



## Sahtu Land and Water Board

### Staff Information Report #6

<b>Applicant:</b> Crown-Indigenous and Northern Affairs Canada (CIRNAC) – Northwest Territories Region – Contaminants and Remediation Division (CARD)	
<b>Location:</b> Great Bear Lake Mine Sites, Sawmill Bay, Silver Bear Mines, El Bonanza/Bonanza Mines, Contact Lake Mines	<b>File Numbers:</b> S17L8-002
<b>Date Prepared:</b> June 22, 2023	<b>Date of Board Meeting:</b> November 7, 2023
<b>Subject/Project Name:</b> Great Bear Lake Sites – 2022 Annual Water Licence Information Report	

### 1.0 Purpose

The purpose of this Report is to present to the Sahtu Land and Water Board for information on the public review completed for the Great Bear Lake Sites 2022 Annual Water Licence Report required by licence S17L8-002.

### 2.0 Background

Licence	Report Received Date	Report Distributed (ORS)	Distribution List	Review Comments Due Date	Proponent Response Due Date	Public Review Comments (Y/N)
S17L8-002	April 6, 2023	April 25, 2023	SLWB – Deline District (JG)	May 18, 2023	May 30, 2023	Yes

### 3.0 Discussion

#### 3.1 Project Overview – S17L8-002 – Miscellaneous Water Licence – Great Bear Lake Sites

In accordance with the requirements of the Water Licence S17L8-002 (the Licence) Part B, Condition 15, and Schedule 1, DIAND (now CIRNAC)-CARD (Licensee) has submitted the 2022 Annual Water Licence Report. Although formal Board approval is not required under the Licence, the Board must be satisfied that the Licensee has met the requirements of the Licence.

The Licensee is entitled to use Water and deposit Waste to support future remediation and restoration activities at the Great Bear Lake Sites, including the Silver Bear Mines, Contact Lake Mine, El Bonanza, and the Sawmill Bay Site.

During the 2022 monitoring and reporting period the sites have remained in pre-remediation status. The project is intending to move into the remediation phase in 2025 following the development of the procurement plans in 2023/2024 Fiscal Year. Once the schedule is confirmed the information will be promptly provided to the Sahtu Land and Water Board.

Prior to beginning site remediation activities, the following plans will be prepared and submitted for Board approval:

- a) Sediment and Erosion Control Plan
- b) Land Farm Management Plan;
- c) Geochemical Verification Program;
- d) Construction Monitoring Plan;
- e) Post-Construction Monitoring Plan;
- f) Remedial Action Plan.

### **3.2 Summary of Major Activities Undertaken During The 2022 Reporting Period**

During the 2022 reporting period the sites remained in pre-remediation status and no site remediation occurred. The Licensee delivered a monitoring program in August 2022. Sahtu De, a Délı̨nę based contractor, provided shadow jobs and wildlife monitors from Délı̨nę to assist in the program.

The activities completed during the 2022 period are broken down below:

#### **August 6-8, 2022**

##### **Water Quality Monitoring**

- ☐ The 2022 Water Quality Monitoring Program was conducted per the GBL Sites Pre-Remediation Monitoring Plan.

### **3.3 Water Use and Waste**

- ☐ There was no fresh water obtained from any sources during the 2022 period.
- ☐ No PAG or Metal Leaching Waste Rock, Tailings, soils, or any other Mineral Materials were deposited or managed during the 2022 period.

- ☐ No sewage was discharged as no field camp was active during the 2022 period.
- ☐ No process water was generated during the 2022 period.

### **3.4 Remedial Activities**

There were no remedial activities or associated remedial field camp requiring the use of devices/meters.

### **3.5 2022 Engagement Activities**

The following engagement activities were conducted during the 2022 reporting period:

- ☐ **March 15, 2022** - Déljné Got'ine Government, CIRNAC, and CanNor meeting to discuss economic and capacity development opportunities, site visits, support to Déljné businesses, and economic benefits from the GBL Project.
- ☐ **April 8, 2022** - Tłjchq Government Project Update Meeting.
- ☐ **April 13, 2022** – GBL Operations Committee Meeting.
- ☐ **April 20, 2022** – GBL Operations Committee Meeting.
- ☐ **October 12, 2022** – GBL Operations Committee Meeting.
- ☐ **October 13, 2022** – Remediation Management Committee Meeting and Déljné Leadership Meeting.
- ☐ **November 8-9, 2022** – GBL Operations Committee Meeting.
- ☐ **November 17, 2022** – Meeting with Tłjchq to discuss Tłjchq Knowledge gathering opportunities.
- ☐ **December 11-12, 2022** – GBL Operations Committee Meeting.

### **3.6 Planned 2023 Engagement Activities**

- a. Community Update Meetings, Traditional Knowledge exercise, Canada-Déljné Operations Committee meetings, Canada-Déljné Remediation Management Committee meetings, community site tours, and training program related to the upcoming remediation work at the GBL project site.
- b. The Community Liaison Coordinator and/or Construction Manager position will continue to be funded in Déljné through a contribution agreement that assists in planning engagement meetings and communicating with community members about the project.
- c. Additional training opportunities will be provided during the 2023 period related to the Water Quality Monitoring Program, Hazmat abatement, the continued gap analysis/care and maintenance programs as well as the in preparation for the remediation implementation.
- d. Project updates will continue being provided to the Waste Sites Management Committee when they meet.

- e. Project updates will be provided to the Dól̓nə Got'ínə Government and the Tł̓chə Government according to the approved Engagement Plan.

## **4.0 Water Quality Monitoring**

The Pre-Remediation Monitoring Plan and the responsive monitoring stations were successfully implemented August 5-11, 2022.

All parameters at background stations met applicable Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life guidelines, except for fluoride in R-2 and R-3 which the licensee has attributed to regionally high concentrations of fluorine containing minerals.

### **4.1 Principal Findings**

#### **4.1.1 Terra Mine**

- ☐ Fluoride concentrations in T-8 (Ho Hum TCA (Tailings Containment Area)) were approximately 5x higher than Camsell River background levels, but within historical ranges. The Licensee suggests the high fluoride concentrations are likely due to mining and milling activities concentrating local mineralogical effects.
- ☐ Arsenic and copper concentrations in T-8 exceeded CWQG-PAL (Canadian Water Quality Guidelines for the Protection of Aquatic Life) guidelines but remained below the water licence EQC (Effluent Quality Criteria). The licensee has compared the findings from the 2021 and 2022 water quality data and indicated a consistent or slightly increased arsenic and copper concentrations at T-8.
- ☐ Total aluminum and iron in T-10 decreased in comparison to 2021 and were below the CWQG-PAL guidelines.
- ☐ Long-term water quality data (2002-2022) indicated that arsenic concentrations in the Ho-Hum TCA decreased over time. Total copper concentrations in the Ho-Hum TCA were generally stable or slightly increasing over time.
- ☐ Total arsenic and copper concentrations at T-10 were approximately 4X or and 1.5x lower than concentrations in 2021, respectively. Metal concentrations at T-10 met all applicable CWQG-PAL guidelines and were generally consistent with Camsell River background conditions downstream of the wetland area in Moose Bay.

#### **4.1.2 Northrim Mine**

- ☐ Similar to previous years, copper, and arsenic concentration at N0-7 in Hermandy Lake marginally exceeded the CWQG-PAL guidelines, due to the submerged tailings in Hermandy Lake TCA. Lead concentration decreased 10x in 2022 and met the CWQG-PAL guidelines.



- Similar to previous years, fluoride concentration at NO-6 was marginally above CWQG-PAL of 0.12 mg/L but were within the Silver Bear Mine regional background ranges (i.e., 0.15mg/L), and not related to contaminant impact. Fluoride concentration at NO-7 was marginally below CWQG-PAL.
- At NO-6, the discharge location of the Hermandy drainage to Camsell River (i.e., receiving environment), all metals were below CWQG-PAL guidelines, including arsenic and copper.
- Total arsenic, lead, and zinc concentrations in 2022 were slightly than those in 2021 at NO-6 and NO-7 and were still within their historical ranges.
- Water quality at NO-6 is consistent with Camsell River background ranges, indicating minimum or no impact from the Northrim mine area.

#### **4.1.3 Norex Mine**

- Water quality at NX-3 had lower conductivity, hardness, TDS (Total Dissolved Solids), and sulphate concentrations as compared to previous years.
- Fluoride concentrations in NX-3 and NX-12 were above the CWQG-PAL guidelines; at NX-12, fluoride concentrations were within its historical ranges and consistent with Camsell River background concentrations. At NX-12 fluoride concentrations were approximately 1.3x higher than reported in 2021 and in range with reported in 2017, 2018, and 2019.
- Total arsenic concentration at NX-3 reached 531 ug/L, which exceeded the CWQG-PAL and was approximately 10 to 20 times higher than concentrations reported in 2016 and 2019 and 1.2 times higher than reported in 2021.
- Total aluminum, and cadmium concentrations at NX-3 increased from 2021 and exceeded the CWQG-PAL guidelines.
- Cadmium and zinc concentrations at NX-3 decreased from 2021 and were below CWQG-PAL guidelines. It is likely that elevated concentrations in 2021 were due to enrichment of metal concentrations because of lower water volumes and potential sediment entrainment of metal, which was not applicable in 2022.
- Similar to 2018, 2019, 2020, and 2021, all PHC (Petroleum Hydrocarbon) and BTEX (Benzene, Toluene, Ethylbenzene, and Xylene) samples from NX-3 and NX-12 were below detection limits.

#### **4.1.4 Contact Lake**

- Similar to previous years fluoride concentrations in tailings pond (CL-3) exceeded the CWQG-PAL. Fluoride concentrations in CL-3 have continued to slowly decrease since 2016 and slightly increased in 2022.

- Similar to previous years, total arsenic, copper, and uranium concentrations in the tailings pond CL-3 were consistently above the CWQG-PAL guidelines and generally one to two orders of magnitude higher than Contact Lake background ranges.
- Similar to previous years, Tailings Pond CL-3 reported detectable Ra-226 concentrations, but within its historic range below CGDWQ guidelines.
- Metal concentrations in CL-26 were generally stable and consistent with the background conditions. All metal concentrations met the CWQG-PAL guidelines, which is consistent with previous sampling events.

#### 4.1.5 Smallwood Mine

- The 2022 dissolved zinc concentration at SM-1 and SM-2 was 25.5 µg/L and 44.5 µg/L, respectively, which was higher than the calculated guidelines of 16 µg/L. In 2022, total zinc concentrations slightly increased compared to 2021, but remained below 60 µg/L.
- **HISTORIC CONTEXT:** Total zinc concentrations in SM-1 were below 20 µg/L before 2009 and increased significantly to 82.7 µg/L during the 2017 sampling event. In 2018, 2020, and 2021, total zinc concentrations remained below 60 µg/L and no increasing trend was observed during this period. No samples were collected in Smallwood Lake in 2019.
- Total zinc concentrations in SM-6A and SM-6B (offshore in Smallwood Lake) were lower than samples collected closest to the waste pile (SM-1), but consistently higher than background conditions. Total zinc concentrations in SM-2 (nearshore) were marginally higher than that in SM-1.
- **HISTORICAL CONTEXT:** Total zinc concentrations at SM-6A, the surface sample at this location, were relatively stable between 2005 and 2009, but exhibited an increasing trend between 2016 and 2020, from 11 µg/L to 23.6 µg/L, and then decreased to 14.9 µg/L in 2021 and later increased to 49.8 µg/L in 2022.

## 5.0 Public Review

The Annual Report submitted by the Licensee was posted and distributed for review on the Online Review System (ORS) on April 25, 2023. The item for review received letters from reviewers indicating no comments. The following reviewers participated in the review of the Annual Report:




- Fisheries and Oceans Canada (DFO)
- Environment and Climate Change Canada (ECCC)
- Government of Northwest Territories – Environment and Natural Resources (ENR) – Environmental Assessment and Monitoring (EAM)

## 6.0 Conclusion and Recommendation

Based on the review of all evidence, the Licensee has met the requirements for the 2022 Annual Water Licence Report of Licence S17L8-002.

Board staff recommend that the Board:

- Receive the Great Bear Lakes Site 2022 Annual Water Licence Report for information, noting that the Board is satisfied the Licensee has met the requirements of the Licence.
- Endorse/Support the draft letter to be sent by Board staff to the Licensee indicating Board satisfaction with the 2022 Annual Water Licence Report.

Respectfully Submitted:	Reviewed by:	Approved By:
		
<b>Benjamin Roy</b> Regulatory Technician	<b>Bonnie Bergsma, M.Sc.</b> Regulatory Coordinator Specialist	<b>Paul Dixon</b> Executive Director

## 7.0 Attachments

- 7.1 Board Staff Letter Indicating Satisfaction
- 7.2 GNWT-ENR-EAM Comment Cover Letter
- 7.3 Review Comment Table
- 7.4 Map of SNP Stations
- 7.5 GBL 2022 Annual Water Licence Report



**Sahtu Land and Water Board**

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**November 8, 2023**

**File: S17L8-002**

Joel Gowman,  
Crown-Indigenous Relations and Affairs Canada  
Contaminants and Remediation Division  
Box 1500

Sent by email

Dear Joel Gowman,

**Crown Indigenous Relations and Affairs Canada – Contaminants and Remediation Division – 2022  
Annual Water Licence Report – Board Satisfaction Letter**

The Sahtu Land and Water Board (SLWB) met on November 7, 2023, to consider the 2022 Annual Water Licence Report submitted on March 31, 2023, in accordance with Part B, Condition 15 and Schedule 1 of Licence S17L8-002. Based on reviewer comments and Board staff review, the Board was satisfied that the Licensee has met the requirements of the Licence.

The ongoing cooperation of Crown-Indigenous Relations and Affairs Canada – Contaminants and Remediation Division is appreciated. If you have any questions or concerns, please contact Benjamin Roy at [broy@slwb.com](mailto:broy@slwb.com).

Respectfully,

*Benjamin Roy*

Benjamin Roy  
Regulatory Technician  
Sahtu Land and Water Board  
CC to:

Murray Somers – Crown Indigenous Relations and Affairs Canada – Contaminants and Remediation Division – Project Officer



May 18, 2023

Bonnie Bergsma  
Regulatory Coordinator  
Sahtu Land and Water Board  
Box 1  
Fort Good Hope, NT  
X0E 0H0

Dear Bonnie Bergsma,

**RE: (S17L8-002) Great Bear Lake Remediation Project - 2022 Annual Water Licence Report**

The Department of Environment and Climate Change (ECC), Government of the Northwest Territories has reviewed the application at reference based on its mandated responsibilities under the *Waters Act*. GNWT-ECC has no comments or recommendations for the consideration of the Sahtu Land and Water Board regarding this file.

Please contact [GNWT\\_EA@gov.nt.ca](mailto:GNWT_EA@gov.nt.ca) with any questions or concerns.

Sincerely,

Shakita Jensen  
Regulatory Analyst  
Department of Environment and Climate Change

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## Reviewer Comments and Proponent Responses

**Project: Great Bear Lake Remediation Project**  
**Board: Sahtu Land and Water Board**  
**Organization: CIRNAC-CARD (Yellowknife)**

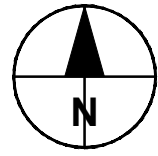
No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
Environment and Climate Change Canada (ECCC) - Anna Graham				
1		Environment and Climate Change Canada has reviewed the application and has no comments.	Environment and Climate Change Canada has reviewed the application and has no recommendations.	

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
Fisheries and Oceans Canada (DFO) - Nicholas Wasilik				
1	Great Bear Lake Sites - 2022 Annual Water Licence Report	Fisheries and Oceans Canada has reviewed the report and has no comments at this time.	Fisheries and Oceans Canada has no recommendations at this time.	

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response
GNWT-ENR - EAM (Environmental Assessment and Monitoring) - Environmental Regulatory Analyst				
1	GNWT-ECC No Comment Cover Letter	Please see attached.	N/A	



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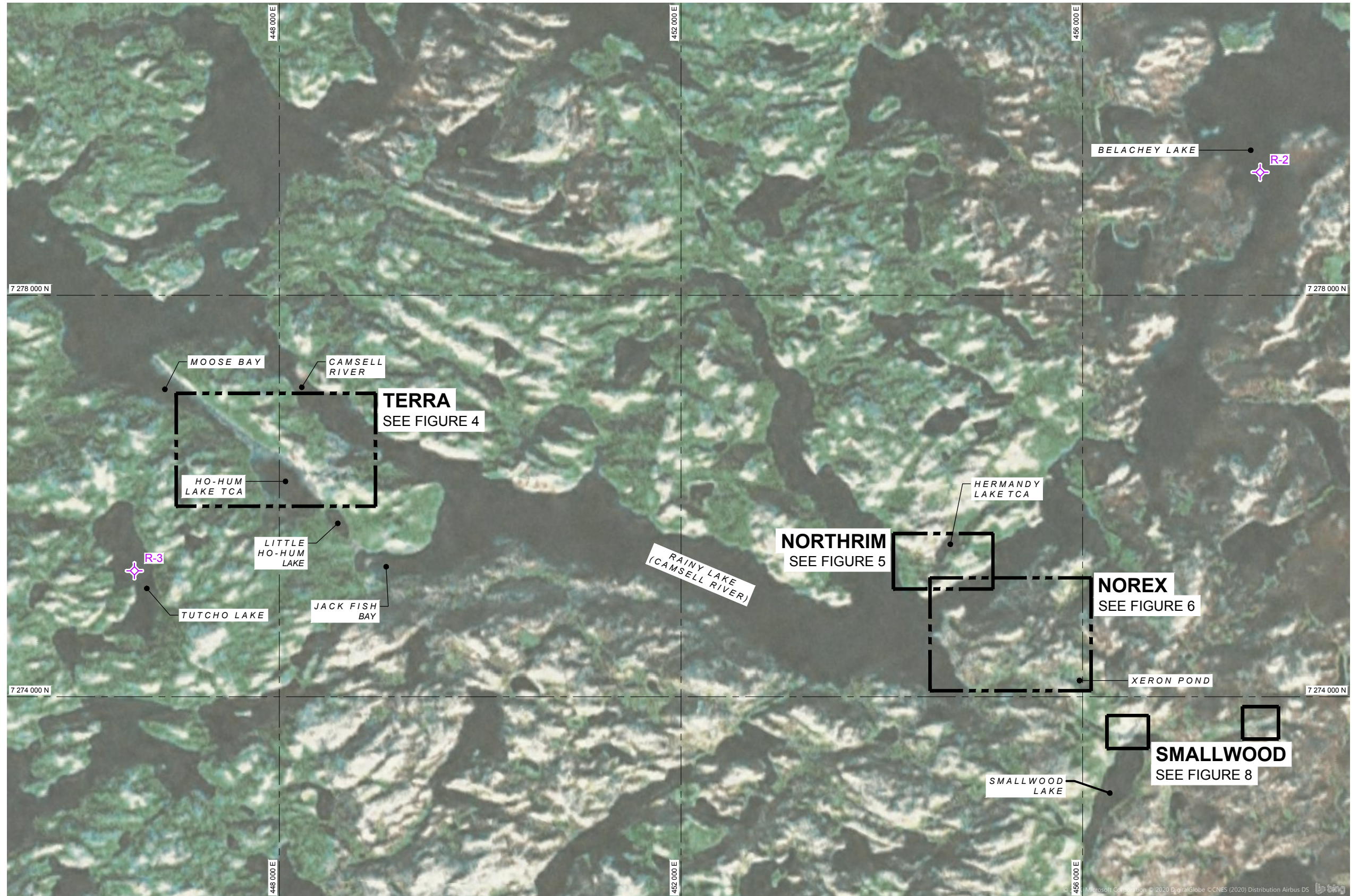
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 REFERENCE STATION

 FIGURE BOUNDARY



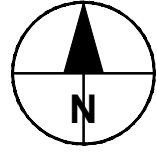
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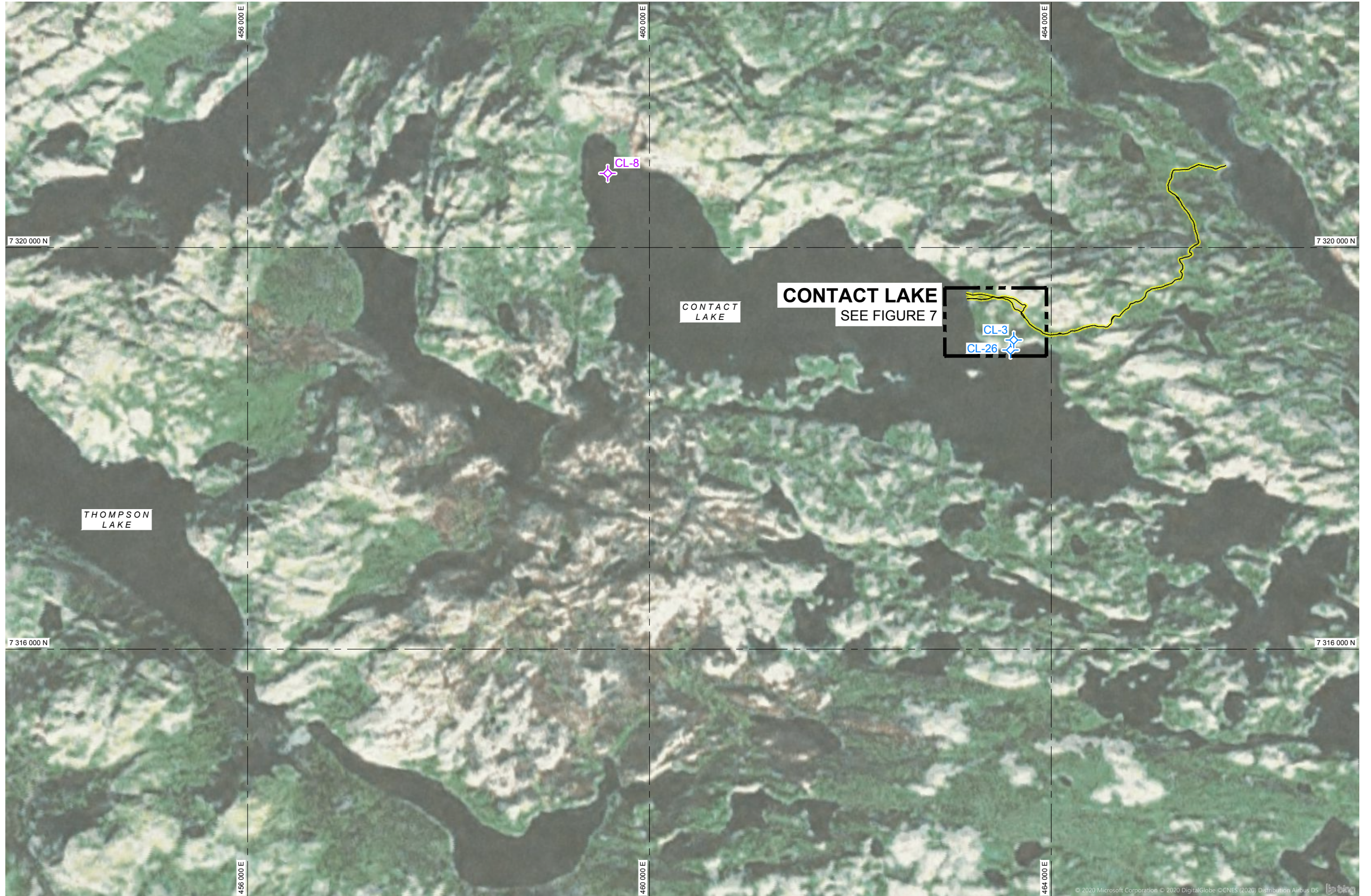
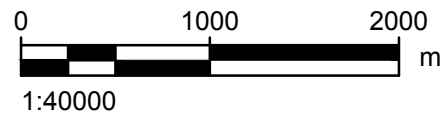


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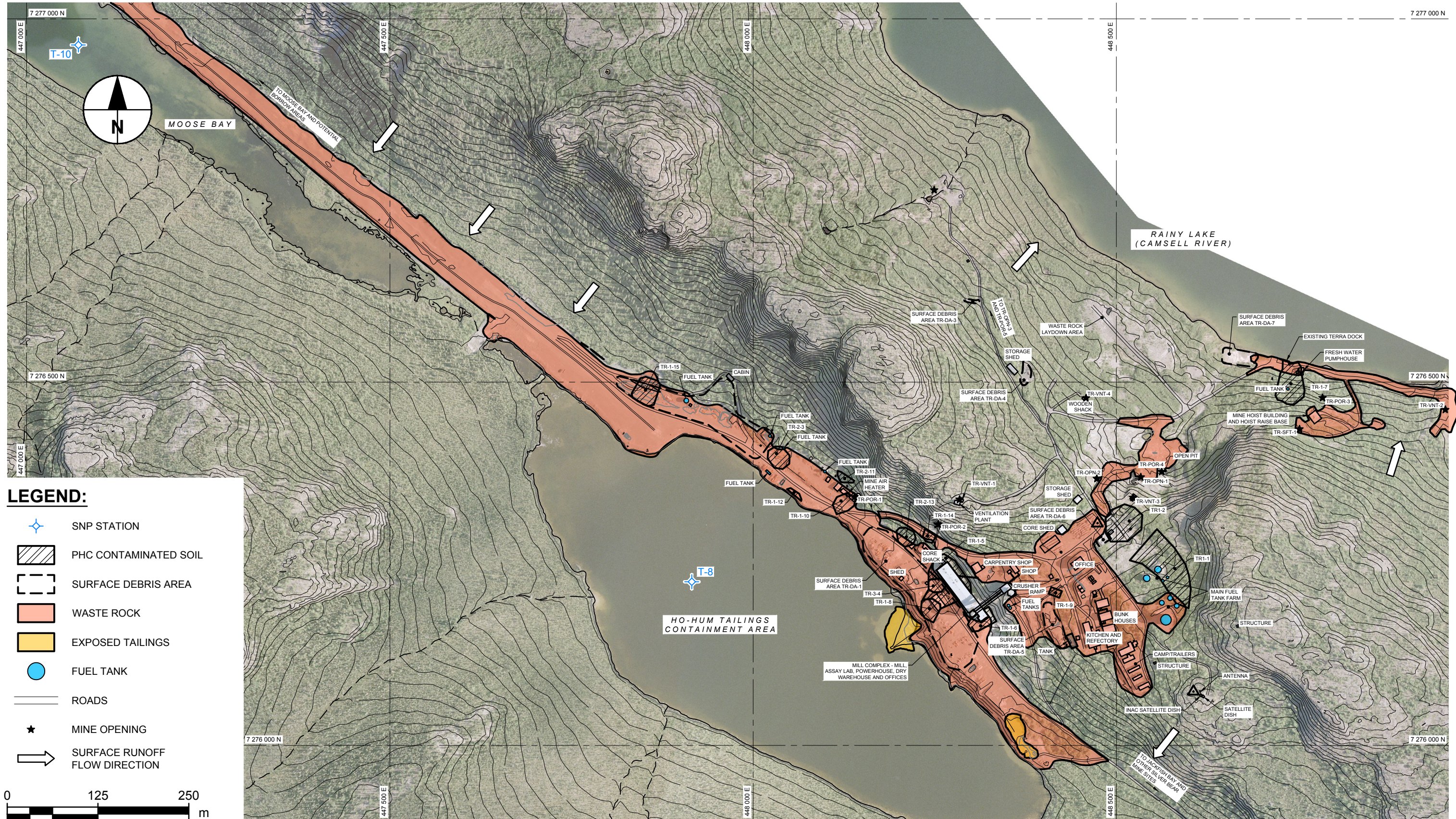
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-  REFERENCE STATION
-  FIGURE BOUNDARY
-  ROADS



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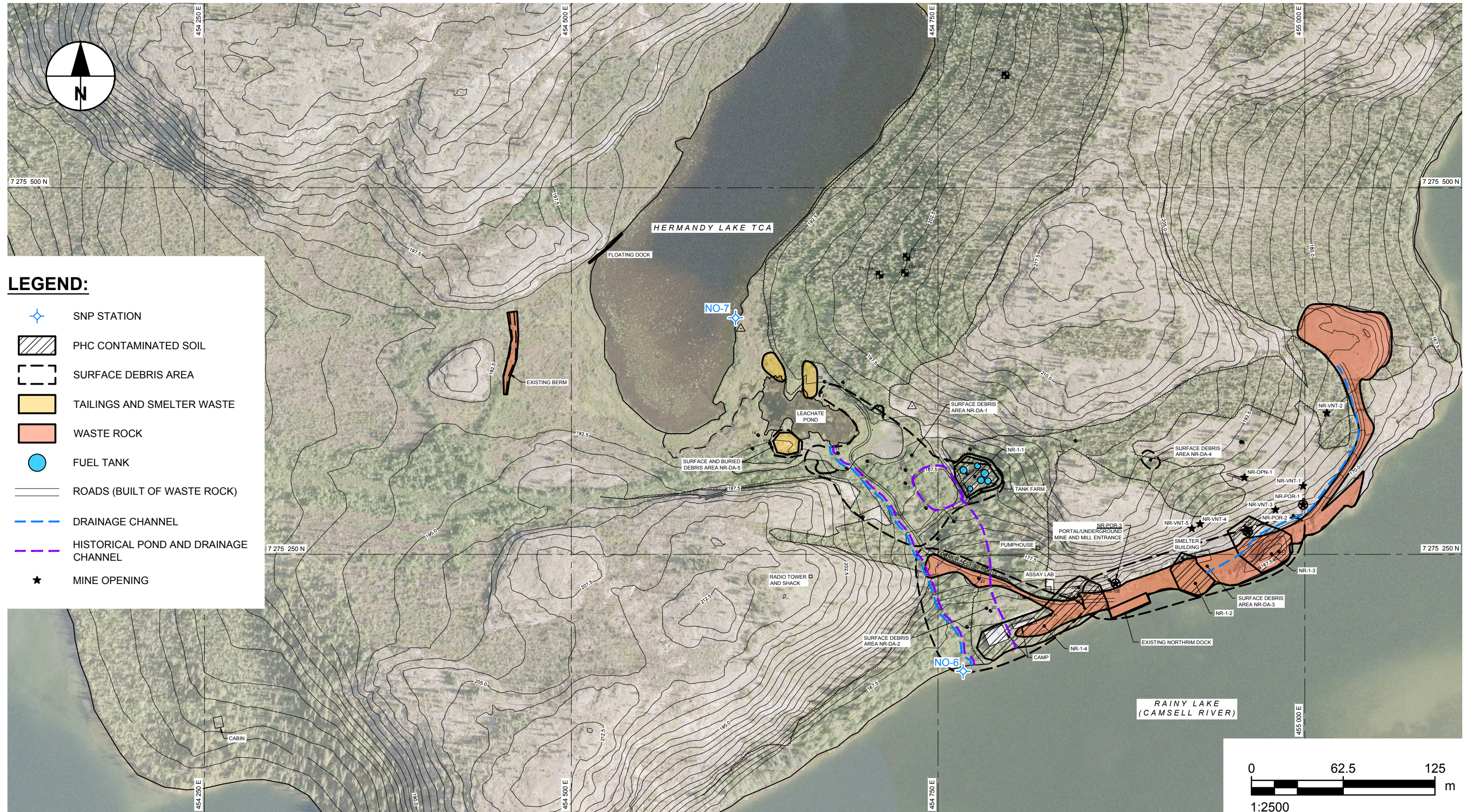
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- PHC CONTAMINATED SOIL
- SURFACE DEBRIS AREA
- WASTE ROCK
- EXPOSED TAILINGS
- FUEL TANK
- ROADS
- MINE OPENING
- SURFACE RUNOFF FLOW DIRECTION

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










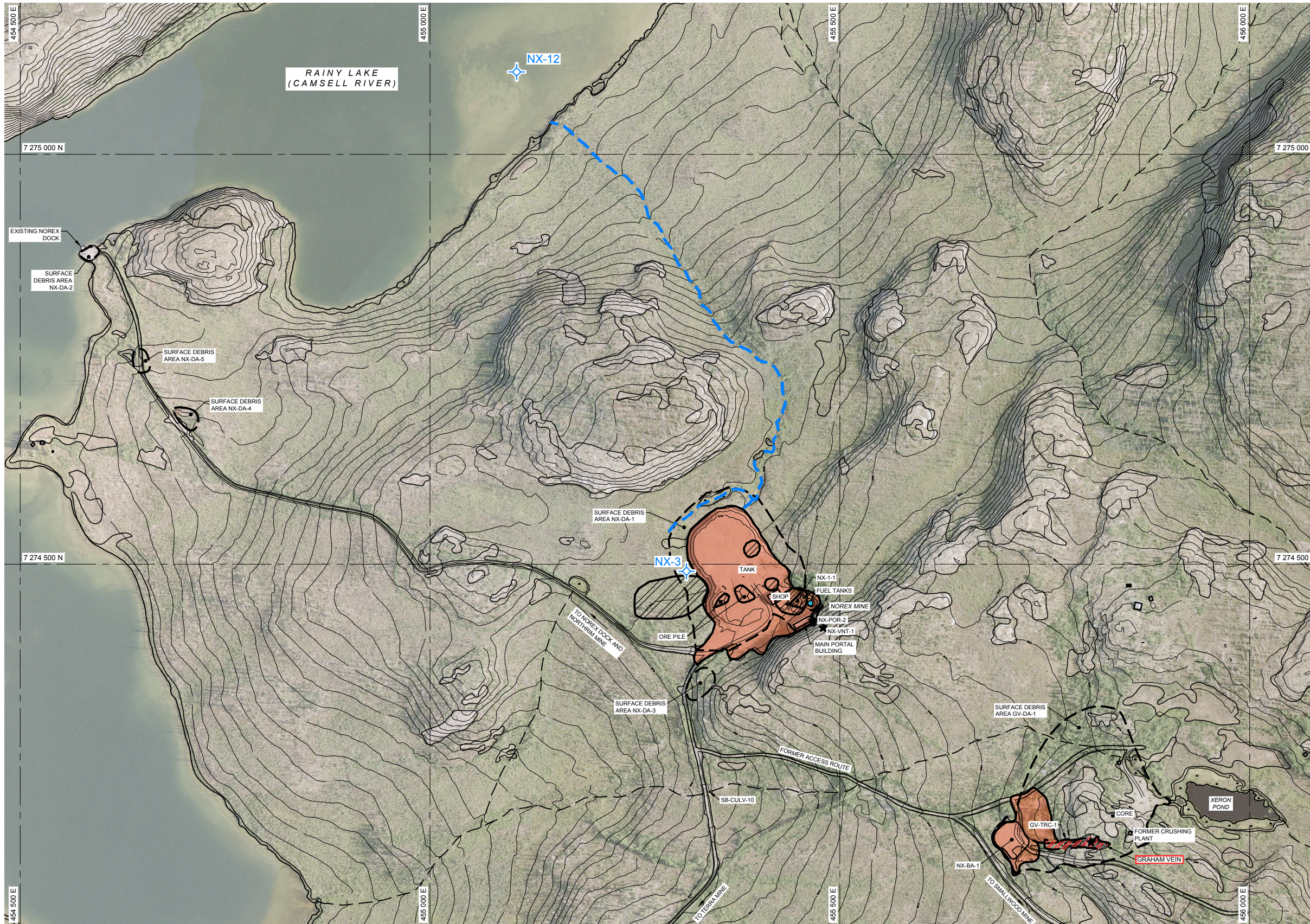
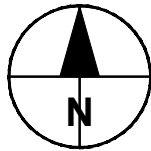
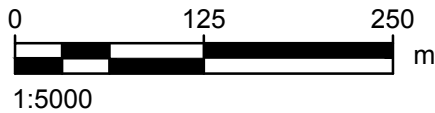
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**LEGEND:**

-  SNP STATION
-  PHC CONTAMINATED SOIL
-  SURFACE DEBRIS AREA
-  WASTE ROCK
-  ORE PILE
-  GRAHAM VEIN
-  FUEL TANK
-  ROADS
-  DRAINAGE CHANNEL
-  MINE OPENING

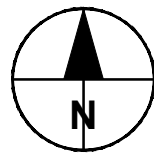
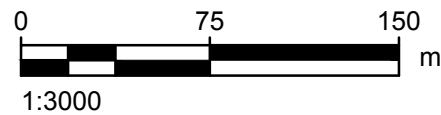


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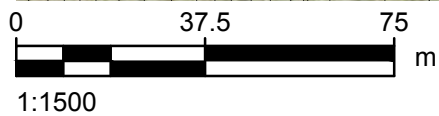
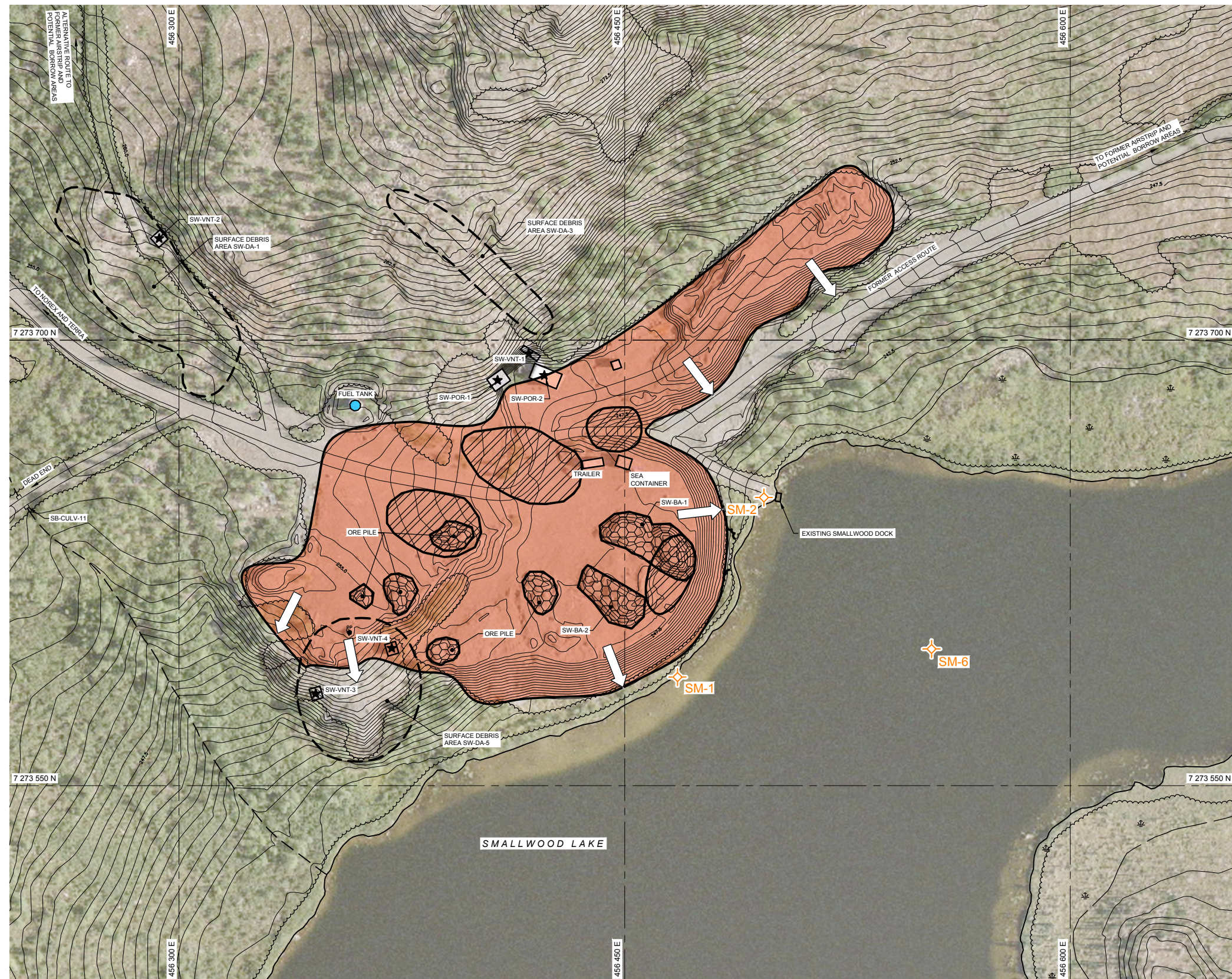
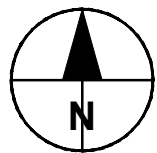
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- PHC CONTAMINATED SOIL
- SURFACE DEBRIS AREA
- WASTE ROCK
- TAILINGS
- ROADS
- DRAINAGE CHANNEL
- MINE OPENING
- SURFACE RUNOFF FLOW DIRECTION



Issue Status: FINAL

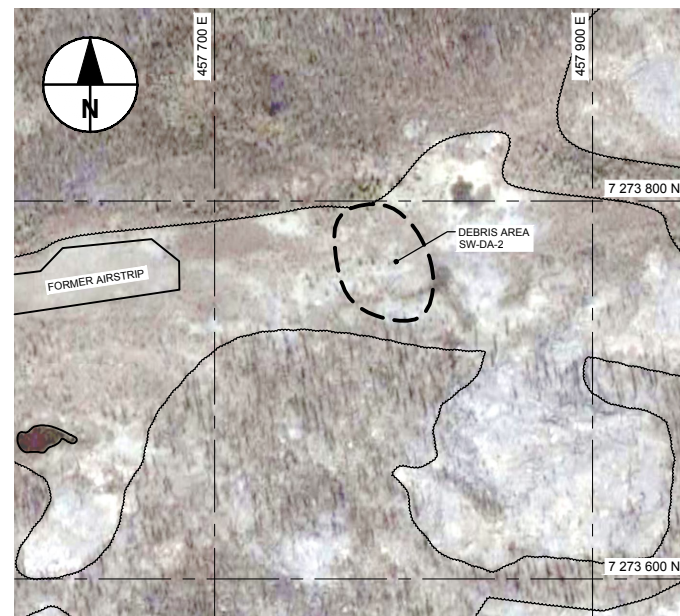


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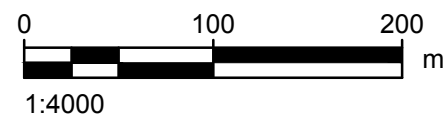


## LEGEND:

- WATER QUALITY MONITORING STATION
- PHC CONTAMINATED SOIL
- SURFACE DEBRIS AREA
- WASTE ROCK
- ORE PILE
- FUEL TANK
- ROADS
- MINE OPENING
- SURFACE RUNOFF FLOW DIRECTION



## SMALLWOOD FORMER AIRSTRIP DEBRIS AREA



Issue Status: FINAL





Contaminants and Remediation Division  
P.O. Box 1500  
Yellowknife, NT X1A 2R3

April 6, 2023

Ms. Bonnie Bergsma  
Regulatory Specialist  
Sahtu Land and Water Board  
P.O. Box 1  
Fort Good Hope, NT X0E 0H0

***Great Bear Lake Sites – 2022 Annual Water Licence Report (Licence #S17L8-002)***

**Prepared for: Sahtu Land and Water Board**

**Date: April 6, 2023**

Version	Submission Date	Revisions
1	April 6, 2023	

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) – Northwest Territories Region – Contaminants and Remediation Division (CARD) received a Water Licence renewal from the Sahtu Land and Water Board (SLWB) effective July 25, 2017 for the Great Bear Lake Sites (GBL Sites) Remediation Project. This Water Licence was subsequently amended on September 11, 2017 and again on October 30, 2017 to reflect minor administrative changes and carries Licence # S17L8-002. The Water Licence entitles the use of water and waste deposition in support of remediation and restoration activities at the Great Bear Lake Sites (GBL Sites), including the Silver Bear Mines, Contact Lake Mine, El Bonanza/Bonanza Mine and the Sawmill Bay site. Table 1 outlines the most current Water Licence details.

**Table 1: Licence Information**

Licensee	Crown Legal name of Crown-Indigenous Relations and Northern Affairs Canada – Contaminants and Remediation Division
Licensee Mailing Address	Box 1500, Yellowknife, NT X1A 2R3
Licence Number	S17L8-002 – Admin Amend
Licence Type	B
Location	Great Bear Lake Mine Sites: Sawmill Bay, Silver Bear Mines, El Bonanza/Bonanza Mines and Contact Lake Mine
Purpose	Water use and Waste Disposal to support remediation works



Effective Date of Licence	October 30, 2017
Expiry Date of Licence	July 24, 2024

In accordance with the requirements of the Water Licence, CIRNAC-CARD has produced the following 2022 Annual Water Licence Report. This report follows the format as presented in the updated Water Licence S17L8-002 Schedule 1, Part B: General Conditions, in which requirements of the Annual Water Licence Report are outlined. Where necessary, additional information has been added which may be of interest to the SLWB.

It is important to note that the Water Licence was issued in support of upcoming remediation activities at the project sites. **However, during the 2022 period the sites remained in pre-remediation status and no site remediation occurred.** A monitoring program was delivered in August, 2022. Sahtu De, a Délı̨nę based contractor, provided job shadows and wildlife monitors out of Délı̨nę to assist in the program.

The following tasks were completed during this visit:

### **August 6-8, 2022**

#### **Water Quality Monitoring**

- The 2022 Water Quality Monitoring Program that was conducted as per the *GBL Sites Pre-Remediation Monitoring Plan (PRMP)*, dated June 28, 2018, which was approved by the SLWB. Requirements of the PRMP were outlined within the renewed Project Water Licence S17L8-002 ("Admin Amend" version dated October 30, 2017)
  - Associated report is appended



## **Schedule 1 Part B: General Conditions**

1. The **Annual Water Licence Report** referred to in Part B, Item 15 shall include, but not be limited to the following information:

a) *A summary of the calibration and status of meters and devices referred to in Part B, Item 14 of this Licence;*

Water Licence Part B, Item 14 states "The Licensee shall install, operate, and maintain meters, devices or other such methods used for measuring the volumes of Water and Waste discharged to the satisfaction of an Inspector".

There were no remedial activities or associated remedial field camp requiring the use of devices/meters.

b) *The monthly and annual quantities in cubic metres of fresh water obtained from all sources;*

There was no fresh water obtained from any sources during the 2022 period.

c) *A summary of engagement activities conducted in accordance with the approved **Engagement Plan**, in Part B of this Licence, undertaken during the previous calendar year and shall include a brief description of activities planned for the forthcoming year;*

The following engagement activities were conducted during the 2022 period:

- March 15, 2022 - Délı̨nę Got'ı̨ne Government, CIRNAC, and CanNor meeting to discuss economic and capacity development opportunities, site visits, support to Délı̨nę businesses, and economic benefits from the GBL Project.
- April 8, 2022 – Tłı̨chǫ Government Project Update Meeting
- April 13, 2022 - GBL Operations Committee Meeting
- April 20, 2022 - GBL Operations Committee Meeting
- October 12, 2022 - GBL Operations Committee Meeting
- October 13, 2022 - Remediation Management Committee Meeting and Délı̨nę Leadership Meeting
- November 8-9, 2022 - GBL Operations Committee Meeting
- November 17, 2022 – Meeting with Tłı̨chǫ to discuss Tłı̨chǫ Knowledge gathering opportunities
- December 11-12, 2022 – GBL Operations Committee Meeting

Engagement will continue in 2023 and is currently anticipated to include the following:

- Community Update Meetings, Traditional Knowledge exercises, Canada-Délı̨nę Operations Committee meetings, Canada-Délı̨nę Remediation Management Committee





meetings, community site tours, and training program related to the upcoming remediation work at the GBL project site.

- The Community Liaison Coordinator and/or Construction manager position will continue to be funded in Dél̓ı̄n̓ę through a contribution agreement that assists in planning engagement meetings and communicating with community members about the project.
- Additional training opportunities will be provided during the 2023 period related to the Water Quality Monitoring Program, Hazmat abatement, the continued gap analysis/care and maintenance programs as well as in preparation for the remediation implementation.
- Project updates will continue being provided to the Waste Sites Management Committee when they meet.
- Project updates will be provided to the Dél̓ı̄n̓ę Got̓ı̄n̓ę Government and the Tłı̄ch̓ų Government according to the approved Engagement Plan.

d) A summary of **Construction** activities conducted in accordance with Part F of this Licence, undertaken during the previous calendar year;

No construction activities were conducted during the 2022 period.

e) An updated schedule of activities for the undertaking;

The project is intending to move into remediation phase in 2025 following the development of the procurement plans in the 2023/2024 Fiscal Year. Once the schedule is confirmed, this information will be promptly provided to the SLWB.

f) A summary of **Modification** activities and major maintenance work conducted in accordance with Part E of this Licence, undertaken during the previous calendar year;

No modification activities or major maintenance work was conducted during the 2022 period.

g) A summary of activities conducted in accordance with the approved **Waste Management Plan**, required in Part D, Item 3 of this Licence, undertaken during the previous calendar year, including:

- i. A summary of updates or changes to the process or facilities required for the management of Waste;

No updates or changes were required to waste management processes or facilities.

ii. The monthly and annual quantities in cubic metres of non-hazardous and hazardous



*Waste(s) generated and managed during Remediation Activities;*

The project is in the pre-remediation phase and no remediation activities were conducted.

*iii. The monthly and annual quantities in cubic metres of all Waste deposited, identified by location;*

No waste was deposited during the 2022 period.

*iv. Monthly and annual quantities in cubic metres of all liquid Waste deposited, identified by location;*

No liquid waste was deposited as no field camp was active during the 2022 period.

*v. Monthly and annual quantities and geochemical characteristics of all PAG and Metal Leaching Waste Rock, Tailings, soils and any other Mineral Materials deposited/managed, identified by location;*

No PAG or Metal Leaching Waste Rock, Tailings, soils or any other Mineral Materials were deposited or managed during the 2022 period.

*vi. The estimated monthly and annual quantities in cubic meters of Sewage deposited into the Sewage Disposal Facilities;*

No sewage was deposited as no field camp was active during the 2022 period.

*vii. Monthly and annual quantities in cubic metres of Sewage Discharged from the Sewage Disposal Facilities, identified by disposal location;*

No sewage was discharged as no field camp was active during the 2022 period.

*viii. Monthly and annual quantities in cubic metres of Wastewater Discharged from the Process Water Treatment Facilities, identified by disposal location; and*

In the absence of active remediation, no process water was generated during the 2022 period.

*ix. Any other item as directed by the Board.*



No further requests have been received.

- h) A summary of activities conducted in accordance with the approved **Sediment and Erosion Control Plan**, as required in Part D, Item 5 of this Licence, including;*
- i. A description of any erosion susceptible areas encountered, and a summary of activities undertaken to prevent or mitigate erosion;*
  - ii. A report of the performance of erosion mitigations applied in previous years, if applicable; and*
  - iii. Any other item as directed by the Board.*

As indicated in the Water Licence, the Sediment and Erosion Control Plan is not required to be submitted to the SLWB until “60 days prior to the commencement of Remediation activities”. Consequently, this Plan has not yet been developed and this requirement does not yet apply. However, there were no areas of increased erosion or changing ground conditions noted during the 2022 field programs. Similarly, no previous erosion mitigations have been applied which would require performance monitoring.

- i) A summary of activities conducted in accordance with the approved **Landfarm Management Plan**, required in Part D, Item 7 of this Licence, undertaken during the previous calendar year, including:*
- i. A summary of updates or changes to the process or facilities required for the treatment of PHC contaminated soil and rock;*
  - ii. The monthly and annual quantities in cubic metres of PHC contaminated soil and rock placed in the Landfarms;*
  - iii. The monthly and annual quantities in cubic metres of PHC contaminated Groundwater and free-phase product removed and a description of how this material was managed; and*
  - iv. Any other item as directed by the Board.*

As indicated in the Water Licence, the Landfarm Management Plan is not required to be submitted to the SLWB until “60 days prior to Landfarm Construction”. These facilities have not been constructed, the Landfarm Management Plan not yet developed, and there were no soil treatment activities during the 2022 period.

- j) A summary of activities conducted in accordance with the approved **Sediment and Erosion Control Plan**, as required in Part D, Item 5 of this Licence, including;*
- i. A description of any erosion susceptible areas encountered, and a summary of activities undertaken to prevent or mitigate erosion;*
  - ii. A report of the performance of erosion mitigations applied in previous years, if applicable; and*
  - iii. Any other item as directed by the Board.*

This requirement is a duplicate of Schedule 1, Part B, Item h. As discussed above, this requirement is not yet applicable.



- k) *A summary of activities conducted in accordance with the approved **Spill Contingency Plan** required in Part G of this Licence, undertaken during the previous calendar year, including:*
- i. *A list of all Unauthorized Discharges that occurred during the previous calendar year, including the date, NWT spill number, volume, location, summary of the circumstances and follow-up actions taken and status (i.e. open or closed), in accordance with the reporting requirements in Part G of this Licence; and*

No Unauthorized Discharges occurred during the 2022 period.

- ii. *An outline of any spill training and communication exercises carried out during the previous calendar year.*

No spill training was conducted in 2022 as there were not site activities beyond a Water Quality Monitoring Program.

- l) *A summary of all results in accordance with the approved **Geochemical Verification Program**, referred to under Part D, Item 8 and Schedule 2, Item 3 of this Licence;*

As indicated in the Water Licence, the Geochemical Verification Program is required to be submitted to the SLWB “90 days prior to the commencement of Remediation”. Consequently, this Plan has not yet been developed and this requirement does not yet apply. There were no geochemical verification activities implemented in the 2022 period.

- m) *A summary of all results in accordance with the approved **Pre-Construction Monitoring Plan**, referred to under Part D, Item 12 of this Licence;*

It is noted that Part D, Item 12 of the Water Licence refers to the Post-Construction Monitoring Plan, and the Pre-Construction/Remediation Monitoring Plan is instead referenced in Part D, Item 9. It is assumed that this request is in reference to the Pre-Construction (or Remediation) Monitoring Plan.

The GBL Sites Pre-Remediation Monitoring Plan was submitted to the SLWB on June 29, 2018. On July 3, 2018 CIRNAC was provided notification that the SLWB approved the Pre-Remediation Monitoring Plan.

The Pre-Remediation Monitoring Plan includes prescribed sampling stations/parameters, as well as provision for “Responsive Monitoring” to address any concerns or questions from previous monitoring events. On August 5, 2022 the SLWB was notified of the stations to be included as part of the 2022 monitoring activities, including the responsive monitoring stations.



Additional/Responsive sampling stations included:

GBL Site	Station	Location	Analyses	Rationale
Smallwood Mine	SM-1	Smallwood Lake - shoreline adjacent to waste rock	General Chemistry, Total Metals, Dissolved Metals, and PHCs	Baseline and remedial design support
	SM-2	Smallwood Lake - shoreline by the dock	General Chemistry, Total Metals, Dissolved Metals, and PHCs	Baseline and remedial design support
	SM-6 A&B	Smallwood Lake - downgradient of waste rock	General Chemistry, Total Metals, Dissolved Metals, and PHCs	Baseline and remedial design support

In 2022, responsive monitoring included sampling three previously established stations within Smallwood Lake at the Smallwood Mine. This was conducted to confirm 2017 and 2018 results of cadmium and zinc, which were higher than documented in earlier sampling events

The Pre-Remediation Monitoring Plan, with the responsive monitoring stations, was successfully implemented August 5 to 11, 2022. The associated Great Bear Lake Sites 2022 Water Quality Monitoring Report is provided as Appendix C of this report. The principal findings are as follows:

- All parameters at background stations met applicable Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-PAL) guidelines, except for fluoride in R-2 and R-3, which is attributed to regionally high concentrations of fluorine containing minerals. Relevant for ongoing evaluation of fluoride concentrations at Silver Bear Mine sites.

At Terra Mine

- Fluoride concentrations in T-8 (Ho Hum TCA) were approximately 5x higher than Camsell River background levels, but within historical ranges. High fluoride concentrations are likely due to mining and milling activities concentrating local mineralogical effects
- Arsenic and copper concentrations in T-8 exceeded CWQG-PAL guidelines, but remained below the water licence EQC. The comparison between 2021 and 2022 water quality data indicated consistent or slightly increased arsenic and copper concentrations at T-8.
- Total aluminum and iron in T-10 decreased in comparison to 2021 and were below the CWQG-PAL guidelines.
- Long-term water quality data (2002-2022) indicated that arsenic concentrations in the Ho-Hum Tailings Containment Area (TCA) decreased over time. Total copper concentrations in Ho-Hum TCA were generally stable or slightly increasing over time
- Total arsenic and copper concentrations at T-10 were approximately 4x or and 1.5x lower than concentrations in 2021, respectively. Metal concentrations at T-10 met all applicable CWQG-PAL guidelines and were generally consistent with Camsell River background conditions downstream of the wetland area in Moose Bay.

At Northrim Mine

- Similar to previous years, copper and arsenic concentration at NO-7 in Hermandy





Lake marginally exceeded the CWQG-PAL guidelines, due to the submerged tailings in Hermandy Lake TCA. Lead concentration decreased 10x in 2022 and met the CWQG-PAL guidelines.

- Similar to previous years, fluoride concentration at NO-6 was marginally above CWQG-PAL of 0.12 mg/L but were within the Silver Bear Mine regional background ranges (i.e., 0.15 mg/L), and not related to contaminant impact. Fluoride concentration at NO-7 was marginally below CWQG-PAL.
- At NO-6, the discharge location of the Hermandy drainage to Camsell River (i.e., receiving environment), all metals were below CWQG-PAL guidelines, including arsenic and copper.
- Total arsenic, lead, and zinc concentrations in 2022 were slightly than those in 2021 at NO-6 and NO-7, and were still within their historical ranges.
- Water quality at NO-6 is consistent with Camsell River background ranges, indicating minimum or no impact from the Northrim mine area.

#### At Norex Mine

- Water quality at NX-3 had lower conductivity, hardness, TDS, and sulphate concentrations as compared to previous years.
- Fluoride concentrations in NX-3 and NX-12 were above the CWQG-PAL guidelines; at NX-12, fluoride concentration was within its historical ranges and consistent with Camsell River background concentrations. At NX-12. Fluoride concentration was approximately 1.3x higher than reported in 2021 and in range with reported in 2017, 2018, and 2019.
- Total arsenic concentration at NX-3 reached 531 µg/L, which exceeded the CWQG-PAL and was approximately 10 to 20 times higher than concentrations reported in 2016 and 2019 and 1.2 times higher than reported in 2021.
- Total aluminum, and cadmium concentrations at NX-3 increased from 2021, and exceeded the CWQG-PAL guidelines.
- Cadmium and zinc concentrations at NX-3 decreased from 2021 and were below CWQG-PAL guidelines. It is likely that elevated concentrations in 2021 were due to enrichment of metal concentrations because of lower water volumes and potential sediment entrainment of metal, which was not applicable in 2022.
- Similar to 2018, 2019, 2020, and 2021, all PHC and BTEX samples from NX-3 and NX-12 were below detection limits.

#### At Contact Lake

- Similar to previous years, fluoride concentrations in tailings pond (CL-3) exceeded the CWQG-PAL. Fluoride concentrations in CL-3 have continued to slowly decrease since 2016 and slightly increased in 2022.
- Similar to previous years, total arsenic, copper and uranium concentrations in the tailings pond CL-3 were consistently above the CWQG-PAL guidelines and generally one to two orders of magnitude higher than Contact Lake background ranges.
- Similar to previous years, Tailings pond CL-3 reported detectable Ra-226 concentrations, but within its historic range and below CGDWQ guidelines.
- Metal concentrations in CL-26 were generally stable and consistent with the background conditions. All metal concentrations met the CWQG-PAL guidelines, which is consistent with previous sampling events.



#### At Smallwood Mine

- The 2022 dissolved zinc concentration at SM-1 and SM-2 was 25.5 µg/L and 44.5 µg/L, respectively, which was higher than the calculated guidelines of 16 µg/L. In 2022, total zinc concentrations slightly increased compared to 2021, but remained below 60 µg/L.

HISTORIC CONTEXT: Total zinc concentrations in SM-1 were below 20 µg/L before 2009 and increased significantly to 82.7 µg/L during the 2017 sampling event. In 2018, 2020, and 2021, total zinc concentrations remained below 60 µg/L and no increasing trend was observed during this period. No samples were collected in Smallwood Lake in 2019.

- Total zinc concentrations in SM-6A and SM-6B (offshore in Smallwood Lake) were lower than samples collected closest to the waste pile (SM-1), but consistently higher than background conditions. Total zinc concentrations in SM-2 (nearshore) were marginally higher than that in SM-1.

HISTORICAL CONTEXT: Total zinc concentrations at SM-6A, the surface sample at this location, were relatively stable between 2005 and 2009, but exhibited an increasing trend between 2016 and 2020, from 11 µg/L to 23.6 µg/L, and then decreased to 14.9 µg/L in 2021 and later increased to 49.8 µg/L in 2022.

The Pre-Remediation Monitoring Plan employed the quality assurance and quality control procedures outlined in the revised Great Bear Lake Sites – Quality Assurance and Quality Control Plan (V2 dated April 30, 2018). The plan was first submitted on August 11, 2017 and was provided with interim approval. Following SLWB distribution and review, the plan was revised and resubmitted on April 30, 2018. The SLWB provided notification to CIRNAC on May 30, 2018 that the revised plan was approved.

*n) A summary of all monitoring results and any Action Level exceedances in accordance with the approved **Construction Monitoring Plan**, referred to under Part D, Item 11 and Schedule 2, Item 4 of this Licence;*

As indicated in the Water Licence, the Construction Monitoring Plan is required to be submitted to the SLWB Board “90 days prior to the commencement of Remediation”. The site is currently in pre-remediation (i.e. there were no construction activities) and this plan has not yet been developed.

*o) A summary of all monitoring results and Action Level exceedances in accordance with the approved **Post-Construction Monitoring Plan**, referred to under Part D, Item 13 and Schedule 2, Item 6 of this Licence;*

As indicated in the Water Licence, the Post-Construction Monitoring Plan is required to be submitted to the SLWB “90 days prior to demobilization”. The site is currently in pre-remediation (i.e. there were no post-construction activities) and this plan has not yet been developed.



- q) *A summary of activities conducted in accordance with the approved **Remedial Action Plans** undertaken during the previous calendar year, including;*
- i. *A summary of all Remediation and reclamation activities carried out at each site during the previous calendar year, as they relate to Water Use and Waste Disposal including progress made to develop the schedule for Phase II implementation,*
  - ii. *A summary of updates or changes to the process or facilities required for the management of Waste Rock and Tailings;*
  - iii. *The monthly and annual quantities in cubic metres of excavated Tailings for placement into Landfills and any excavation contingency measures implemented;*
  - iv. *The monthly and annual quantities in cubic metres of PAG Waste Rock excavated and deposited into trenches or adits;*
  - v. *The monthly and annual quantities in cubic metres of soil and rock placed below Waste Rock Covers, placed above Waste Rock Covers, and used elsewhere on site;*
  - vi. *Any geochemical inspection reports, as appendices to the Annual Water Licence Report;*
  - viii. *A camp set-up schematic;*
  - viii. *An outline of anticipated activities for the next year; and*
  - ix. *Any other item as directed by the Board.*

The GBL Sites are currently in pre-remediation and no activities related to the Remedial Action Plans were implemented during the 2022 period.

- r) *Any other details on Water Use or Waste disposal requested by the Board by November 30 of the year being reported;*

CIRNAC is not aware of any other information requests from the Board.

- s) *Tabular summaries of all data and information generated under the Surveillance Network Program and graphical summaries of parameters with effluent quality criteria referred to in Part D, and the points of compliance (SNP Stations-001 (1), (2), (3), S17L8-002 (14I), (7A) and 7 (B), in excel or an electronic and printed format acceptable to the Board. The Licensee shall provide raw data in electronic form to the Board.*

The sampling requirements of the SNP were successfully implemented during the 2022 field program. SNP sampling was integrated with the larger pre-remediation water quality monitoring program. Results from both programs are included in the 2022 Water Quality Monitoring Report provided in Appendix A of this water licence report. The 2022 Water Quality Monitoring report includes multi-year graphical summaries of applicable results, description of monitoring approach/methodologies, quality assurance and quality control (QA/QC) procedures/findings, field measurements/photographs and recommendations.

Appendix B of the 2022 Water Quality Monitoring Report includes tabular summaries of all 2022 SNP monitoring data. As part of this submission, the SLWB will also be provided with an Excel file of all 2022 SNP data.





## 2022 SNP Sampling and Data

Currently in pre-remediation, many of the stations listed in the SNP are not yet active. This includes stations associated with discrete remedial activities (e.g. soil treatment areas, process water generation) and the operation of a remediation camp. For clarity, each of the SNP stations within Water Licence S17L8-002 is discussed below, including sampling rationale and results where applicable.

### SNP Station S15L8-001 (1)

- Water Licence Description: Treated Sewage effluent prior to Discharge
- Water Licence Location: Camp Operations
- 2022 Sampling Rationale: Not sampled. Remediation camp and sewage treatment facility not yet constructed.

### SNP Station S15L8-001 (2)

- Water Licence Description: Treated grey water prior to disposal
- Water Licence Location: Camp Operations
- 2022 Sampling Rationale: Not sampled. Remediation camp and grey water treatment facility not yet constructed.

### SNP Station S15L8-001 (3 a, b, c, d....)

- Water Licence Description: Treated Process Water prior to disposal
- Water Licence Location: Camp Operations
- 2022 Sampling Rationale: Not sampled. No remediation activities conducted or process water generated.

### SNP Station S15L8-001 (4)

- Water Licence Description: Camsell River Intake
- Water Licence Location: Camp Operations
- 2022 Sampling Rationale: Not sampled; Water Licence requires quantity measurement only.

### SNP Station S15L8-001 (5)

- Water Licence Description: Great Bear Lake Intake
- Water Licence Location: Camp Operations
- 2022 Sampling Rationale: Not sampled. Water Licence requires quantity measurement only. No water use from Great Bear Lake in 2021.

### SNP Station S17L8-002 (6)

- Water Licence Description: Contact Lake Intake
- Water Licence Location: Camp Operations
- 2022 Sampling Rationale: Not sampled. Water Licence requires quantity measurement only. No water use from Contact Lake in 2021.

### SNP Station S17L8-002 (7A)

- Water Licence Description: Ho Hum Tailings Containment Area (TCA) – Corresponding with station T-8



- Water Licence Location: Silver Bear – Terra Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B of the 2022 Water Quality Monitoring Report, Tables B1 to B5. Multiple depth station with duplicate at surface. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: Table B1 provides parameters as specified in the Water Licence with the EQC as indicated in Part D, Item 25. All sample results are below the EQC. Sample results are a maximum of 5% of the respective EQCs. Given the order of magnitude difference between the sample results and the EQCs, graphical summaries are not beneficial.

SNP Station S17L8-002 (7B)

- Water Licence Description: Moose Bay – Corresponding with station T-10
- Water Licence Location: Silver Bear – Terra Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B, Table B1, of the 2022 Water Quality Monitoring Report. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: Table B1 of the 2022 Water Quality Monitoring Report provides parameters as specified in the Water Licence with the EQC as indicated in Part D, Item 25. All sample results are below the EQC values. Sample results are a maximum of 5% of the respective EQCs. Given the order of magnitude difference between the sample results and the EQCs, graphical summaries are not beneficial.

SNP Station S17L8-002 (8C)

- Water Licence Description: Hermandy Lake – Corresponding with station NO-6
- Water Licence Location: Silver Bear – Northrim Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B, Table B1, of the 2022 Water Quality Monitoring Report. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (9D)

- Water Licence Description: Camsell River – Corresponding with station NO-7
- Water Licence Location: Silver Bear – Northrim Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B, Table B1, of the 2022 Water Quality Monitoring Report. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (10E)

- Water Licence Description: Norex Waste Rock – Corresponding with station Norex-3 (also known as NX-3)
- Water Licence Location: Silver Bear – Norex Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B, Table B1, of the 2022 Water Quality Monitoring Report. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.



SNP Station S17L8-002 (11F)

- Water Licence Description: Camsell River – Corresponding with station NX-12
- Water Licence Location: Silver Bear – Norex Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B, Table B1, of the 2022 Water Quality Monitoring Report. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (12G)

- Water Licence Description: Tailings Pond – Corresponding with established station CL-3
- Water Licence Location: Contact Lake Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B, Table B1, of the 2022 Water Quality Monitoring Report. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (13H)

- Water Licence Description: Contact Lake – Corresponding with established station CL-26
- Water Licence Location: Contact Lake Mine
- 2022 Sampling Rationale: Sampled once in 2022 (August) and SNP data provided in Appendix B, Table B1, of the 2022 Water Quality Monitoring Report. Complete dataset provided in Appendix D – 2022 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (14I)

- Water Licence Description: Landfarm Discharge Water
- Water Licence Location: Landfarm at Silver Bear Mines, Sawmill Bay and El Bonanza/Bonanza
- 2022 Sampling Rationale: Not sampled. Landfarms not yet constructed.

## 2022 SNP Actions

All 2022 sampling results were below respective EQCs and no response actions were required.

*t) A map depicting all the SNP Stations with GPS locations;*

Maps depicting the location of all SNP stations sampled during the 2022 season are provided in Appendix A of the 2022 Water Quality Monitoring Report. These figures include station coordinates for future reference.

It is noted that stations which are not yet active (landfarm monitoring, process water, sewage treatment discharge, etc.) are not included in the figures. The exact coordinates will be



determined during the start of active remediation and incorporated in future figures.

*u) A summary of actions taken to address concerns, non-conformances or deficiencies in any report filed by an Inspector.*

CIRNAC was not provided with an Inspection Report or any associated non-conformances/concerns.

If you have any questions or require additional information, please do not hesitate to contact myself (867-669-2423, Joel.Gowman@rcaanc-cirnac.gc.ca) or Murray Somers (867-445-2824), murray.somers@rcaanc-cirnac.gc.ca).

Thank you,

Joel Gowman  
Project Manager, CIRNAC-CARD

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