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M E M O R A N D U M

DATE: October 29, 2018

TO: Rainie DeVaney
Jeff May

FROM: Jerry Zieg

SUBJECT: Addendum to Integrated Discharge Permit Application for the Black Butte Copper Project

Tintina Montana, Inc. (Tintina) is submitting this memorandum as an addendum to the Integrated Discharge Permit Application (Permit Application) for the Black Butte Copper Project (Project). This addendum adds a contingency to the water management plan for storage of treated water during the seasonal period when the total nitrogen standard is applied (July 1 to September 30, for Middle Rockies Ecoregion). Below is a description of the water management plan for the storage contingency, a description of the TWSP, and an update to the Storm Water Discharge Systems.

Water Management Storage Contingency

Tintina is proposing to discharge water as described in the Integrated Discharge Permit Application Narrative (Hydrometrics, 2018) if the discharge water meets the seasonal effluent limits for total nitrogen in the MPDES permit. However, if the total nitrogen concentration is greater than the effluent limit, the treated water will be discharged to the Treated Water Storage Pond (TWSP) from July 1st to September 30th. Starting October 1st, the stored water will be routed back to the WTP and blended with the WTP effluent prior to discharge to Outfall 001. Prior to discharge the blended water will be sampled/monitored as required in the MPDES permit. In the event that storage is necessary, the average seasonal discharge (October 1st to June 30th) to Outfall 001 will be 531 gpm (133 gpm from the TWSP and 398 gpm from the WTP). An updated water balance schematic (revised Figure 3.8) and contingency discharge schematic (Figure 3.8A) is provided in Attachment A.

Treated Water Storage Pond Description

The TWSP will be located southeast of the WTP and west of Brush Creek as shown the revised Figure 1.3 included in Attachment 1. The design of the TWSP was based on an average seasonal flow rate from the WTP of 405 gpm. The average seasonal flow rate is slightly larger than the average annual discharge due to minor differences in seasonal flows from Mill Catchment Runoff associated with the seasonal precipitation and evaporation at the site. The TWSP has been designed to store up to 53.7 million gallons of treated water, providing enough temporary storage for treated water from July 1 to September 30 at an average flow rate of 405 gpm. The pond will be lined with a 60 mil HDPE geomembrane liner installed over a 12 oz/yd2 non-woven geotextile cushion. Treated water from the water treatment plant will be pumped through a 6-inch (150mm) diameter HDPE pipeline to the TWSP. Water stored in the TWSP will then be pumped back to the water treatment plant via a 6-inch (150mm) diameter HDPE pipeline, where it will be mixed with the WTP effluent and allow for the blended water to be sampled prior to being discharged per the MPDES permit.

Storm Water Discharge Systems Update

The addition of the TWSP requires updates to the site drainage controls and storm water permit. The additional storm water controls include a runon control berm on the northwest portion of the pond, drainage ditches along the remainder of the facility, and two storm water outfalls (Outfalls 012 and 013). An update to Figure 3.1 shows the storm water controls and outfalls for the project. Storm water flows to each of the new outfalls were simulated using the same methods and modeling software for the other outfalls (See Section 4.2 of permit). In addition, storm water quality is assumed to be similar to that summarized in Section 4.3 of the permit. Below is a description of the new drainage controls and a summary of the changes to the permit application.

Storm water Outfall 012 discharges water from approximately 8.75 acres from areas south and west of the TWSP. Discharge will include storm water from native lands and a portion of the TWSP embankment (constructed from non-waste rock materials). Diversion ditches collect runoff from the drainage areas and directs flow to the outfall. The storm water simulations indicate that peak flow will be 9.72 cfs with a total runoff volume of 0.5 acre-feet during a 10-year/24-hour storm event. A summary of the flow calculations and SEDCAD4 output are provided in Attachment B.

Storm water discharges to Outfall 013 originate from 2.6 acres of the southern and western portion of the vegetated TWSP embankment. Diversion ditches collect runoff from the drainage areas and directs flow to the outfall. Storm water modeling simulated a peak flow of 1.76 cfs with a total runoff volume of 0.1 acre-feet from a 10-year/24-hour storm event.

There is a small area (0.4 acres) of sheet flow from the vegetated embankment on the northeast corner of the TWSP. The simulated peak flow for this area is estimated at 0.27 cfs with a total volume of 0.01 acre-feet from a 10-year/24-hour storm event.

Outfalls 012 and 013 share a runon control structure along the northwest side of the TWSP. The runon control structure will consist of a berm above the cut slope of the northwest portion of the pond. The northeast corner of the TWSP embankment extends into a natural drainage channel. The embankment will be protected from scouring via a riprap covering on the northeast corner and a modified drainage channel as shown on revised Figure 3.1. The geometry of the diversion channel will be similar to that shown on Figure 4.2 in the permit application.

The information for the two additional outfalls (012 and 013) required for Form 2F is provided below:

I. Outfall Location

Outfall No.	Latitude	Longitude	Receiving Water
012	46° 45' 58.68"	110° 54' 22.68"	Brush Creek
013	46° 46' 2.28"	110° 54' 16.92"	Brush Creek

II. Improvements

No additional information

III. Site Drainage Map

A revised Site Drainage Map (Figure 3.1) is included with this memorandum

IV. Narrative Description of Pollutant Sources

Outfall No.	Area of Impervious Surface	Total Drained Area
012	No Impervious Surface	8.75 acres
013	No Impervious Surface	2.60 acres

No additional information for Parts B and C.

V. Nonstormwater Discharges

Not Applicable

VI. Significant Leaks or Spills

No additional information

VII. Discharge Information

No additional information

VIII. Biological Toxicity Testing Data

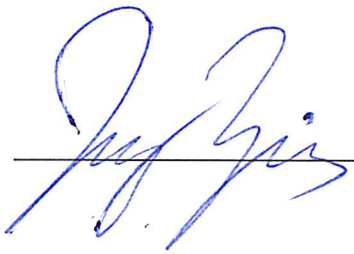
No additional information

IX. Contract Analysis Information

No additional information

Certification and Signatory Page

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



_____ (Signature) 10/29/2018 (Date)

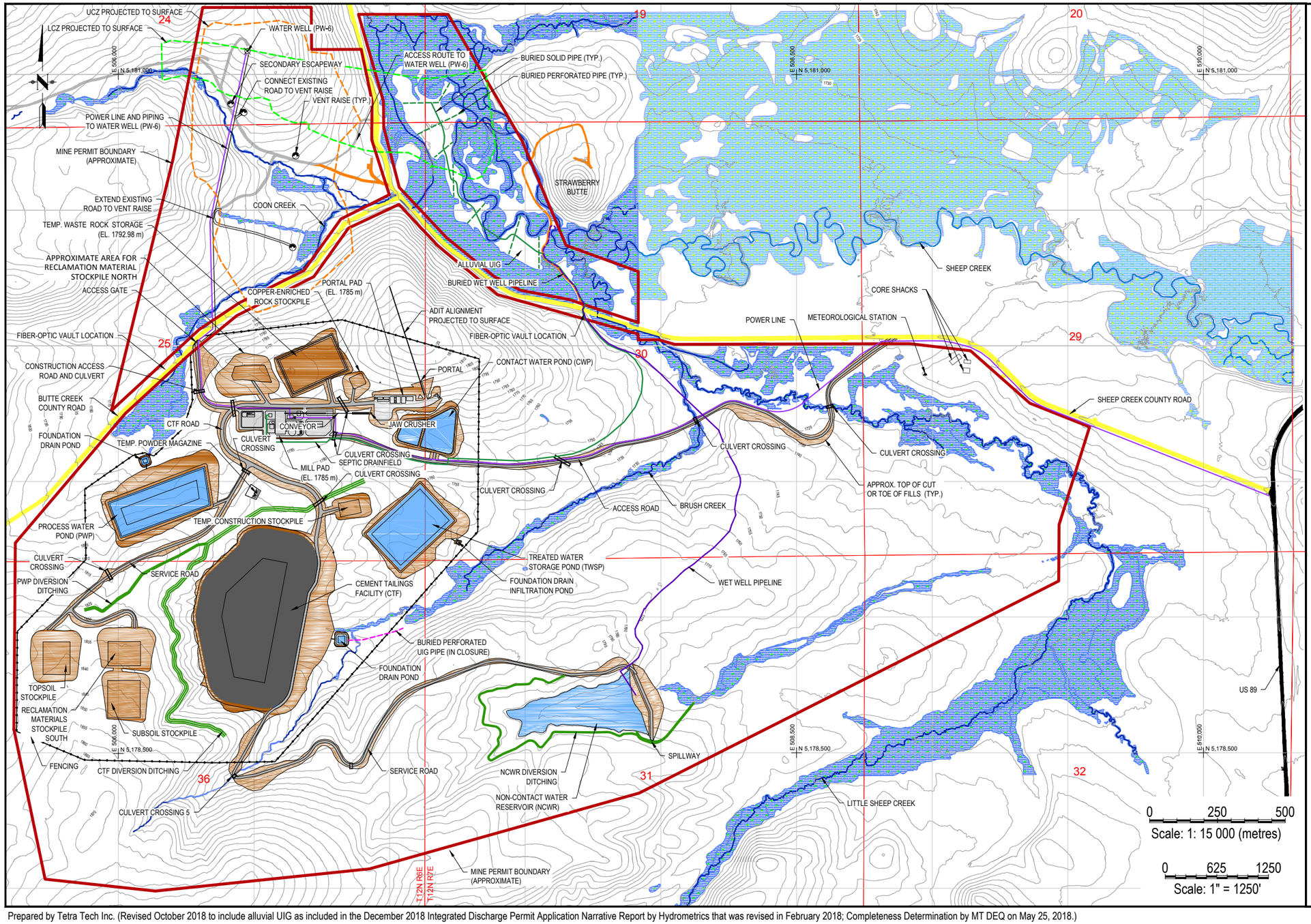
Jerry Zieg (Printed Name)

Senior Vice President (Title)

Tintina Montana, Inc. (Company)

ATTACHMENT A

REVISED FIGURES



LEGEND

- STREAMS
- STREAMS (OUTSIDE PROJECT BOUNDARY: SEE NOTE BELOW)
- WETLANDS
- WETLANDS (OUTSIDE PROJECT BOUNDARY: SEE NOTE BELOW)
- US ROUTE 89
- COUNTY ROAD
- PRIVATE ROAD
- SECTION LINE
- 32 SECTION NUMBER
- E 1,000 / N 1,000 UTM Z12N NAD83 COORDINATES
- MINE PERMIT BOUNDARY (APPROX.)
- NEW MINE ROAD
- NEW FENCE
- POWER LINE ROUTE
- APPROX. TOES / TOP OF CUT
- DIVERSION DITCH
- CULVERT CROSSING
- BURIED UNDERGROUND INFILTRATION GALLERY (UIG) - SOLID PIPE IN CLOSURE
- BURIED ALLUVIAL CONVEYANCE PIPELINE
- ALLUVIAL INFILTRATION TRENCH
- BURIED WATER LINE
- FOUNDATION DRAIN POND
- WET WELL PIPELINE
- BURIED WET WELL PIPELINE
- VENT RAISE
- WATER WELL

Some streams and wetlands shown outside of the project boundary were determined via photo-interpretation and were not delineated according to USACE methodology. These features are presented for display purposes only and do not represent jurisdictional features.

Streams within the project boundary represent jurisdictional features that were determined during field inventory to have an ordinary high water mark (OHWM) consistent with 33 CFR § 328.3.

Topographic base map from US Geological Survey (2011):
Strawberry Butte 7.5 Minute Quadrangle.

Map Projection:	UTM Zone 12N
Map Datum:	NAD83
Contour Interval:	5m

Prepared by Tetra Tech Inc. (Revised October 2018 to include alluvial UIG as included in the December 2018 Integrated Discharge Permit Application Narrative Report by Hydrometrics that was revised in February 2018; Completeness Determination by MT DEQ on May 25, 2018.)

FIGURE 1.3

Facilities Site Plan

Black Butte Copper Project

Mine Operating Permit Application

Meagher County, Montana

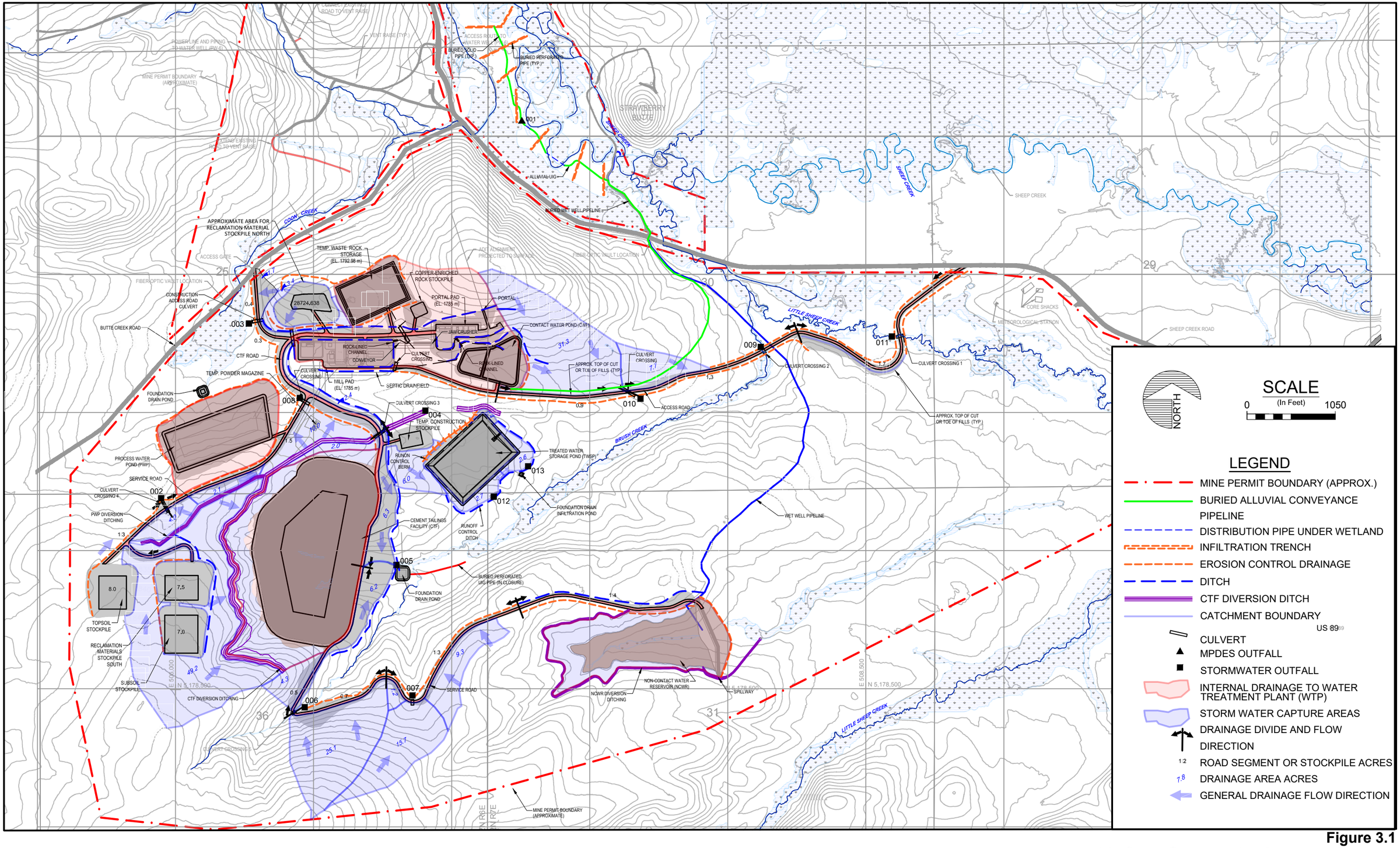


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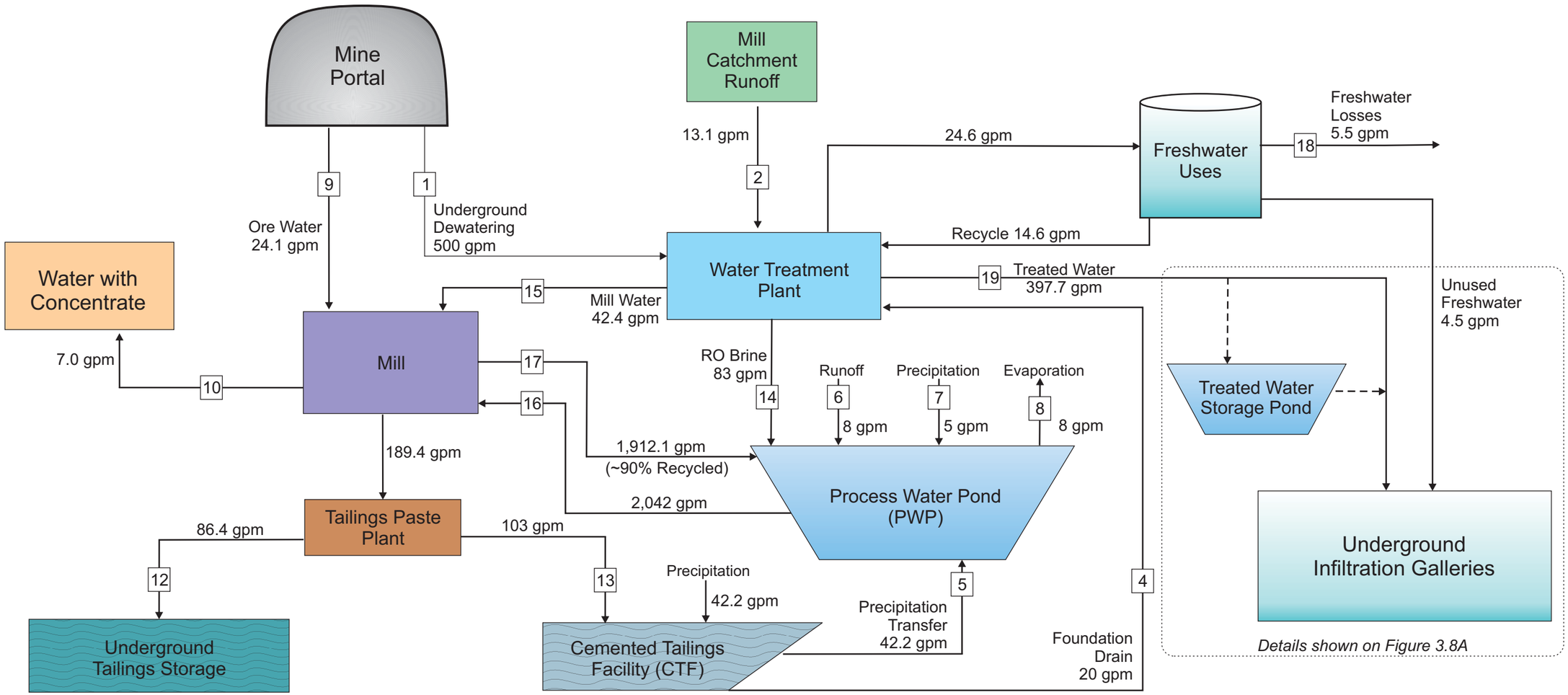
Figure 3.1
MPDES and Storm Water Discharge Systems
Black Butte Copper Project
Meagher County, Montana

Hydrometrics, Inc.
Consulting Scientists and Engineers



Estimated Groundwater Consumptive Use Components

Water use	Consumptive Use	
	gpm	acre-ft/year
PWP Evaporation	8	13
CTF Void Loss	103	166
Underground Tailings Void Loss	86	139
Water Loss to Concentrate	7	11
Freshwater Losses	6	9
Total Consumptive Use	**210**	**339**

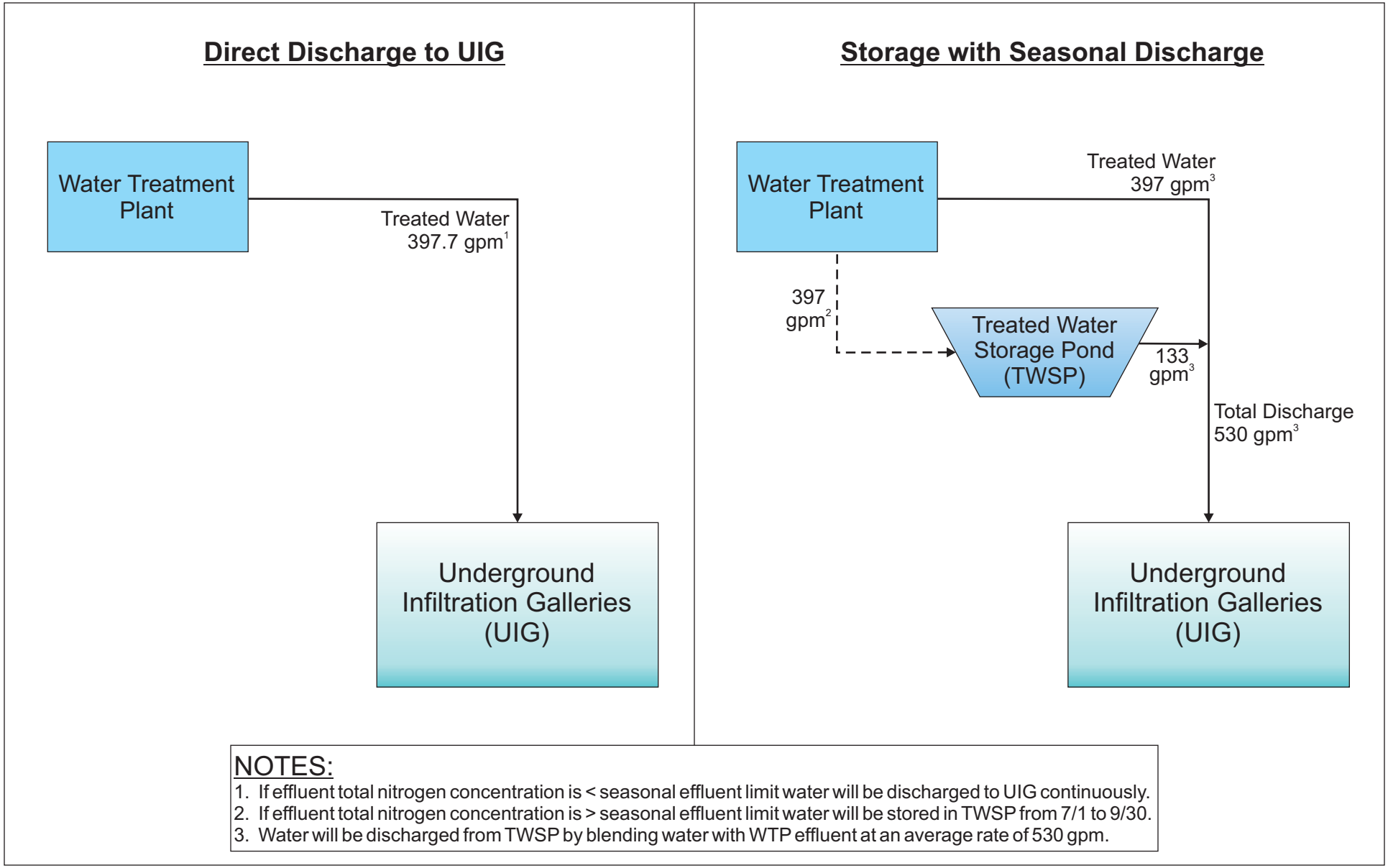
NOTES:

1. WATER IN TAILINGS PASTE IS ASSUMED TO BE UNRECOVERABLE.
2. SEEPAGE IS ASSUMED TO BE ZERO AS THE FACILITIES ARE LINED.
3. THE NUMBERS IN THE BOXES CORRESPOND TO TABLE V-1 IN APPENDIX V.

Reference: Modified after Knight Piesold (2017a): Report No. VA101-46-/3-2

Hydrometrics, Inc.
Consulting Scientists and Engineers

FIGURE 3.8
Annual Water Balance Schematic for Mean Case - Year 6
Mine Operating Permit Application
Black Butte Copper Project
Meagher County, Montana



NOTES:

1. If effluent total nitrogen concentration is < seasonal effluent limit water will be discharged to UIG continuously.
2. If effluent total nitrogen concentration is > seasonal effluent limit water will be stored in TWSP from 7/1 to 9/30.
3. Water will be discharged from TWSP by blending water with WTP effluent at an average rate of 530 gpm.

Hydrometrics, Inc.
Consulting Scientists and Engineers

FIGURE 3.8A
MPDES Discharge
Mine Operating Permit Application
Black Butte Copper Project
Meagher County, Montana

ATTACHMENT B

FLOW CALULATIONS AND SEDCAD4 OUTPUT

Time of Concentration

	Outfall 012			Outfall 013		SF-03
Drainage Areas	1	2	3	1	2	1
Total Acres	6.01	1.95	0.79	0.90	1.70	0.40
Channel Flow*						
Slope %	15.3	21.1	10.7	11.4	5.6	
Horizontal Distance (ft)	392.0	202.0	299.4	317.0	750.0	
Vertical Distance (ft)	60.0	42.6	32.0	36.0	42.0	
Time (hr)	0.1	0.0	0.0	0.0	0.0	
Soil Type (1)	Poin	Compacted Fill	Compacted Fill	Compacted Fill	Compacted Fill	Compacted Fill
Hydraulic Soil Group	P(D)	CF (B)	CF (B)	CF (B)	CF (B)	CF (B)
Vegetation Type	Shrubland	Grass Cover	Grass Cover	Grass Cover	Grass Cover	Grass Cover
Upland Flow ***						
CN	83	73	73	73	73	73
Slope %	7.6	33.3	31.4	30.8	25.9	32.8
Horizontal Distance (ft)	105.0	64.0	68.0	64	57	65
Vertical Distance (ft)	8.0	21.3	21.3	20	15	21
S (in)	2.0	3.7	3.7	3.699	3.699	3.699
Time (hr)	0.029	0.013	0.014	0.013	0.013	0.013
Tc (Total)	**0.084**	**0.021**	**0.030**	**0.030**	**0.033**	**0.013**

OUTFALL 012

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.010	0.084	0.085	0.346	83.000	S	9.18	0.447
	2	1.950	0.021	0.000	0.000	73.000	S	1.32	0.073
	3	0.790	0.030	0.000	0.000	73.000	S	0.54	0.027
	Σ	**8.750**						**9.72**	**0.547**
#2	Σ	**8.750**						**9.72**	**0.547**

OUTFALL 013

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	0.900	0.030	0.000	0.000	73.000	S	0.61	0.033
	2	1.700	0.033	0.000	0.000	73.000	S	1.15	0.064
	Σ	**2.600**						**1.76**	**0.097**
#2	Σ	**2.600**						**1.76**	**0.097**

SHEET FLOW 003

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	0.400	0.013	0.000	0.000	73.000	S	0.27	0.011
	Σ	**0.400**						**0.27**	**0.011**
#2	Σ	**0.400**						**0.27**	**0.011**