NORTH AMERICAN TUNGSTEN CORPORATION LTD

March 13, 2023

Mackenzie Valley Land and Water Board
7th Floor – 4922 48th Street
PO Box 2130
Yellowknife, NT X1A 2P6
Attention: Kimberley Murray, Regulatory Specialist

Ms. Murray,

Re: MV2015L2-0003 Renewal, Water Management Plan

North American Tungsten Corporation Ltd. ("NATC") is pleased to provide the enclosed document, *Water Management Plan*, in relation to NATC's application for a new land use permit and Type-B care and maintenance water licence, as the existing water licence expires on January 27, 2024. NATC looks forward to the public review of the enclosed document and other documents related to the application.

Should you have any questions regarding these responses, feel free to contact the writer or Vicki Chan at 604.639.0847 or vchan@alvarezandmarsal.com.

Yours truly,
North American Tungsten Corporation Ltd.
by its Monitor, Alvarez & Marsal Canada Inc.
acting in its capacity as Monitor of NATC and not
in its personal capacity

Todd M. Martin
Senior Vice President

WATER MANAGEMENT PLAN

CANTUNG MINE, NT

VERSION #5

PREPARED BY NORTH AMERICAN TUNGSTEN CORPORATION LTD.

Dated: March 13, 2023

SUMMARY

This *Water Management Plan* describes how water is used and monitored at the Cantung Mine during care and maintenance, and what is done to prevent and manage erosion and sedimentation.

REVISION SUMMARY

Version	Date	Summary of Changes
MV2023L2-xxxx, MV2023Dxxxx		
5	Mar 2023	***Water Management Plan*** Consolidated water, hydrology and sediment and erosion control into one plan, for consistency and ease of implementation. Edited and restructured throughout for clarity and consistency with other Plans. Revised throughout to reflect current status of the mine site, being care and maintenance. Revised throughout to reflect current site knowledge and findings of various recent assessment studies. Revised monitoring discussion to reflect proposed changes to the SNP. Removed throughout aspects pertaining to use of the Wastewater Treatment Facility and the related discharge to the Flat River and associated monitoring aspects. Included DQO and WQOs for mine water receiving environments.
MV2015L2-0003		
-	-	-
MV2002L2-0019		
1	2014	***Hydrology Management Plan*** First version, developed primarily in relation to WWTF discharge
4	2013	***Combined Water Management Plan and Sediment and Erosion Control Plan*** Updated to reflect party comments received on previous version
3	2012	***Combined Water Management Plan and Sediment and Erosion Control Plan*** Updated plan
2	2011	***Combined Water Management Plan and Sediment and Erosion Control Plan*** Submitted pursuant to MVLWB indication that a combine3d plan would satisfy water licence conditions.
1	2009	***Water Management Plan*** The earliest version of this plan which formalized the existing water management practices at the Cantung Mine and addressed water licence requirements

CONFORMITY

Condition	Plan Section	Comment
		[Table to be populated following licence issuance]

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GLOSSARY AND ACRONYMS

Term	Definition
A&M	Alvarez & Marsal Canada Inc., Court-appointed monitor of NATC
C&M	Care and Maintenance
CCAA	*Companies' Creditors Arrangement Act*
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
Care and Maintenance	The status of a mine when it undergoes a temporary closure
Company	North American Tungsten Corporation Ltd.
Court	The Supreme Court of British Columbia
Inspector	An Inspector designated by the Minister under subsection 84(1) of the *Mackenzie Valley Resource Management Act*
DQO	Discharge Quality Objectives
EQC	Effluent Quality Criteria
Joint Sales Process	Joint sales and marketing process for the Cantung Mine and Mactung property undertaken by the Government of Canada and Government of the Northwest Territories.
Mine	Cantung Mine
MVLWB	Mackenzie Valley Land and Water Board
MVRMA	*Mackenzie Valley Resource Management Act*
Monitor	Alvarez & Marsal Canada Inc.
NATC	North American Tungsten Corporation Ltd.
NT	Northwest Territories
PMF	Probable Maximum Flood
Plan	Water Management Plan
Site Manager	The person or organization responsible for the implementation of routine site plans and procedures and site projects and all H&S at site as defined in the Mine Health and Safety Act.
SNP	Surveillance Network Program
TCA	Tailings Containment Area
TSF OMS Manual	Operation, Maintenance, and Surveillance Manual, Cantung Mine Tailings Storage Facility
WQO	Water Quality Objective

1.0 INTRODUCTION

North American Tungsten Corporation Ltd.'s (NATC or the Company) Cantung Mine (Mine) is located on the Flat River, approximately 275 km northwest of Nahanni Butte, 300 km north of Watson Lake, just east of the Yukon border in the Dehcho Region of the Northwest Territories (NT).

The Cantung Mine, which opened in 1962, is North America's largest tungsten producer. It was most recently operated by NATC, up until the fall of 2015 when mining and milling ceased and the site entered care and maintenance. On June 9, 2015, NATC filed for creditor protection under the *Companies' Creditors Arrangement Act* (CCAA) and Alvarez & Marsal Canada Inc. (A&M or the Monitor) was appointed as the Monitor by the Supreme Court of British Columbia (the Court).

This *Water Management Plan* (the Plan) has been prepared by NATC to describe water management and monitoring, as well as erosion and sediment control measures during care and maintenance.

1.1 BACKGROUND

On June 9, 2015, NATC filed for creditor protection under the CCAA and A&M was appointed as Monitor by the Court.

Subsequent to cessation of mining and operations at Cantung at or around November 16, 2015, the Monitor has managed the affairs of the Company pursuant to an Order of the Court. Funding of NATC's care and maintenance activities since November 2015 have been provided by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC).

On November 18, 2015, the Government of Canada determined that the Mine is a New Site Requiring Remediation, as per section 6.28 of the Devolution Agreement. As such, the site is now a federal area under the Mackenzie Valley Resource Management Act (MVRMA), for which the Government of Canada is now responsible.

Prior to a decision by NATC to transition Cantung to permanent closure and remediation, NATC and the Monitor solicited third parties for any interest in a possible investment or acquisition of Cantung that would see a restart of Mine operations. In that regard, a sale and investment solicitation process was conducted by the Company and the Monitor in 2015 which did not result in a transaction. Subsequently, with the assistance of the Monitor, a re-marketing of the Cantung Mine and Mactung property (formerly owned by NATC) was undertaken by the Government of Canada and Government of the Northwest Territories (Joint Sales Process) during the period of July 2019 through March 2022. Despite interest from select interested parties, NATC and the respective governments did not identify or transact with a party to invest, acquire or otherwise partner with NATC to take a financial interest in the Mine with a possible restart of same.

In April 2022, NATC, with input from CIRNAC, decided to continue care and maintenance in the near term and transition the Mine towards permanent closure and ultimately, remediation.

1.2 SITE DESCRIPTION

The Mine site area occupies approximately 75 ha, held under surface lease by NATC. It is located within Treaty 11 Territory, the traditional territory of the Dehcho First Nations and is also within the Kaska Dena Council's asserted territory.

As illustrated in Figure 1, the Mine comprises both open pit and underground workings together with milling facilities and five tailings containment areas. The historic Tungsten townsite is located adjacent to the Mine and mill facilities on the west side of the Flat River at an elevation of 1,128 m, and includes historic residential, recreational and office/shop buildings, some of which remain in use.

The Flat River is located in a steep-sided valley with the valley bottom being approximately 500 m wide. The valley rises to mountain peaks up to 2,750 m high. Climatic conditions in this area are typically sub-arctic with an average mean annual air temperature -4.0°C[1]. Blizzard conditions during January and February are frequent but usually of short duration and maximum snow depth in the valleys during the winter averages 127 cm. The snow-free season extends from mid-May to early October. Total annual precipitation averages 551 mm[1], with approximately half occurring as rain and half as snow.

The Flat River flows from northwest to southeast through the site, and drains into the South Nahanni River, which flows through the Nahanni National Park Reserve, and drains into the Liard River and then the Mackenzie River. The Flat River is characterized by the alpine hydrologic regime of the western mountains of the Canadian Cordillera and has a gross drainage area of approximately 155 square kilometers (km^2) at the Mine Middle Bridge (Tetra Tech 2020).

The Flat River flows through a well-defined floodplain composed of glacial and fluvial deposits and has a meandering channel, characterized by riffles and pools at low flow, and confined by the narrow valley walls (Tetra Tech 2020, RCBio 2018); the river gradient at the Mine is 0.1% (Tetra Tech 2020). The Flat River is a low productivity watercourse due to its high elevation and northern latitude resulting in a short open water season and a low annual mean water temperature. Sardine Creek flows through the north end of the site into the Flat River. Active geothermal areas occur on the Mine site with groundwater discharging periodically into Stinky Pond, and hot springs occurring beyond the extent of the airstrip; both of which ultimately discharge into the Flat River.

The site is accessible by air, utilizing the existing airstrip, or by the Nahanni Range Road.

1.3 PURPOSE & OBJECTIVES

The purpose of this Plan is to is to ensure a common understanding of water use, management and monitoring, and what is done to prevent and manage sediment and erosion.

The objectives of this Plan are to:

- Ensure employees and contractors understand their water management obligations;
- Clarify expectations and tasks related to water management, erosion and sediment control, and associated monitoring;
- Support minimizing the impacts of the Mine on the quantity and quality of water in the receiving environment through the use of appropriate mitigation measures, monitoring, and follow-up actions; and
- Satisfy compliance requirements.

1.4 SCOPE

This Plan applies to all water used and monitored throughout the Mine site during care and maintenance (C&M).

It should be noted specifically that no mining or milling is occurring, there is no industrial water use or waste deposit to water during C&M.

[1] Record period of 2017-2022, Cantung Weather Station.

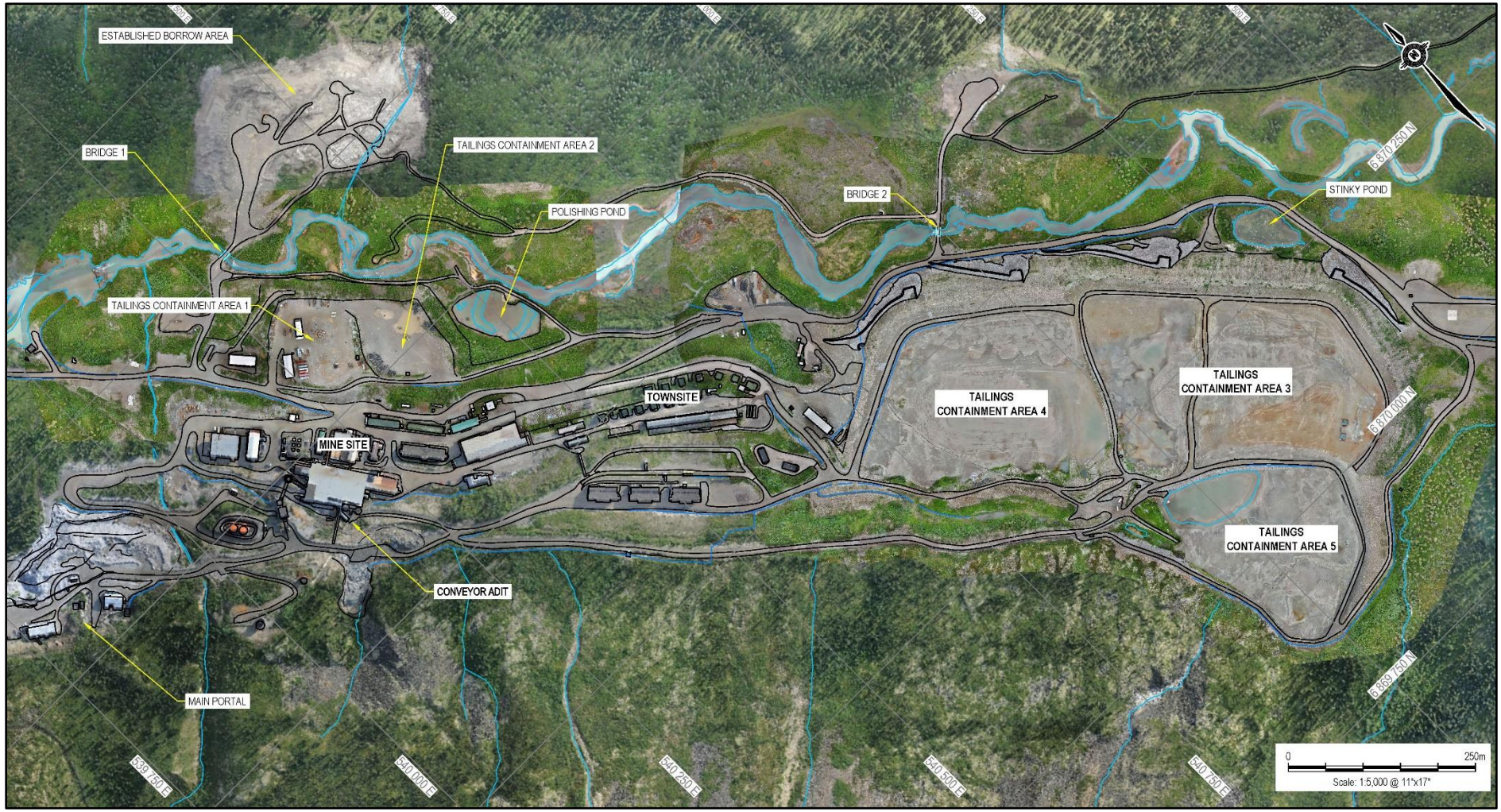

Figure 1: Site layout, Cantung Mine

1.5 RELATED DOCUMENTS

The documents listed in Table 1 are related to, and should be considered when, implementing this Plan, and may be updated from time to time.

1.6 PLAN MANAGEMENT AND IMPLEMENTATION

The Plan is effective upon approval. The Plan is reviewed annually by the Site Manager or designate and updated as needed and following issuance of new or amended authorizations to ensure alignment with relevant terms and conditions. When material changes occur, the updated document is provided to parties in accordance with the *Engagement Plan.*

A copy of this Plan is maintained on site in the administration office and in A&M's office in Vancouver.

Table 1. Related documents

Title	Author	Year	Relation to this Plan
Northwest Territories Lands and Resources Devolution Agreement	Government of Canada	2013	Provides federal jurisdiction for specific areas within the Northwest Territories
Mackenzie Valley Resource Management Act	Government of Canada	1998	Enables the water licencing process
Mackenzie Valley Federal Areas Waters Regulations	Government of Canada	1998	Defines water use and classifies undertakings
Water Licence	Mackenzie Valley Land and Water Board	2024	Allows for water use, includes Surveillance Network Program and Effluent Quality Objectives, lists requirements for a Water Management Plan, and identifies reporting requirements
Land Use Permit	MVLWB	2024	Permits activities to occur
Surface Leases	Government of Canada	1984	Allows for exclusive surface access and specifies activities
Care and Maintenance Plan	NATC	2023	Describes activities undertaken during care and maintenance
Spill Response Plan	NATC	2023	Provide a materials inventory, outlines measures for preventing and responding to spills
Engagement Plan	NATC	2023	Identifies interested parties, provides triggers for engagement
Waste Management Plan	NATC	2023	Describes solid and liquid waste streams, management and infrastructure
Groundwater Pumping Contingency Plan	NATC	2023	Provides response framework in the even that groundwater EQCs are exceeded
Water Quality Sampling Quality Assurance and Quality Control Plan (QA/QC Plan)	NATC	2023	Outlines QA/QC measures during water sampling and analysis

Title	Author	Year	Relation to this Plan
Emergency Response Plan	NATC	2023	Outlines response measures to be taken in the event of a non-spill emergency
Operation, Maintenance, and Surveillance Manual, Cantung Mine Tailings Storage Facility (TSF OMS Manual)	NATC	2023	Describes the Tailings Containment Areas
Conceptual Site Model, Cantung, NT	Tetra Tech Canada Inc.	2021	Qualitatively and quantitatively describes in detail the hydrologic regime as well as the water management system in place on site. Includes current water balance
Phase III Environmental Site Assessment, Cantung Mine, NWT	Tetra Tech Canada Inc.	2020	Presents a discussion and rationale for proposed drainage quality criteria for mine water receiving environments
Standard Outline for Management Plans	Land and Water Boards of the Mackenzie Valley	2021	Describes preferred format for Management Plans
Waste and Water Management Policy	Land and Water Boards of the Mackenzie Valley	2023	Provides objectives and guidance for waste deposit and water management practices

2.0 ROLES AND RESPONSIBILITIES

NATC is responsible for the Mine, including implementation and management of this Plan. Contact information for NATC is provided below.

North American Tungsten Corporation Ltd.
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925 W. Georgia St.
Suite 902, Cathedral Place Building
Vancouver, BC V6C 3L2
Ph: (604) 638-7440
Contact:
Todd M. Martin, Sr. Vice President
tmartin@alvarezandmarsal.com
or
Vicki Chan, Vice President
vchan@alvarezandmarsal.com

2.1 SITE MANAGER AND STAFF

The Site Manager, or designate, is responsible for implementation and management of this Plan.

NATC staff implement and comply with the Plan as directed by the Site Manager

2.2 CONTRACTORS, SUPPLIERS AND VISITORS

All personnel conducting activities on site, including contractors, suppliers and visitors, are required to implement this Plan as it pertains to their activities on site.

3.0 HYDROLOGICAL SETTING

Groundwater and surface water at the Mine site ultimately report to the Flat River. Quantitative and qualitative aspects of the hydrologic setting for the Mine is described in detail in *Conceptual Site Model, Cantung Mine NT* (Tetra Tech 2021) and summarized in the following sections. Figure 2 illustrates groundwater and surface water flow.

3.1 SURFACE WATER

The Cantung Mine is located in the alpine hydrological regime of the Dehcho Region, characterized by little soil or lake storage of water, while some storage can exist within porous and fractured rock and within valley-bottom and terrace sediments. Local catchments around the Mine site drain in a northeast-southwest direction perpendicular to the valley slopes which flank the site and into the Flat River. The Mine site contains drainage ditches which collect and divert surface runoff and mine water to the Flat River; limited surface water flows interact with the Mine due to the diversion ditching upgradient of the mine site (Tetra Tech 2021).

The primary surface water flows on the Mine site are channelized flow originating from the underground mine discharge from the Main Portal and the Conveyor Adit portal. As flows upgradient of the tailings containment areas (TCAs) are diverted, there is minor surface water flow from the surface of the TCAs over and along the berms and towards the Flat River. There are similarly minor surface flows running from the townsite towards the Flat River and as overland flow across the mine rock stockpiles. (Tetra Tech 2021).

Two surface water features occur on the Mine site: Stinky Pond and the Polishing Pond. Stinky Pond is a small naturally occurring spring-fed pond located east of TCA 3 between the Flat River and TCA 3, which formerly received effluent from the wastewater treatment facility; it currently receives no effluent or run-off. ‘Stinky Pond’ is a historical name, owing to the sometimes sulphurous odour associated with the spring.

The Polishing Pond is a historically constructed settling pond, located south of TCA 2. It is also known as the ‘old lagoon’, or the ‘runoff catchment pond’. It was created with a low berm of rock sectioning off an oxbow of the Flat River and was constructed in conjunction with historic spill contingency planning to act as a catchment pond for surface runoff from the Mine, providing containment and to support clean-up of any spills prior to reaching the Flat River (no such spills have occurred). The Polishing Pond typically discharges to the Flat River at Surveillance Network Program (SNP) station 5-2 during freshet only.

TCAs 3, 4, and 5 were originally established as exfiltration ponds prior to their use for tailings deposition, so historically a significant amount of water infiltrated into this area. The current configuration of the TCAs still allows for infiltration into the tailings material (simulated to be in the range of 20% to 45% of annual precipitation), but at much lower rates than when they were used for exfiltration (Tetra Tech 2021).

With the cessation of pumping in 2015, the underground mine flooded to the 3,950 ft at the Main Portal level by April 2017 and has been stable at this level since 2017. Mine water discharge is primarily through the Conveyor Adit, with some overflow through the Main Portal when water elevations rise above the sill elevation. Long-term groundwater elevations are not expected to fluctuate significantly from present values given the available recharge and the elevation control provided by the Main Portal (Tetra Tech 2021).

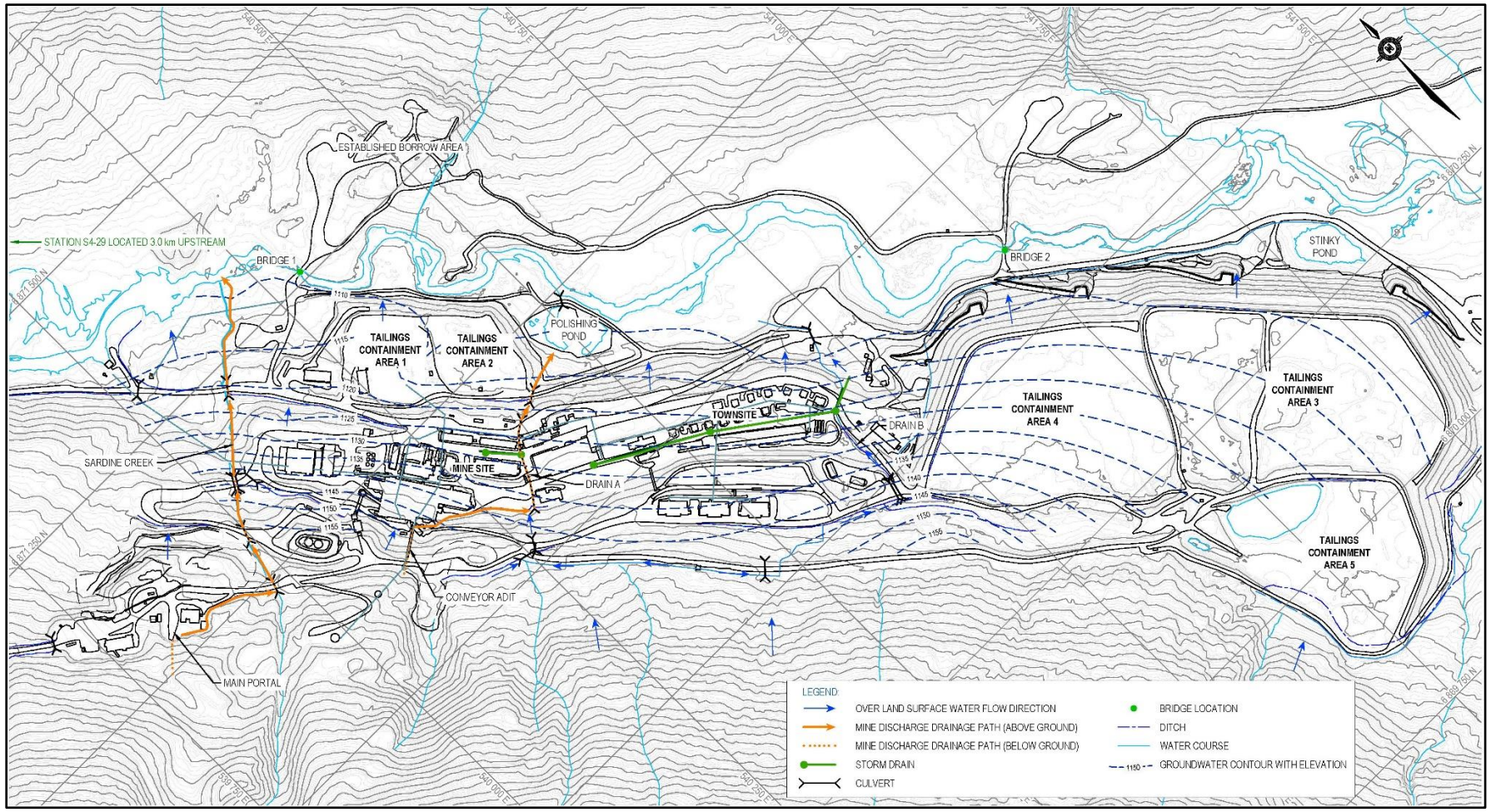

Figure 2: Cantung Mine site water flow and management features

3.2 GROUNDWATER

The Mine is underlain by a shallow, unconfined overburden aquifer, and a deeper bedrock aquifer. The overburden aquifer consists predominantly of glacial sand and gravel deposits, with some colluvium. These coarse-grained materials are more permeable than the bedrock and therefore the overburden aquifer carries the bulk of the groundwater flow beneath the site. Rainfall and snowmelt along the flanks of the Flat River valley walls recharge the overburden aquifer. Most groundwater discharges along the valley floor as seepage into the Flat River and in springs adjacent to the river. During low flow conditions, groundwater is interpreted to form the largest component of streamflow and have the greatest influence on surface water quality. For the reach of the Flat River adjacent to the Mine, groundwater discharge from the Mine site is strongly diluted by inflowing Flat River stream water from upper parts of the catchment. Shallow groundwater in the vicinity of the Flat River is interpreted to flow perpendicular to the Flat River channel; shallow groundwater near and beneath the river flows forms a discharge zone adjacent to the Flat River (Tetra Tech 2021).

3.3 GROUNDWATER AND SURFACE WATER INTERACTION

Groundwater and surface water flows on the Mine site are small in magnitude when compared with streamflow in the reach of the Flat River adjacent to the Mine. Based on stream flow monitoring typical Flat River base flow is approximately 55,000 m^3/d with peak flows approximately 1,050,000 m^3/d. The estimated groundwater discharge to the Flat River adjacent to the Mine ranges from 635 m^3/d to 771 m^3/d depending on the location on the river relative to the Mine. This groundwater discharge comprises 0.6% to 1.4% of Flat River streamflow; Flat River streamflow is 70 to 160 times greater than groundwater volume at low flow. This demonstrates the strong dilution effect by through-flowing Flat River water on groundwater discharge from the Mine site (Tetra Tech 2021).

4.0 WATER USE

4.1 WATER SOURCES

NATC plans to continue direct water use, predominantly for domestic purposes, up to 299 m^3/day withdrawn from the Flat River. Non-domestic use is limited to infrequent use for dust suppression and emergencies such as fire suppression.

NATC indirectly uses water in the following ways: maintaining water course crossings in the form of bridges; watercourse training in the form of culverts; diversions of mine water at surface.

4.2 DIRECT WATER USE

Water is withdrawn from the Flat River at the existing water intake location (SNP station 4-1), as illustrated on Figures 3 and 4.

Direct water use typically occurs at a rate of less than 100 m^3/day, however, for compliance certainty, 299 m^3/day is licenced. Based on monitoring data collected since 2017, average flows in the Flat River range from 60,747 to 2,558,544 m^3/day (average of 423,347 m^3/day[2]). Accordingly, maximum licence use volume is <0.005% of the average low flow volume of the Flat River[2].

[2] Record period of 2017-2022.

4.3 INDIRECT WATER USE

4.3.1 WATERCOURSE CROSSINGS

As illustrated on Figure 2, there are three (3) bridges across the Flat River that are associated with the Mine. The bridges are referred to as Bridge 1 at the upstream extent which provides access to the existing borrow area, Bridge 2 midway along reach of the Flat River adjacent to the Mine, and Bridge 3, beyond the extent of the airstrip providing access to the landfill. These bridges have existed historically and continue to be used and maintained throughout C&M. Should bridge repairs be required, they will occur in accordance with the applicable Code of Practice for clear span bridges (DFO 2022a). No new watercourse crossings are anticipated during C&M.

4.3.2 WATERCOURSE TRAINING

As illustrated on Figure 2, there are sixteen (16) culverts associated with the Mine: four (4) culverts for water course training (Sardine Creek) and twelve (12) culverts for drainage management. These culverts have existed historically and continue to be used and maintained throughout C&M. Should culvert repairs be required, they will occur in accordance with the applicable Code of Practice for culvert maintenance (DFO 2022b), where applicable. No new watercourse trainings are anticipated during C&M.

4.3.3 MINE WATER DIVERSION

Following the cessation of mining and related pumping and treatment of mine water, the underground mine filled up with water to the 1,390 ft level by April 2017. Mine water discharges to surface at two locations, the Main Portal or ‘E Zone Discharge’, and the Conveyor Adit or ‘Conveyor Gallery’, monitored at SNP stations 4-13 and 4-42, respectively (see Figure 3). Once at surface, the mine water flows in open ditches and culverts to tributary watercourses[3] and eventually to the Flat River.

[3] Mine water discharge to Sardine Creek is a historic practice dating back to at least 1995 wherein it was authorized in water licence N3L2-0004.

Figure 3: Monitoring station locations, Mine site, Flat River and TCAs 1 & 2

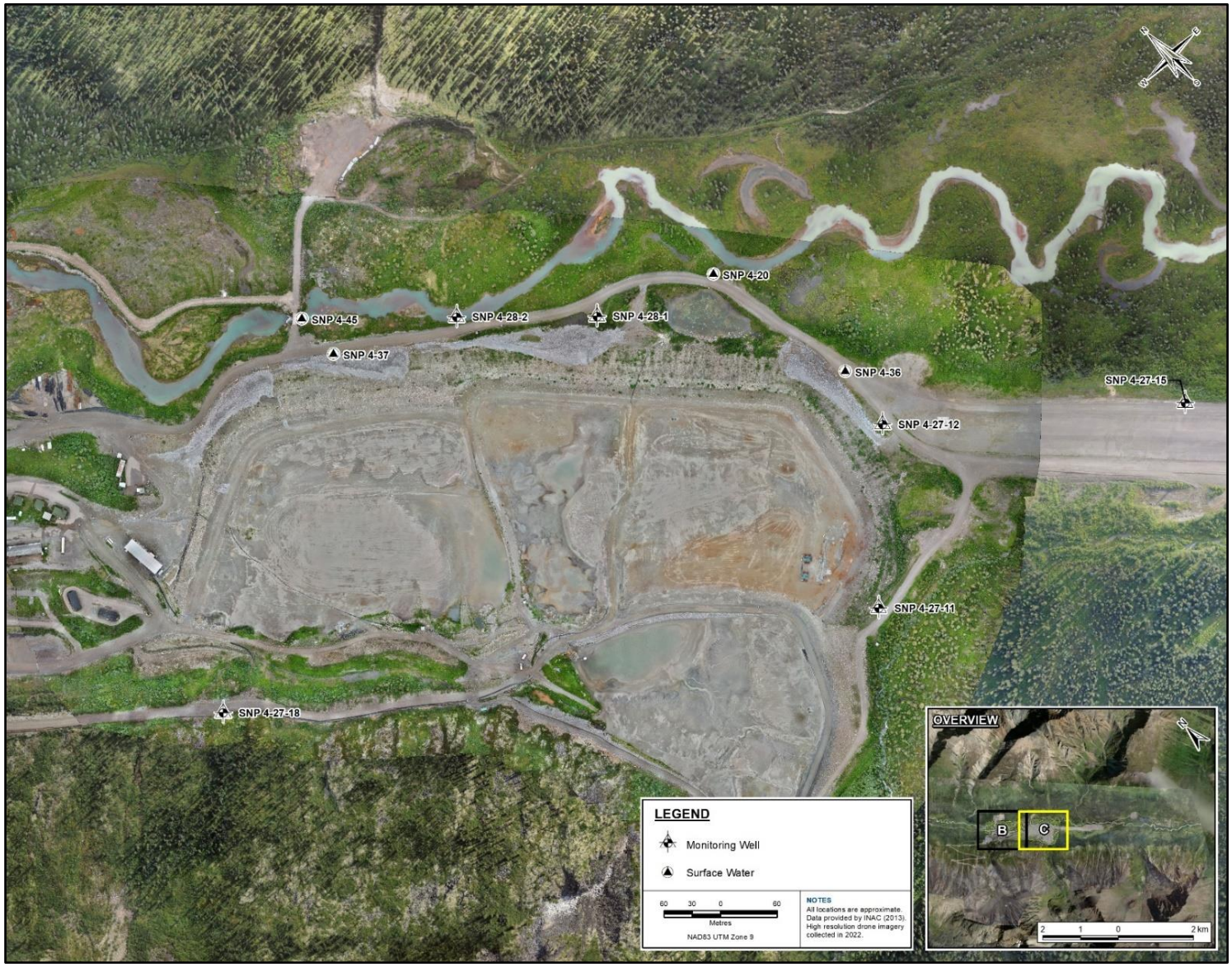

Figure 4: Monitoring station locations, Flat River and TCAs 3, 4 & 5

5.0 WATER MANAGEMENT SYSTEM

The water management system is in place to ensure continued domestic water use, mine water diversion to the Flat River, overland flow management, adequate sewage treatment and compliance monitoring; no effluent treatment is occurring during C&M. The water management system includes:

- Water supply facility on the Flat River;
- Mine water diversions at surface;
- Stormwater management system, including ditches, culverts, ponds and subsurface conveyance;
- Sewage conveyance and treatment system;
- Tailings containment areas; and
- Water monitoring infrastructure including groundwater wells, dataloggers and stream gauging and sampling stations.

Water monitoring is discussed further in Section 9. Sewage conveyance and treatment is primarily addressed in the *Waste Management Plan*, and summarized here.

5.1 WATER SUPPLY

Withdrawal facilities include a pump with an inline water meter, located in a pumphouse. Pump configuration and housing may change over time, however the withdrawal method and location remains the same.

Water withdrawal infrastructure, specifically the screen on the water intake, complies with the applicable Code of Practice (DFO 2020).

5.2 MINE WATER

Mine water discharged from the Main Portal flows into Sardine Creek and from there directly into the Flat River (monitored at SNP station 4-32). Mine water discharged from the Conveyor Adit flows to an open ditch behind the mill building, then by ditch and culvert into the Polishing Pond. Water from the Polishing Pond infiltrates into the ground beside the Flat River or overflows through a culvert directly into the Flat River (monitored at SNP station 5-2; see Figure 5).

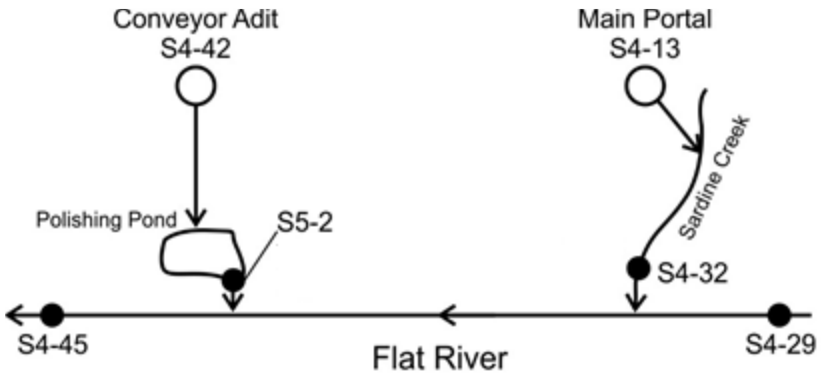

Figure 5: Schematic Flow Path for Minewater discharge and related sampling Stations

Discharge varies throughout the year with an increase in spring (starting in May) due to snow melt and corresponding increases in infiltration, as well as groundwater seepage into the fully flooded mine workings during spring freshet. The variability in discharge volumes during the summer are understood to be related to changes in infiltration and groundwater inflow rates in response to precipitation events (Tetra Tech, 2020). Average daily discharge[4] monitored at SNP Stations 4-13 and 4-42 was 163 and 664 m^3/day on average when flowing, respectively. Mine water diversion in this manner is expected to continue throughout C&M.

For ease of access and measurement, a station equipped with a v-notch weir, has been established just downstream of the Conveyor Adit and SNP station 4-42, known as 4-12. Station 4-12 is a surrogate for 4-42.

5.3 STORMWATER

Stormwater is collected and conveyed through, or diverted around, the Mine site via existing surface ditches and buried infrastructure, with stormwater discharge to the Polishing Pond, or the Flat River, respectively. Conveyance is monitored in accordance with the *Care and Maintenance Plan*. No changes to infrastructure, quality or quantity are expected throughout routine C&M activities.

5.4 SEWAGE TREATMENT

Sewage is currently collected and treated in the existing sewage treatment plant, located in an insulated building located below the townsite. The sewage treatment plant was built during mining operations and serviced the entire Mine and historic townsite, up to 600 persons. Sewage is subject to settling, solids removal and aeration. Outflow from the treatment plant is pumped to TCA 4 for settlement and exfiltration. Flow through the sewage treatment plant is measured with a flow meter as the water leaves the plant and is pumped to TCA 4. On average, a volume of 100 m^3/day passes through the facility.

Given the operational capacity being up to 600 persons, the facility is oversized for C&M and may be replaced by other means of liquid waste management. Alternative means may be installed concurrent with installation of a modular camp and may include a package treatment plant, a holding tank, or pacto-style toilets and may involve greywater or effluent discharge to TCA 4, incineration, or raw sewage backhaul for treatment and disposal offsite.

Sewage management is discussed in greater detail in the *Waste Management Plan*.

5.5 TAILINGS CONTAINMENT AREAS

There are 5 TCAs at the Mine: TCA 1 and 2, referred to as the west TCAs, both of which are historic and covered with rock; TCAs 3, 4, and 5, referred to as the east TCAs, all of which were originally constructed as exfiltration ponds prior to receiving tailings. The east TCAs are uncovered and subject to periodic application of a dust suppressant. Water from upslope of the TCAs is diverted around the facilities via ditches, and any surface water accumulating on the east TCAs arises from local precipitation and either evaporates or exfiltrates throughout the year.

TCA 4 receives effluent from the sewage treatment plant.

Management of the TCAs is discussed in greater detail in the *TSF OMS Manual*.

[4] From April 1, 2017 when the mine filled to the 3,950 ft level, to the end of 2022.

6.0 WATER BALANCE

The water balance was updated in 2021 to reflect C&M and to inform closure planning. The water balance is presented in detail in *Conceptual Site Model, Cantung Mine NT* (Tetra Tech 2021); the associated schematic is appended (Appendix A).

The 2021 water balance is considered to be adequate for the duration of C&M and will be recalculated during permanent closure planning.

7.0 EROSION AND SEDIMENT CONTROL

7.1 EROSION AND SEDIMENT SOURCES

Erosion is the removal and transport of sediment, while sedimentation is the deposition of the mobilized materials. Erosion at the Mine site is typically associated with wind, precipitation or runoff.

Based on experience gained on site over time and past inspection results, erosion and sedimentation may typically occur in the following scenarios and locations during C&M:

- Erosion and sediment release during bridge and culvert maintenance;
- Wind erosion of uncovered tailings;
- Runoff causing erosion on the exposed side slopes in the borrow pit area and landfill;
- Site-wide snowmelt and associated overland runoff mobilizing sediments in ditches, collecting in the Polishing Pond;
- Runoff collecting in the interceptor ditch upslope of TCA 4 causing erosion at the outlet of the 2 culverts and associated downstream ditching;
- Snow melt and heavy rainfall possibly causing erosion on the over-steepened section of the TCA 5 interceptor ditch; or
- Rainfall and wind possibly causing erosion of excavated materials exposed during earth moving.

While active erosion is not currently occurring, it was noted in 2022 during a site inspection that the riprap armoring along the edge of Flat River at the road embankment near TCA 1 and 2 was observed to be discontinuous and varied in gradation, with minor undercutting of the channel banks noted adjacent to TCA 1. The undercutting is not impacting the road or embankment toe stability, is not an immediate concern, but warrants monitoring so is mentioned here and discussed further in the subsequent sections on prevention and monitoring.

Drainage infrastructure is generally considered to be adequate, however bridges and culverts may be replaced if needed. The areas identified above are considered low risk for sedimentation and erosion, with effects mitigated through prevention and maintenance, and identified areas subject to routine inspection.

7.2 EROSION PREVENTION

Erosion can be prevented in the following scenarios:

- Applying a dust suppressant to erodible surfaces (uncovered tailings ponds);
- Carrying out regular maintenance of ditches to ensure conveyance capacity is maintained; and
- Planning work to occur outside of peak flow, storm events or fisheries timing windows, where applicable[5].

7.3 CONTROL METHODOLOGIES

Typical methods for controlling and minimizing erosion and sedimentation include:

- Conducting bridge and culvert maintenance and repairs in accordance with the applicable Code of Practice (DFO 2022b);
- Maintaining culvert inlets and ditches clear so runoff can flow unimpeded;
- Installing geotextile or equivalent on erodible areas;
- Maintaining speed limits on private Mine roads to reduce dust generation;
- Installing rock or straw check dams and/or silt fencing where appropriate to reduce runoff and ditch flow velocity and allowing sediment to settle out.

In addition to the above, erosion and sediment control methods for known susceptible areas around the Mine include:

- Maintaining drainage ditching and check dams in the borrow pit;
- Regrading and armouring erosion-susceptible slopes in the landfill;
- Applying armouring as needed to sections of TCA 4 and 5 interceptor ditches;
- Replacing the culverts in the TCA 5 interceptor ditch with a larger single culvert, as conditions dictate over time; and
- Staging rip rap adjacent the toe of TCAs 1 and 2 for easy access should remedial repairs to existing armouring be required.

An inventory of erosion and sediment control supplies is maintained on site.

8.0 FLOODING

8.1 FLOOD EVALUATION

A flood evaluation for the Flat River is presented in detail in *Conceptual Site Model, Cantung Mine NT* (Tetra Tech 2021). Figure 6 illustrates the lateral extents and associated flow velocity associated with the Probable Maximum Flood (PMF) wherein the PMF flows were estimated as five times the 1,000-year flow based on the ratio from the Probable Maximum Precipitation for the same events (Tetra Tech 2021).

8.2 FLOOD CONTROL

Flooding of the Flat River is controlled predominantly by armouring of the Flat River banks proximal to mine infrastructure including access roads and drainage ditches running along the toes of the TCAs, as

[5] NWT Zone 2 fish timing window when in water activities may occur July 16th to August 14th

well as armouring around bridge abutments.

Localized flooding occurs intermittently in the vicinity of the hot springs and road at the south end of the airstrip due to beaver activity. Flooding is controlled largely through application of the Code of Practice for beaver dam breaching and removal, and regular culvert maintenance (DFO 2022c).

9.0 MONITORING

9.1 WATER MONITORING

Water monitoring, including surface water, groundwater, mine water quality and quantity, as well as seepage, occurs at SNP stations in accordance with the water licence and is a continuation of historical monitoring at applicable stations (Figure 3); Annex A of the water licence lists stations, parameters and frequency for monitoring groundwater, mine water and surface water. For ease of reference the SNP is also provided in Appendix B.

9.1.1 METHODOLOGY

Detailed methodology associated with monitoring is outlined in NATC Standard Operating Procedures and related site-specific guidance. General approaches and typical equipment are summarized below.

9.1.1.1 SURFACE WATER QUALITY

Surface water quality is determined through measurement of field parameters *in situ* and collection of water samples submitted to accredited environmental analytical laboratories for analysis. Field parameters are measured with handheld meters that are calibrated to manufacturer specifications. Samples are collected and handled in accordance with the *QA/QC Plan*.

All data generated is reviewed for quality assurance, quality control and compliance where applicable, and is stored in NATC's database.

All surface water quality stations are established stations with a historical data record and appropriate signage designating the sampling location in the field.

9.1.1.2 SURFACE WATER QUANTITY

Surface water quantity can be measured using several methods, each applicable to a specific scenario, as discussed below. All surface water quantity stations are established, existing stations with a historical data record, appropriate signage designating the sampling location in the field, and instrumentation installed, where appropriate.

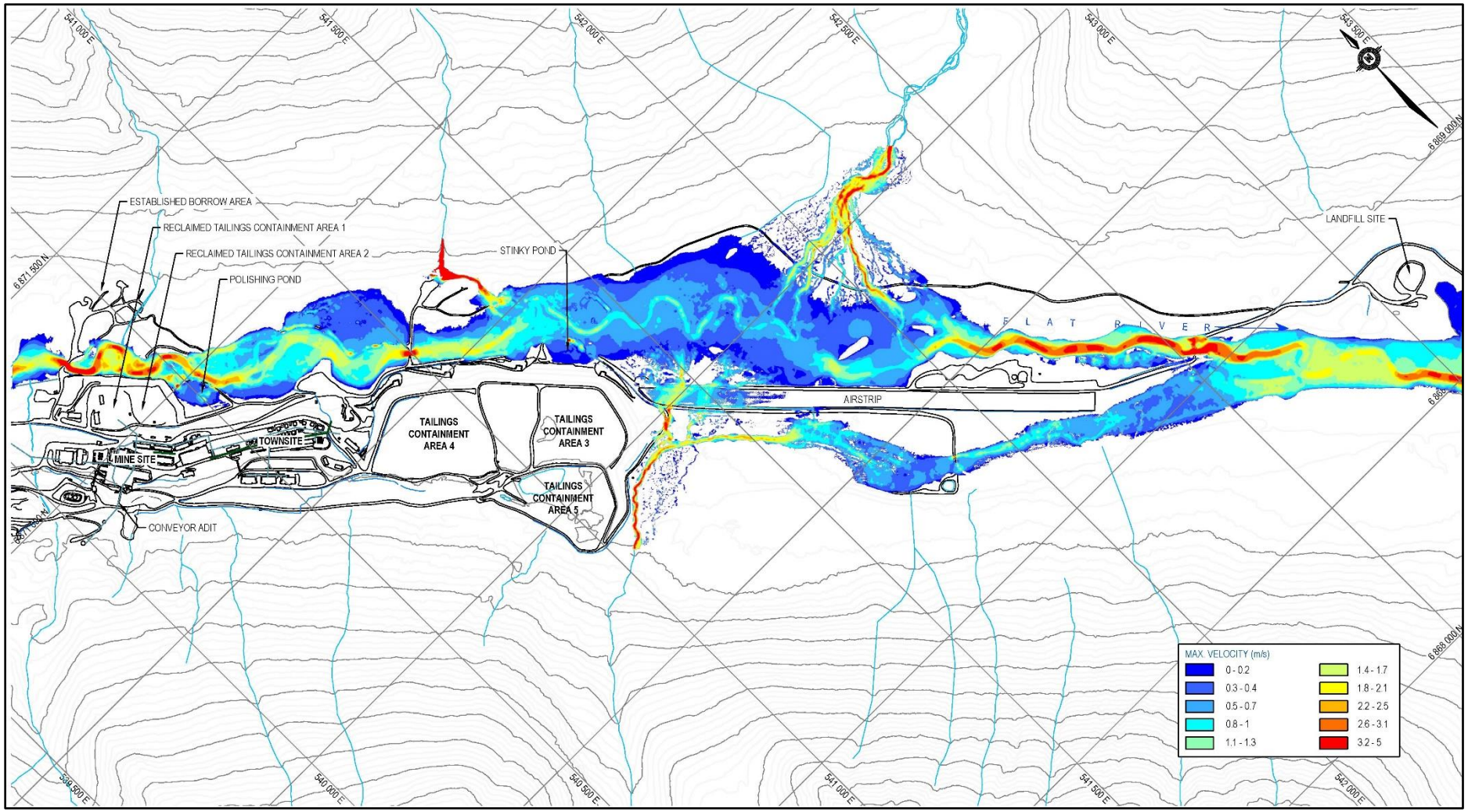

Figure 6. Flat River flood evaluation

9.1.1.2.1 STREAM GAUGING

Stream gauging is the process of estimating stream flow via the direct measurement of stream velocities through measured cross sections of the river.

Stream gauging is typically conducted by wading the stream and measuring flow velocities at pre-determined locations across the stream. The wading rod and current meter are assembled and operated according to the manufacturer's instructions. Alternatively, a Swoffer 2100 (Swoffer) or equivalent flow meter may also be used. Where wading conditions are unsafe, a boat may be used, or flow measurements may be taken from a bridge.

Each time stream discharge is measured, the water elevation at the monitoring station is recorded. The relationship between water elevation (stage) in the channel and discharge is established and is described by a stage-discharge rating curve. An increased number of measurements improves the stage-discharge rating curve and will confirm that that channel remains stable from year to year. Given the long term dataset at the Mine, the rating curve is well established.

The Swoffer can be calibrated in the field by following instructions provided in the Swoffer Operating Manual. It is calibrated periodically throughout the season depending on frequency of use, and annually prior to the start of the spring sampling. If the Swoffer appears to be malfunctioning due to damage or wear, it is sent to the manufacturer or supplier for repair and calibration.

9.1.1.2.2 STAFF GAUGE

Staff gauges are, essentially, well-marked measuring rods. They are generally staked-in-place adjacent to dataloggers described in the following section. They allow for quick, simple measurement of water levels and are useful to cross-reference data recorded by the dataloggers.

It is useful to tie staff gauge readings to elevations by surveying the gauge. It is important to check staff gauges in the spring to determine whether or not ice forces have moved the gauge vertically. This is done annually, in the spring.

There are several established staff gauges at the Mine.

9.1.1.2.3 DATALOGGERS

Water levels in critical locations are recorded on a continuous basis with the use of electronic pressure sensors. The pressure sensors used at all continuous monitoring stations are called Leveloggers, manufactured by Solinst Canada Ltd (Solinst). The Leveloggers record total pressure (i.e. air pressure and water pressure) at each location. To achieve accurate data reduction, the installation of a Barologger, also made by Solinst, is also required to measure air pressure. Multiple Leveloggers and Barologgers (together referred to as dataloggers) are installed at the Mine.

Dataloggers are surveyed in place to tie their location in to the existing mine grid and allow for accurate data comparison among different loggers over time. Water levels are surveyed periodically and compared with levels measured by the Leveloggers.

The dataloggers are programmed to record pressure periodically, with recording frequency determined by the battery, frequency of data download and data collection needs. At the Mine, Leveloggers typically record a measurement every hour.

Data is typically retrieved from the datalogger using a direct read cable, which allows for data retrieval without retrieving the datalogger from its surveyed location. Should the direct read cable be damaged, the datalogger can be retrieved, and data download. Once the datalogger is reinstalled its location is resurveyed.

To ensure that datalogger sensors are functioning properly, they are periodically temporarily removed

and tested in known water depths.

Data checks are conducted once data reduction is complete to ensure there are no discrepancies between staff gauge readings and the data recorded by Leveloggers. If deviations are greater than 10mm, installation of the Levelogger is tested to identify deficiencies.

9.1.1.2.4 CULVERT MEASUREMENTS

Using a culvert or weir for the flow measurement station provides a clearly defined, consistent channel section. A measurement of the depth and average velocity at the culvert outflow provides an accurate measurement of the flow. The depth is used with the culvert geometry to compute the flow area. The flow area multiplied by the average velocity estimates the discharge. This discharge may be checked by measuring upstream and downstream water levels and applying culvert hydraulics.

9.1.1.2.5 GROUNDWATER GAUGING AND QUALITY

Prior to collecting a groundwater sample, wells are gauged to determine the depth to groundwater. This is conducted with a water level probe (calibrated electric tape) and occurs prior to any disturbance to the well such as removal of dedicated tubing or installation of a sampling pump. The probe is lowered into the well to measure the depth to groundwater below the surveyed measuring point on the well. Measured groundwater depth is compared with historical measurements for that well, and re-measured if there is a significant difference (>1 m) between successive measurements. Water volume within the well is calculated from the measured depth to groundwater (Tetra Tech 2022).

Where monitoring wells contain enough groundwater that sampling can be conducted, and in consideration of well depth, groundwater samples are collected either by hand bailing or using a pump.

Dependent upon the volume of water within each monitoring well, as determined by groundwater gauging, as well as the well depth, the decision between purging the required well volume amount via hand bailing or pumping can be made; use of bailers limits the amount of sediment in the samples and allows the top of the water column to be sampled where free product may be present, both of which may be important considerations depending on analytical parameters. Where using bailers or inertia pumps, dedicated bailers or tubing should be used for each well.

Prior to collecting a sample, the well is purged by removing 3 well volumes. Once the well has recharged following purging, the water sample is collected and field parameters measured.

9.1.2 CRITERIA AND OBJECTIVES

Effluent quality criteria (EQC) are defined in Part G of the water licence and apply to specific SNP stations associated with groundwater in the TCAs and seepage downgradient of the fuel berm, as listed in Table 2. These are compliance points and exceedances require notification, reporting and response pursuant to the water licence.

Site-specific discharge quality objectives (DQO) have been developed for tributaries that receive water discharging from the underground mine, namely at SNP station 4-32 (at Sardine Creek upstream of the confluence with Flat River) and at SNP station S5-2 (outflow of the Polishing Pond), as listed in Table 3. The DQO were developed for use as a screening tool to identify the presence or absence of potential impacts from water discharging from the flooded underground workings (Tetra Tech 2020). For simplicity, only one set of DQCs were developed for both stations[6]. While a detailed discussion on the derivation of these objectives is provided in *Phase III Environmental Site Assessment, Cantung Mine, NWT* (Tetra Tech 2020), a brief discussion, along with their application, is provided here.

These SNP stations (4-32 and 5-2) were considered to be the most appropriate for establishing DQO

[6] Based on 2017-2018 data. DQOs are being updated at the time of writing to reflect more recent monitoring data

values, given their location proximal to the Flat River and fish habitat, and they capture all discharge from the underground workings and some runoff. The DQO values are considered appropriate and conservative as they satisfy all *Metal and Diamond Mining Effluent Regulations* requirements for mine effluent, most are lower than the Canadian Drinking Water Standards (Tetra Tech 2020), and all are either equivalent to or lower than the historic EQC applicable to treated mine water discharge to the Flat River at SNP station 4-43. A review of mine water discharge quality measured through the monitoring program from 2017-2022 indicates that the DQOs are routinely attainable.

Further, the water quality objectives (WQO) that were established under the previous water licence for the Flat River are considered to continue to apply inasmuch as they indicate an acceptable objective for quality of Flat River water downstream of the mine. The DQOs were developed using the existing WQOs for the Flat River so that the mixture of mine discharge water and Flat River water does not exceed WQOs in Flat River.

These are monitoring points: results are compared to objectives and reported in monthly SNP reports and the annual water licence report.

Table 2. Cantung Mine groundwater and seepage EQCs

SNP Station	Parameter	EQC in mg/L	
		Maximum Average Concentration	Maximum Grab Concentration
4-34	Extractable Petroleum Hydrocarbons	4.00	5.00
	Benzene	4.00	-
	Ethyl Benzene	2.00	-
	Toluene	0.39	-
4-27-9 4-27-11 4-27-12 TC11-7 TC11-11	Total Suspended Solids	15.00	30.00
	Total Ammonia as N	5.00	10.00
	Total Arsenic	0.20	0.40
	Total Cadmium	0.01	0.02
	Total Copper	0.20	0.40
	Total Lead	0.20	0.40
	Total Nickel	0.40	0.80
	Total Zinc	0.20	0.40

Table 3. Cantung Mine site specific DQOs and WQOs for mine water receiving environments

Parameter	DQO at 4-32, 5-2	WQO at 4-44
	Maximum Grab Concentration (mg/L)	
TSS	7	6
Ammonia	3.85	1.27
Nitrite (as N)	0.18	0.06
Nitrate (as N)	8.9	3.0
Chloride	366	120
Fluoride	2.98	1.03
Total Aluminum	0.6	0.3
Total Arsenic	0.013	0.005
Total Boron	4.6	1.5
Total Cadmium	0.0005	0.00021
Total Chromium (III+VI)	0.002	0.001
Total Copper	0.0060	0.0032
Total Iron	3.3	1.3
Total Lead	0.015	0.005
Total Mercury	0.000069	0.000026
Total Molybdenum	0.220	0.073
Total Nickel	0.371	0.125
Total Selenium	0.002	0.001
Total Silver	0.0003	0.0001
Total Thallium	0.0024	0.0008
Total Uranium	0.041	0.015
Total Zinc	0.075	0.03

9.2 EROSION AND SEDIMENT CONTROL MONITORING

Erosion and sedimentation are monitored through various means. Monitoring for ditch stability and erosion-susceptible areas is carried out as a part of routine site inspections, pursuant to the *Care and Maintenance Plan*. The annual geotechnical inspection required under the water licence requires an engineer to inspect engineered facilities, including the TCAs and related infrastructure. Similarly, the *TSF OMS Manual* requires routine inspection of TCA facilities and requires a continuous site presence during certain times of the year (i.e. freshet) to carry out monitoring during snow melt and peak flows. Reporting and follow-up actions are associated with each monitoring aspect.

Remote cameras may also be installed to support surveillance during times when the Mine is unoccupied.

10.0 RESPONSE ACTIONS

10.1 WATER QUALITY

Should EQCs be exceeded, notification is required along with activation of the *Spill Contingency Plan* (SNP station 4-34) or the *Groundwater Pumping Contingency Plan* (SNP stations 4-27-9, 4-27-11, 4-27-12, TC11-7, TC11-11 4-28-1, 4-28-2) as applicable.

10.2 EROSION AND SEDIMENT

Should an erosion event occur that results in sediment release into a watercourse, the *Spill Contingency Plan* is activated.

Should an erosion event occur that results in damage to the TCAs and/or tailings release, the *Emergency Response Plan* is activated.

Should an erosion event occur elsewhere on site, remedial measures are implemented as soon as the work area is safe and under suitable weather conditions.

10.3 FLOOD RESPONSE

Should a flood event occur that jeopardizes Mine infrastructure or worker safety, the *Emergency Response Plan* is activated.

11.0 REPORTING AND DOCUMENTATION

Reporting occurs in accordance with the water licence and any direction issued by the Inspector or the Mackenzie Valley Land and Water Board.

Documentation such as inspection records are maintained both on site and at A&M's office in Vancouver. Documents are available to the Inspector upon request.

12.0 CONTRIBUTION TO CLOSURE

Data collected in association with this Plan informs development of remedial options, contributes to the permanent closure water balance, and supports development of a permanent closure plan and related monitoring program.

13.0 REFERENCES

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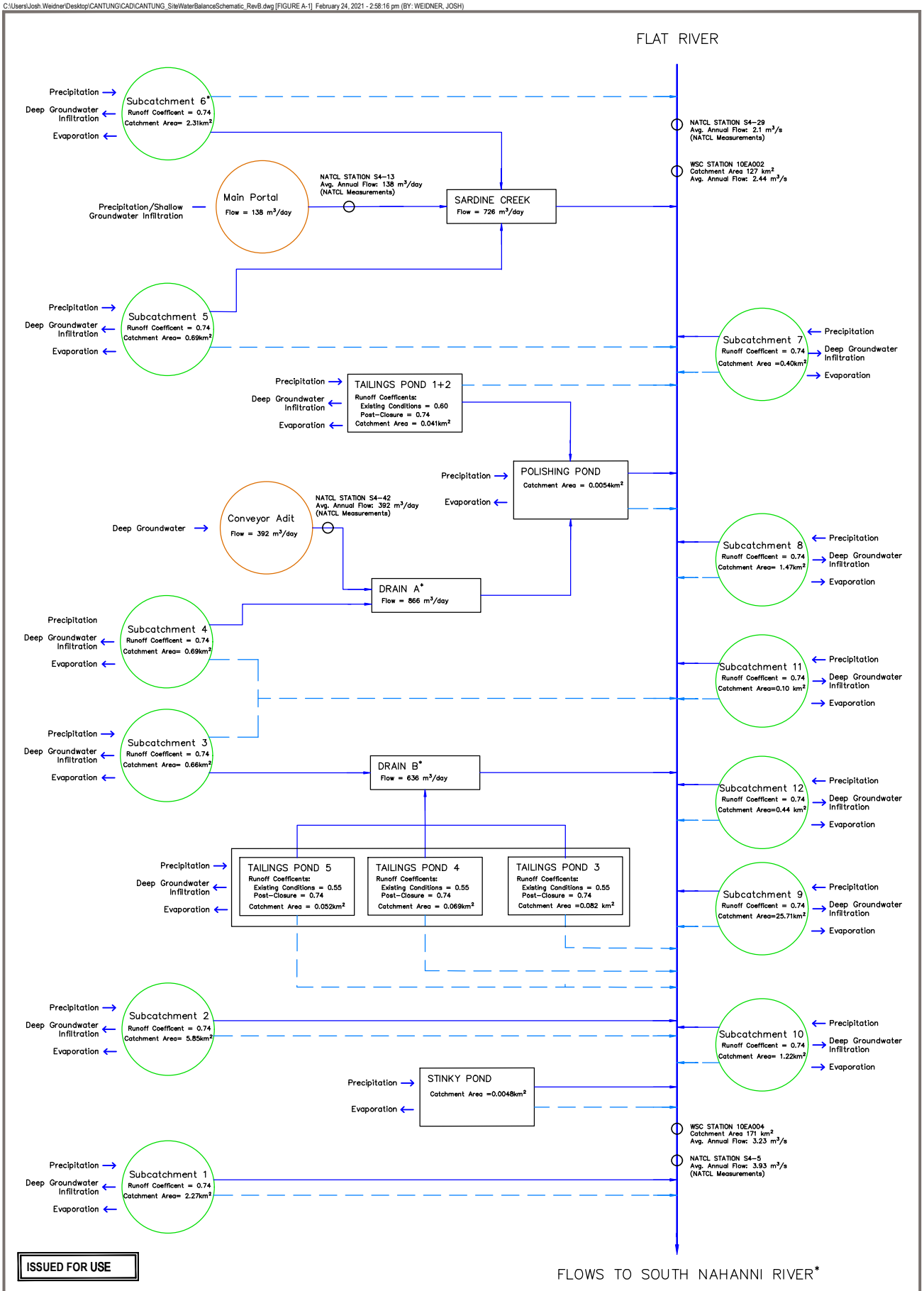
APPENDIX A

WATER BALANCE SCHEMATIC



LEGEND

Surface Water Flow

Shallow Groundwater Flow (Baseflow)

NOTES

1. Geographic locations for Subcatchment and their numbering system can be found in Figure 8-1.
2. The segments Drain A and Drain B are drainage channels which convey surface runoff through the mine site and into the Flat River.
3. South Nahanni River is 150 Km downstream from Cantung Mine Site

CLIENT

CANTUNG MINE

SITE WATER BALANCE SCHEMATIC

TETRA TECH

PROJECT NO.	DWN	CKD	REV
ENW.WENW03039-05	JAW	GC	B
OFFICE	DATE		
VANC	April 2021		

Figure A-1

APPENDIX B

WATER MONITORING PROGRAM (SNP)

SNP Station #	Location		Description
	Easting	Northing	
4-1	540034	6871361	Flat River at the Project freshwater intake, located in the Water Supply Facility.
4-5	542520	6869094	Flat River at bridge downstream of airstrip.
4-13	539835	6871035	Discharge from “E” Zone.
5-2	540523	6870986	Old Lagoon Outflow
4-20	541342	6870330	Drainage culvert from Stinky Pond.
4-27-9	540489	6871000	Monitoring downgradient of TCA 2
4-27-11	541216	6869956	TP5-07-MW01.
4-27-12	541357	6870091	TP3-07-MW01.
4-27-15	541600	6869880	Groundwater well southeast of airstrip.
4-27-17	539968	6871380	Groundwater well upstream of the Project.
4-27-18	540646	6870369	Groundwater monitoring well (MW13-01) up-gradient of the Project-
4-28-1	541224	6870386	Groundwater pumping well PW-1.
4-28-2	541118	6870491	Groundwater pumping well PW-2.
4-29	538180	6873871	Flat River, three (3) kilometres upstream of pumphouse.
4-33R	543488	6867875	Flat River, downstream station
4-34	-	-	Seepage down-gradient of the fuel berm.
4-36	541368	6870158	Any point between Tailings Containment Area 3 and the Flat River, where Seepage is visible.
4-37	-	-	Any point between Tailings Containment Area 4 and the Flat River, where Seepage is visible.
4-38	-	-	Any point between Tailings Containment Area 1 and the Flat River, where Seepage is visible.
4-39	-	-	Any point between Tailings Containment Area 2 and the Flat River, where Seepage is visible.
4-45	541000	6870605	Middle Bridge, upstream of Stinky Pond Discharge to Flat River.
TC11-7	540323	6871176	Groundwater monitoring well downgradient of TCA 1
TC11-11	540405	6871071	Groundwater monitoring well downgradient of TCA 2