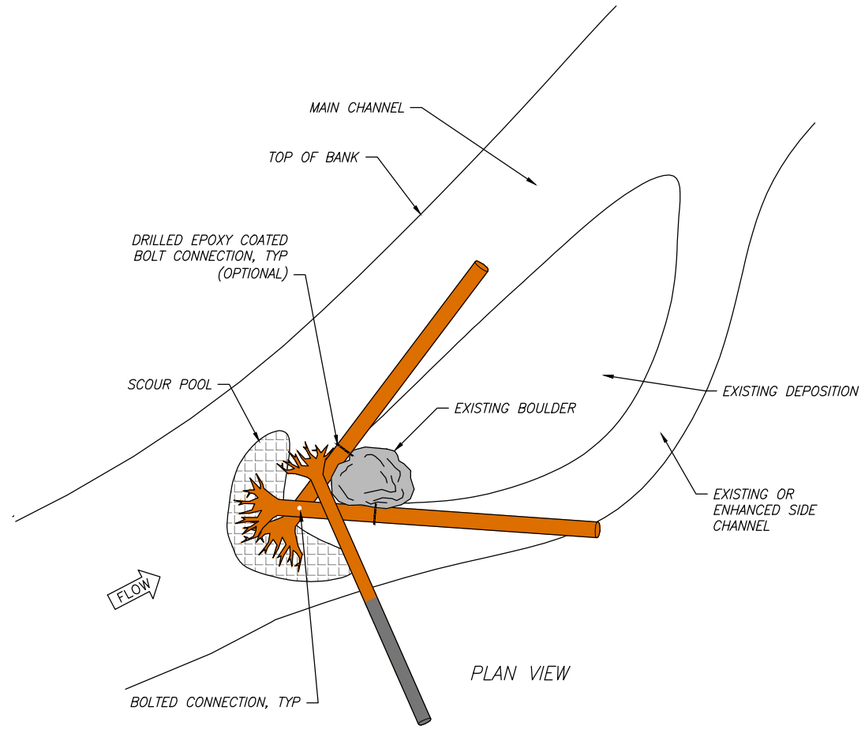

PLAN VIEW

EXISTING BOULDER APEX JAM STRUCTURE NOTES:

1. INSTALL EXISTING BOULDER APEX JAM STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. SMALL APEX JAM STRUCTURES ARE SCALEABLE TO THE SIZE OF STREAM AND MAY CONSIST OF FEWER OR MORE LOGS INCLUDING FEWER KEY LOGS.
3. PROVIDE FOR BOULDER BALLAST IF SPECIFIED MINIMUM COVER OVER KEY LOGS NOT POSSIBLE.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.

STRUCTURE INTENT:

1. UTILIZE EXISTING BOULDERS AND/OR LIVE TREES TO STRATEGICALLY BRACE LOGS DEFINING THE THALWEG, FORCING POOL FORMATION, FORCING SIDE CHANNEL DEVELOPMENT, RETAINING GRAVEL, AND PROVIDING IN–STREAM VELOCITY REFUGE.

21 TYPICAL EXISTING BOULDER APEX JAM

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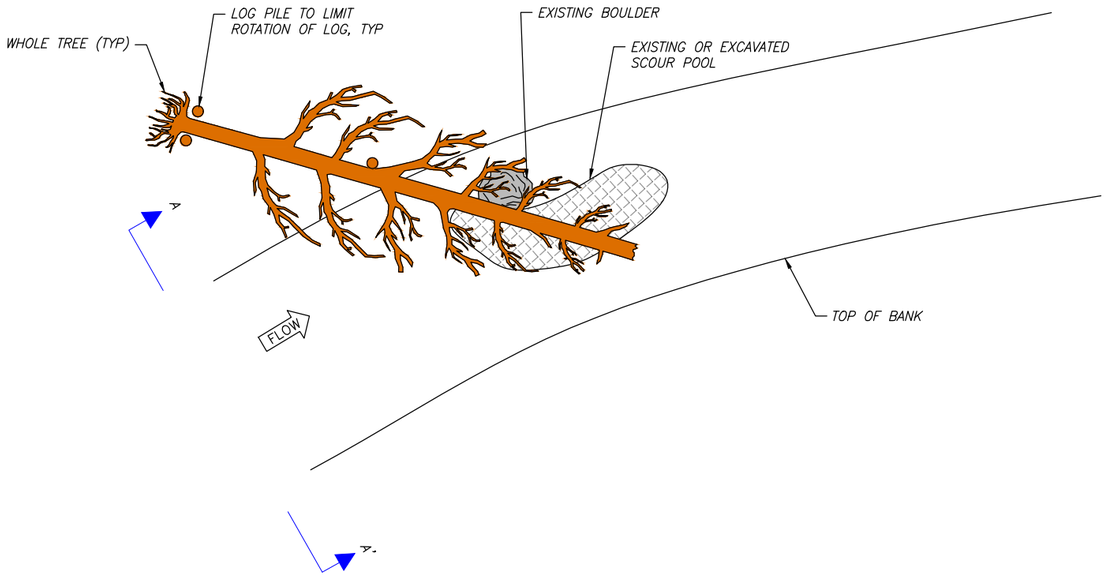

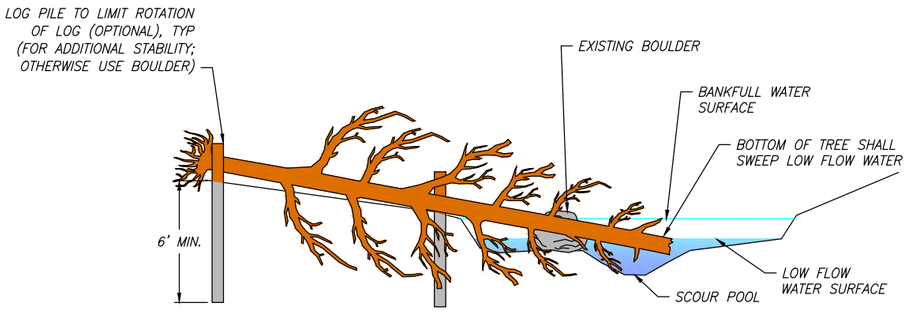

SECTION VIEW A–A'

WHOLE TREE HABITAT STRUCTURE NOTES:

1. INSTALL WHOLE TREE HABITAT STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. LOG PILES MAY BE USED IF NO CHANNEL LINER PRESENT, OTHERWISE USE BOULDER BRACING.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE WITHOUT PILES.
5. BRACE AGAINST EXISTING BOULDERS OR VEGETATION OR INSTALL WOOD PILES (OPTIONAL) FOR ADDITIONAL STABILITY.

STRUCTURE INTENT:

1. UTILIZE EXISTING BOULDERS AND SCOUR POOLS AND ENHANCE WITH WHOLE TREES. STRATEGICALLY BRACE LOGS AGAINST EXISTING BOULDERS AND LIVE TREES, FORCING POOL FORMATION, RETAINING GRAVEL, AND PROVIDING IN–STREAM VELOCITY REFUGE.

22 TYPICAL WHOLE TREE HABITAT STRUCTURE

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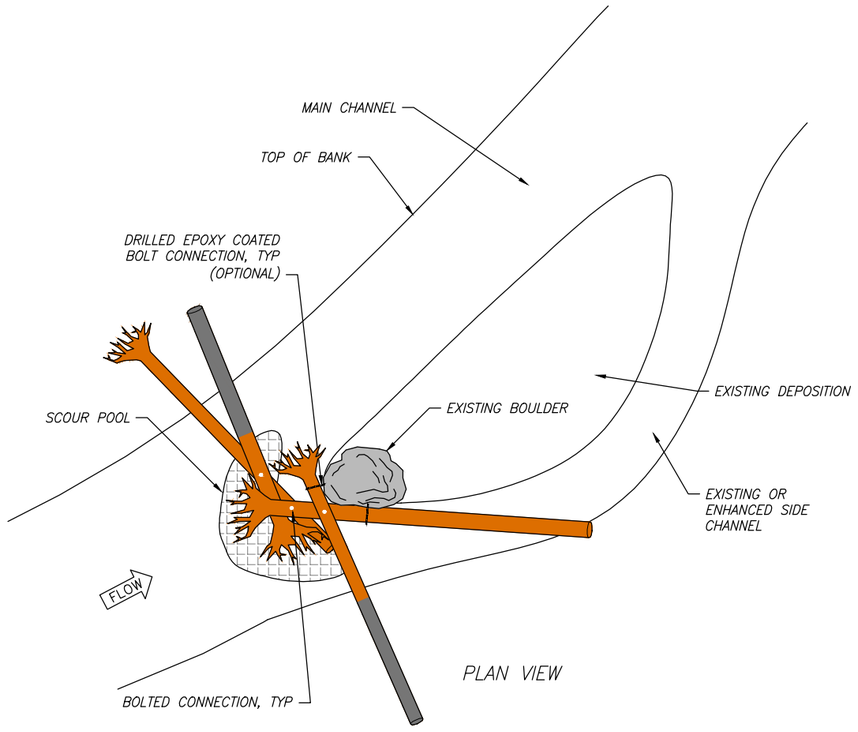

PLAN VIEW

EXISTING BOULDER APEX JAM STRUCTURE NOTES:

1. INSTALL EXISTING BOULDER APEX JAM STRUCTURES AT LOCATIONS IDENTIFIED ON PLAN OVERVIEW SHEETS FOR EACH REACH OR AT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER AT THE SPECIFIED STRUCTURE QUANTITY.
2. SEE INDIVIDUAL REACH QUANTITY SHEETS FOR NUMBER OF STRUCTURES, LOGS, AND ASSOCIATED MATERIAL QUANTITIES.
3. SMALL APEX JAM STRUCTURES ARE SCALEABLE TO THE SIZE OF STREAM AND MAY CONSIST OF FEWER OR MORE LOGS INCLUDING FEWER KEY LOGS.
3. PROVIDE FOR BOULDER BALLAST IF SPECIFIED MINIMUM COVER OVER KEY LOGS NOT POSSIBLE.
4. STREAMS LESS THAN 10 FEET WIDE MAY HAVE LOGS PLACED ON THE SURFACE OR BURIED INTO THE BANK.

STRUCTURE INTENT:

1. UTILIZE EXISTING BOULDERS AND/OR LIVE TREES TO STRATEGICALLY BRACE LOGS DEFINING THE THALWEG, FORCING POOL FORMATION, FORCING SIDE CHANNEL DEVELOPMENT, RETAINING GRAVEL, AND PROVIDING IN–STREAM VELOCITY REFUGE.

23 TYPICAL EXISTING BOULDER CHANNEL SPANNING JAM

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Drawing No.
D–12

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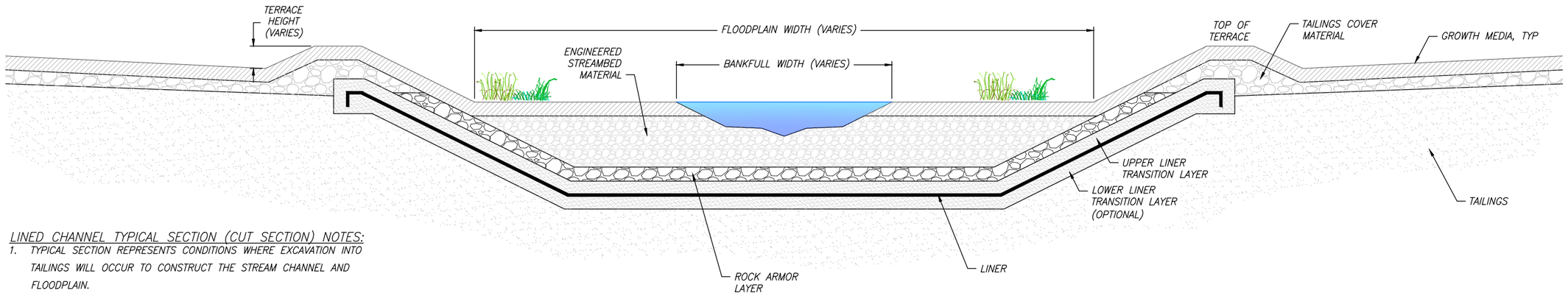
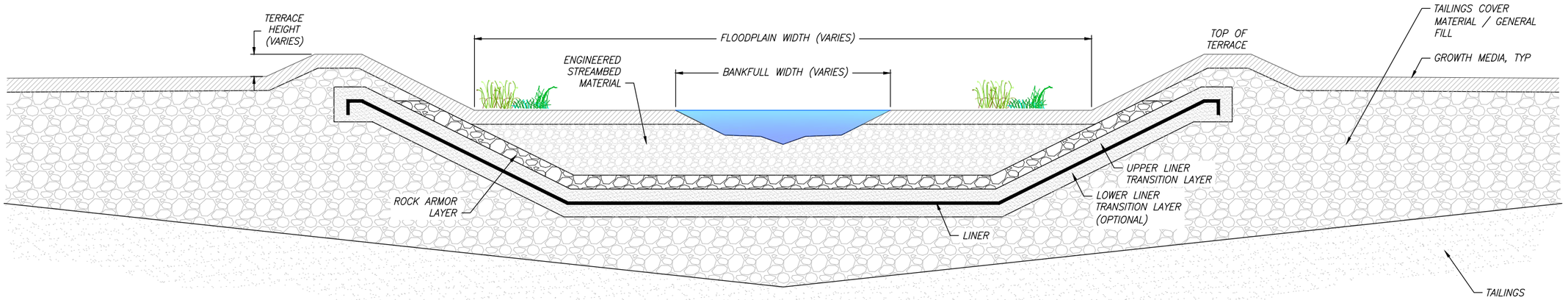


LINED CHANNEL TYPICAL SECTION – CUT SECTION

LINED CHANNEL TYPICAL SECTION (CUT SECTION) NOTES:

1. TYPICAL SECTION REPRESENTS CONDITIONS WHERE EXCAVATION INTO TAILINGS WILL OCCUR TO CONSTRUCT THE STREAM CHANNEL AND FLOODPLAIN.
2. ASSUMED MAXIMUM OF 15 FEET OF EXCAVATION INTO THE TAILINGS NEAR THE DOWNSTREAM END (DAM FACE).
3. ASSUMED MAXIMUM OF 5 FEET OF EXCAVATION INTO THE TAILINGS ELSEWHERE.



LINED CHANNEL TYPICAL SECTION – FILL SECTION

LINED CHANNEL TYPICAL SECTION (FILL SECTION) NOTES:

1. TYPICAL SECTION REPRESENTS CONDITIONS WHERE STREAM CHANNEL AND FLOODPLAIN WILL BE CONSTRUCTED ON FILL PLACED ABOVE TAILINGS.
2. EXCAVATION MAY BE REQUIRED INTO THE TAILINGS COVER MATERIAL.

24 LINED CHANNEL TYPICAL SECTIONS (ON TOP OF TSF)

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D–13

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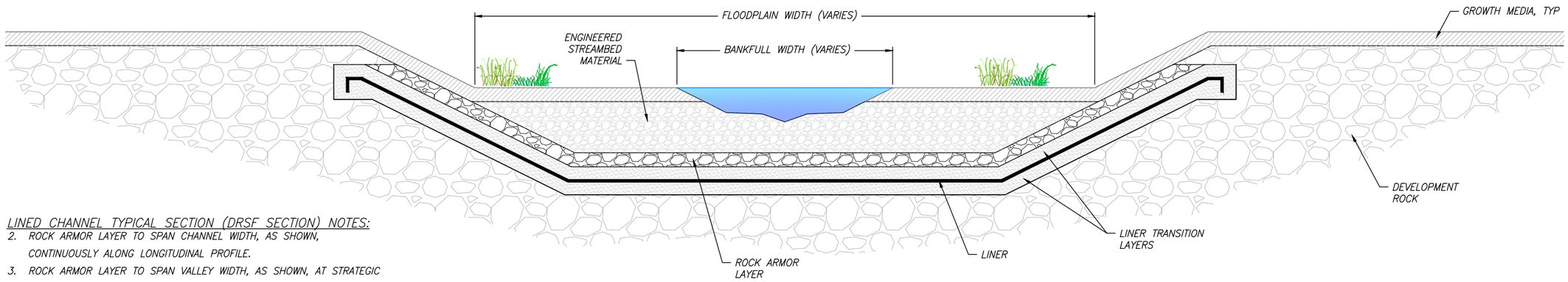

LINED CHANNEL TYPICAL SECTION (DRSF SECTION) NOTES:

2. ROCK ARMOR LAYER TO SPAN CHANNEL WIDTH, AS SHOWN, CONTINUOUSLY ALONG LONGITUDINAL PROFILE.
3. ROCK ARMOR LAYER TO SPAN VALLEY WIDTH, AS SHOWN, AT STRATEGIC LOCATIONS (TBD) ALONG LONGITUDINAL PROFILE.

25 LINED CHANNEL TYPICAL SECTION (ON TOP OF DRSF)

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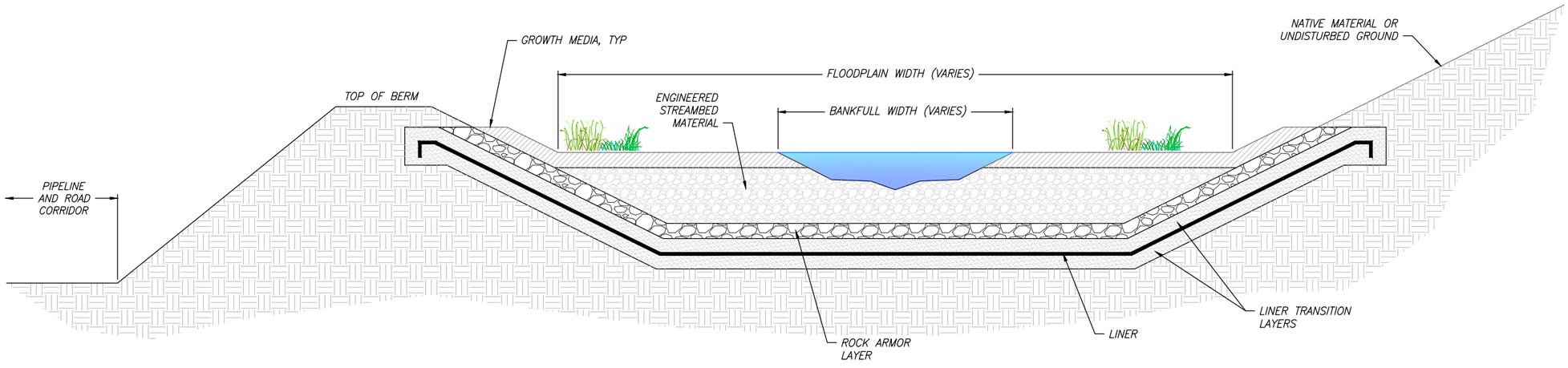

26 LINED CHANNEL TYPICAL SECTION (MC4 AND MC5 DIVERSION CHANNEL)

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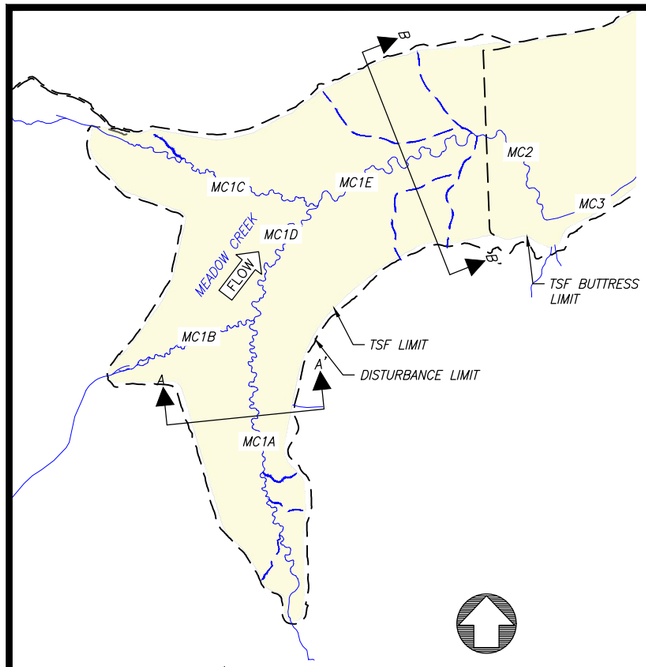
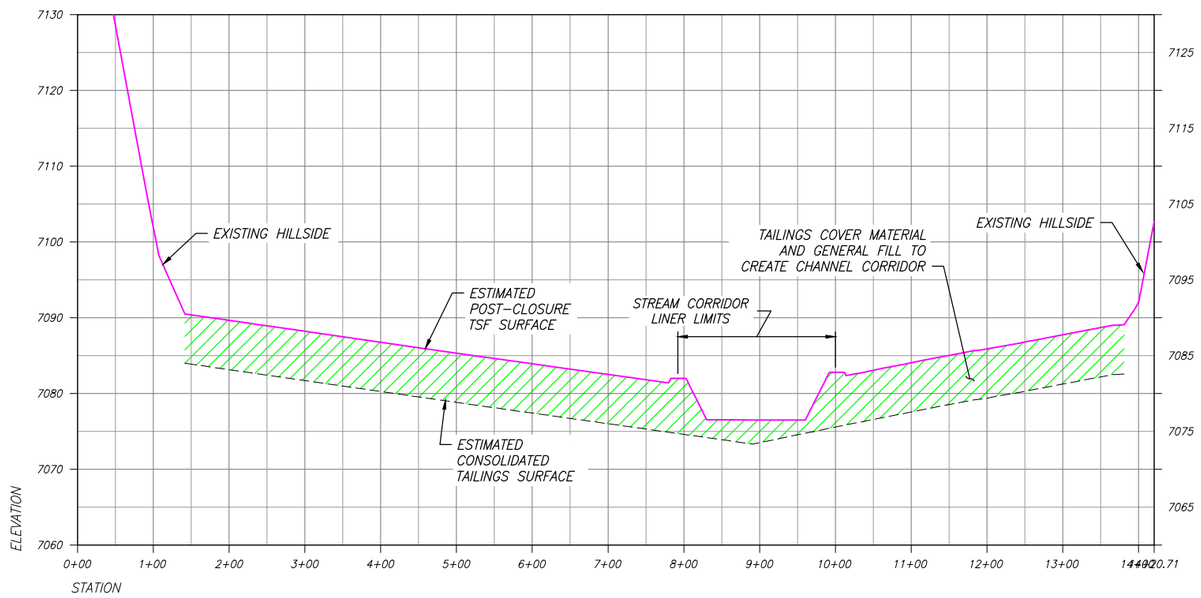


TSF/DRSF VICINITY MAP

1" = 1,000'



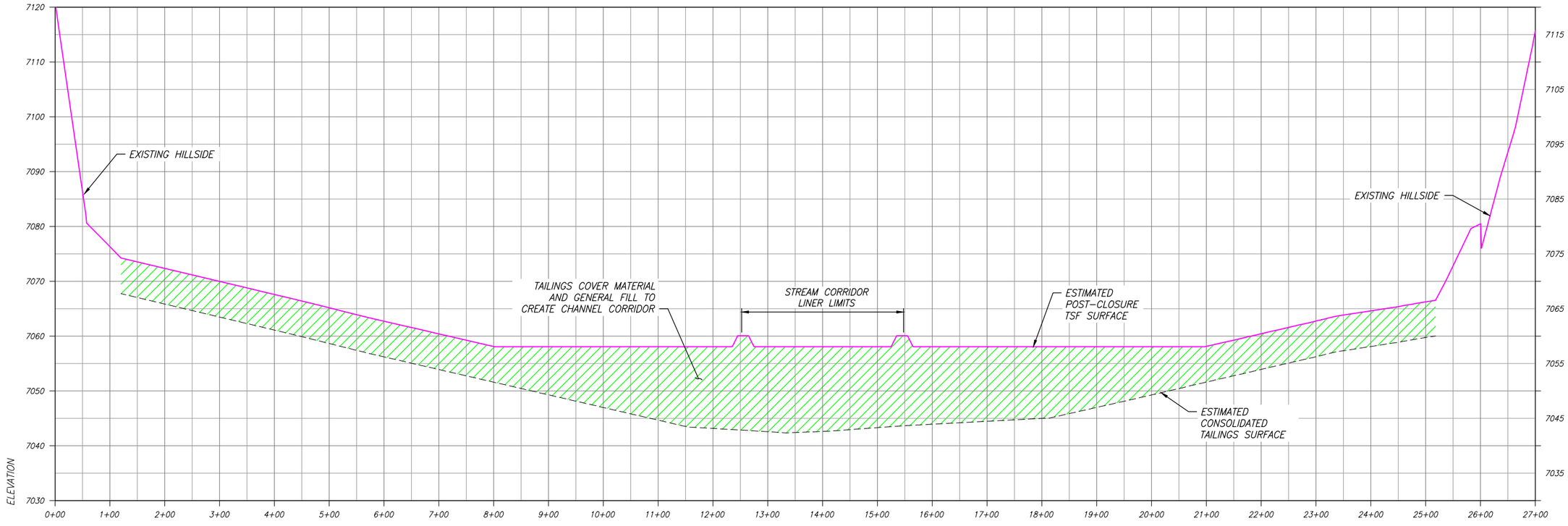
27 TSF SECTION A–A'

NOTES:

1. SECTIONS ARE CUT LEFT TO RIGHT LOOKING DOWNSTREAM ON THE TSF IN THE MEADOW CREEK DRAINAGE.
2. REFER TO SHEET D–13, DETAIL 24 – LINED CHANNEL TYPICAL SECTIONS (ON TOP OF TSF) FOR ADDITIONAL CHANNEL CORRIDOR DETAIL.
3. REFER TO SHEET MC1A–2 AND MC1E–1 FOR STREAM DESIGN AT SECTION LOCATIONS.

LEGEND:

- ESTIMATED TSF CONSOLIDATED GROUND PROFILE
- ESTIMATED POST–CLOSURE TSF GROUND PROFILE
- FILL ZONE



28 TSF SECTION B–B'

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D–15

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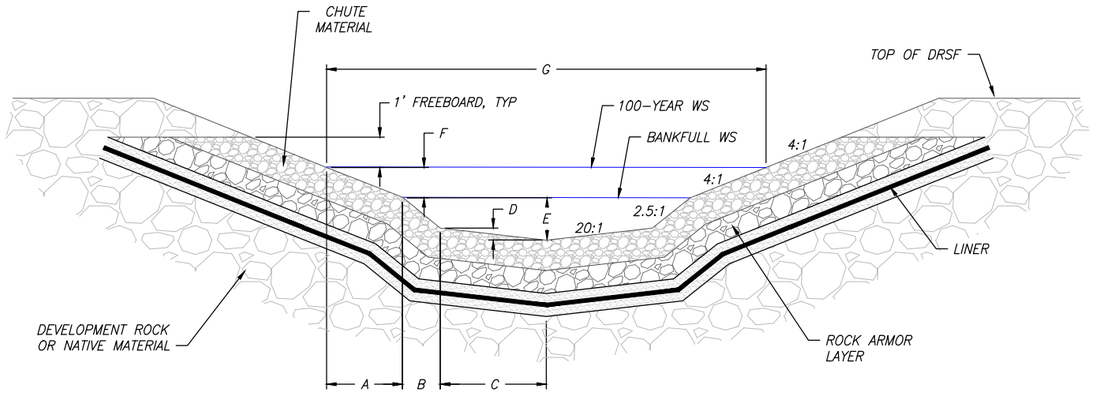

SECTION VIEW

LINED RIPRAP CHUTE CHANNEL DEFINITION TABLE

TABLE – A												
REACH ID	100-YR FLOW (CFS)	CHUTE MATERIAL TYPE	CHUTE MATERIAL THICKNESS (IN)	ROCK ARMOR MATERIAL TYPE	ROCK ARMOR MATERIAL THICKNESS (FT)	A (FT)	B (FT)	C (FT)	D (FT)	BANKFULL DEPTH, E (FT)	F (FT)	TOP WIDTH, G (FT)
MC3	243	C1	4.0	A2	2.0	3.6	4.8	2.8	0.1	2.0	0.9	23.6
WE2	6	C2	3	A2	2.0	1.2	1.5	0	0	0.6	0.3	5.4

NOTES
1. CHUTE MATERIAL TYPES: C1 (D50 = XX"), C2 (D50 = XX").
2. ROCK ARMOR MATERIAL TYPES: A1 (D50 = XX"), A2 (D50 = XX").

29 LINED RIPRAP CHUTE
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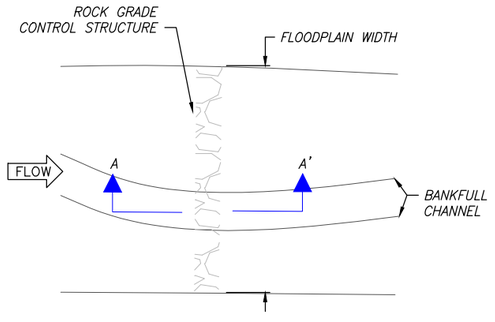
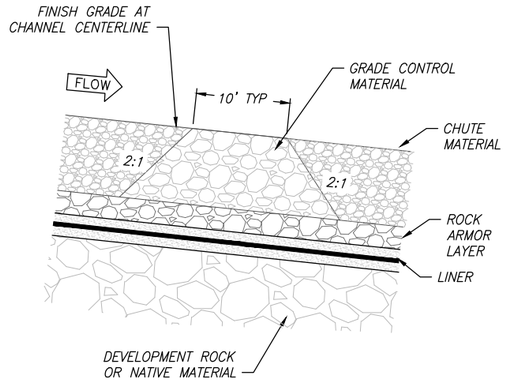


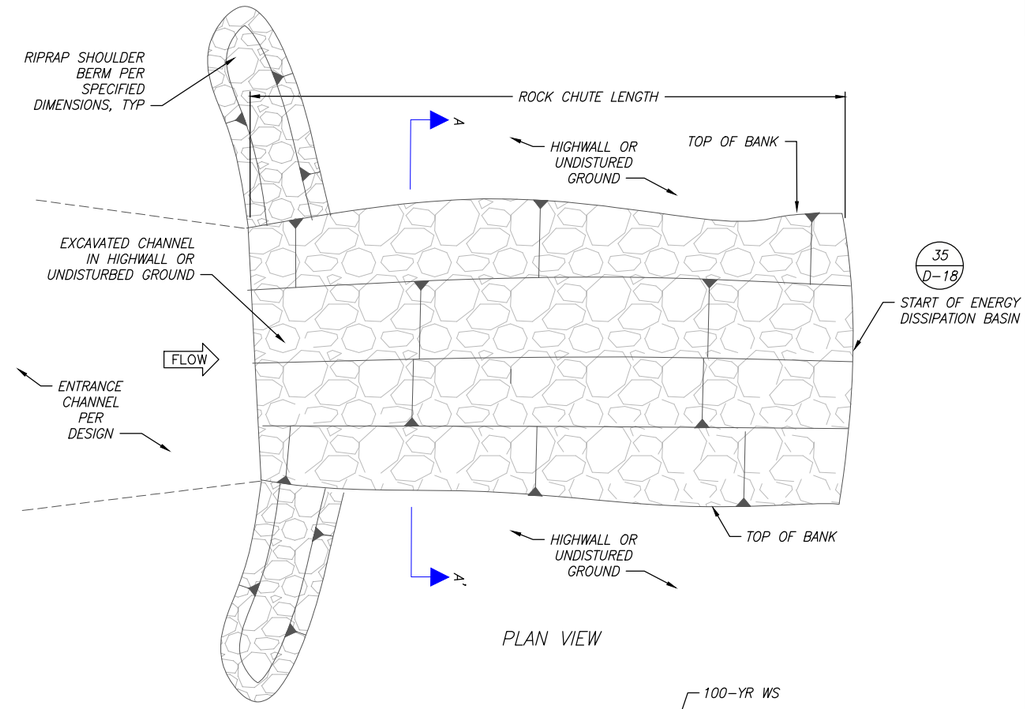
PLAN VIEW



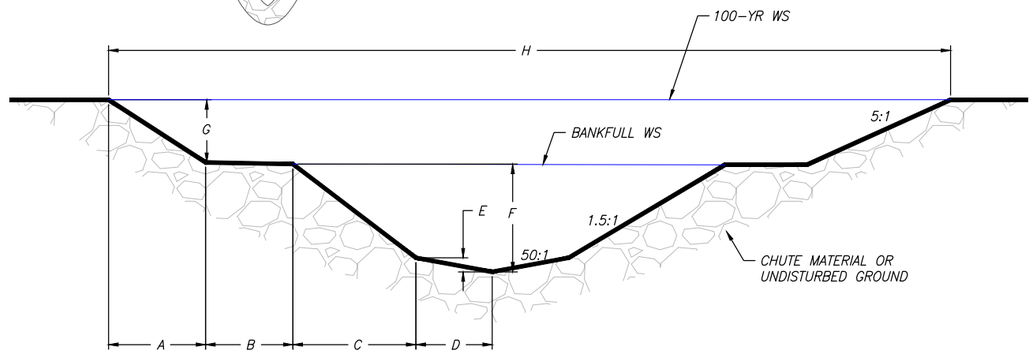
SECTION A–A'

NOTES
1. CONSTRUCT ROCK GRADE CONTROL STRUCTURES TO THE DIMENSIONS SPECIFIED IN THE LINED RIPRAP CHUTE DETAIL (THIS DRAWING).
2. ROCK GRADE CONTROL MATERIAL SHALL CONSIST OF MATERIAL MATCHING THE ROCK ARMOR LAYER FOR THE SAME REACH.

31 ROCK GRADE CONTROL STRUCTURE
NTS



PLAN VIEW



SECTION VIEW A–A'

UNLINED CHUTE CHANNEL DEFINITION TABLE

TABLE – A											
REACH ID	DESIGN EVENT	FLOW (CFS)	CHUTE MATERIAL TYPE	CHUTE MATERIAL THICKNESS (FT)	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)	H (FT)
HC1	100-YR	9	NATIVE BEDROCK	NA	1.0	0.0	0.3	0	0.1	0.3	0.2	2.6
WE2	100-YR	6	NATIVE BEDROCK	NA	1.5	0.0	0.9	0	0	0.6	0.3	4.8
WE3	100-YR	20	C2	2.0	2.5	0.0	0.8	2.0	0.1	0.6	0.5	10.5

NOTES
1. CHUTE MATERIAL TYPES: C1 (D50 = XX"), C2 (D50 = XX").

30 UNLINED CHUTE
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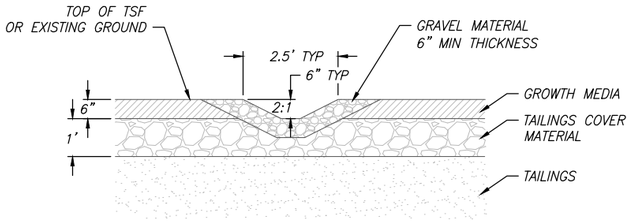

SECTION VIEW

32 NON–PERENNIAL SWALE

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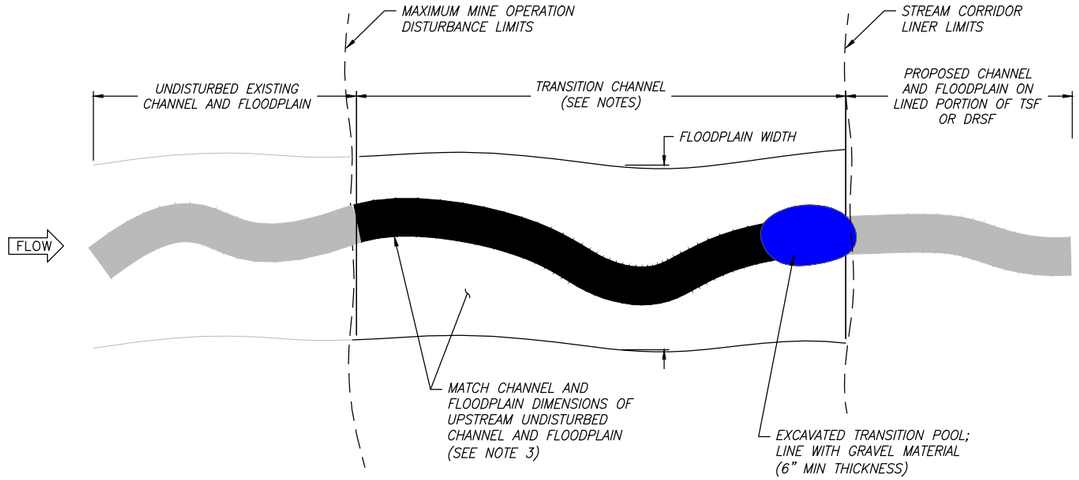
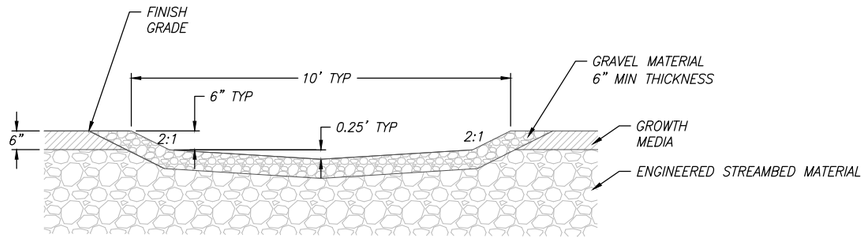


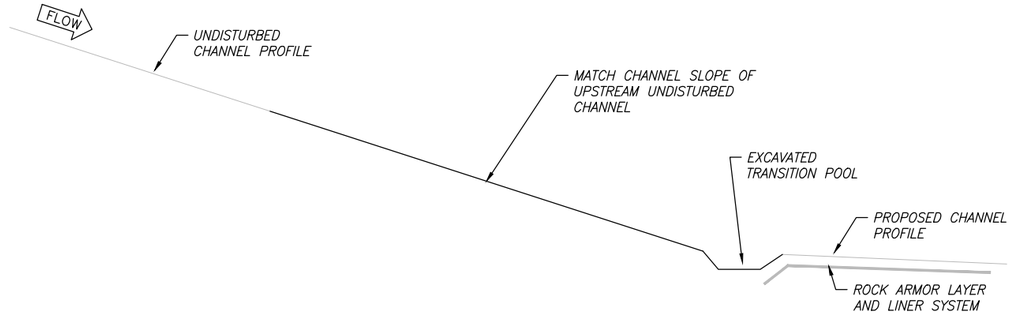
TYPICAL PLAN VIEW



SECTION VIEW

33 HIGH FLOW NON–PERENNIAL CHANNEL

NTS



TYPICAL PROFILE VIEW

TRANSITION CHANNEL NOTES:

1. TRANSITION CHANNELS SHALL BE LOCATED IN THE REGION BETWEEN STREAM CORRIDOR LINER LIMITS (ON TSF OR DRSF) AND THE MAXIMUM MINE OPERATION DISTURBANCE LIMITS AT LOCATIONS WHERE AN EXISTING (PERENNIAL OR NON–PERENNIAL) IS DISTURBED BY MINE OPERATIONS (RESTORATION OF ACCESS ROADS AND DIVERSION CHANNELS OR ANY OTHER DISTURBANCE).
2. TRANSITION CHANNELS SHALL ALSO BE LOCATED ON PERENNIAL AND NON–PERENNIAL CHANNEL AT LOCATIONS IDENTIFIED ON THE PLAN OVERVIEW SHEETS FOR EACH REACH AND AT LOCATIONS AS DETERMINED BY THE OWNER OR ENGINEER.
3. RE–CONTOUR CHANNEL AND FLOODPLAIN AREA TO ACHIEVE SMOOTH TRANSITION BETWEEN UPSTREAM UNDISTURBED CHANNEL AND DOWNSTREAM PROPOSED CHANNEL (OR DOWNSTREAM EXISTING UNDISTURBED CHANNEL IN SOME CASES; TYPICAL DETAIL SHOWN REPRESENTS TRANSITION AT LINER LIMITS).

34 TRANSITIONAL CHANNEL

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Drawing Name
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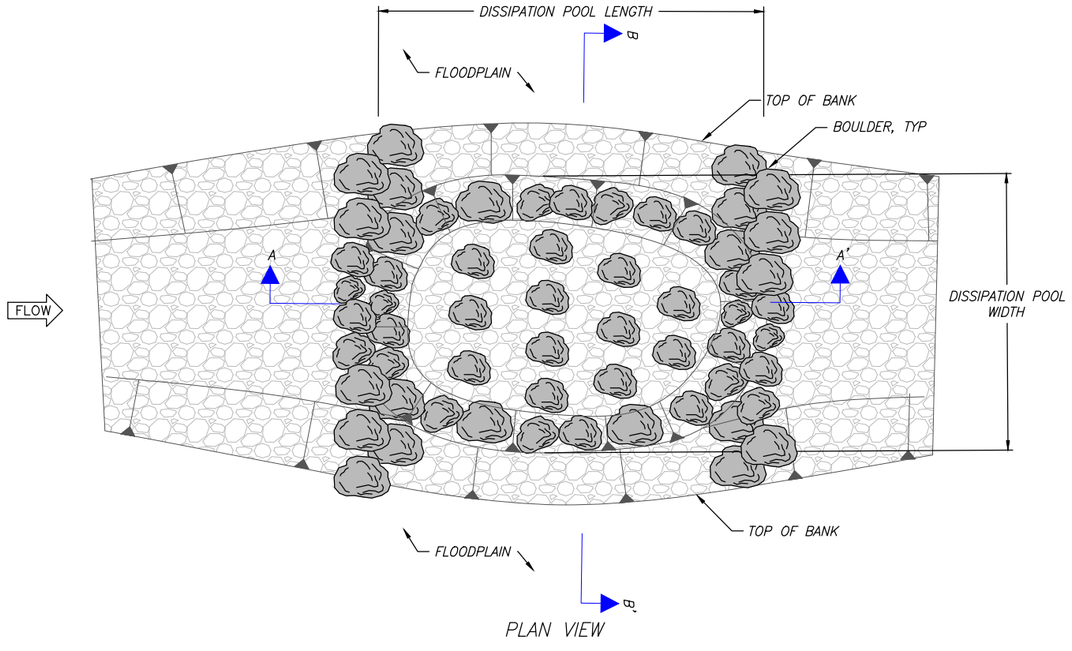
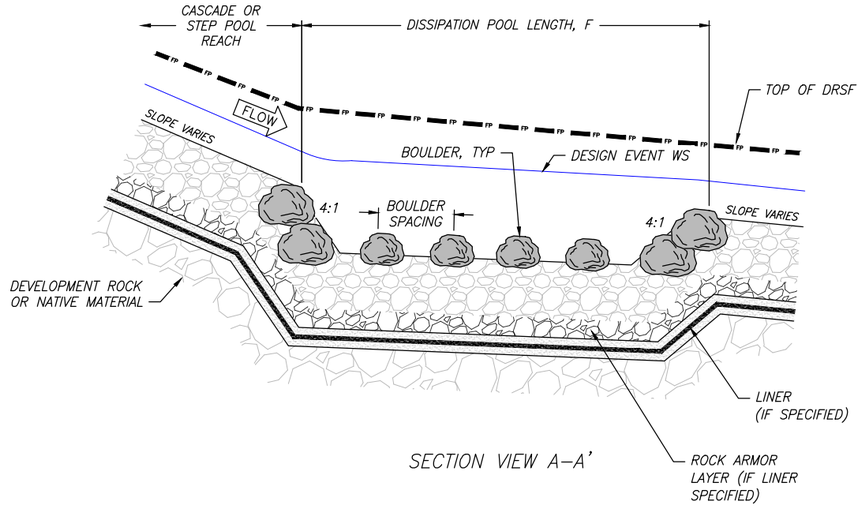
Drawing No.
D–17



PLAN VIEW



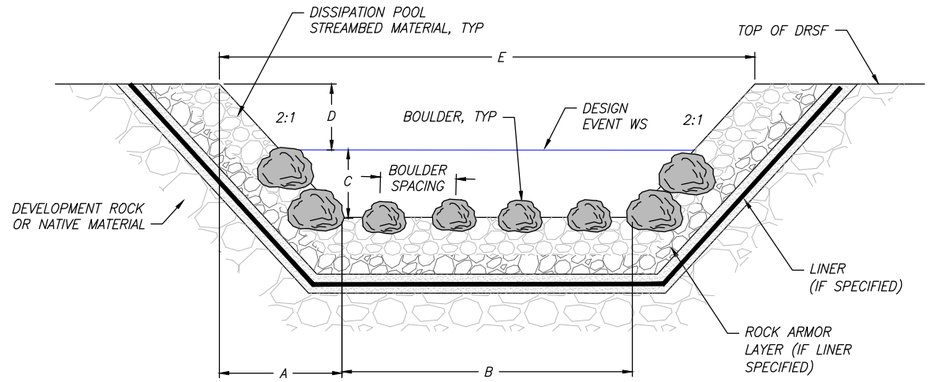
SECTION VIEW A–A'

ENERGY DISSIPATION BASIN DEFINITION TABLE

TABLE – A

REACH ID	DESIGN EVENT	FLOW (CFS)	BASIN MATERIAL TYPE	BASIN MATERIAL THICKNESS (IN)	ROCK ARMOR MATERIAL TYPE	ROCK ARMOR MATERIAL THICKNESS (IN)	A (FT)	B (FT)	C (FT)	FREEBOARD, D (FT)	CHANNEL TOP WIDTH, E (FT)	POOL LENGTH, F (FT)
MC3	100-YR	208	B1	4.0	A2	2.0	TBD	TBD	TBD	TBD	TBD	TBD
BC2	100-YR	76	B1	3.0	A2	NA	TBD	TBD	TBD	TBD	TBD	TBD
MNC1	100-YR	15	B1	3.0	NA	2.0	TBD	TBD	TBD	TBD	TBD	TBD
HC1	100-YR	9	B1	3.0	NA	2.0	TBD	TBD	TBD	TBD	TBD	TBD
WE3	100-YR	20	B1	3.0	NA	NA	TBD	TBD	TBD	TBD	TBD	TBD

NOTES
1. BASIN MATERIAL TYPES: B1 (D50 = XX")
2. ROCK ARMOR MATERIAL TYPES: A1 (D50 = XX"), A2 (D50 = XX").



SECTION VIEW B–B'

35 ENERGY DISSIPATION BASIN
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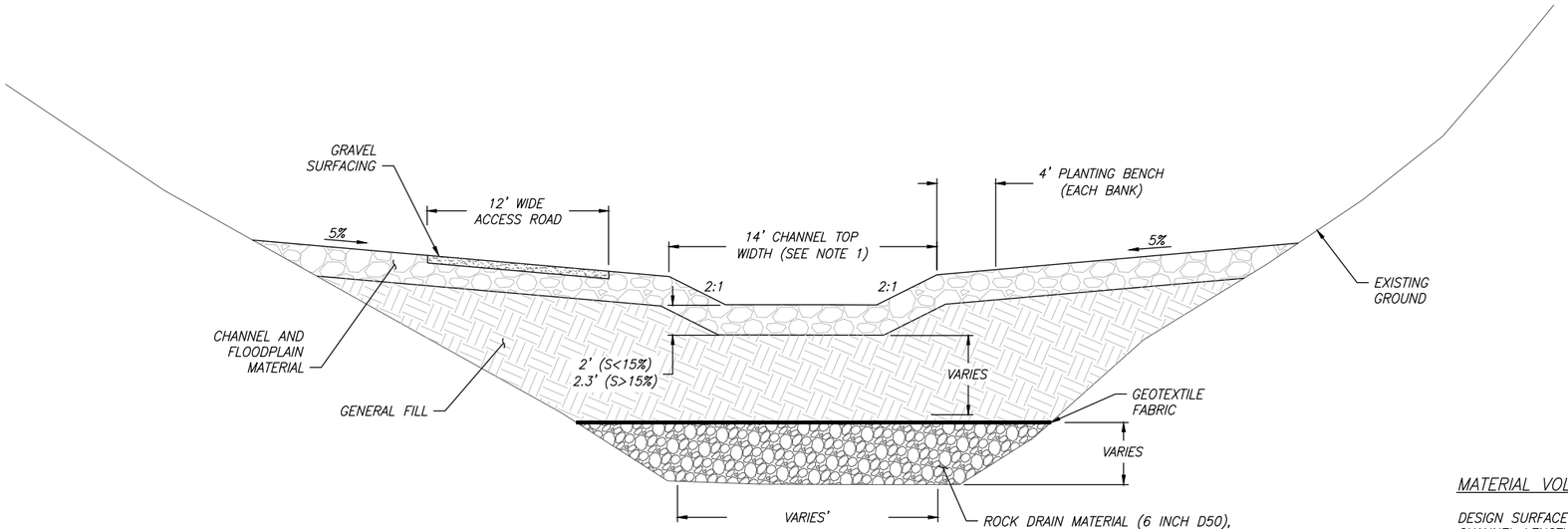


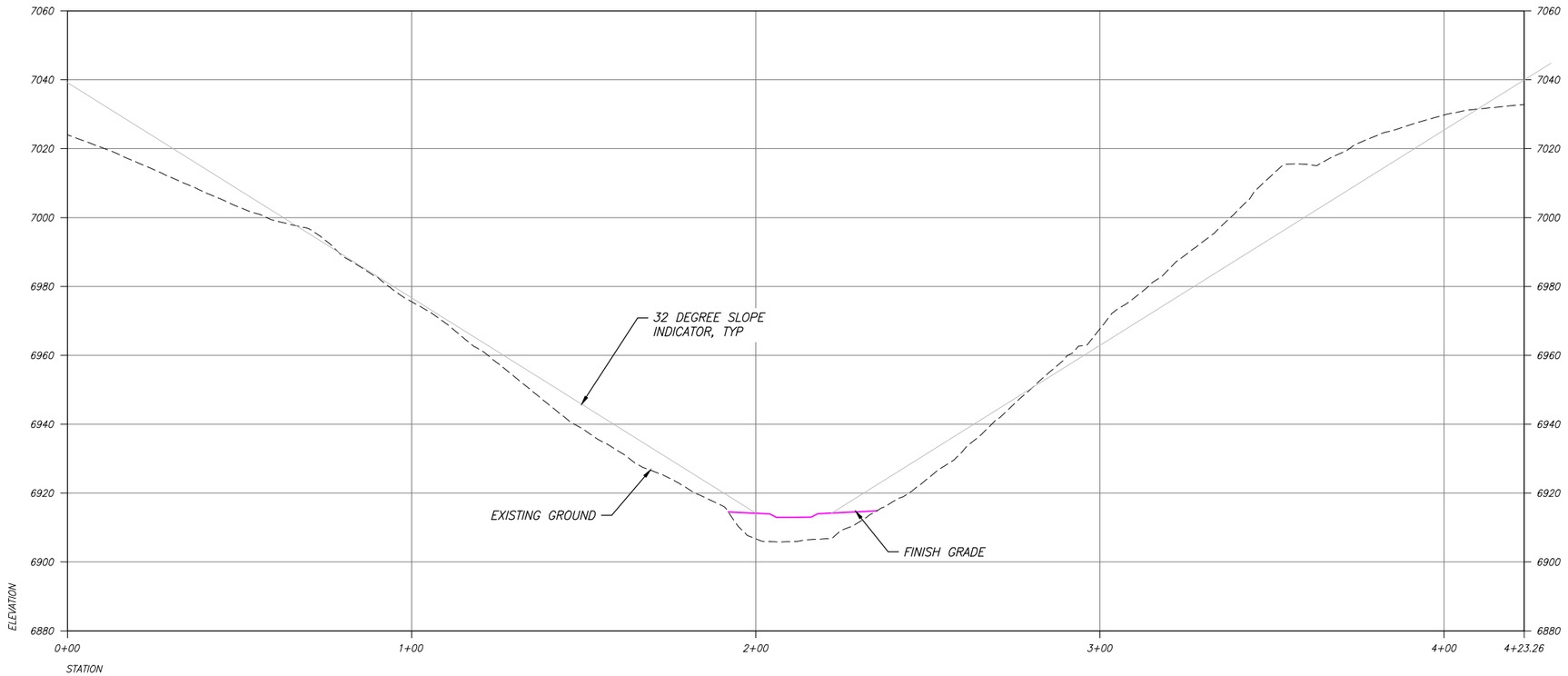
NOTES:

1. SURFACE CHANNEL SIZED FOR 100-YR FLOW (71 CFS); 10-FOOT BOTTOM WIDTH, 1-FOOT DEPTH, 2:1 SIDE SLOPES.

MATERIAL VOLUME ESTIMATE:

DESIGN SURFACE TOTAL FILL VOLUME = 18,500 CY
CHANNEL LENGTH = 1,070 FT

ROCK DRAIN MATERIAL = 1,150 CY
GENERAL FILL MATERIAL = 12,100 CY
CHANNEL AND FLOODPLAIN MATERIAL = 4,700 CY
GRAVEL SURFACING MATERIAL = 650 CY



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LOCATION: R:\PROJECTS\SF_SALMON_JAJO90\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\TYPICALDETAILS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021

BANK TREATMENT SCHEDULE – LEFT BANK											
REACH ID	BANK TREATMENT	START STA	END STA	BRUSHLAYER		BRUSH LAYER PLANTING		LIVE STAKES		LIVE STAKES PLANTING	
				START STA	END STA	BRUSH LAYER THICKNESS (IN)	PLANTING DENSITY (# CUTTINGS PER L.F.)	START STA	END STA	PLANTING WIDTH (FT)	PLANTING DENSITY (SPACING)
MC1A	A	0+00	0+00	0+00	0+00	12	1	0+00	0+00	2	4' O.C.

BANK TREATMENT SCHEDULE TO BE COMPLETED IN A FUTURE DESIGN PHASE

NOTES:
1. SEE SHEET D-1 – TYPICAL DETAILS – 1 FOR BANK TREATMENT TYPES AND DETAILS.

BANK TREATMENT SCHEDULE – RIGHT BANK											
REACH ID	BANK TREATMENT	START STA	END STA	BRUSHLAYER		BRUSH LAYER PLANTING		LIVE STAKES		LIVE STAKES PLANTING	
				START STA	END STA	BRUSH LAYER THICKNESS (IN)	PLANTING DENSITY (# CUTTINGS PER L.F.)	START STA	END STA	PLANTING WIDTH (FT)	PLANTING DENSITY (SPACING)
MC1A	A	0+00	0+00	0+00	0+00	12	1	0+00	0+00	2	4' O.C.

BANK TREATMENT SCHEDULE TO BE COMPLETED IN A FUTURE DESIGN PHASE

NOTES:
1. SEE SHEET D-1 – TYPICAL DETAILS – 1 FOR BANK TREATMENT TYPES AND DETAILS.

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D-20

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ZONE 1 CONTAINER PLANTING SCHEDULE

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	WETLAND INDICATOR STATUS	PLANT SIZE / PROPAGULE TYPE	PERCENT OF MIX, %	PLANTING SPACING (ON CENTER), FT
Elodea species (E. canadensis; E.Nuttalii)	waterweed	aquatic macrophyte	OBL	2.5 inch	25	2
Isoetes bolanderi	Bolander's quillwort	aquatic macrophyte	OBL	2.5 inch	15	2
Potomogeton alpinus	alpine pondweed	aquatic macrophyte	OBL	2.5 inch	15	2
Potomogeton epihydrus	ribbonleaf pondweed	aquatic macrophyte	OBL	2.5 inch	15	2
Ranunculus aquatilis	white water crowfoot	aquatic macrophyte	OBL	2.5 inch	15	2
Utricularia macrohiza	common bladderwort	aquatic macrophyte	OBL	2.5 inch	15	2
Total					100	

ZONE 2 CONTAINER PLANTING SCHEDULE

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	WETLAND INDICATOR STATUS	PLANT SIZE / PROPAGULE TYPE	PERCENT OF MIX, %	PLANTING SPACING (ON CENTER), FT
Carex canescens var. canescens	silvery sedge	graminoid	OBL	10 ci	10	3 ft
Carex lenticularis var. lipocarpa	lakeshore sedge	graminoid	OBL	10 ci	10	3 ft
Carex utriculata	beaked sedge	graminoid	OBL	10 ci	10	3 ft
Deschampsia elongata	slender hairgrass	graminoid	FACW	10 ci	20	3 ft
Equisetum fluviatile	water horsetail	fern ally	OBL	2.5-in	20	3 ft
Glyceria striata (G. elata)2	fowl mannagrass (tall managrass)	graminoid	OBL (FACW)	10 ci	20	3 ft
Juncus ensifolius	swordleaf rush	graminoid	FACW	10 ci	10	3 ft
Total					**100**	

ZONE 2 SEEDING SCHEDULE

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	WETLAND INDICATOR STATUS	PERCENT OF MIX, %	PLS, SEEDS/LB	PLS, LB/ACRE
Deschampsia elongata	slender hairgrass	graminoid	FACW	30	2,300,000	1.03
Glyceria striata (G. elata)2	fowl mannagrass (tall managrass)	graminoid	OBL (FACW)	40	1,600,000	1.97
Juncus drummondii	Drummond's rush	graminoid	FACW	15	17,000,000	0.07
Juncus ensifolius	swordleaf rush	graminoid	FACW	15	24,000,000	0.05
Total				100		3.12

ZONE 3 CONTAINER PLANTING SCHEDULE

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	WETLAND INDICATOR STATUS	PLANT SIZE / PROPAGULE TYPE	PERCENT OF MIX, %	PLANTING SPACING (ON CENTER), FT
Betula glandulosa	resin birch	shrub	OBL	D 40	10	6 ft
Calamagrostis canadensis var. canadensis	bluejoint reedgrass	graminoid	FACW	10 ci	10	3 ft
Deschampsia elongata	slender hairgrass	graminoid	FACW	10 ci	10	3 ft
Equisetum hyemale var. affine	scouring rush	fern ally	FACW	2.5-in	5	3 ft
Salix drummondiana	Drummond's willow	shrub	FACW	live stakes; D 40	20	3 ft; 4 ft
Salix geyeriana	Geyer's willow	shrub	FACW	live stakes; D 40	20	3 ft; 4 ft
Salix melanopsis	dusky willow	shrub	OBL	live stakes; D 40	20	3 ft; 4 ft
Senecio triangularis	arrowleaf ragwort	forb	FACW	10 ci	5	3 ft
Total					100	

ZONE 3 SEEDING SCHEDULE

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	WETLAND INDICATOR STATUS	PERCENT OF MIX, %	PLS, SEEDS/LB	PLS, LB/ACRE
Calamagrostis canadensis var. canadensis	bluejoint reedgrass	graminoid	FACW	25	3,800,000	0.52
Deschampsia elongata	slender hairgrass	graminoid	FACW	35	2,300,000	1.19
Glyceria striata (G. elata)3	fowl mannagrass (tall managrass)	graminoid	OBL (FACW)	20	1,600,000	0.98
Juncus arcticus ssp. littoralis (J. balticus)	mountain rush	graminoid	FACW	5	7,500,000	0.05
Juncus ensifolius	swordleaf rush	graminoid	FACW	5	24,000,000	0.02
Mimulus lewisii	purple monkeyflower	forb	FACW	5	20,636,363	0.02
Senecio triangularis	arrowleaf ragwort	forb	FACW	5	500,000	0.78
Total				**100**		**3.56**

ZONE 4 CONTAINER PLANTING SCHEDULE

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	WETLAND INDICATOR STATUS	PLANT SIZE / PROPAGULE TYPE	PERCENT OF MIX, %	PLANTING SPACING (ON CENTER), FT
Alnus incana ssp. tenuifolia	thinleaf alder	shrub/tree	FACW	D 40	20	6 ft
Calamagrostis canadensis var. canadensis	bluejoint reedgrass	graminoid	FACW	10 ci	10	3 ft
Cornus sericea (C. alba)	redosier dogwood	shrub	FACW	D 40	15	6 ft
Geum macrophyllum var. perincisum	largeleaf avens	forb	FAC	10 ci	10	3 ft
Lonicera involucrata var. involucrata	twinberry honeysuckle	shrub	FAC	D 40	15	6 ft
Picea engelmannii var. engelmannii	Engelmann's spruce	tree	FAC	D 40	10	8 ft
Ribes lacustre	prickly currant	shrub	FAC	D 40	10	6 ft
Salix drummondiana	Drummond's willow	shrub	FACW	live stakes; D 40	5	3 ft; 4 ft
Salix lasiandra	Pacific willow	shrub	FACW	live stakes; D 40	5	3 ft; 4 ft
Total					100	

ZONE 4 SEEDING SCHEDULE

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	WETLAND INDICATOR STATUS	PERCENT OF MIX, %	PLS, SEEDS/LB	PLS, LB/ACRE
Calamagrostis canadensis var. canadensis	bluejoint reedgrass	graminoid	FACW	30	3,800,000	0.55
Deschampsia elongata	slender hairgrass	graminoid	FACW	20	2,300,000	0.61
Elymus trachycaulus ssp. trachycaulus	slender wheatgrass	graminoid	FAC	40	160,000	17.44
Potentilla gracilis	slender cinquefoil	forb	FAC	10	1,700,000	0.42
Total				100		19.02

PLANTING ZONE NOTES:
1. SEE SEE DRAWING D-1 – TYPICAL DETAILS – 1 FOR PLANTING AND SEEDING ZONES ASSOCIATED WITH BANK TREATMENT TYPES.

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Typical Details
Valley County, Idaho

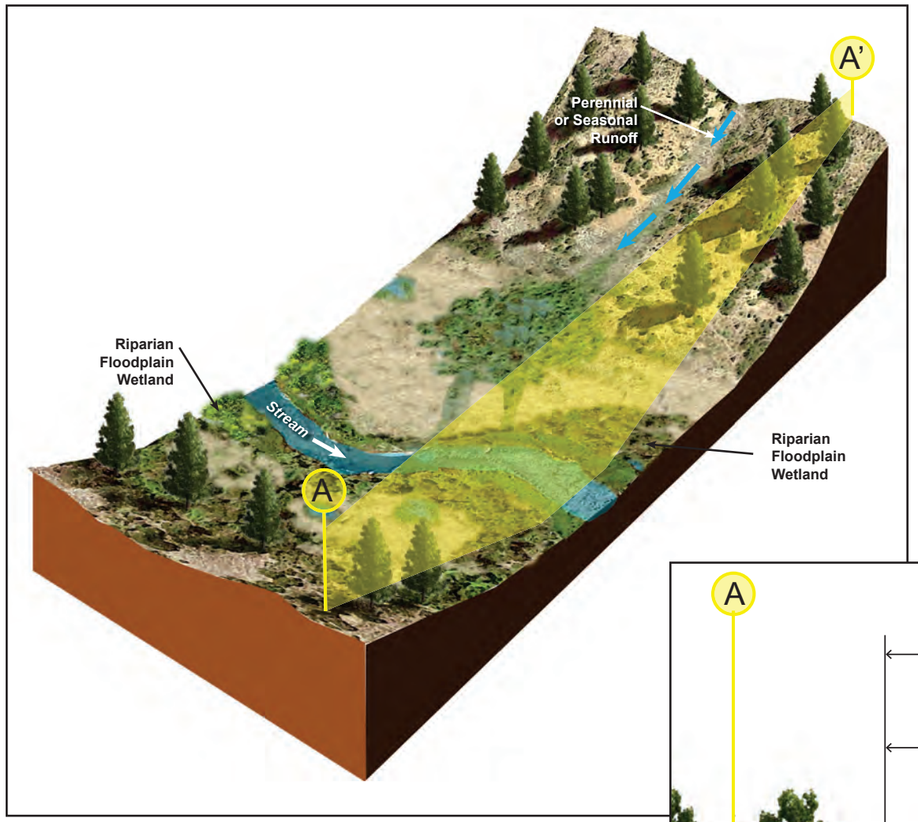
Draft

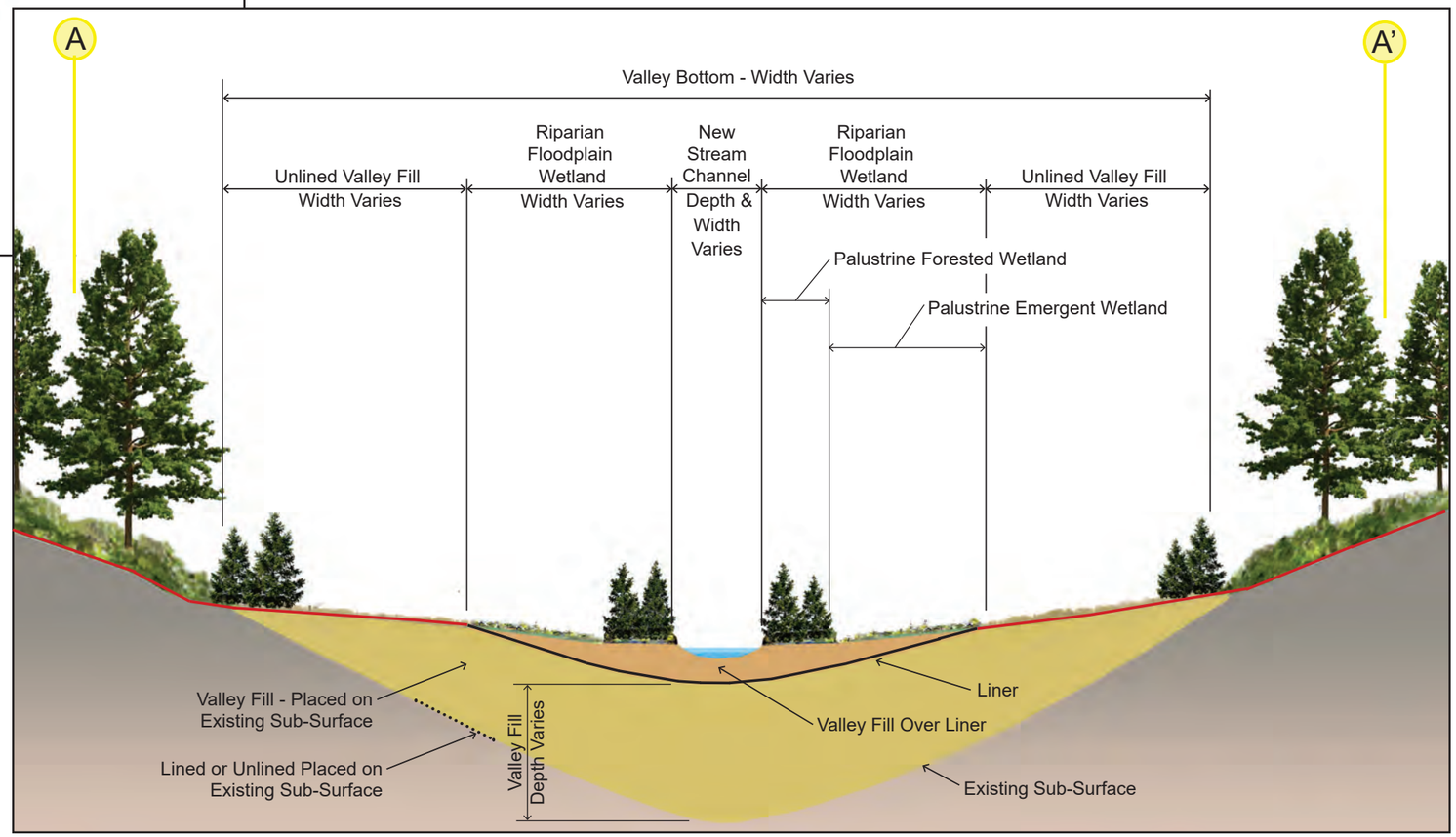
Date: March 2021
Designed: JF, JY, MP
Drawn: JF, JY, MP
Checked: RR
Approved: --

Drawing Name
Typical Details – 21

Drawing No.
D-21

LOCATION: R:\PROJECTS\SF_SALMON_JAI\09\STIBNITE_RESTORATION_MIDAS\CAD\PRODUCTION\TYPICALDETAILS_CONCEPTDESIGN.DWG PLOT DATE: 3/3/2021





RIPARIAN FLOOD PLAIN WETLAND A-A'

NOT TO SCALE

TETRA TECH

Perpetua Resources

Stibnite Gold Project

Stream And Wetland Restoration Concept Design

Wetland Details

Valley County, Idaho

Draft

Date:	MAR. 2021
Designed:	LC
Drawn:	JHD
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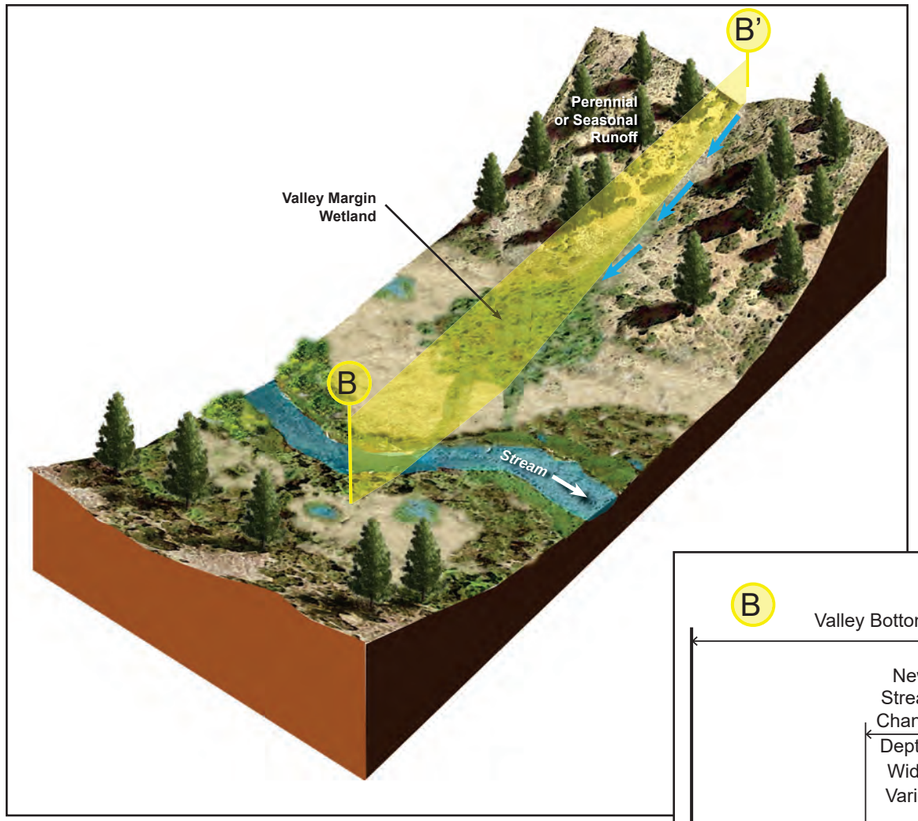
Approved:	—

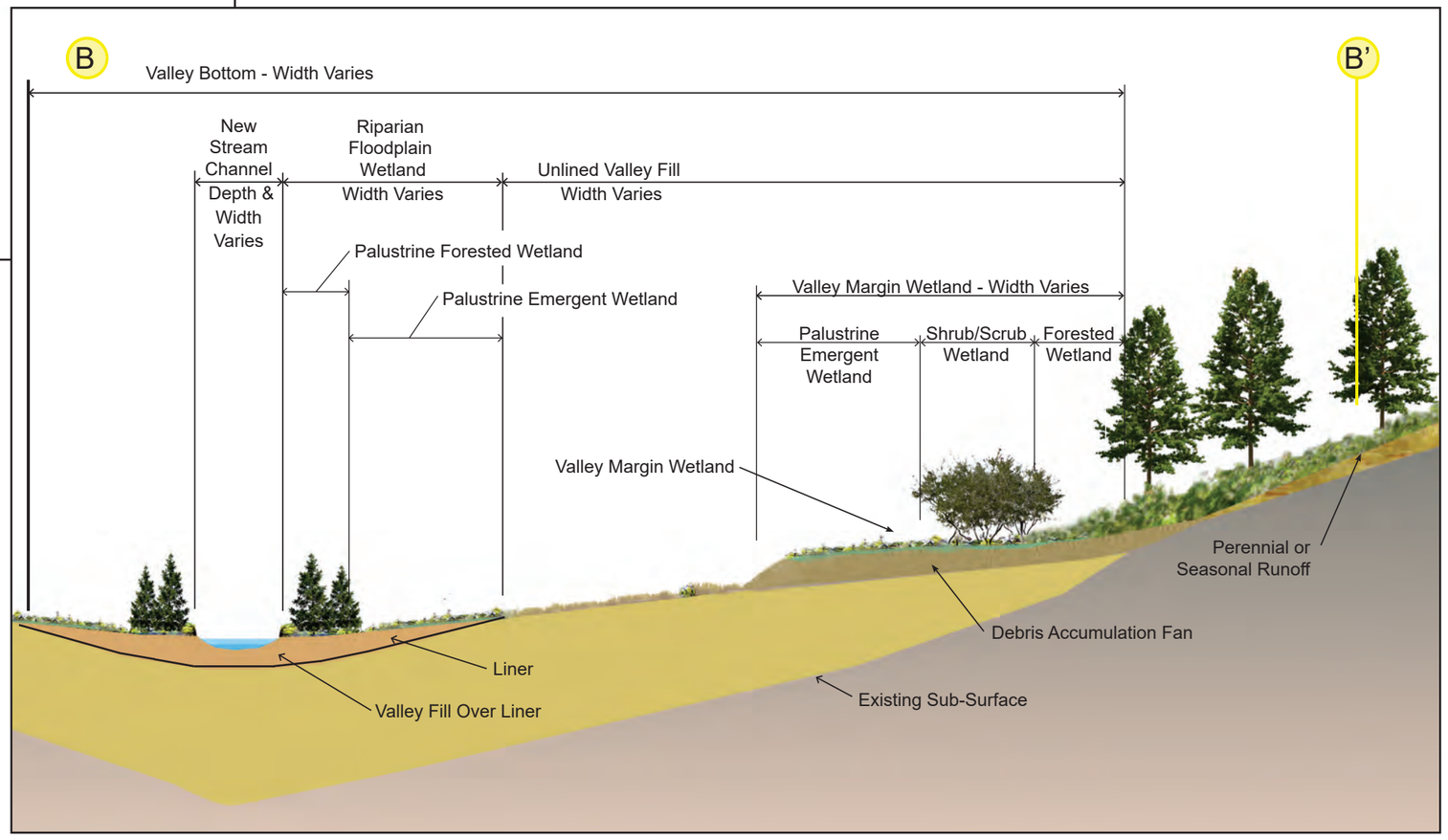
Drawing Name

Wetland Detail Sheet - 1

Drawing No.

D-22





VALLEY MARGIN WETLAND B-B'

NOT TO SCALE

TETRA TECH

Perpetua Resources

Stibnite Gold Project

Stream And Wetland Restoration Concept Design

Wetland Details

Valley County, Idaho

Draft

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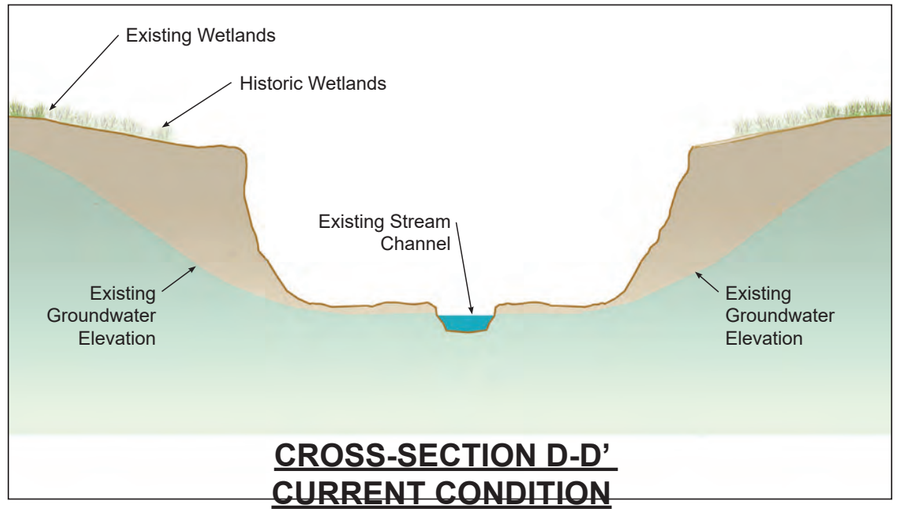
Designed:	LC
Drawn:	JHD
Checked:	LC
Approved:	

Drawing Name

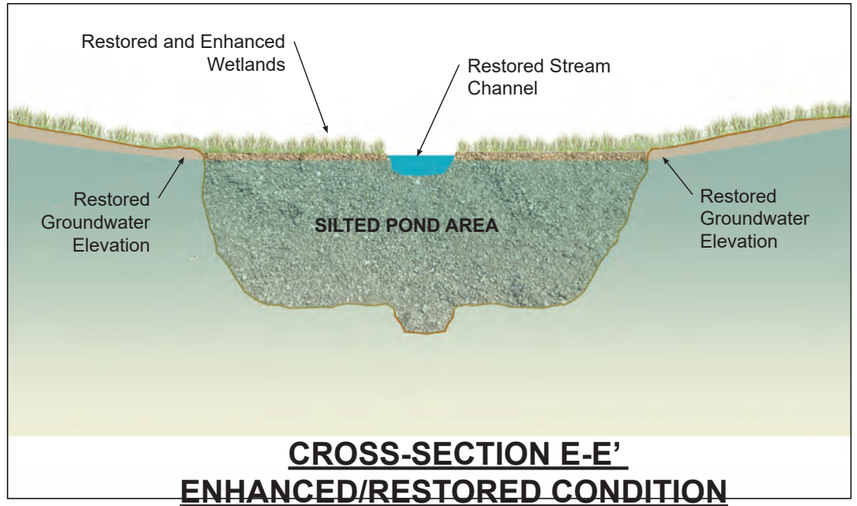
Wetland Detail Sheet - 2

Drawing No.

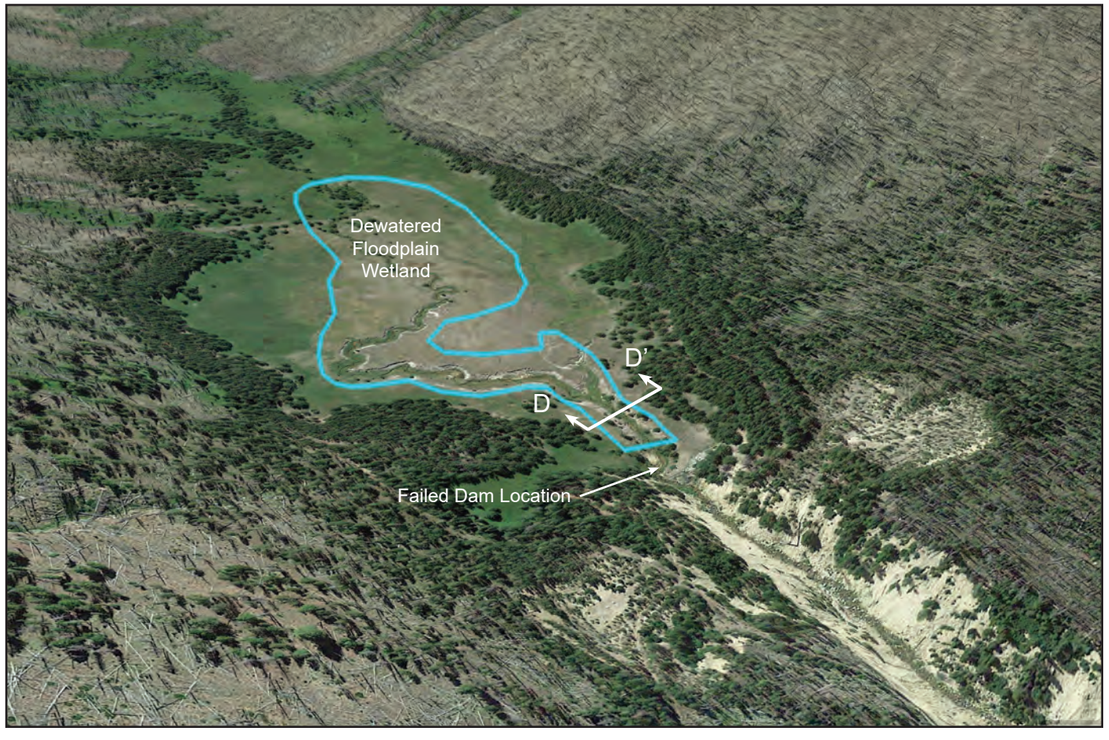
D-23



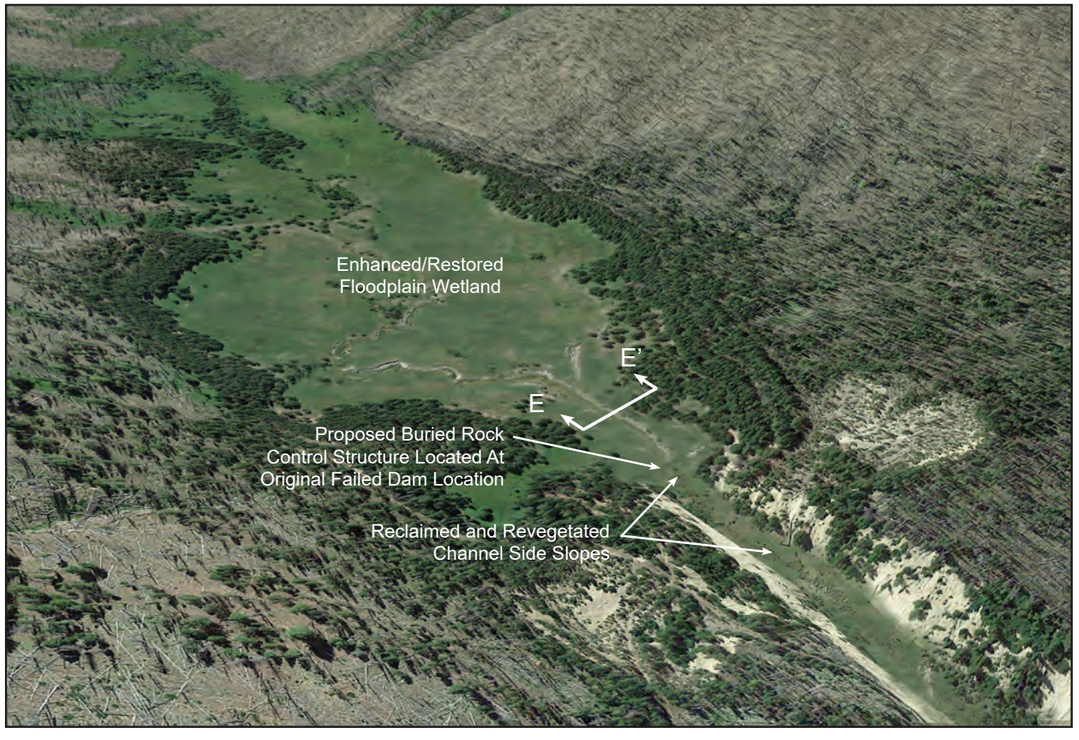
CROSS-SECTION D-D'
CURRENT CONDITION



CROSS-SECTION E-E'
ENHANCED/RESTORED CONDITION



BLOWOUT CREEK - CURRENT CONDITION



BLOWOUT CREEK - ENHANCED/ RESTORED CONDITION

TETRA TECH

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Stream And Wetland Restoration Concept Design
Wetland Details
Valley County, Idaho

Draft

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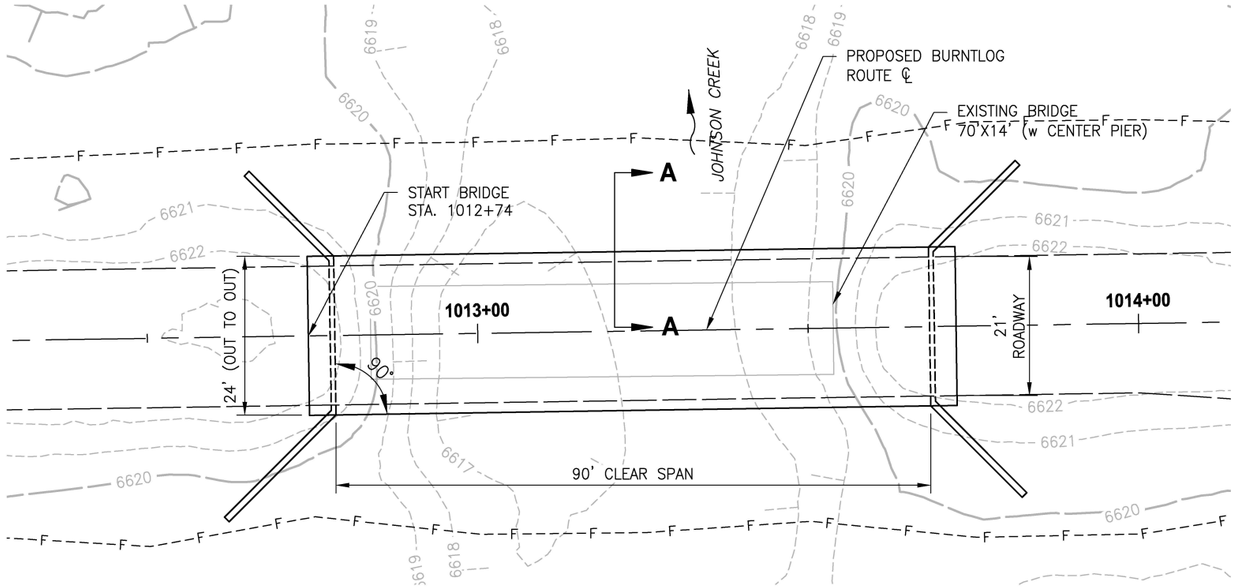
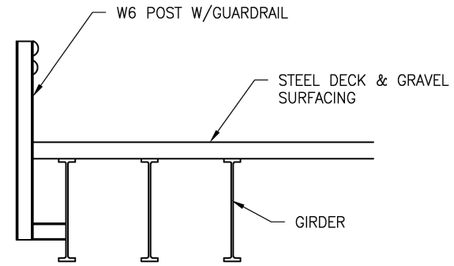
Checked:	LC
Approved:	

Drawing Name
Wetland Detail Sheet - 3

Drawing No.
D-24



PLAN
SCALE: 1"=20'



SECTION A-A
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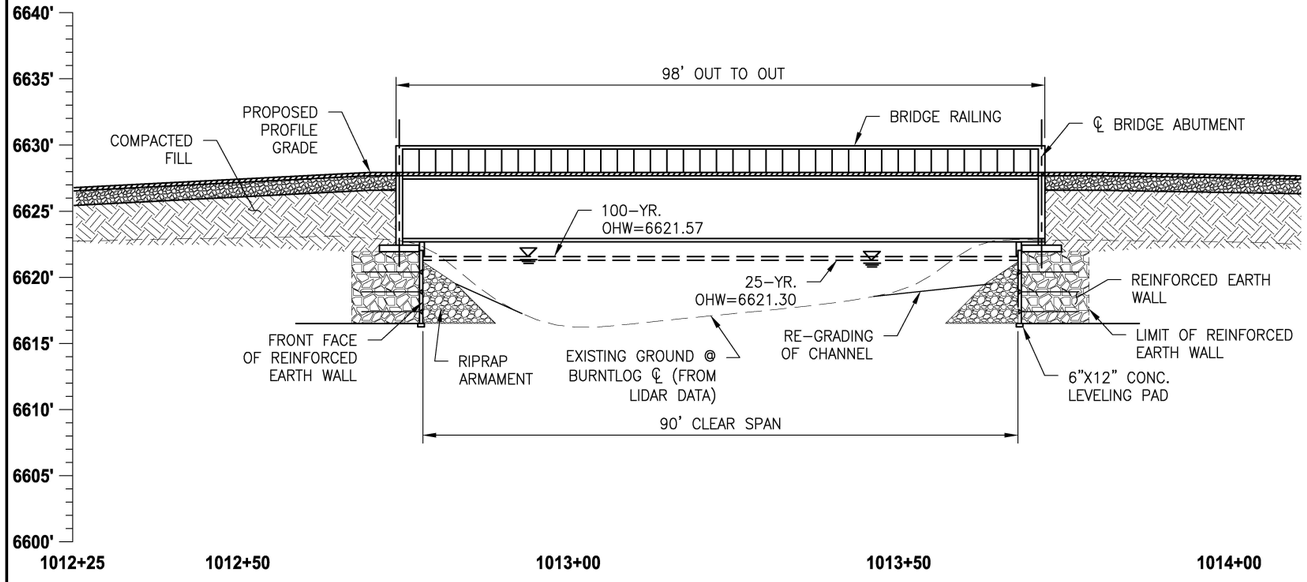

ELEVATION (AT CONTROL LINE)
SCALE: 1"=20'H, 1"=10'V

FEASIBILITY DESIGN SUBMITTAL

REVISIONS	DATE	BY

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JOB No.	314-7260-001	DRAWN	I. MEDINA	APPROVED	D. MELDRUM

NOT FOR CONSTRUCTION

MIDAS GOLD
405 S 8th St.
Boise, ID 83702

PROJECT NAME
STIBNITE GOLD ACCESS
ROAD FEASIBILITY DESIGN
SEGMENT A
BRIDGE PLANS

DRAWING NO.
1 OF 6

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Culvert/Bridge Typicals
Valley County, Idaho

Draft

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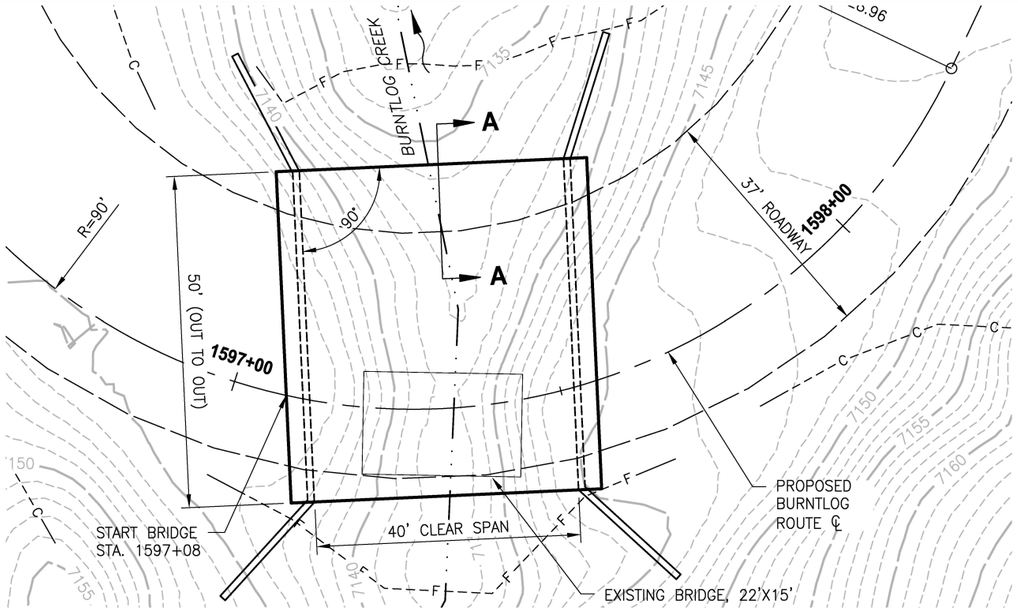
Drawing Name

Drawing No.
D-25

LOCATION:



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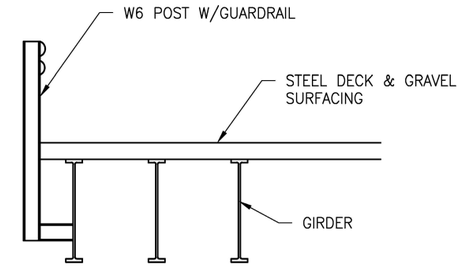

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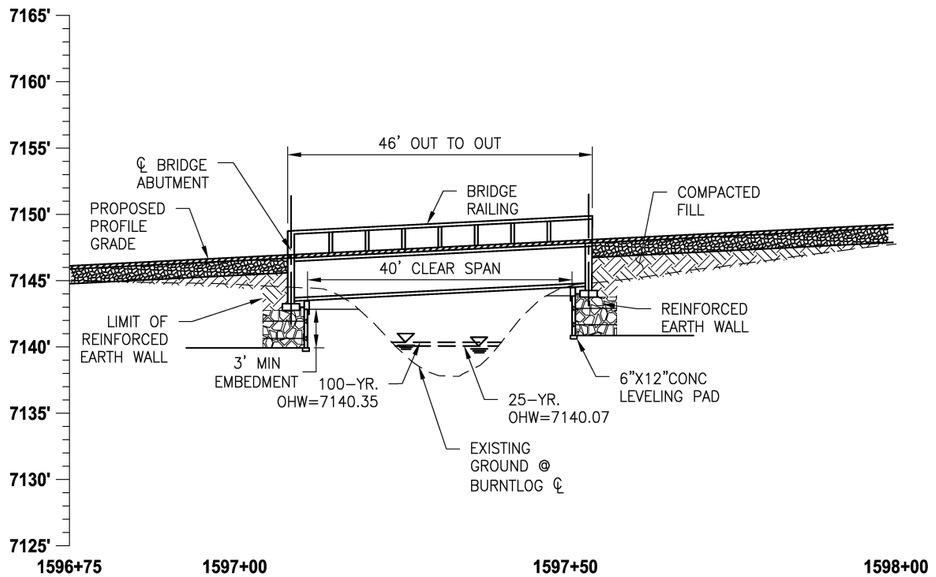
SCALE: 1"=4'



ELEVATION (AT CONTROL LINE)
SCALE: 1"=20'H, 1"=10'V

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MIDAS GOLD
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PROJECT NAME
STIBNITE GOLD ACCESS
ROAD FEASIBILITY DESIGN
SEGMENT B
BRIDGE PLANS

DRAWING NO.
2 OF 6

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Stibnite Gold Project
ModPRO2
Culvert/Bridge Typicals
Valley County, Idaho

Draft

Date:
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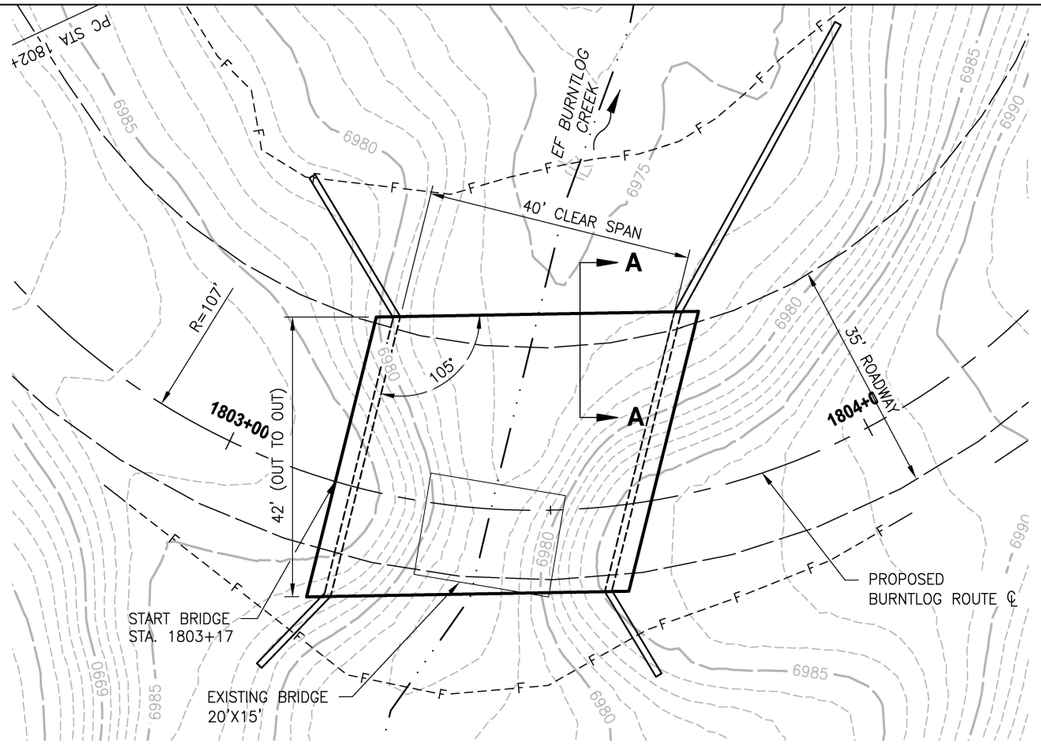
Drawing Name

Drawing No.
D-26

LOCATION:



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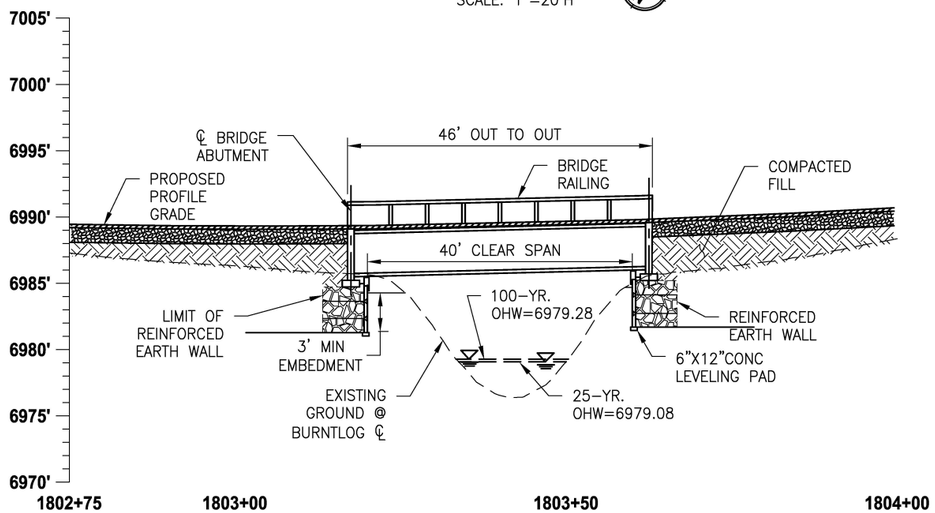
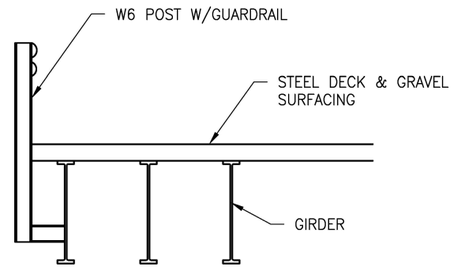
SCALE: 1"=20'H



ELEVATION (AT CONTROL LINE)

SCALE: 1"=20'H, 1"=10'V



SECTION A-A

SCALE: 1"=4'

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1		

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PROJECT NAME
STIBNITE GOLD ACCESS ROAD FEASIBILITY DESIGN SEGMENT B
BRIDGE PLANS

DRAWING NO.
3 OF 6

FEASIBILITY DESIGN SUBMITTAL

LOCATION:

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Culvert/Bridge Typicals
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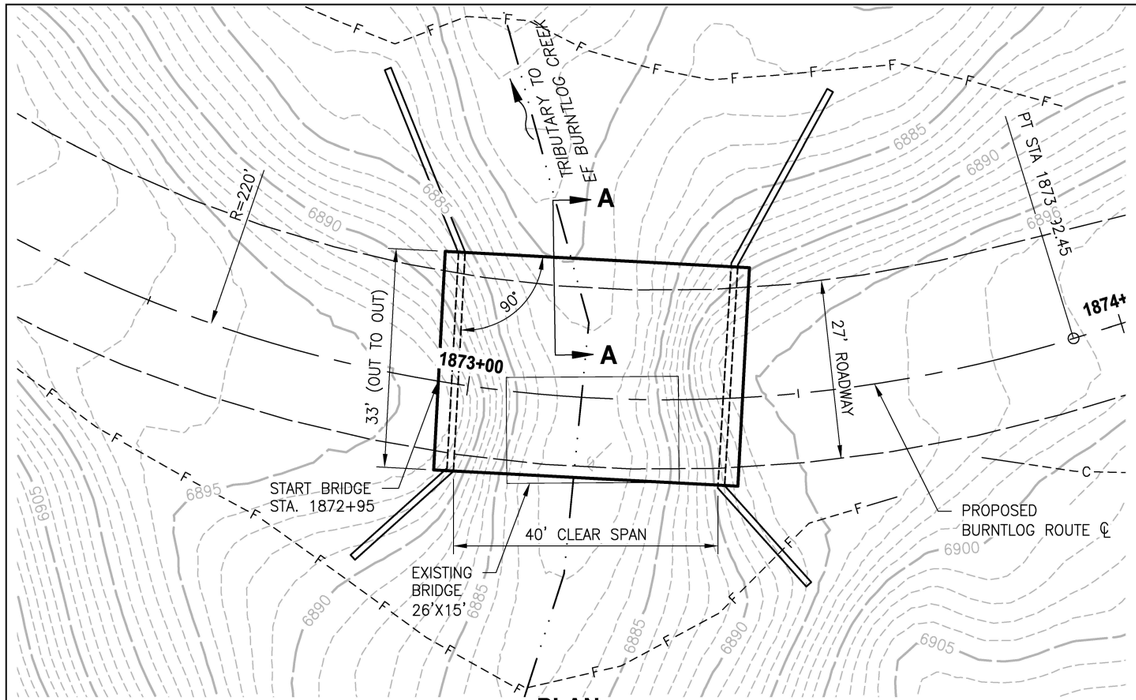
D-27



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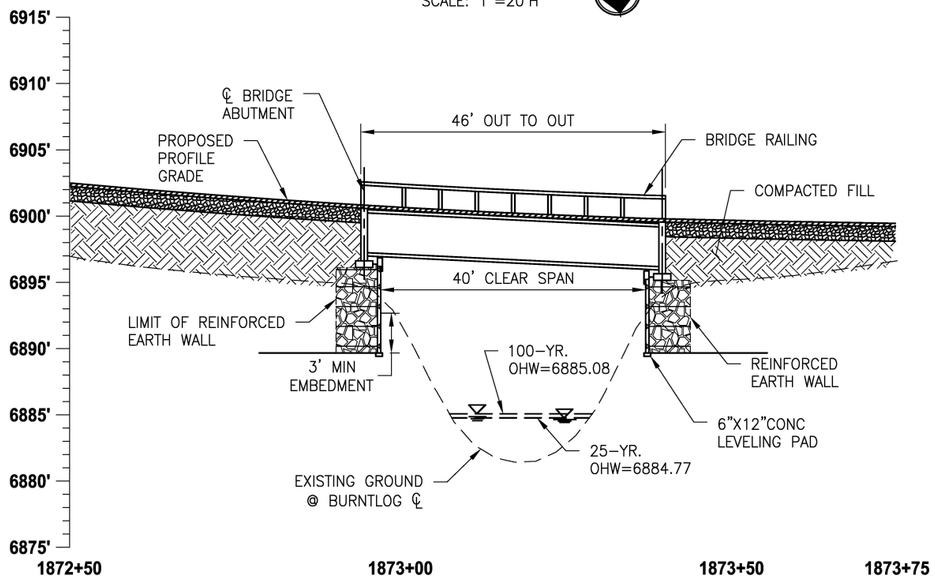
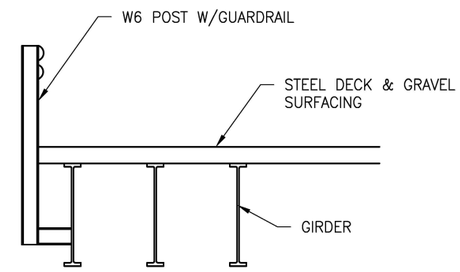


ELEVATION (AT CONTROL LINE)

SCALE: 1"=20'H, 1"=10'V



SECTION A-A

SCALE: 1"=4'

REVISIONS	DATE	BY

ONE INCH AT HALF SCALE IF NOT, SCALE ACCORDINGLY

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MIDAS GOLD
405 S 8th St.
Boise, ID 83702

PROJECT NAME
STIBNITE GOLD ACCESS
ROAD FEASIBILITY DESIGN
SEGMENT B
BRIDGE PLANS

DRAWING NO.
4 OF 6

FEASIBILITY DESIGN SUBMITTAL

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Stibnite Gold Project
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Culvert/Bridge Typicals
Valley County, Idaho

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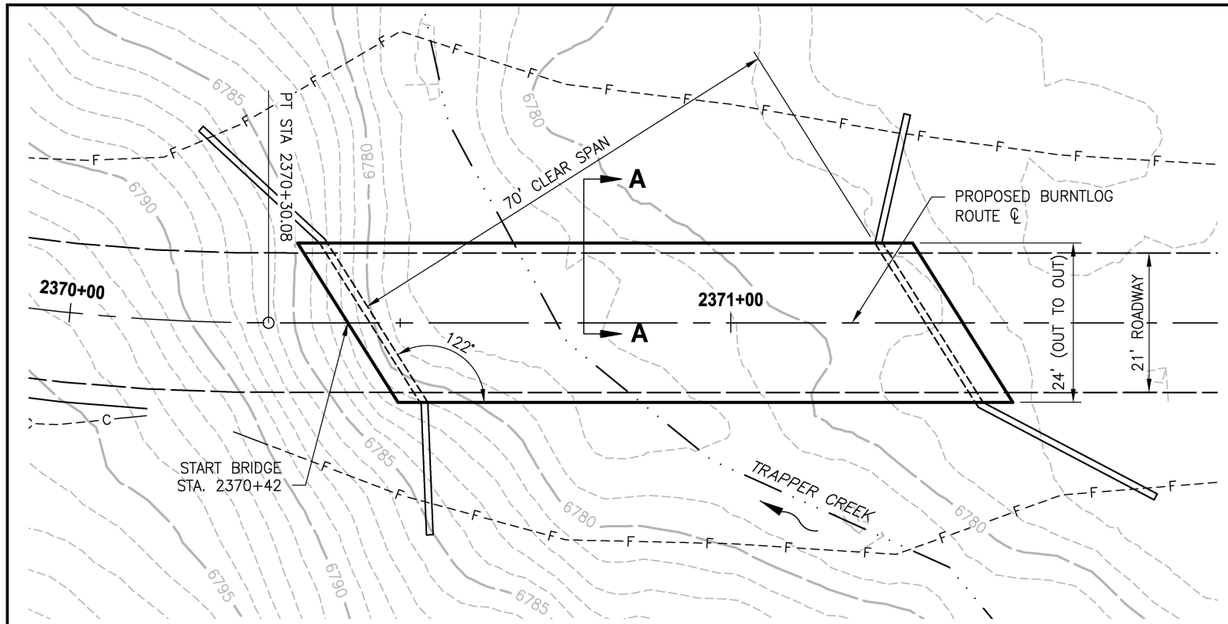
Date:
Designed:
Drawn:
Checked:
Approved:

Drawing Name

Drawing No.
D-28

LOCATION:



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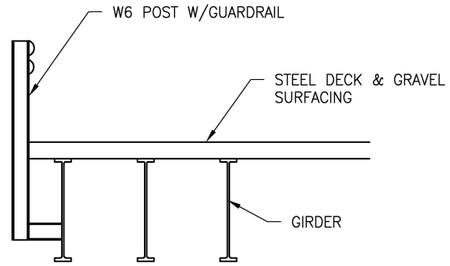

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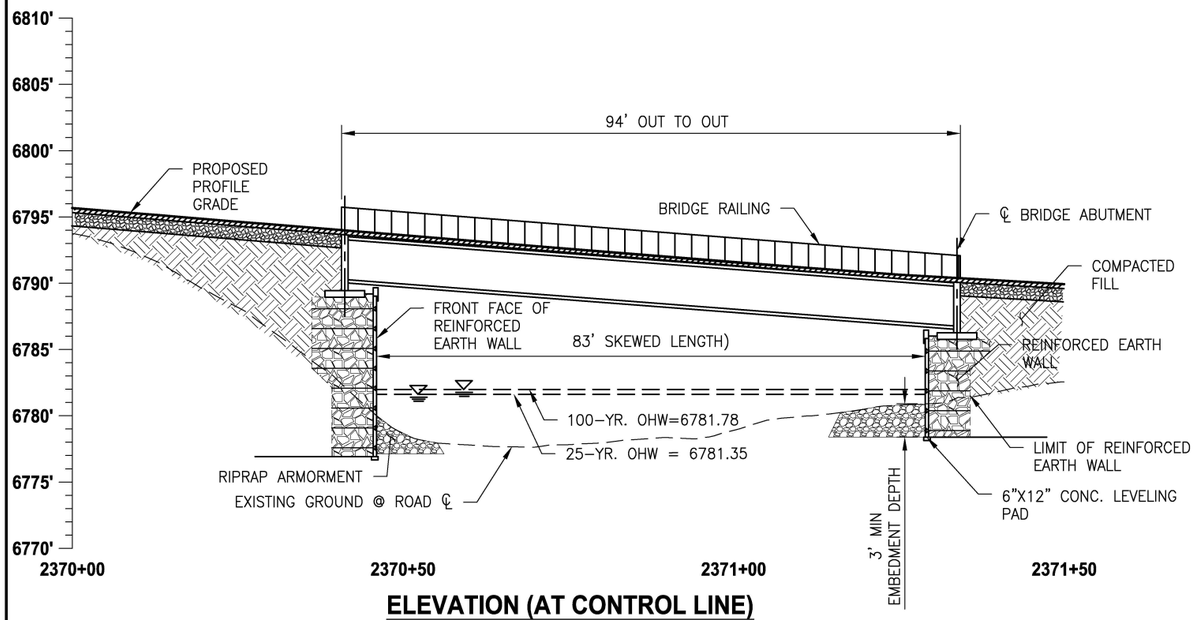
SCALE: 1"=4'



ELEVATION (AT CONTROL LINE)
SCALE: 1"=20'H, 1"=10'V

NOTE:
GEOTECHNICAL ADDENDUM REPORT RECOMMENDS THIS BRIDGE TO BE CONSTRUCTED ON PILE FOUNDATIONS.

FEASIBILITY DESIGN SUBMITTAL

REVISIONS	DATE	BY

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MIDAS GOLD
405 S 8th St.
Boise, ID 83702

PROJECT NAME
STIBNITE GOLD ACCESS
ROAD FEASIBILITY DESIGN
SEGMENT C
BRIDGE PLANS

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Culvert/Bridge Typicals
Valley County, Idaho

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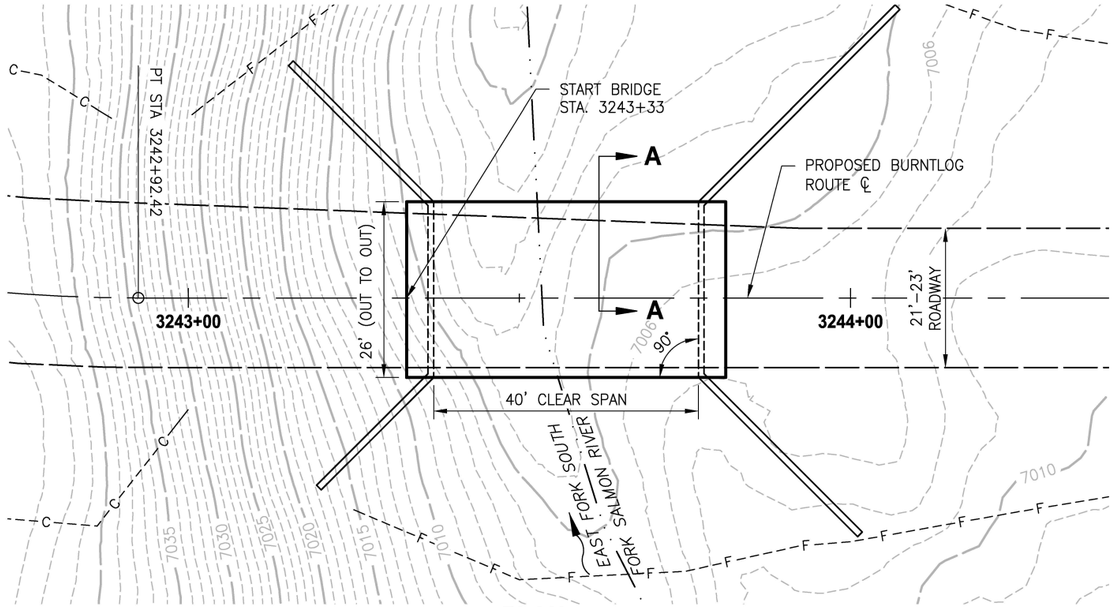
Drawing Name

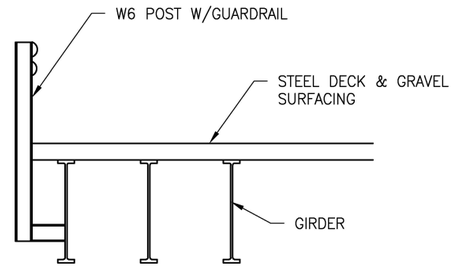
Drawing No.
D-29

LOCATION:



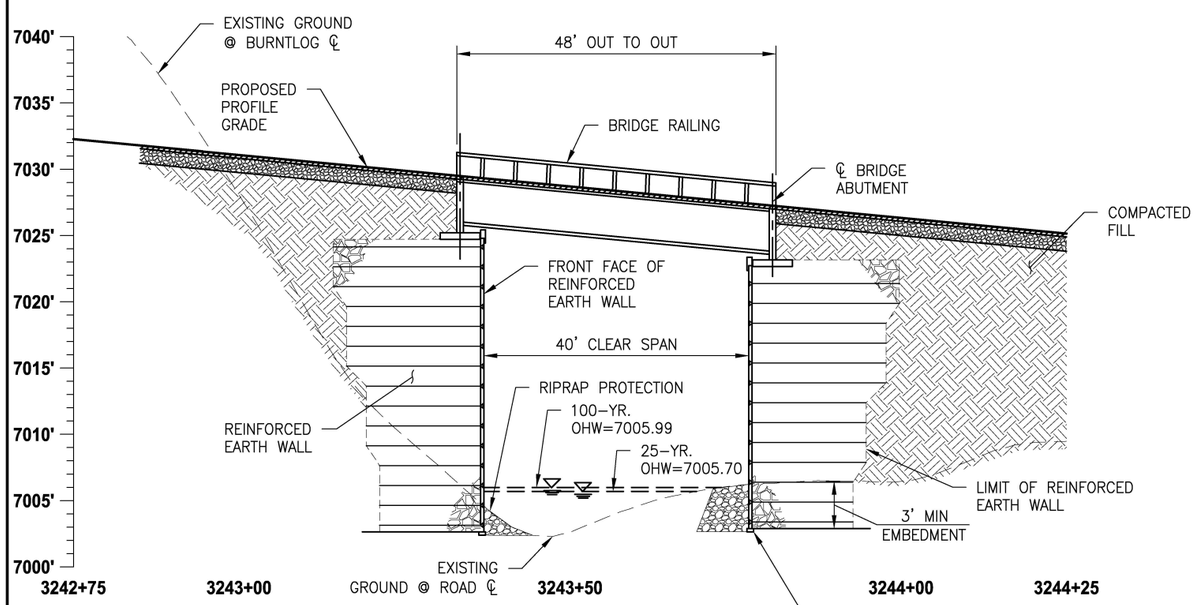
PLAN

SCALE: 1"=20'



SECTION A-A

SCALE: 1"=4'



ELEVATION (AT CONTROL LINE)

SCALE: 1"=20'H, 1"=10'V

FEASIBILITY DESIGN SUBMITTAL

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JOB No. 314-7340-001	DRAWN I. MEDINA	APPROVED D. MELDRUM

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MIDAS GOLD
405 S 8th St.
Boise, ID 83702

PROJECT NAME
STIBNITE GOLD ACCESS
ROAD FEASIBILITY DESIGN
SEGMENT E
BRIDGE PLANS

DRAWING NO.
6 OF 6

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Culvert/Bridge Typicals
Valley County, Idaho

Draft

Date:
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Checked:
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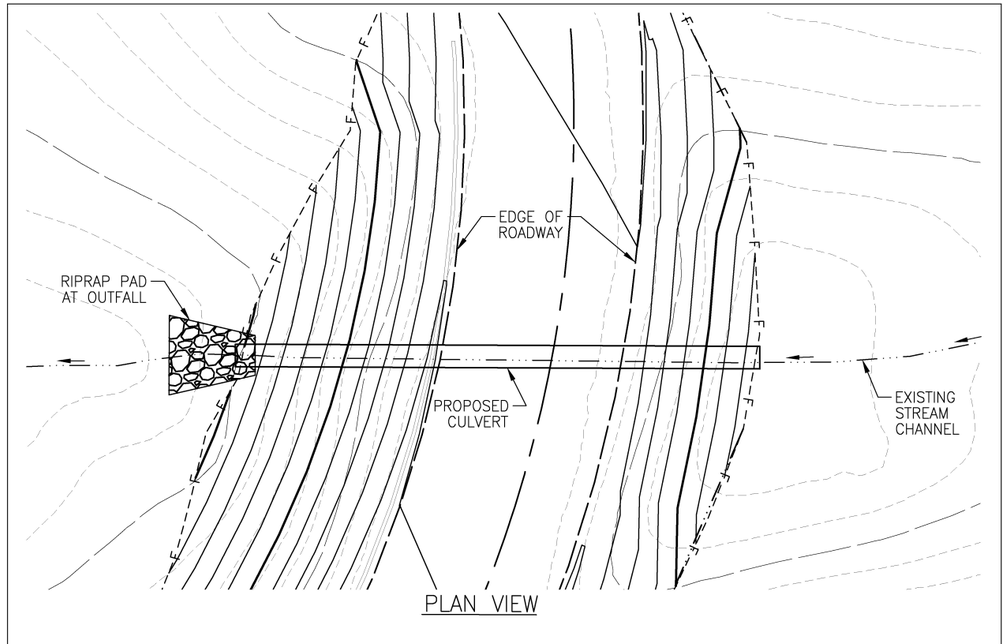
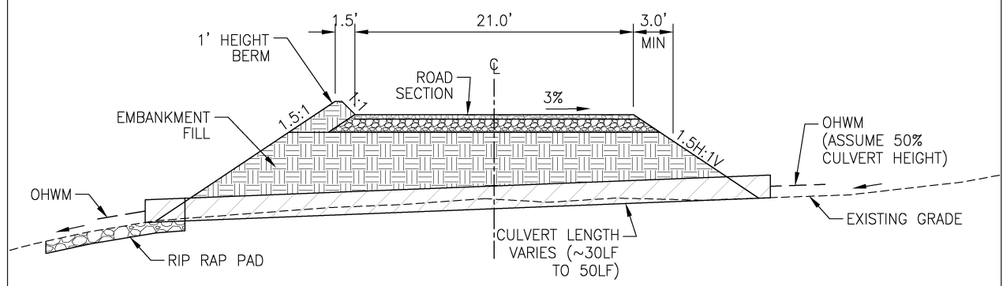
Drawing Name

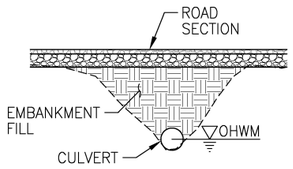
Drawing No.
D-30



PLAN VIEW



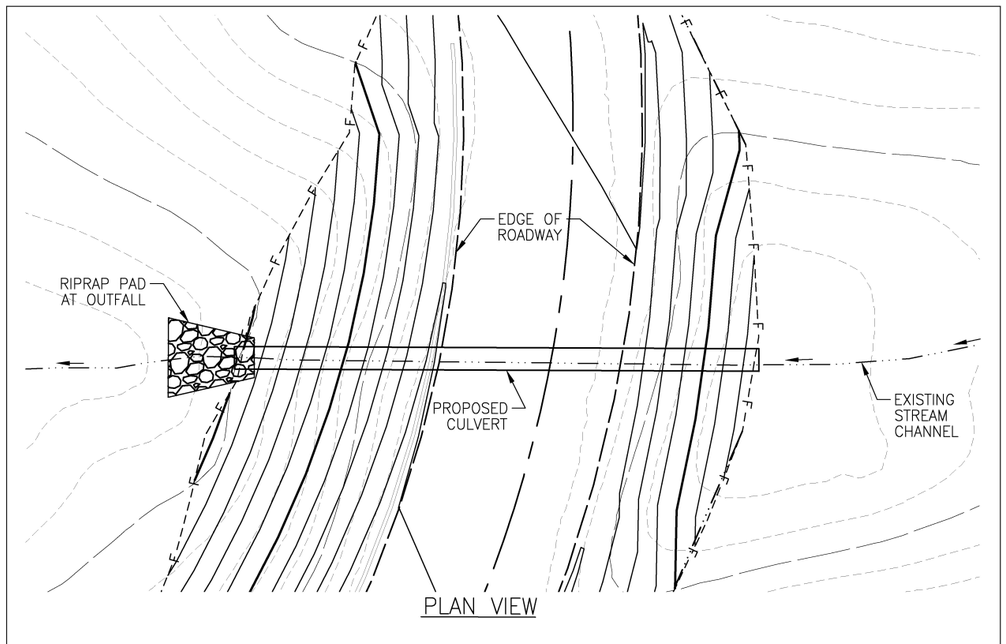
PROFILE VIEW



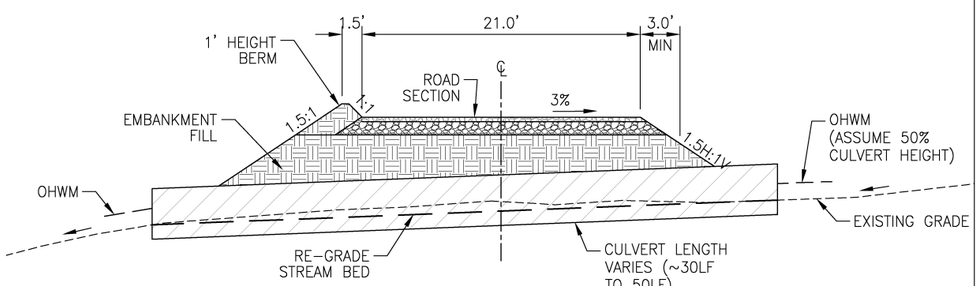
SECTION VIEW

RIPRAP PAD SIZING

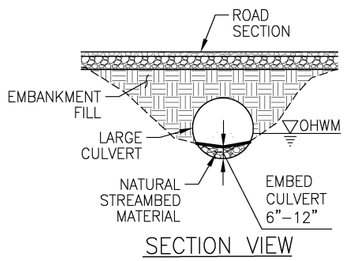
PIPE SIZE	ROCK SIZE	DEPTH (FT)	LENGTH (FT)	WIDTH (FT)
18"	12"	2	8	10
24"	12"	2	10	13
30"	12"	2	13	16
36"	12"	2	15	19
48"	15"	2.5	20	26
60"	15"	2.5	25	32



PLAN VIEW



PROFILE VIEW



SECTION VIEW

Applied Science & Engineering

Perpetua Resources

Stibnite Gold Project
ModPRO2
Culvert/Bridge Typicals
Valley County, Idaho

Draft

Date:
Designed:
Drawn:
Checked:
Approved:

Drawing Name

Drawing No.
D-31

LOCATION:

Appendix E: Assumptions and Dependencies

Stibnite Gold Project Stream and Wetland Assumptions and Dependencies

Summary:

The 2008 Mitigation Rule considers risk and uncertainty at length, and there are provisions that allow District Engineers to require additional compensatory mitigation when necessary to address the risk and uncertainty associated with compensatory mitigation projects. The U.S. Army Corps of Engineers (USACE) has asked that Perpetua Resources Idaho, Inc. (Perpetua Resources) consider and provide what is referenced as "assumptions and dependencies" regarding restoration implementation risk, timing, and success. That is, the USACE wants to know what things in the mine plan and associated environmental measures must be in place or must happen for each of the major restoration reaches to proceed (i.e., Risk Management).

Risk Management includes four steps (PMI 2013):

1) Avoidance - Develop an alternative approach that is more likely to succeed and/or eliminate the risk;
   a) Avoidance was a key piece in the alternatives evaluated during development of the Plan of Restoration and Operations (PRO; Midas Gold, 2016) and is a key part of the alternatives analysis in the EIS.
   b) It is assumed that the risks evaluated below are classified as "unavoidable."
2) Reduction - Design, construction, and adaptive management strategies to reduce the likelihood of risk occurrence and/or risk consequence if it occurs.
   Commonly referred to as risk "Mitigation" (PMI 2013) but summarized here as "Risk Reduction Factor" to avoid confusion with other planned mitigation measures not discussed.
   a) Summarized in the table below: Risk Reduction Factor.
3) Transfer - Shifting the risk to another party;
   a) Accommodated via bonding for the project,
4) Acceptance - If risk cannot be avoided, reduced, and/or transferred, collaborating partners agree to accept the risk.
   a) Assumes any risk remaining after avoidance, reduction and transfer is acceptable understanding that risk cannot be completely removed from the project.

Stream/Wetland Segment	Mine Feature	Assumption/Dependency/ Critical Success Factor	Risk	Risk Reduction Factor	Adaptive Management Measures
Upper Meadow Creek	TSF	Post deposition tailings consolidation and stability will be sufficient for stream/floodplain construction within 7 years after ore processing and tailing deposition.	Post deposition tailings do not consolidate as quickly or as much as expected, which could delay restoration timing and/or require unexpected restoration design change.	TSF consolidation has been modeled and stream/floodplain restoration on top of the TSF is not scheduled to occur until such time as the modeling predicts sufficient consolidation has occurred. Tailings consolidation is dependent on the thickness of the tailings. Consolidation is expected to occur faster in the upper reaches and stream restoration would therefore need to be phased, with the upper reaches of Meadow Creek constructed first and lower reaches constructed last. The SFA does not account for any of the restoration until all phases are constructed and the stream is flowing. Actively managing the tailings facility (including enhanced water evaporation techniques) can increase consolidation rates if ongoing monitoring[1] reveals slower than anticipated consolidation. Additionally, the stream design (Rio ASE 2021a) includes a substantial amount of fill placed over the tailings in the lower portion of the TSF where consolidation is expected to be greatest. This additional fill will both increase the rate of consolidation (due to the added weight above the tailings in this location) and provide an even, down-valley gradient on top of which the stream and floodplain restoration would occur.	Ongoing monitoring[1] during mine operations would measure actual consolidation rates enabling improved predictions of consolidation timing as tailings deposition continues. If monitoring suggests consolidation rates are slower than anticipated, tailings management practices would be modified to increase consolidation rates. Potential management measures may include, but are not limited to, the following: ▪ Enhanced evaporation to minimize the water pool. ▪ “Mud farming” the tailings. ▪ Pre-load fill to consolidate sections of tailings in advance of restoration construction. ▪ Horizontal or vertical wicks.
Upper Meadow Creek	TSF	Tailings consolidation continues after stream restoration, potentially impacting stream function.	Post-restoration tailings consolidation negatively affects Meadow Creek restoration and/or tailings become exposed contaminating soil and water.	Modeling of tailings consolidation provides a reasonable estimate for restoration timing, expected settlement magnitude, and post-settlement valley slope in the facility. Ongoing monitoring[1] and modeling of actual tailings consolidation during operations would refine these estimates which would inform final stream restoration designs. Restoration of Meadow Creek over the TSF would begin only after at least 85% tailings consolidation has actually occurred. Detailed monitoring plans are in development[1], but it is anticipated that a combination of broad-scale LiDAR and on-the-ground physical survey points would be conducted at least annually to measure consolidation. Differences in consolidation rates (i.e., differential settlement) are not anticipated to occur in localized areas given the extent of the TSF and gradual changes in tailings depth across the facility. The laminated geosynthetic clay liner is proposed to separate Meadow Creek from the underlying tailings. The geomembrane component of this type of liner is flexible and able to withstand small amounts of displacement/movement associated with additional consolidation and tailings settlement. Further, the entire liner would be protected from exposure by scour via transition and armor layers above it, and the bentonite clay component would remain as a low-permeability feature indefinitely regardless of the integrity of the geomembrane or geotextile components.	Tailings consolidation and associated settlement would be detected by consolidation monitoring during mine operations and the post-operations consolidation period. Monitoring would continue for several years after Meadow Creek has been restored over the TSF. As part of regular/planned stream monitoring, the stream would be closely evaluated to identify any unanticipated and deleterious changes to function (including water quality). If a sufficiently deleterious change in water quality has been associated with a perceived breach of the stream liner, the breach location would be identified and repaired.

Stream/Wetland Segment	Mine Feature	Assumption/Dependency/ Critical Success Factor	Risk	Risk Reduction Factor	Adaptive Management Measures
Upper Meadow Creek; EFSFSR; Fiddle Creek	TSF and DRSF Surfaces	Stream floodplain liner will adequately capture the stream surface flow and near-surface groundwater over the long-term.	Liner does not adequately capture flows resulting in excessive surface flow loss to groundwater or stream flowing outside of liner extent.	Rio ASE (2021a) incorporated many factors to address this risk: floodplain liner flare at the upstream end to accommodate alluvial fan formation; floodplain width is designed to exceed the maximum calculated meander amplitude; floodplain liner would be armored laterally and vertically to prevent exposure or damage to liner; floodplain liner would be buried at depth greater than or equal to maximum calculated scour depth to reduce risk of exposure and to capture near-surface (hyporheic) groundwater; high ground (terraces and/or valley margin slope) would be placed at the margins of the floodplain to retain large-scale flood events within the lined floodplain. Vegetation planting prescriptions within and outside the floodplain would help stabilize the channel banks and floodplain limiting excessive erosion/scour.	Ongoing stream monitoring post restoration is proposed to occur for a minimum of 5 years. During this period, if the stream liner were to become exposed, additional armoring would be placed over the exposure to protect the liner and prevent future exposure. If the height and/or width of the lined stream/floodplain corridor is shown to be inadequate (i.e., flood water escaping the lined corridor onto the adjacent tailings surface), additional fill and/or armor (i.e., levee) would be placed at the margin of the floodplain to retain the stream and associated flood water within the floodplain corridor. Alternatively, the width of lined stream corridor could be expanded to accommodate the additional conveyance required to maintain separation between Meadow Creek and the adjacent tailings surface.
Upper Meadow Creek; EFSFSR; Fiddle Creek	TSF and DRSF Surfaces	Sufficient alluvium (stream material) and topsoil will be available to fill the floodplain on top of the stream liner to accommodate future channel evolution and development of a floodplain wetland.	Insufficient materials are available resulting in use of inferior materials, or less depth than predicted.	Rio ASE (2021a) calculated materials quantities needed for stream restoration including alluvial fill (stream material) and topsoil to be placed over stream liners as shown in the Stream Design. Adequate alluvium material has been sourced from documented glacial alluvium within the proposed Hangar Flats pit, within the Blowout Creek alluvial fan, and elsewhere within the proposed project area. These materials would be excavated during mining and stored on-site for use during restoration. Topsoil and growth media quantities have been quantified and appropriately sized storage areas have been identified within the project area to store these materials until needed for floodplain restoration (Tetra Tech 2021a).	If insufficient materials quantities are available for restoration construction, additional (on-site or nearby off-site) materials would be sourced, appropriate permits obtained, and those materials would be hauled to the restoration site for use.
EFSFSR	Tunnel Fishway	Tunnel fishway will allow volitional fish passage up/downstream.	Fish are unable/unwilling to pass through the tunnel; migrating fish are injured or otherwise adversely impacted by the tunnel fishway.	Detailed design analysis and 3D computational fluid dynamic modeling have been completed to evaluate and develop a fishway that meets or exceeds all passage requirements including an upstream weir to manage fishway flow to ensure in-stream depth and velocity within the fishway are within fish passage tolerances at the times of year (and associated discharge) when fish will be migrating (McMillen Jacobs 2019). Additionally, the fishway tunnel substantially reduces the risk of injury to fish, in particular for juveniles migrating downstream, compared to the pre-project conditions of the Yellow Pine pit highwall cascade.	The Tunnel Fishway includes a Fishway Operations and Management Plan (FOMP) that is designed to monitor fishway operations and fish passage success. The FOMP provides for adjustments to the fishway operation or alternative trap and haul operations as a backup fish passage process should fish passage performance be less than anticipated. This plan includes maintenance access within the tunnel to adjust physical features of the fishway to adjust fishway conditions to improve passage. Trap and haul operations are included as a backup for passing fish upstream; a fish collection facility is included in the design so that the fishway can be switched to trap and haul if necessary.
EFSFSR	Yellow Pine Pit Backfill	Restored stream will function naturally allowing volitional fish passage up/downstream.	Over-engineered stream is excessively armored reducing stream function or a poorly implemented stream design becomes unstable and habitat features fail on a large-scale including development of fish passage barriers either due to steep slopes or insufficient depth of flow.	Rio ASE (2021a) outlines the various well-established scientific and engineering protocols used to develop a natural stream design for each design reach within the project area. The stream design emulates natural channels including channel geometries and materials appropriate for the valley slope and stream energy calculated per reach allowing for reasonable amounts of channel evolution, response, and dynamism. It is not expected that stream channels will be static. Each design reach includes a broad meander belt width providing space (vertically and horizontally) for the channel to evolve, respond, and function dynamically (i.e., be resilient under a variety of conditions like a natural stream). The broad meander belt width includes an accessible floodplain to dissipate flood energy. Each stream reach also incorporates grade control riffles to prevent excessive channel incision. The stream design strikes a balance between stability and channel dynamics similar to natural streams that function within a "dynamic equilibrium" (Langbein and Leopold 1964). It should be noted that the more certainty desired from the outcome, the more physically rigid the stream design will necessarily become to meet risk expectations.	If stream function is not meeting implementation, compliance, and/or effectiveness monitoring requirements, an assessment by a Perpetua Resources, USACE, and USFS Monitoring and Adaptive Management Team will establish the cause of functional inadequacy and collaboratively develop a strategy for repair. Examples may include installing new/additional grade controls to overcome unexpected channel incision; installing new/additional bank stabilization structures to overcome unexpected bank erosion; excavating new/additional channels or a larger channel geometry to accommodate higher than expected discharge and/or flood water surfaces; installing new/additional in-stream structures (large woody debris and/or boulders) to buffer higher-than-expected in-stream velocity and/or energy; and/or installing new/additional bank and stream structures to capture and retain appropriate sediment and to provide habitat/cover for aquatic organisms if habitat is considered inadequate.
Restored Streams and Wetlands at Hangar Flats Pit Backfill and Blowout Creek Borrow Source	N/A	Streams are dynamic and a reasonable amount of channel evolution, response, dynamism is expected and is desirable.			
Restored Streams and Wetlands	N/A	SFA and/or wetland ledger estimates are not achieved as scheduled and/or at the magnitude anticipated.	Required mitigation credits are not obtained within expected timeframe.	A comprehensive on- and off-site mitigation portfolio has been prepared by Perpetua Resources including estimated mitigation credits per mine year summarizing the total amount and timing of impacts (mitigation debits) and uplift (mitigation credits) via wetland and stream functional assessment ledgers (Tetra Tech and Rio ASE 2021). A net surplus of mitigation credits is predicted that is proposed to address temporal losses and to reduce the risk of failing to fully offset all mitigation debits.	Further rick reductions can be achieved through off-site project opportunities. Additionally, a forthcoming watershed assessment will identify and prioritize potential restoration projects that could be used to fill in mitigation gaps in the future if needed.
Lower Meadow Creek and EFSFSR	Hangar Flats Pit and Yellow Pine Pit Blasting	Assumes that blasting can be completed with sufficient protection of fish and aquatic resources.	Blasting too close to streams or waterbodies could impact fish and aquatic organisms.	As part of the Fisheries Mitigation Plan, Perpetua Resources outlined its proposed approach to maintaining safe and effective protective buffer distances between blasting area and aquatic habitats to protect fish and other vulnerable aquatic organisms. Safe buffer distances would be computed based on the required buffer distance necessary to prevent noise and vibration impacts based on accepted standards that have been vetted with the U.S. Fish and Wildlife Service and National Marine Fisheries Service. Monitoring of blasting would include initial testing to confirm that the buffers are satisfactory to maintain noise and vibration below the threshold levels for injury or damage. The results of the blast test monitoring results would be compared to verify the predicted and measured levels and make recommended adjustments to buffer distance or blasting practices as needed. Analysis of the mine plan and areas of blasting indicated that sufficient buffers can be maintained.	Perpetua Resources' approach to fish protection during blasting operations is sufficiently flexible to adjust to conditions in the field where blasting may occur closer than the safe blasting buffer distance. Blasting parameters such as bench height, drill hole diameter, stemming length, powder column height, powder volume, and charge per hole can be changed to reduce the blast impact and narrow the required fish protection buffer. In the highly unlikely circumstance that blasting may be needed very close to a stream or lake, and the protective buffer cannot be maintained, Perpetua Resources would displace or salvage fish from the potentially affected area using the fish salvage and relocation procedures described in the Fish and Aquatic Mitigation Plan.
Restored Streams and Wetlands	Growth Media	There is suitable and adequate amount of growth media available.	There is not suitable or enough salvageable growth media to place 6-12 inches of material in wetlands.	The Reclamation and Closure Plan (Tetra Tech 2021a) has estimated the volumetric needs of growth media for all habitat types (wetlands and uplands) that are proposed for creation, restoration, or reclamation. This plan indicates, to the extent possible, hydric soils that contain a seed bank will be salvaged and stockpiled independently from other growth media in an attempt to retain the seed bank and supplement re-vegetation efforts on newly created floodplain and wetland cells. Additionally, the Reclamation and Closure Plan estimates a surplus of hydric soils will be salvaged above and beyond the estimated volumes need for wetland restoration.	The Reclamation and Closure Plan has proposed acquisition and transport of compost to the site to fill any soil deficit needs. If an unexpected seed bank material deficit is recognized, Perpetua Resources will acquire additional compost to fill such a deficit. If there is a shortfall of seed bank material, local/regional commercial sources of hydric vegetation in seed form will be used to inoculate growth media.

Stream/Wetland Segment	Mine Feature	Assumption/Dependency/ Critical Success Factor	Risk	Risk Reduction Factor	Adaptive Management Measures
Restored Streams and Wetlands	Vegetation Sources (seed and root stock)	There is suitable and adequate amount of wetland vegetation (seed and root stock) available.	The availability of seed and the volume of root stock is not available to meet the needs of the restored streams and wetlands.	Appendix D of the Compensatory Stream and Wetland Mitigation Plan (Tetra Tech 2021b) identifies the volume of plant material (seed and root stock) needed on a per acre basis for stream embankments and wetlands. Section 9.3.5 of this plan discusses propagation of plant species that would be installed in stream and wetland restoration areas. If feasible, Perpetua Resources may develop a restoration nursery. This nursery may be located in close proximity of the Project Area and may be developed prior to or during construction or operations. Seeds of native forb, graminoid, shrub, and tree species would be collected on-site, to the extent possible, and grown to a seedling condition in the restoration nursery. These nursery-grown seedlings would then be planted in the stream and wetland restoration areas. A detailed restoration schedule will allow for Perpetua Resources to plan for the volumes of plant materials needed and allow for on-site propagation or off-site acquisition.	If seed or root stock wetland plants are not available for the proposed restoration, Perpetua Resources would source additional plants from other regional suppliers. Perpetua Resources has a restoration schedule as it pertains to streams and wetlands and therefore, the seed and root stock material needs will be known years in advance, allowing for adequate planning to either grow or acquire the necessary materials.
Blowout Creek Upper Meadow	Blowout Creek Meadow	Hydrology will be re-established to support wetlands.	Volume of water does not provide the hydrology needed to establish and support a wetland in the designed area.	Head cutting and shallow aquifer de-watering 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 the meadow in the Blowout Creek headwaters as well as recharge the shallow groundwater system and reduce stream head cutting. The grade control structure will be designed to retain the maximum amount of water to inundate the historic wetland areas in an effort to re-establish this large wet meadow with palustrine emergent and shrub/scrub communities.	Surface and groundwater monitoring as well as wetland plant growth and vigor would be monitored for a minimum of 5 years after restoration. If during that time it is determined that hydrologic inputs are insufficient to maintain stream and/or wetland function as predicted, a Perpetua Resources, USACE, and USFS Monitoring and Adaptive Management Team will establish the cause of functional inadequacy and collaboratively develop a strategy for repair, which may include the following: raising the elevation of the proposed grade control; decreasing the permeability of the grade control by adding fines to the face of the structure; and/or adding additional grade control structures (i.e., beaver dam analogues) farther upstream.
Blowout Creek Rock Drain	Blowout Creek Rock Drain	Baseflow will pass underground through the rock drain and the rock drain will stabilize the adjacent slopes.	Stream flows occupying the surface destabilize adjacent slopes contributing sediment to local streams.	Stream hydrology has been developed from local gauges and established statistical methods (England, et al. 2018) providing confidence in the baseflow and potential future peak flow hydrology of Blowout Creek. The rock drain has been designed to convey baseflows within the rock drain (i.e., underground) and to convey high flows on the surface via a designed high-flow swale (i.e., channel) to focus any surface flows over the center of the rock drain to reduce flows and erosion against the unstable valley slopes. Additionally, the rock drain would effectively fill the valley bottom providing accommodation space for sloughing valley sediment at the toe of the slope rather than into the active stream channel. By removing the erosion at the toe of the slope, the primary cause of sediment production would be addressed. By providing accommodation space for future sediment, the symptoms of erosion would be addressed. The slope would also be seeded/planted with appropriate vegetation to promote long-term stability.	If unacceptable amounts of fine sediment (turbidity) are shown to be sourced from Blowout Creek, a Perpetua Resources, USACE, and USFS Monitoring and Adaptive Management Team will establish the cause of functional inadequacy and collaboratively develop a strategy for repair, which may include the following: increasing surface channel conveyance by increasing the surface channel geometry (width and/or depth); adding additional bank armor to prevent erosion; adding additional seed/plantings for slope stabilization; and/or incorporating stormwater pollution prevention best management practices (coir rolls, mulch, surface water diversion channels, etc.) until the slopes become adequately stabilized.
Valley Margin Wetlands on Perimeter of the TSF	Valley Margin Wetlands	How the design addresses these alluvial fan wetlands that can take a long time to naturally develop.	Engineering design specifications do not result in the establishment of these valley margin 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. Because debris fans (rock and organic materials) accumulate due to episodic events that might not occur for long periods after the TSF reclamation is completed, it is anticipated that some placement and grading of mixed materials to produce the fan-like landform required for these types of wetlands would be necessary.	If wetlands function is not meeting implementation, compliance and/or effectiveness monitoring requirements, an assessment by a Perpetua Resources, USACE and USFS Monitoring and Adaptive Management Team will establish the cause of functional inadequacy and collaboratively develop a strategy for repair.

Notes:

[1] Monitoring and adaptive management specifics will be included in the Final Compensatory Mitigation Plan (pending), and after issuance of the ROD and 404 Permit; these specifics will be added to the EMMP for implementation.

DRSF = development rock storage facility; EFSFSR = East Fork of the South Fork Salmon River; LiDAR = light detection and ranging; SFA = stream functional assessment; TSF = tailings storage facility; USACE = U.S. Army Corps of Engineers; USFS = U.S. Forest Service

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