2AM-LUP2032
LUPIN MINE SITE
2022 ANNUAL REPORT

Prepared for:

Nunavut Water Board

Crown-Indigenous Relations and Northern Affairs Canada

Prepared by:

Frazer Bourchier, President & CEO Mandalay Resources

Mandalay Resources Corporation is 100% owner of Lupin Mines Inc. which in turn owns 100% owner of Lupin Gold Mine.

EXECUTIVE SUMMARY

The Lupin Mine entered into temporary Care and Maintenance Phase in late June 2022 resulting in mini mal on-site activities. The Lupin Mine camp was operational from April 9, 2022 to July 29, 2022. During this period, care and maintenance, and closure activities included the following:

- camp opening and closing, utilizing freshwater, and deposit of sewage to the Sewage Lakes Disposal Facility, and incineration of general camp wastes;
- minor repairs to buildings and equipment and mobile equipment
- annual geotechnical inspection of engineered facilities including the Tailings Containment Area (TCA);
- Dam Safety Review (DSR) of the TCA;
- a portion of the approved waste rock was collected and placed according to design;
- construction of the temporary fuel storage berm commenced;
- drilling and blasting at the crown pillar;
- collecting and analyzing water quality samples collected during the post-freshet period (June 2022);
- routine pH monitoring at 13 stations in the TCA;
- minor repairs to internal dams at the TCA;
- completion of the 1.0 m cover surface on previously exposed Cell N tailings;
- in-situ water treatment and water transfer from Cell N to Pond 1, water transfer from Pond 1 to Pond 2.

The following activities did not occur:

- no reclamation work undertaken on the underground, borrow and quarry areas, landfill, site roads, water management facilities, or explosives magazine;
- no mobilization or demobilization of equipment was undertaken.

EXECUTIVE SUMMARY INUKTITUT

2022 ᐅᑭᐅᒧᑦ ᑐᓴᖅᓯᑕᐅᑦ ᐊᖏᓚᐅᖅᑐᒧᔪᓄᑦ ᓯᕕᑭᓇᖅᓯᒪᔪᑦ

ᐃᓕᓇ ᓗᐱᓕ ᐅᓴᕋᓯᐅᖅᕕᐅᖅ ᐊᑐᓕᒃᐃᓇᖅᑕᖏᑦ ᒥᐊᓂᓱᐅᓂᖏᑦ ᐊᒻᒪ ᐊᑭᑭᐅᒪᓂᖏᑦ ᐱᓕᓱᓂᖏᑦ ᐊᑦᑕᖅᑎᑦᓗᒍ ᔨᓂ 2022 ᐱᑦᔨᑕᐅᔨᓗᓂ ᒥᑭᓂᖅᓴᓄᑦ ᓴᓇᕕᖅᒥ ᐱᓕᓱᓂᙵᑦ. ;ᑕᑦᓇ ᓗᐱᓕ ᐅᓴᕋᓯᐅᖅᕕᐅᖅ ᓴᓇᕕᖅᖏᑦ ᐊᐅᓪᓚᖅᑐᖅ ᑕᑦᓂᖅᖏᑦ ᐊᐃᐱᓗ 9, 2022 ᑎᑭᑦᓗᒍ ᓄᓪᓚᕕᑦ 29, 2022. ᐊᑐᖅᑎᑦᓗᒍ ᐅᓇ ᐱᓕᓱᕕᖅᖏᑦ, ᒥᐊᓂᓱᐅᓂᖏᑦ ᐊᒻᒪ ᐊᑭᑭᐅᒪᓂᖏᑦ, ᐊᒻᒪ ᐅᒥᐅᑕᐅᓂᖏᑦ ᐱᓕᓱᐊᑦ ᐃᓕᖅᑐᑦᑕᑦ ᑕᒪᔪᓂᖏᑦ:

- ᓴᓇᕕᖅ ᐊᖏᒪᖅᓂᖏᑦ ᐊᒻᒪ ᐅᒥᐅᓂᖏᑦ, ᐊᑐᖅᓂᖏᑦ ᐃᒥᑎᐅᔨᖏᓇᖅᑐᖅ ᐃᒪᖅ, ᐊᒻᒪ ᔪᕕᑦᑕᖅᓂᖅᓯᑦ ᖃᔪᖅᑕᐃᑦ ᖃᔪᖅᑕᖅᓄᑦ ᑕᓯᑦ ᔪᕕᑦᑕᖅᕕᖏᓚᓄᑦ ᐱᓕᓱᑦᔨᕐᑎᓄᑦ, ᐊᒻᒪ ᐃᔪᐊᓪᑕᓂᓐᓂᖅᓯᑦ ᑕᒪᐃᑕ ᓴᓇᕕᖅᒥ ᐊᐅᑕᔪᓂ
- ᒥᑭᔨᑦ ᓴᓇᓴᖅᓴᑦ ᐃᒡᓗᖅᐸᐅᓄᑦ ᐊᒻᒪ ᓴᓇᓪᑕᑎᑦ ᐊᒻᒪ ᐃᖅᑲᓪᓚᖅᑐᑦ ᓴᓇᓪᑕᑎᑦ
- ᐅᑭᐅᒧᑦ ᓄᓇᓕᖏᑎᑦ ᖃᐅᔨᓴᖅᓂᑦ ᖃᐅᔨᓪᓚᔨᐅᔨᑦ ᐱᓕᓱᑦᔨᕐᑎᖅᑲᑦ ᐃᓕᐅᑎᑦᓗᑦ ᑕᒪᓇ ᐅᓴᖅᑕᖅᓂᔪᑦ ᔪᐊᒪᖅᑕᐅᓕᕆᔨᖅ (TCA);
- ᓴᐳᑦ ᔪᐅᕋᓇᐃᑦᓂᖏᑦ ᓇᓗᓇᐃᖅᑐᖅᓂᖏᑦ (DSR) ᑕᒪᓇ ᐅᓴᖅᑕᖅᓂᔪᑦ ᔪᐊᒪᖅᑕᐃᓕᓚᖏᑦ;
- ᐃᓕᖏᑦ ᐊᖏᑭᖅᑕᐅᔪᒪᔨᖅ ᐊᖅᑕᔪᑦ ᐅᓴᖅᑦ ᑲᑎᑕᐅᔪᒪᔨᑦ ᐊᒻᒪ ᐃᓕᓚᐅᖅᓂᖏᑭᑦ ᒪᓕᖅᓱᑎᑦ ᐱᓇᑦᔨᔪᖅᓴᖏᑦᓗ;
- ᐱᓇᓴᐅᓂᖏᑦ ᐊᑐᖅᑕᐃᓇᖅᑐᑦ ᐅᖅᔪᖅᔨᐊᑦ ᑐᑦᔩᒪᓚᖏᑦ ᐊᓂᓪᓗᖏᑦ ᐱᑎᐊᖅᑐᑦ;
- ᐃᓚᖏᑦ ᐊᖏᑭᖅᑕᐅᔪᒪᔨᖅ ᐊᖅᑕᔪᑦ ᐅᓴᖅᑦ ᑲᑎᑕᐅᔪᒪᔨᑦ ᐊᒻᒪ ᐃᓕᓴᐅᖅᓂᖅᓯᑦ ᒪᓕᓴᓱᑎᑦ ᐱᓇᑦᔨᔪᖅᓴᖏᑦᓗ;
- ᐃᔪᑕᖅᓂᑦ ᐊᒻᒪ ᖃᖅᑕᖅᓂᑦ ᐱᖅᑐᓂᓂᑦ ᖃᐅᔨᓴᖅᓂᖏᑦ
- ᑲᑎᑎᖅᓂᑦ ᐊᒻᒪ ᖃᐅᔨᓴᖅᓂᖅᓯᑦ ᐃᓗᓕᐸ ᐊᑲᐅᓂᖏᑦ ᓇᓗᓇᐃᖅᑐᑎᑦ ᑲᑎᑎᖅᓂᑦᓗ ᐊᑐᖅᑎᑦᓗᒍ ᐱᐅᓂᖏᓇᖅᑐᑦᓗᒍ ᐊᐅᖅᑐᓕᓂᖅᑐᑦᓗᒍ ᐱᓇᑦᔨᔪᖅᓴᖏᑦᓗ (ᔨᓂ 2022);
- ᐊᑐᐃᐅᕙᓂᖏᑦ ᐃᓗᓕᐸ ᖃᓄᓇᑦᓂᖏᑦ (Ph) ᒥᐊᓂᓇᓂᖏᑦ ᑕᖅᕙᓂ 13 ᐱᓕᓱᓇᖏᓕᓂ ᑕᖅᕙᓂ ᐅᓴᖅᑕᖅᓂᔪᑦ ᔪᐊᒪᖅᑕᐅᓕᕆᔨᖅ (TCA);
- ᒥᑭᔨᑦ ᓴᓇᓴᖅᓴᑦ ᐃᓗᐊᓂ ᓴᐳᑎᑦ ᑕᖅᕙᓂ ᐅᓴᖅᑕᖅᓂᔪᑦ ᔪᐊᒪᖅᑕᐅᓕᕆᔨᖅ (TCA);
- ᐱᐊᓂᑎᖅᓂᖏᑦ ᑕᒪᓇ 1.0 ᑭᑕᑦ ᖃᓕᖅᑐᖅᓂᖏᑦ ᖃᖏᑦ ᔪᐅᐊᓂ ᓴᑦᕈᖅᓂᖏᑦ ᔪᕕᑦᑕᖅᓇᖏᑦ N ᐅᓴᖅᑕᖅᓂᔪᑦ;
- ᑕᐃᒪᑦᑕᐅᖅ ᐃᒪᖅ ᓴᓗᒪᖅᓴᖅᓂᖏᑦ ᐊᒻᒪ ᐃᒪᖅ ᓄᑎᖅᓂᖏᑦ ᑕᒡᓂᖏᑦ ᔪᕕᑦᑕᖅᓇᖏᑦ N ᑕᒡᐅᖏᑦ ᑕᔪᕐᖅ 1, ᐃᒪᖅᓄᑎᖅᓂᖏᑦ ᑕᒡᓂᖏᑦ ᑕᔪᕐᖅ 1 ᑕᒡᐅᖏᑦ ᑕᔪᕐᖅ 2.

ᑕᒪᔪᐊᑦ ᐱᓕᓱᐊᑦ ᐊᑐᖅᑭᑦᑐᑦ:

- ᓴᓗᒪᖅᓴᓕᐅᖅᑭᑦᑐᑦ ᓴᓇᓂᖅᑭ ᐱᓕᓱᓴᐅᓂᑦ ᓄᓇᐸ ᐃᓗᐊᓂ, ᐃᓗᑦᑐᖅᓄᖅᓯᒪᔪᑦ ᐊᒻᒪ ᑐᐊᐸᓕᐊᖅᑕᖅᓇᖅᑐᑦ ᐃᓂᓂ, ᐃᒪᖅ ᐊᐅᓪᓚᕕᐅᓂᖅᑐᖅ ᐱᓕᓱᓂᖅᑐᑦ, ᐅᓂᓗᓄᑦ ᖃᖅᑕᖅᓄᖅ, ᓴᓇᓪᓚᕕᖅᖏᑦ ᐊᐅᓪᓚᕕᐅᓂᖅᑐᖅ ᐱᓕᓱᓂᖅᑐᑦ, ᐅᓂᓗᓄᑦ ᖃᖅᑕᖅᓄᖅ;
- ᓄᑎᑦᓂᖏᑦᑐᑦ ᐅᓂᓗᓄᑦ ᐊᑐᑭᑕᖅᐸᓕᐊᓂᖏᑦ ᓴᓇᓪᑕᑎᑦ ᐱᓕᓱᓂᖅᑐᑦ ᐱᓕᓱᐊᑦᑐᑦ.

EXECUTIVE SUMMARY INNUINAQTUN

2022 Ukiumut Tuhaqhitaut Ataniuyunut Nainaqhimayuq

Tamna Lupin Uyarakhiuqvik atuliqta atullaknia Munaqtaunia Ihuaqhihimanialu Pityuhia atpaqtitlugu Juni 2022 pityutaupluni hulluangitni huliniit havakvikmi. Tamna Lupin Uyarakhiuqvik hiniktaqvik aulatauyuq talvanga Aipuru 9, 2022 tikitlugu Julai 29, 2022. Atuqtitlugu una pivigiya, munaqtaunia ihuaqhihimanialu, umiknianutlu huliniit ilalgit tahapkuninga:

- Hiniktaqvik angmaqnia umiknialu, atuqnia imigaulaq imaq, kuviraqni quqtait talvunga Anait Tahiit Kuvittaqvit Havaguta, ikualattinilu tamaitnut hiniktaqvikmi iqakut;
- Mikiyut hanayauni igluqpait hanalrutitlu ingilralatlu hanalrutit
- Ukiumut nunaliqutit qauyihaqni qauyimayiuyut havagutai ilalgit tamna Uyaraktaqnikut Kuviraqvia Hiamaktailivia (TCA);
- Haputauyuq Hivuranaitnia Naunaiyaqnia (DSR) tamna TCA-nga;
- Ilagiya tamna angiqtauhimayuq iqakut uyaqat katitauyut iliyauplutiklu malikhugu hanatyuhikha;
- Hanayaunia atullaktukhaq uqhukhat tutqumavia avallua pigiaqtuq;
- Ikuutaqni qagaqtaqnilu qaliriya puqtuyaqnit;
- Katitiqni qauyihaqnilu immap nakuuni naunaiyagat katitauyut atqutitlugu auktuliqaqtitlugu pivigiya (Juni 2022);
- Atuqpaknia immap qanuritnia (pH) munarinia talvani 13 hanavit taphuma TCA-nga;
- Mikiyut hanayauni iluani haputauyut talvani TCA-nga;
- Iniqtiqnia tamna 1.0 miitat qaliriya qangani hivuani hakyaiqtuq Kuviraqvia N uyaraktaqnikut;
- havakviani imaq halumaqhauta imaqlu nuktiqnia Kuviraqviani N talvunga Tahiraq 1, imaq nuktiqnia talvanga Tahiraq 1 talvunga Tahiraq 2.

Tahapkuat huliniit atungittut:

- piittuq halumaqtiqnia havat piyuayut nunap iluani, iluttuqtiqnini tuapaktaqvinilu inait, nunami iqakuqvik, havakviup apqutai, imaq aulatauni havagutai, uvaluniit qagaqtautiqaqvik;
- nuktiringittut uvaluniit ituptiringittut hanalrutinik havagaungittut.

Contents

ABBREVIATIONS

BOD	Biological Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene and total Xylenes
CDSG	Canadian Dam Safety Guidelines
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada
DEOR	Deputy Engineer of Record
DMS	Discovery Mining Services
DSI	Dam Safety Inspection
DSR	Dam Safety Review
EOR	Engineer of Record
FCRP	Final Closure and Reclamation Plan
JDS	JDS Energy & Mining Inc.
LMI	Lupin Mines Incorporated
NWB	Nunavut Water Board
NWNSRTA	Nunavut Waters and Nunavut Surface Rights Tribunal Act
SLR	SLR Consulting (Canada) Ltd.
TCA	Tailings Containment Area
TFF	Temporary Fuel Farm
TKN	Total Kjeldahl Nitrogen
TPDS	Third-Party Drum Storage
WSP	William Sale Partnership Ltd.

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Comment
1	2024/04/30	All	All	Resubmission - This report has been prepared in cooperation with Discovery Mining Services (DMS), Stantec, WSP Canada Inc., and JDS Mining & Energy Services (JDS) for Mandalay Resources Inc. on behalf of Lupin Mines Inc.

Approved By: 

Frazer Bourchier,
President & CEO, Mandalay Resources.

INTRODUCTION

The Lupin Mine is located approximately 285 km southeast of Kugluktuk in the Kitikmeot Region of Nunavut and is owned by Lupin Mines Incorporated (LMI), a wholly owned, indirect subsidiary of Mandalay Resources Corporation. The mine site is situated on the western shore of Contwoyto Lake, approximately 60 km south of the Arctic Circle. It is an underground gold mine that was in operation from 1982 to 2005 with temporary suspensions of activities between January 1998 and April 2000, and again between August 2003 and March 2004. The mine resumed production in March 2004 until February 2005 when the Site was placed into Care and Maintenance, and no active mining has taken place since.

On October 20, 2017, Mandalay Resources Corporation, through its wholly owned, independent subsidiary Lupin Mines Incorporated (LMI), announced that the Lupin Mine will transition from care and maintenance to full closure and reclamation, beginning in 2018 through to 2020. An application for renewal and amendment of the current water licence (Application), as well as a Final Closure and Reclamation Plan (FCRP) was submitted to the Nunavut Water Board on July 27, 2018 which underwent an extensive review process and culminated in the issuance of amended Type A Water Licence 2AM-LUP2032 on February 29, 2020 by the Nunavut Water Board (NWB) and approval by the Minister of Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) on April 9, 2020. LMI continued active preparatory work and initiated year one of the active closure phase in Q1 of 2020. In late June 2022, LMI entered into Care and Maintenance with limited on-site closure activities occurring in 2022.

Under Part B, Item 2 of the Licence 2AM-LUP2032, an Annual Report is required to be submitted to the NWB prior to March 31 of the year following the calendar year being reported and prepared in accordance with Schedule B of the Licence.

The following sections provide the information as required under Schedule B of Water Licence No. 2AM-LUP2032.

SCHEDULE B REPORTING

Item 1 (a): Monthly and annual quantities of water pumped from Contwoyto Lake at Station LUP-01 and other sources.

The Lupin Mine camp opened on April 9, 2022 and closed on July 29, 2022.. Pumping water from Contwoyto Lake at the causeway began on April 11, 2022 until July 27, 2022 utilizing a submersible pump, filling a 4,542 litre (1,200 usg) plastic tank within a water truck that is used to transport water to the camp's two (2) 4,542 litre storage tanks. The water is then run through a series of filters with disinfection provided by a flow-through Ultraviolet chamber prior to distribution in camp. The camp was open for 102 days in 2022, through July 29, 2023, using a total of approximately 160 m^3 of freshwater, for an approximate average water use of 18 m^3/day (Footnote 1 - A Blue-White Industries Model F-1000-RT Totalizer flow meter is used to calculate the daily freshwater consumption.) for domestic purposes, well within the maximum authorized water use of 250,025 m^3/year during Active Closure and Reclamation Phase under the water licence.

The following table summarizes the monthly and annual quantities in cubic metres of Water pumped from Contwoyto Lake at Monitoring Station LUP-01.

2023	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Water Use (m^3/day)				18	18	18	18						1,836 m^3/year

Item 1 (b): Monthly and annual quantities of water pumped from ponds against the roads, or ponds or lakes proximal to the road for industrial purpose, including dust suppression.

Approximately 80m3 of water was pumped from ponds against roads, or ponds or lakes proximal to the road for industrial purpose or for dust suppression in 2022.

Item 1 (c): Monthly and annual quantities of treated Tailings Effluent discharged at Station LUP-10.

No tailings effluent discharge at Station LUP-10 occurred in 2022.

Item 1 (d): Monthly and annual quantities of Minewater discharged at Station LUP-11.

No minewater effluent discharge at Station LUP-11 occurred in 2022.

Item 1 (e): Monthly and annual quantities of treated Sewage Effluent discharged at Station LUP-14.

No treated sewage effluent discharge at Station LUP-14 occurred in 2022.

Item 1 (f): Details on the types and quantities of Hazardous Waste and Chemicals stored on site.

The following table summarizes the types and quantities of hazardous waste and chemicals remaining on site as of 31 December 2022, to be used or eventually transported offsite.

Type Hazardous Waste or Chemicals	Quantity
Waste Motor Oil	14,350 litres (70 ea - 205L drums) in TPDS; 19,000 litres (19 ea - 1000L Steel totes) in TPDS; 15,750 litres (21 ea - 750L plastic totes) in TPDS;
Contaminated (old) Diesel Fuel	17,015 litres expired diesel in Fuel Berm
Contaminated (old) Jet Fuel	4,305 litres (21 ea - 205L drums) expired AV gas in TPDS; 9,840 litres (48 ea - 205L Drums) expired AV gas in Seacan;
Contaminated (old) Gasoline	None
Oily Water	3,000 litres (3 ea - 1,000L tanks) in TPDS;
Acid Filled Batteries	10 ea - 12V lead/acid batteries in Shop
Hydrated Lime	Approx. 800kg (40 ea - 20kg bags) in Cold Storage
Soda Ash	Approx. 10 ea - 907kg totes in Cold Storage
Portland Cement	3,000 kg (150 - 20kg bags) in Cold Storage
Calcium Chloride	Approx. 30 ea - 900kg sacks in Cold Storage
Other	20,820 litres (1 ea - 5500 gallon pup trailer) antifreeze, motor oil, waste oil mix in TPDS

No waste was shipped offsite in 2022, as all waste, hazardous waste and chemicals will be shipped to Yellowknife via the winter road at the conclusion of active closure phase and implementation of passive closure.

The pre-existing fuel storage facilities at Lupin included a Main Tank Farm (including a system of 14 diesel tanks, 1 jet A tank and 9 individual tanks), a Satellite Tank Farm (STF) (including a system of 10 diesel tanks and 2 gasoline tanks and a waste oil tank farm which included 2 waste oil tanks). As of December 2020:

- two of the diesel storage tanks and the Jet A tank are in use. 11 diesel storage tanks have been cleaned and placed in the landfill. 7 individual tanks have been cleaned and will be disposed in the landfill. Clean tanks in the boneyard were also demolished and placed in the landfill.
- LMIs fuel and petroleum inventory as of 31 December 2022 includes approximately: 195,000 litres of diesel fuel, and 338,743 litres of jet fuel in storage in large fuel tanks within the Bulk Fuel Storage (Main Tank Farm).

Additionally, there are several empty 205 litre drums and twenty (20) empty 1,000 litre totes on site available for spill contingency and/or temporary storage of hydrocarbons or hydrocarbon contaminated water.

Item 1 (g): Tabular Summaries of all data generated under the "Monitoring Program".

Summary of Monitoring Program (Type A Water Licence 2AM-LUP2032, Schedule J)

Station ID	Location	Frequency	Parameter	Annual Update
LUP-01	Freshwater Intake from Contwoyto Lake	Annually	Field, Conventional, Total Metals, and Biological	Care and Maintenance - No sample taken.
		Monthly	Quantity of water measured and recorded in cubic metres	Refer to Item 1 (a) above.
LUP-10	Pond 2 discharge at Dam 1A	Daily during periods of Discharge	Field, Conventional, Total Metals, Cyanide, no visible sheen of Oil & Grease	No discharge in 2022
			Quantity of treated effluent discharged, measured and recorded in cubic metres	No discharge in 2022
		Weekly during periods of discharge from the Tailings Containment Area	Nutrients Radium (^{226}RA)	No discharge in 2022
		Monthly (no less than one month Intervals) commencing with the first day of decant	Cyanide Bioassay	No discharge in 2022
LUP-10a (LUP- 102)	Internal station in TCA Pond 2, approximately 100 m upstream from siphon intake	Once prior to initiation of decant and once prior to termination of decant	Field, Conventional, Nutrients, Total Metals, Cyanide, and Radium (^{226}RA), and Bioassay	No decant in 2022
LUP-11	Minewater discharge at automatic sampler in the mill	Not Active		Not Active
LUP-12	Mill tailings taken at the mill	Not Active		Not Active
LUP-14	Decant structure from the Sewage Lakes Disposal Facilities	First day of discharge and then monthly thereafter during periods of flow	Field, Conventional, Nutrients, Total Metals, Biological, and Other: Biochemical Oxygen Demand (BOD5), Total Phosphorus, Total Orthophosphorus - (OPO4), Total Kjeldahl Nitrogen (TKN))	No discharge in 2022

Station ID	Location	Frequency	Parameter	Annual Update
		Monthly	Quantity of treated effluent discharged in cubic metres	No discharge in 2022
LUP-15	Discharge from TCA Pond 1 (east pond) into TCA Pond 2 (west pond)	Not Active		Not Active
LUP-16	TCA Pond 2 at center	Not Active		Not Active
LUP-17	TCA Pond 2 upstream of Station LUP-10	Not Active		Not Active
LUP-19	East end of Seep Creek in Dam 2 Lake	Not Active		Not Active
LUP-20	West end of Seep Creek before discharge into Unnamed Lake	Weekly during discharge from the Tailings Containment Area commencing with the first day of discharge	Field, Conventional, Nutrients, Total Metals, Cyanide, and Radium (^{226}RA)	No discharge in 2022
LUP-21	North end of Concession Creek before discharge into Unnamed Lake	Weekly during discharge from the Tailings Containment Area commencing with the first day of discharge	Field, Conventional, Nutrients, Total Metals, Cyanide, and Radium (^{226}RA)	No discharge in 2022
LUP-22	Inner Sun Bay near center and midway between end of peninsula and west shore	Weekly at mid-depth, commencing one (1) week prior to discharge from the Tailings Containment Area and concluding two (2) weeks after cessation of the discharge	Field, Conventional, Nutrients, Total Metals, Cyanide, and Radium (^{226}RA)	No discharge in 2022
LUP-24	Inner Sun Bay near narrows	Weekly at mid-depth, commencing one (1) week prior to discharge from the Tailings Containment Area, and concluding two (2) weeks after cessation of the discharge and when bioassay sample is collected at LUP-10 just prior to termination of decant	Field, Conventional, Nutrients, Total Metals, Cyanide, and Radium (^{226}RA)	No discharge in 2022
LUP-25	Outer Sun Bay (Total Rather than specific metals)	Weekly at mid-depth, commencing one (1) week prior to discharge from the Tailings Containment Area, and concluding two (2) weeks after cessation of the discharge	Field, Conventional, Nutrients, Total Metals, Cyanide, and Radium (^{226}RA)	No discharge in 2022
LUP-26	Contwoyto Lake in bay east of water intake	Not Active		Not Active

Station ID	Location	Frequency	Parameter	Annual Update
LUP-27	Bulk Fuel Storage Facility	Once prior to discharge and weekly during periods of discharge	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No discharge in 2022
LUP-28	Discharge from the Landfarm Facility	Once prior to discharge and weekly during periods of discharge	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No discharge in 2022
LUP-29	Landfarm Facility Monitoring Well – Up gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-30a	Landfarm Facility Monitoring Well – Down gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-30b	Landfarm Facility Monitoring Well – Down gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-31	Seepage from the Landfill Facility	Monthly during periods of observed flow	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-32	Landfill Facility Monitoring Well – Up gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-33a	Landfill Facility Monitoring Well – Down gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-34b	Landfill Facility Monitoring Well – Down gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site

Station ID	Location	Frequency	Parameter	Annual Update
LUP-35	Seepage from the Landfill Facility	Monthly during periods of observed flow	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-36	Demolition Landfill Facility Monitoring Well – Up gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-37a	Demolition Landfill Facility Monitoring Well – Down gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-37b	Demolition Landfill Facility Monitoring Well – Down gradient	Monthly during periods of observed flow – June through September	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	No observed flow while on site
LUP-EL-01	East Lake near shoreline near the potential seepage inputs	Twice-yearly: Once in freshet and once in late open-water season, ensuring that baseline samples are collected prior to construction of the waste rock dome.	Field, Conventional, Total Metals	No dome construction initiated
LUP-BL-01	Boot Lake near shoreline near the potential seepage inputs	Twice-yearly: Once in freshet and once in late open-water season, ensuring that baseline samples are collected prior to construction of the waste rock dome.	Field, Conventional, Total Metals	No dome construction initiated
LUP-LSL-01	Lower Sewage Lake near shoreline near the potential seepage inputs	Twice-yearly: Once in freshet and once in late open-water season, ensuring that baseline samples are collected prior to construction of the waste rock dome.	Field, Conventional, Total Metals	No dome construction initiated
LUP-SP-01 to LUP-SP-XX(a)	Seeps from the Waste Rock Dome, Locations of observed seepage or flow from waste rock pile	Twice-yearly: Once in freshet and once in late open-water season	Field, Conventional, Total Metals	No dome construction initiated. No observable seeps

Station ID	Location	Frequency	Parameter	Annual Update
LUP-TCA-01 to LUP-TCA-XX(a)	Seeps from the Tailings Containment Area (TCA), Locations of observed seepage or flow from waste rock pile	Twice-yearly: Once in freshet and once in late open-water season	Field, Conventional, Total Metals	No observable seeps

Notes:

(a) Seep Sampling locations will be added to the post-closure monitoring program as new seeps are documented.

Geotechnical monitoring included in Dam Safety Inspection refer to Item 1 (i) and Appendix A.

On February 21, 2022, the Environmental Protection Operations Directorate for the Prairie and Northern region of Environment and Climate Change Canada (ECCC) confirmed Lupin Mine recognized closed mine status for LMI. ECCC confirmed that records filed in compliance with the *Metal and Diamond Mining Effluent Regulations* (MDMER) were received and Lupin Mine "Facility Operation Status Type" could be updated to reflect recognized closed mine status.

Item 1 (h): Summary of actions taken to address concerns or deficiencies listed in inspection reports and/or compliance reports filed by an Inspector.

Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) enforces terms and conditions of NWB water licences in accordance with the *Nunavut Waters and Nunavut Surface Rights Tribunal Act (NWNSRTA)* section 85-88. CIRNAC did not undertake any on site inspections or issue compliance reports for the Lupin Mine Site between 01 January 2022 and 31 December 2022.

Item 1 (i): Summary of modification and/or major maintenance work carried out on the Water Supply and the Waste Management Facilities, including associated structures.

Geotechnical Inspection (Stantec, 2022[1])

LMI retained Stantec Consulting Ltd. (Stantec) to complete the annual dam safety inspection (DSI) at the Lupin Mine tailings containment area (TCA). The DSI was completed by the Engineer of Record (EOR) for the TCA and included a walkover, visual observation, and photography of the TCA upstream and downstream embankments, dam crest and toe areas, Cell 3 and Cell 5 outfall structures, and the Cell 4 Divider Dyke spillway. The EOR observed for visible signs of instability (cracking, settling, slumping, toe heave or other displacement), over-steepened slopes, uneven crests, erosion, ponded water, seeps, exposed tailings and other indicators of changing or unfavourable physical conditions. General geochemical observations (mineralization, precipitate, colour and vegetation changes, etc.) were also collected. Thermistor, pressure sensor, and VWCA instrumentation was monitored, and instrumentation conditions were documented with photographs.

General observations indicated that the perimeter dams (Dams 1A through 6) and internal dams were in stable condition and pond elevations were noted to be low. Freeboards were in excess of 3.5 m at all structures during the inspection. Existing erosional features related to wave action were observed on some of the dam embankments, though these features were relatively unchanged in 2022 as compared

[1] Stantec. 2022. Lupin Mine Tailing Area Inspection Report, Annual Geotechnical Inspection of the Tailings Containment Area. August 22, 2022. Prepared for: Lupin Mines Incorporated. Prepared by: Alvin Tong, P.Eng.

to historical conditions. Fresh erosional features were identified on the downstream embankment at Dam 4. These features were repaired by the end of inspection. Historical, minor erosional features resulting from water runoff on the crests and embankments of dams were observed. These minor erosional features appeared to be relatively unchanged when compared to historical conditions.

JDS, DMS, and Stantec personnel noted the formation of erosional gullies on the face of K Dam upon arrival to site in 2022. Erosional gullies were backfilled with a mix of clean esker sand and gravel-sized particles in June 2022 in response to observations of erosional gully formation. Material added to K Dam appeared to be stable upon observation during the DSI site visit.

Additional details related to the annual geotechnical inspection, including instrumentation plots, photographs, map layouts, and findings and recommendations for maintenance and closure priorities are presented in the annual inspection report, attached as Appendix A.

The Cell N cover was completed in 2022 as part of the closure activities. Additional surface water management measures were completed at Dam K including resurfacing the crest to allow for drainage away from the downstream crest and placement of a diversion berm at the crest near the downstream embankment to prevent flow over the dam slope.

LMI has reviewed the 2022 annual geotechnical inspection report and commits to:

- Reslope Dam M according to the closure design.

On February 9, 2022, LMI submitted to the NWB in accordance with the Type A Water Licence 2AM-LUP2032, Part G, Item 3 and Schedule G, the following Construction Summary Reports (CSRs):

- Lupin Mine Reclamation 2021 Construction Summary Report - **Cell 3** – Rev.2, dated February 8, 2022 (Stantec 2022).
- Lupin Mine Reclamation 2021 Construction Summary Report - **Cell 5** – Rev.2, dated February 8, 2022 (Stantec 2022).
- Lupin Mine Reclamation 2021 Construction Summary Report – **K Dam Reinforcement** – Rev.2, dated February 8, 2022 (Stantec 2022).

CSRs noted above were reviewed by parties with comments received from CIRNAC and Environment and Climate Change Canada (ECCC). Responses to CIRNAC comments were provided on February 24, 2022.

Temporary Bulk Fuel Storage (WSP, 2022[2])

A design was prepared for a Temporary Fuel Farm (TFF) to store fuel for closure operations and to allow the future decommissioning and cleanup of the existing Main Tank Farm. The TFF is a rectangular impoundment lined with a single piece HAZGUARD liner which will host 6 - 3.7 m diameter by 6.1 m high tanks. A design drawing for the TFF was prepared by WSP and issued for construction on June 27, 2022. The HAZGUARD liner was shipped to site and stored, but construction was deferred until 2023. Issued for Construction drawing provided in Appendix B.

[2] WSP. 2022. Proposed Temporary Fuel Storage. Figure 1. Rev.0 Project No. 21503000.

Item 1 (j): List of description of all unauthorized discharges including volumes, spill report line identification number and summaries of follow-up action taken.

No unauthorized discharges or spills occurred necessitating reporting in 2022.

Item 1 (k): Applicable revisions as Addendums for Plans, Reports or Manuals.

In accordance with the Water Licence 2AM-LUP2032 Part B, Item 15 which states:

> *The Licensee shall review the Plans referred to in this Licence as required by changes in operation and/or technology and modify the Plans accordingly. Revisions to the Plans are to be submitted in the form of an Addendum to be included with the Annual Report required by Part B, Item 2, complete with a revisions list detailing where significant content changes are made.*

As such LMI proposes two addenda to existing Plans as follows:

1. Addenda to approved Final Closure and Reclamation Plan dated August 2020, Table 14 - Summary of Measures for Final Closure (Refer to Appendix C-1); and
2. Addenda to approved Post Closure Monitoring Plan dated April 2021, Table 9 - Water Quality Monitoring Requirements for Active and Passive Closure at Lupin Mine (Refer to Appendix C-2).

The only significant content changes in the proposed addenda reflect LMI current Closure Phase in Care & Maintenance and new implementation timelines for measure of final closure and monitoring for Post Closure Phase as provided in the applicable tables.

Item 1 (l): Summary of public consultation and participation with local organization and residents of nearby communities, including schedule of upcoming events and information sessions.

The site remained in Care & Maintenance with minimal on-site work in 2022. No public consultation with local organization or residents of nearby communities were undertaken in 2022.

Item 1 (m): Summary of any abandonment and reclamation work completed during the year and an outline of any work anticipated for the next year.

Consistent with the FCRP Table 14 Summary of any abandonment and reclamation work completed during 2022 and work anticipated in 2023 is summarized in the table below

Summary of Abandonment and Reclamation Work

Component	Works completed in 2022	Works proposed in 2023
Underground Mine	▪ No reclamation work completed in 2022	▪ No reclamation planned in 2023.
Contaminated Soil	▪ Based on the volume of contaminated soils remediated in 2020 and 2021 (approximately 35,000 m^3), it is anticipated that approximately 53,000 m^3 of petroleum hydrocarbon (PHC) contaminated soil still requires excavation and disposal underground ▪ Approx. 6,000 m3 of stockpiled petroleum hydrocarbon contaminated (PHC) soil was placed in the crown pillar	▪ No reclamation work planned in 2023.
Waste Rock	▪ Extension to Crown Pillar drilled and blasted, which gave an additional capacity in crown pillar. ▪ Approx. 70,000 m3 of blasted rock from the crown pillar was placed in the low elevation areas of the dome footprint.	▪ No reclamation planned in 2023
Tailings Containment Area	▪ Repaired eroded areas in Cell 3 ditch. ▪ Placed approx. 22,000 m3 of esker on exposed tailings at Cell N, completing the 1.0 m cover surface within the cell. ▪ Placed approx. 6,600 of esker on K dam to repair eroded areas ▪ In-situ water treatment with the use of soda ash and water transfer from Cell N to Pond 1.	▪ Dam Safety Inspection (DSI) ▪ Address any outstanding findings and recommendations from 2022 geotechnical inspection ▪ Dam Safety Review (DSR)
Buildings and Equipment	▪ No reclamation work was completed in 2022	▪ Minor repairs to generators (fuel line replacement). No demolition or reclamation work planned in 2023.
Borrow and Quarry Areas	▪ No reclamation work completed in 2022	▪ No reclamation work planned 2023.
Chemicals and Fuel	▪ A design was prepared for a new Temporary Fuel Farm (TFF) to store fuel for the completion of closure operations and to allow for the decommissioning of the Main Tank Farm. The liner was shipped to site. ▪ Inspection of the six (6) vertical tanks for the planned TFF were completed.	▪ The TFF is to be constructed in the summer of 2023.

Component	Works completed in 2022	Works proposed in 2023
Machinery and Mobile Equipment	▪ No reclamation work completed in 2022	▪ On-site equipment, that is no longer in use, will be buried in the landfill, including equipment located in the boneyard. ▪ Minor repairs to mobile equipment.
Landfill	▪ No reclamation work planned in 2023.	▪ No reclamation work planned in 2023.
Site Roads	▪ Approx. 1,700 m3 of esker was used to repair esker pit access roads	▪ No reclamation work planned in 2023
Water Management Facilities	▪ Water transfer from Pond 1 to Pond 2.	▪ No reclamation work planned in 2023
Mobilization/Demobilization	▪ No equipment mobilization or demobilization was completed in 2022.	▪ No equipment mobilization or demobilization planned in 2023.
Explosives Magazine	▪ Explosives consumed in 2022 for blasting extension to Crown Pillar	▪ Plan to move explosives magazine site at TCA to Mine Site for demobilization on future winter road.
Emergency Dump Ponds	▪ No reclamation work completed in 2022	▪ No reclamation work planned in 2023.
Sewage Lagoons	▪ No reclamation work completed in 2022	▪ No reclamation work planned in 2023.

Item 1 (n): Any other details on water use or waste disposal requested by the Board by November 1 of the year being reported.

Neither Lupin Mines Inc. or its subsidiary Mandalay Resources received additional requests from the NWB on details associated with water use or waste disposal activities in the 2022 calendar year being reported herein.

Item 2: The Post Closure Monitoring Plan shall include an update to Schedule B for Annual Reporting Requirements reflecting the Post Closure Phase.

Following community engagement in 2021, the NWB approved on 27 September 2021, the Post Closure Monitoring Plan (PCMP) dated August 2020 and associated Appendix: Water Quality Monitoring Plan and Water and Soil Quality Assurance and Quality Control Plan dated 9 April 2021.

LMI is currently in modified active care & maintenance of the Closure Phase currently scheduled for completion in Q4 of 2025. Refer to addenda provided in Appendix C-1. LMI is committed to updating Schedule B for Annual Reporting Requirements reflecting the Post Closure Phase in the 2024 Annual Report to be submitted to the NWB no later than 31 March 2025.

APPENDIX A: GEOTECHNICAL INSPECTION REPORT

2022 Lupin Mine Tailings Area Inspection Report

Annual Geotechnical Inspection of the Tailings Containment Area

August 22, 2022

Prepared for:

Lupin Mines Incorporated

Prepared by:

Alvin Tong, P.Eng.

Revision	Description	Author		Quality Check		Independent Review	
0	Draft	AT	Aug 17	TP	Aug 19		
1	Final	AT	Aug 22				

Sign-off Sheet

This document entitled 2022 Lupin Mine Tailings Area Inspection Report was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Lupin Mines Inc. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____

(signature)

Alvin Tong, P.Eng.

Reviewed by _____

(signature)

Tim Peterson, P.Eng.

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1.0 INTRODUCTION

Lupin Mines Incorporated (LMI) retained Stantec Consulting (Stantec) to complete the annual geotechnical dam inspection at the Lupin Mine tailings containment area (TCA). The Lupin Mine site is currently undergoing active closure and operates under the Nunavut Water License 2AM-LUP2032 (NWB 2020) for LMI issued by the Nunavut Water Board (NWB, or the Board). LMI is a wholly owned indirect subsidiary of Mandalay Resources.

The Lupin Mine is located on the northwest shore of Contwoyto Lake, approximately 400km northeast of Yellowknife, Northwest Territories (Figure 1). The site consists of a mill, camp and support facilities, fuel storage, airstrip, and the TCA (Figure 2). A detailed view of the mill site is provided in Figure 3 and of the TCA in Figure 4.

The water license explicitly requires an annual geotechnical inspection to be completed for the TCA internal and external dams, including a quantitative assessment of any seepage from the TCA (NWB 2020). Stantec has provided a qualified person to conduct the geotechnical inspection to fulfill the requirements listed in Part E, Item 7 and Part J, Item 12 of the water license, which stipulates the following:

“The tailings containment area shall be constructed, operated and maintained to engineering standards such that:

- A minimum freeboard of 1.0 meter shall be maintained at all times or as recommended by a geotechnical engineer and as approved by the Board in writing.
- Seepage to the environment from the Tailings Containment Area is minimized.
- Any seepage to the environment that occurs is collected and returned immediately to the Tailings Containment Area.
- Erosion of constructed facilities is addressed immediately.
- The solids fraction of the mill tailings shall be permanently contained within the Tailings Containment Area or underground as backfill.
- Implement measures to ensure that the Tailings Containment Area is adequately covered or managed, including the use of approved binding agents, to prevent windblown tailings from impacting other areas of the project site.
- Transducers are installed and maintained within selected existing standpipes, to collect water level data and ensure tailings saturation.
- An inspection of the TCA shall be carried out annually during the ice free, open water condition by a geotechnical engineer. The engineer’s report shall be submitted to the Board within sixty (60) days following the inspection and shall include a cover letter from the Licensee outlining an implementation plan to respond to the engineer’s recommendations.

During care and maintenance, the Licensee shall conduct inspection on a bi-weekly basis during the freshet (approx. May and June), and monthly during the remainder of the open water period (approx. July – October) of the following:

- Seepage in Dam 2.
- Water levels in ponds and cells.
- General surface erosion, tension cracks and/or anomalies on dams.
- Records of these inspections shall be kept for review upon the request of an Inspector, or as otherwise approved by the Board.

- More frequent inspections shall be performed at the request of an Inspector.

This report summarizes Stantec's observations of the TCA's condition in 2022 and presents our recommendations. Previous annual inspections, safety reviews, and risk assessments with respect to the TCA made available to Stantec include:

- Construction reporting during active closure activities.
- Inspection Report from 2018-2021 by Stantec Consulting.
- Inspection Report from 2016-2017 by Norwest Corporation.
- Inspection Reports from 2012-2015 by SRK Consulting.
- 2015 Dam Safety Review Report by SRK Consulting. (See recommendations Section 4.1)
- 2012 TCA Risk Assessment and Water Quality Review by SRK Consulting.

While the annual inspection is carried out to satisfy the license requirements, the format and methodology used are in accordance with the best engineering practice using the Inspection and Maintenance of Dams Safety Guidelines issued by the Province of British Columbia, Water Management Branch (BCWMB 2011) and the Mining Association of Canada (MAC) Guidelines.

1.1 PROJECT DESCRIPTION

1.1.1 Location and Access

The Lupin Mine is only accessible by air or winter road. The air access is serviced by a gravel runway, capable of handling large aircraft such as Hercules C-130 and Boeing 737 jets. Charter flights are typically deployed from Yellowknife for worker rotation and re-supply during the open water seasons. When the mine was in operation, it used the Tibbitt to Contwoyto Winter Road to resupply the mine. This winter road currently ends at the Ekati Diamond Mine and has not been extended to the Lupin Mine since 2005, when the mine went into care and maintenance status. An overland access trail was constructed to site in winter of 2020 to facilitate equipment mobilization for the closure activities. This overland trail will be reestablished for demobilization once the closure activities are completed.

1.1.2 History and Current Status

Currently the Lupin Mine is in active closure and licensed accordingly. Mining operations ceased in 2005. Current closure activities include, but are not limited to, mill demolition, water treatment and discharge, water quality monitoring, tailings cover construction, dam repairs, and waste management as needed.

1.1.3 Site Infrastructure

The mine site historically consisted of the following main structures: mill site, camp and support facilities, fuel storage, airstrip, and tailings containment area (TCA). A number of facilities have been decommissioned as part of the closure activities. See details below:

- The mill site included an underground hoist and wheelhouse, ball mill, concentrator, and a paste backfill plant (all now decommissioned and demolished).
- The camp and support facilities included multiple wings of accommodations for workers, an office building, recreation facilities, cool and warm storage, and generators. Most of these structures are now demolished, with

only two wings of the camp and associated generators remaining. In addition, there are sewage lagoons and dams, and waste management facilities. Gravel roads are in place to connect the facilities.

- Fuel storage includes the main tank farm that contains diesel fuel for annual operation, along with fuel for aircraft. Fuel is pumped to a satellite tank farm as needed for equipment fueling and power generation to minimize the risk of spillage and accidents from using the large fuel tanks at the main farm. Most of the fuel tanks are decommissioned and demolished.
- The airstrip is a gravel runway that could accommodate aircraft up to the size of a Boeing 737 jet when the mine was in operation.
- The TCA consists of a number of frozen core dams that provide a closed system for tailings and water treatment. Tailings are contained in a number of cells and progressive reclamation is ongoing and has now been completed at several cells. Water treatment is carried out using Pond 1 as a holding pond for effluent, treating the water in a plant, and then using Pond 2 as a polishing pond to allow the solids to precipitate prior to discharge to the environment. Details of the TCA configuration are described in Section 2 of this report.

1.2 CLIMATE

Stantec evaluated the climate data from an automated weather station known as Lupin (CWIJ) available in the Weather Underground database (WU 2016). Intermittent climate data is also available from the Environment Canada database under station Lupin CS Climate ID 230N002. The climate data evaluation covers the period from May 2005 to April 2017, however it has not been updated since 2018 as the data has not been made publicly available. The evaluation results are as follows:

- an annual mean temperature of -13°C
- average winter temperature(October to April) of -21°C
- average summer temperature (May to September) of 8°C
- average annual total precipitation of 592mm (note the data does not differentiate between snow and rain)
- mean wind direction of south-southeast, with average wind speed of 16km/h and high of 50km/h

1.3 SITE GEOLOGICAL CONDITIONS

The Lupin Mine is located in the Archean metaturbidite sequence of the Contwoyto Formation. The rocks have been subjected to both regional and contact metamorphism, including deformations and intrusions.

The area was glaciated, and experienced isostatic rebound after the melt. The glaciers and runoff from the melt washed out the erodible soils and formed lakes in low lying areas. The easily erodible glaciolacustrine and glacio-fluvial sands were reworked and displaced by the meltwater and resulted in the outcrops present with thin soil veneers, abandoned beaches and esker formations (Kinross 2005). Where bedrock is not present at the surface, the overburden typically consists of coarse grained glacial till which is intermittently covered by glaciolacustrine and glacial-fluvial deposits. The till is a silty sand with gravel and boulders, with low plasticity and ice depending on the depth.

1.4 PERMAFROST AND DAM GEOTECHNICAL CONDITIONS

The site is within a continuous permafrost region. The active layer is observed to be variable between the depth of 1.25m to 3m based on available data. During operation, scheduled monitoring was completed of all instrumentation, recording water levels, water quality and production volumes. This monitoring program was reduced accordingly

during the care and maintenance period and is now carried out when work is being done on site where applicable. Thermistors are installed in several dams and in the tailings cover to monitor their performance. Some of the thermistors are no longer functional or damaged beyond repair. The remaining thermistors are read at least once annually during the geotechnical inspection and more often when site access allows. The thermistor readings indicate that permafrost remains within the dams and reclaimed tailings, and the readings are consistent with historical variation and limits.

2.0 TAILINGS CONTAINMENT AREA DAMS

The tailings are primarily comprised of amphibole and quartz, which account for 80% of the volume. Pyrrhotite and arsenopyrite make up an additional 17%. The tailings have been shown through various studies to have a potential for acid generation (Kinross 2005). All of the tailings are contained within the TCA.

The Lupin Mine TCA consists of eight (8) perimeter dams and nine (9) internal dams. The perimeter dams are Dams 1A, 1B, 1C, and Dams 2 through 6. The internal dams are Dam 3a through 3e, Dams J through N, and the Divider Dykes. Combinations of the perimeter dams and internal dams form Tailings Cells 1 through 5 for containment. As the progressive reclamation is being completed, some of the internal dams (3a, 3b, 3c, 3e) are incorporated into the cover and are no longer considered as individual dams. Currently, Cells 1 and 2 are completely reclaimed from historical activities. Cell 3 and Cell 5 were covered during the latest closure activities in 2021. Ninety-eight percent (98%) of the documented tailings area is now reclaimed with at least 1m of sand/gravel cover, with the exception of the north corner of Cell 4. No new tailings have been produced since 2005 when the site went into care and maintenance status.

All dams are constructed from esker sands and gravels, with the perimeter dams and Dam K, incorporating a geosynthetic liner for seepage control. All the perimeter dams are designed as frozen core dams founded on permafrost. Generally, the perimeter dams range in height from one (1) to eight (8) meters. The internal dam heights range from six (6) to twelve (12) meters and are now covered.

The active closure procedures for water management directs runoff from Cell 3 into Cell 4 via the outlet over Dam L. The water in Cell 4 then flows through the constructed spillway built in the Divider Dyke into Pond 1. Cell 1 and 2 excess runoff is directed overland into Pond 1, while the rest is left on the cover for evapotranspiration. Cell 5 runoff is directed into Pond 1 via the outlet in the northern abutment of Dam J. The Pond 1 water level is managed by siphoning water into Pond 2 as needed. Water treatment is carried out by treating the water in-situ in Pond 2, by adding neutralizing products to raise the pH. Precipitates from this treatment are deposited in Pond 2. The treated water in Pond 2 is siphoned into the environment in accordance with the Water License requirements (NWB 2020). Pond 2 does not have any flood overflow structures, such as a spillway or a control gate, to manage the water level. All water is retained, and discharge is restricted until water quality meets the discharge requirement outlined in the Water License (NWB 2020).

2.1 DAM CONSEQUENCE CLASSIFICATIONS

Stantec utilized the Canadian Dam Association Guidelines (CDA 2014) to classify the consequence classification of each dam. The CDA consequence classifications are shown in Table 2.1. The dam consequence classifications of the dams based on Stantec's 2020 inspection are outlined in Table 2.2. These consequence classifications are in line with the classifications outlined in the 2015 Dam Safety Review (SRK 2015).

An emergency preparedness plan (EPP) is noted by the dam safety review (DSR) (SRK 2015) to be in place and deemed appropriate for care and maintenance status. Stantec did not review the EPP. Due to the lack of transportable tailings, permanent population or infrastructure downstream of the perimeter dams, a detailed

inundation study is deemed non-applicable. New EPP and ERP are needed to reflect the closure status along with another DSR, and a review of the dam consequence classifications.

Table 2-1: CDA Dam Consequence Classifications

Dam Class	Population at Risk[1]	Incremental Losses		
		Loss of Life[2]	Environmental and Cultural Values	Infrastructure and Economics
Low	None	0	• Minimal short-term loss; • No long-term loss	Low economic losses Area contains limited infrastructure or services
Significant	Temporary only	Unspecified	• No significant loss or deterioration of fish or wildlife habitat • Loss of marginal habitat only • Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	• Significant loss or deterioration of important fish or wildlife habitat • Restoration or compensation in kind highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities
Very High	Permanent	100 or fewer	• Significant loss or deterioration of critical fish or wildlife habitat • Restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g. highway, industrial facility, storage facilities for dangerous substances)
Extreme	Permanent	More than 100	• Major loss of critical fish or wildlife habitat • Restoration or compensation in kind impossible	Extreme losses affecting critical infrastructure or services (e.g. hospital, major industrial complex, major storage facilities for dangerous substances)

Note 1. Definition for population at risk:
None - There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure. **Temporary** - People are only temporary in the dam-breach inundation zone (e.g. seasonal cottage use, passing through on transportation routes, participating in recreational activities).
Permanent - The population at risk is ordinarily located in the dam-breach inundation zone (e.g. as permanent resident); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimate of potential loss life (to assist in decision-making if the appropriate analysis is carried out).
Note 2. Implication for loss of life:
Unspecified - The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

Table 2-2: Lupin TCA Dam Consequence Classifications

Dam		Consequence Classification	Rationale
Perimeter Dams	1A	Significant	Release of water that might not meet discharge criteria into the environment
	1B	Significant	Release of water that might not meet discharge criteria into the environment
	1C	Significant	Release of water that might not meet discharge criteria into the environment
	2	Significant	Release of water that might not meet discharge criteria into the environment
	3	Low	No free-standing water; Stable reclaimed tailings with very limited impact consequence upon failure
	4	Significant	Release of water that might not meet discharge criteria into the environment
	5	Low	No free-standing water; Stable reclaimed tailings with very limited impact consequence upon failure
	6	Low	No free-standing water; Stable reclaimed tailings with very limited impact consequence upon failure
Internal Dams	3D	Low	Any release of effluent or tailings are contained within the TCA
	J	Low	Any release of effluent or tailings are contained within the TCA
	K	Low	Any release of effluent or tailings are contained within the TCA
	L	Low	Any release of effluent or tailings are contained within the TCA
	M	Low	Any release of effluent or tailings are contained within the TCA
	N	Low	Any release of effluent or tailings are contained within the TCA
	Divider Dykes	Low	Any release of effluent or tailings are contained within the TCA

3.0 2022 TCA INSPECTION

3.1 GENERAL

Mr. Alvin Tong, P.Eng., a Senior Geotechnical Engineer with Stantec, conducted the geotechnical inspection from July 20th to 26th, 2022. Detailed visual inspection was completed on all TCA components, along with reading of instrumentation. Mr. Dave Vokey, representative of LMI, was on site for communication and organization, but did not accompany Stantec on the inspection.

The weather during inspection was sunny with overcast periods and intermitted showers. Detailed inspection and photograph logs are provided in Appendix A. General observations indicated that the perimeter dams are in stable condition. The Cell N cover was completed in 2022 as part the closure activities. Additional surface water management measures were performed on Dam K including resurfacing the crest to allow drainage away from the downstream crest and placement of a diversion berm along the downstream crest to prevent flow over the dam slope.

Since the inspection in July, LMI has further graded and compacted the Dam crest to ensure drainage away from the Dam K slope.

3.2 INSTRUMENTATION

3.2.1 Thermistors

Thermistors were installed in the TCA between 1995 and 2004 to monitor the performance of the dams and tailings covers. From the existing records, there were thirteen thermistors installed in the dams, but only four of them are currently functional. Thermistors D4-3 on Dam 4, D2-00-2N on Dam 2 and DK-3 on Dam 3 are not reporting readings and repairs will be attempted next year. Of the four functioning thermistors, three are in the perimeter dams and one is in the internal dams. There are an additional nine thermistors installed in the reclaimed tailings cover, but three of them do not have calibration data on record to evaluate the results and two of them are damaged. This report focuses on the thermistor readings from the dams, using the thermistor readings from the cover for reference and comparison.

The thermistors were read monthly during operation up until 2006, and then read semi-annually during care and maintenance. Not all the functioning thermistors were read consistently throughout the care and maintenance period. To provide a point of reference in this report, selected data series between August and September, from the years 2010 to 2020, are shown for comparison, while maximum values are calculated from the entire series from the first available records up until 2014.

For the perimeter dams, the four functioning thermistors are less than 20m deep. The thermistor readings are shown in the figures below. The data suggests that the 2021 readings are within the historical variations, taking into account annual climatic variations and time of reading. Generally, the active layer (thaw zone) ranges from 2m to 3m depth, as interpolated by the 0°C gradient line. The largest historical variation in the 2020 data set is approximately 3.3°C (between -1.2°C and -4.5°C) in Dam 1 (D1A-00-01s) at the depth of 7m.

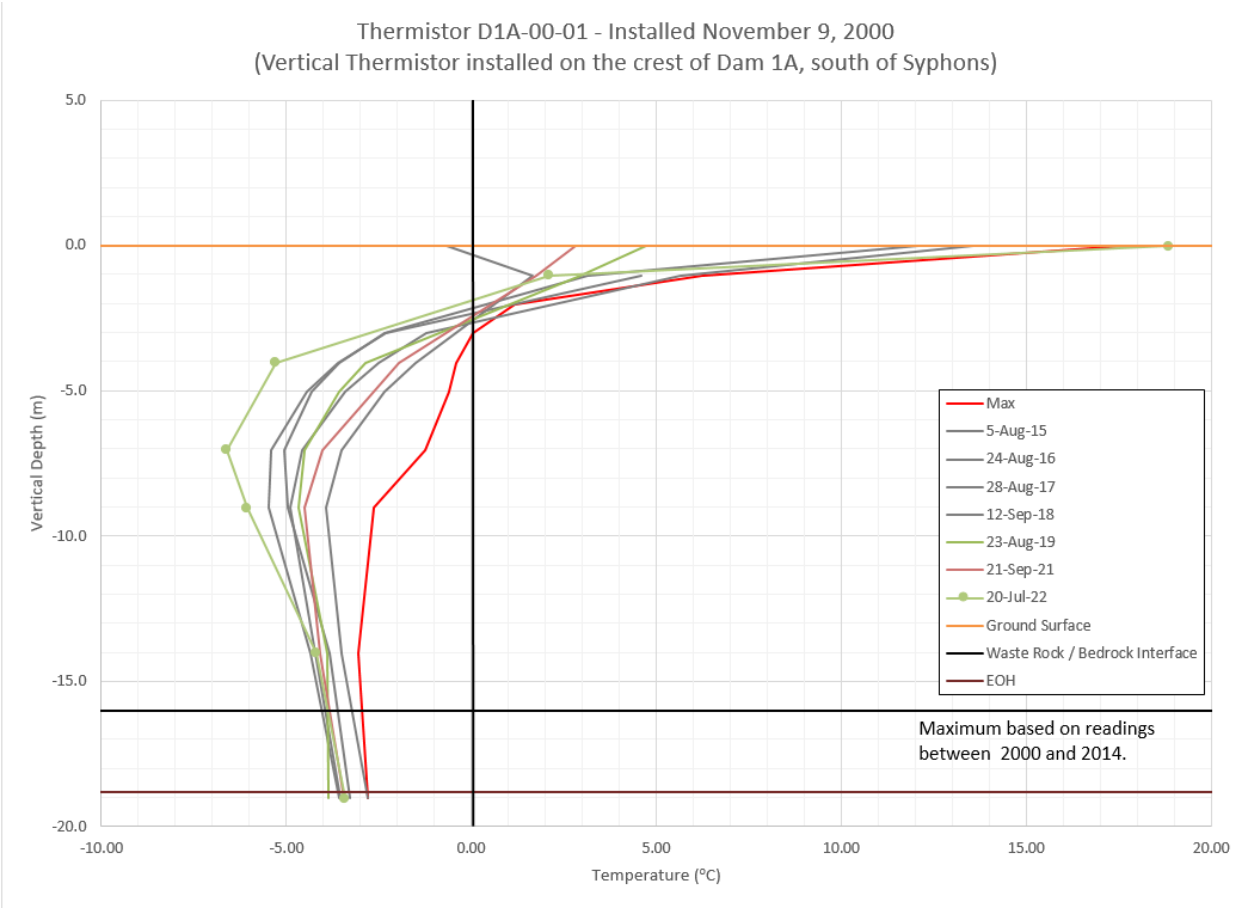

Figure 3-1: Thermistor Reading for Dam 1A

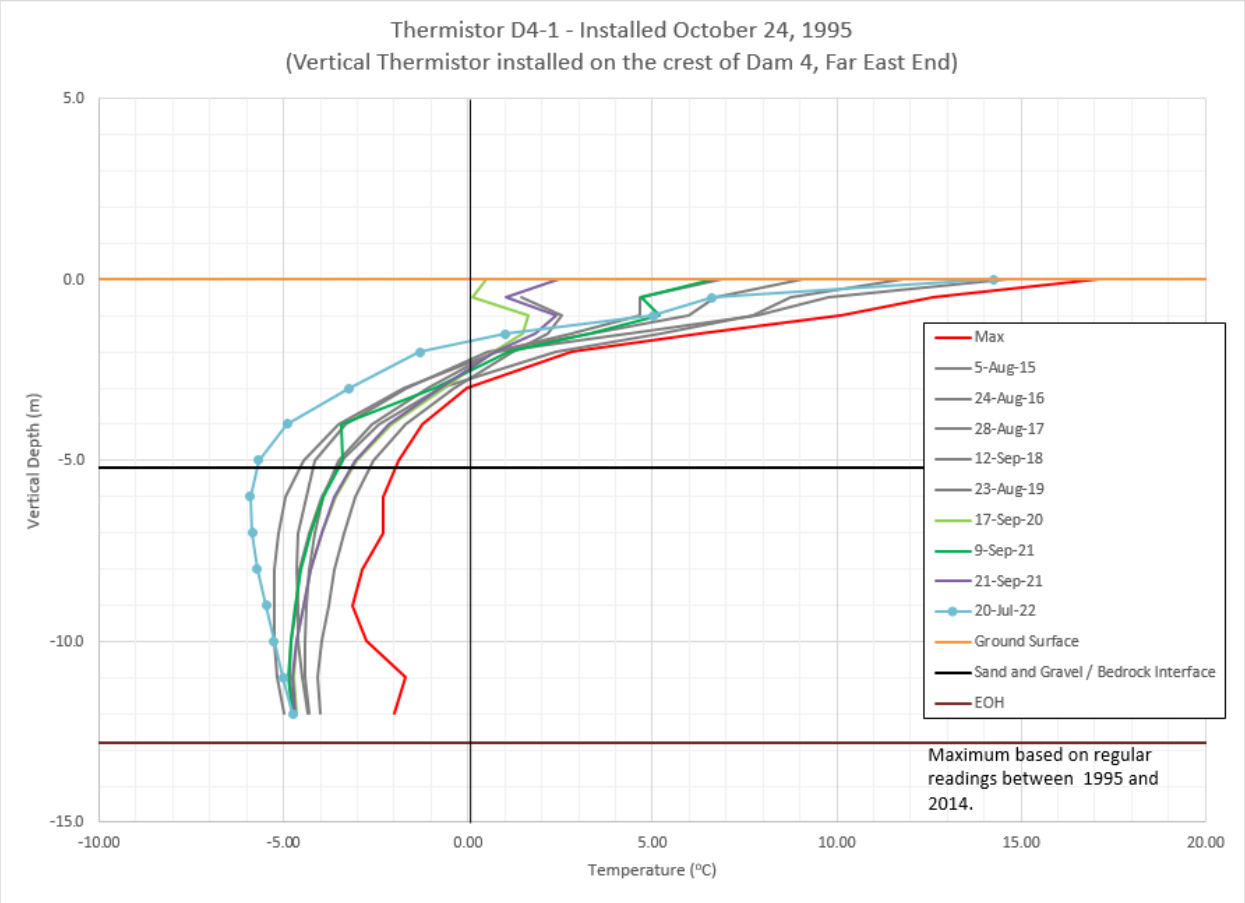

Figure 3-2: Thermistor Reading for Dam 4-1

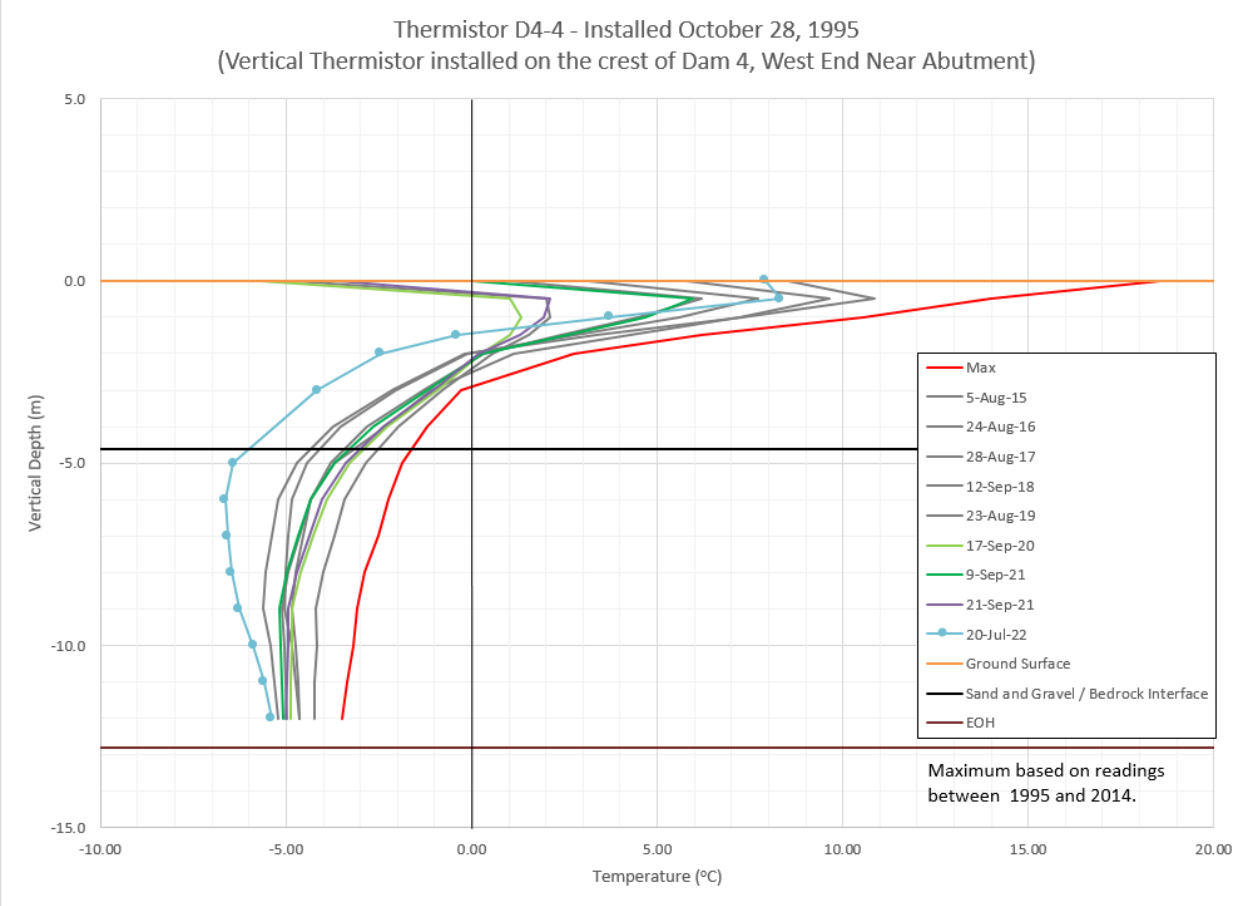

Figure 3-3: Thermistor Reading for Dam 4-4

For the internal dams, there are two thermistors which are also less than 20m deep in Dam K and Dam 3D. These were not historically monitored as rigorously as the ones installed in the perimeter dams, and only have recent data from 2014. Readings from the one functional thermistor are shown in the figure below. The active layer is observed to be around 2m, as interpolated by the 0°C gradient line. The variations between the data set is less than 2°C and generally occur below the historical maximum.

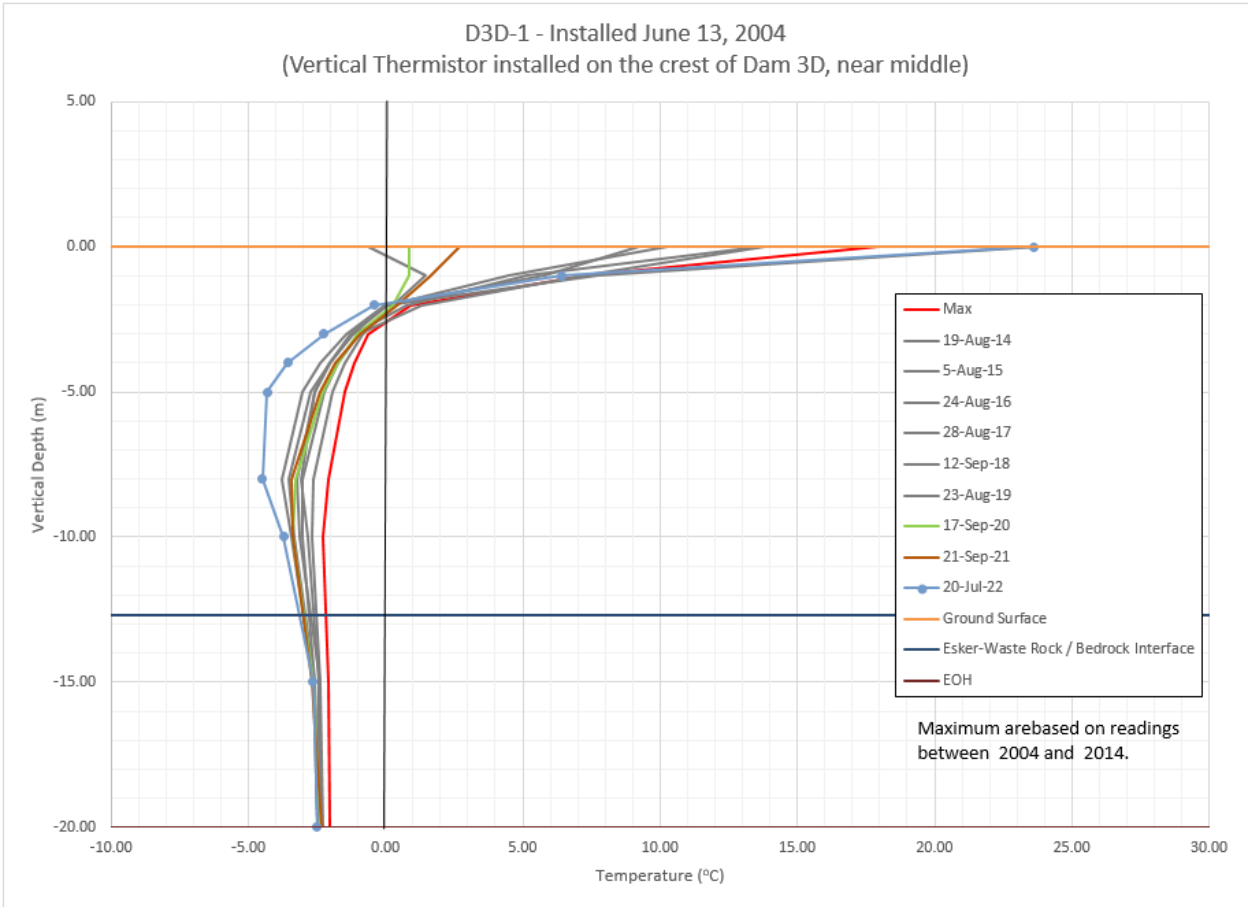

Figure 3-4: Thermistor Reading for Dam 3D

Readings from the four thermistors in the tailings cover are not presented in this report. The cover thermistor trends are comparable to the readings from the dams with a noticeable thinner active layer between 1.25m to 1.75m. All the observed larger temperature variations remained below 0°C and well below the active layer. The observed active layer depths remain consistent with the site recorded data and information provided by national research (Penner 1983). The thermistor readings indicate that the frozen cores within the monitored dams are frozen below the active layer and are performing well.

3.2.2 Moisture Sensors

To provide insight into the performance of the cover, volumetric moisture sensors were installed in the Cell 1 and Cell 3 covers in 2018. The sensors are TEROS-12 VWC sensors that measure volumetric water content, temperature and electrical conductivity. The sensor readings are set to read once every 12 hours and the readings are recorded by dataloggers. Cells 1 and 3 each have one string of five sensors installed within the cover (C2VWC and C3VWC). The sensor spacings and background material are provided in Table 3.1.

Table 3-1: VWC Installation Details

VWC ID	Cell 1-1		Cell 3-1	
	Depth (m)	Material	Depth (m)	Material
Port 5	1.0	Fine Sand (Cover)	0.35	Sand and Gravel (Cover)
Port 4	1.2	Fine Sand (Cover)	0.5	Sand and Gravel (Cover)
Port 3	1.4	Fine Sand (Cover)	0.6	Sand and Gravel (Cover)
Port 2	1.6	Fine Sand (Cover)	0.7	Sand and Gravel (Cover)
Port 1	1.8	Tailings	1.0	Sand and Gravel (Cover)

MEND (2009) shows that an effective barrier against oxidization can be achieved with a soil cover moisture content greater than 85%. The intent of the sensor readings is to define the degree of saturation throughout the year at various depths within the cover. It should be noted that sensors register ice as a dry void. Thus, as the pore water freezes and ice forms, the moisture content reading in the sensors drops sharply. In order to calculate the volumetric water content, an assumed void ratio is assigned to each sensor string based on the cover material type. The assumed void ratio for Cell 2 cover is 0.42 which corresponds to a fine sand, and the Cell 3 cover is 0.33 which corresponds to a gravelly sand.

The data from 2022 indicates that at both strings there is a zone of saturated material above the tailings.

3.2.2.1 Cell 1-1 VWC

The figure below shows the percentage saturation for VWC in Cell 1. All sensors show frozen conditions between November and July. There is a spike in the percentage of saturation in all sensors in early July related to overall thawing. The 2021 data indicated Port 4 moisture contents are above 85% saturation once thawed. Ports 1, 2 and 3, which are at a lower elevation than Port 4, showed a variable trend but remain around 80% saturation. After an in-depth review of the data, it was found that the lower degree of saturation in Ports 1 through 3 could be contributed to near freezing temperatures measured at depth. The WCC interpret frozen material as voids thus reporting a lower degree of saturation.

It should be noted that there is a gap in data collection between July 6th to August 7th, 2020. The cause of the data gap is unknown and will be noted for documentation.

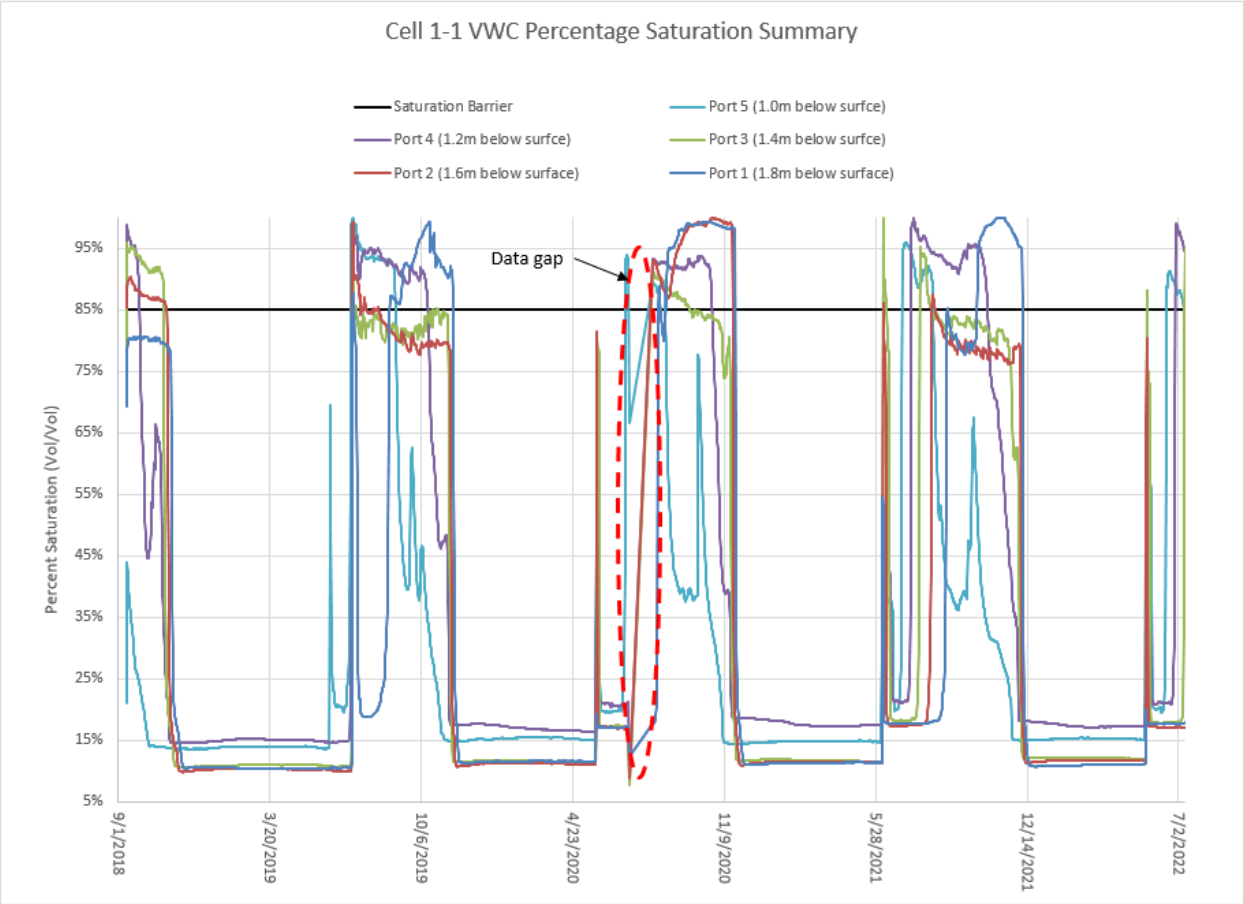

Figure 3-5: Cell 1-1 VWC Percentage Saturation Summary

3.2.2.2 Cell 3-1 VWC

The figure below shows the percentage saturation for VWC in Cell 3. The majority of the sensors show frozen conditions between October and June. There is a spike in percentage of saturation in the top sensors in June signaling overall thawing. The 2022 data indicates that the lower portion of the cover, as shown by Ports 1 and 2, is generally above 85% saturation once thawed. The upper portion cover as shown in Port 3 to 5 showed a variable trend between 57% to 86% saturation, mostly related to surface evaporation and rehydration from rain. It is assumed that the tailings remain to be inert as the lower portion of the cover is above 85% saturation.

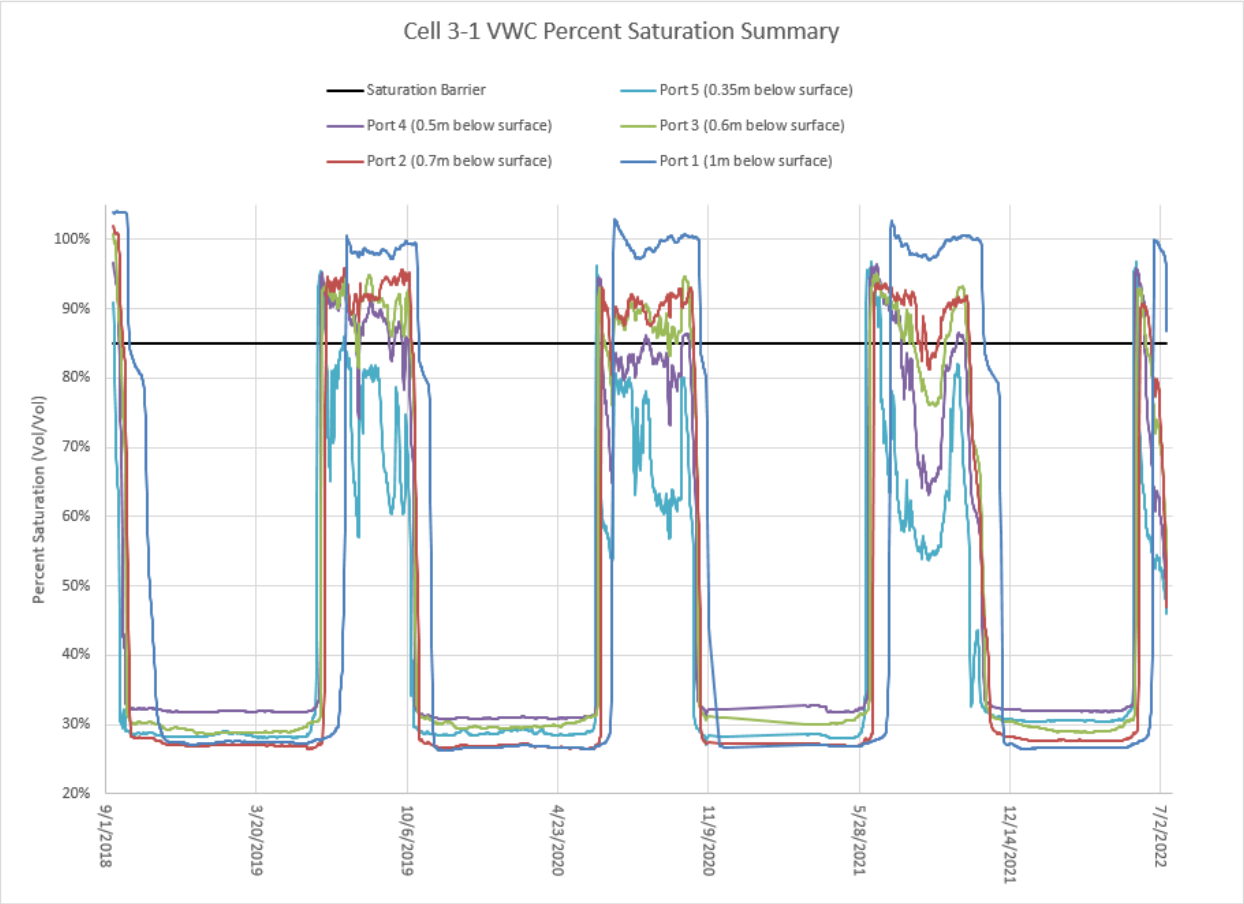

Figure 3-6: Cell 3-1 Port 1 VWC Result

3.2.3 Transducers

Three Level TROLL 400 transducers and one BaroTROLL 500 transducer were installed in 3 standpipes in Cell 1 in 2019. Based on the historical information (Kinross 2006), the standpipes were installed to the tailings/cover contact and the transducers were installed a few centimeters off the bottom. The installation data indicated there is approximately 1m cover thickness between the three transducers locations. These will provide further insight into the cover performance and help reconcile the VWC data. The transducers are programmed to read depth of water above the sensor in each standpipe, every 15 minutes. The transducers are winterized to continue functioning through the freezing period, but any water level readings at temperatures below zero degrees Celsius are not representative of real water/ice thickness.

Water level data from the transducers are provided in Figure 3-9 below. Data collected during the freezing period are not provided in the plot as the non-representative readings skew the scale for the real non-freezing period (summer) data. The summer readings fluctuate as expected due to evaporation and precipitation events, but the general trend indicates there is minimum 0.2m of water above the tailings/cover contact. Reading above the top cover indicated

ponding above the cover. According to the transducers data, the cover and tailings are reporting to be saturated at these locations, indicating the cover is functioning as designed.

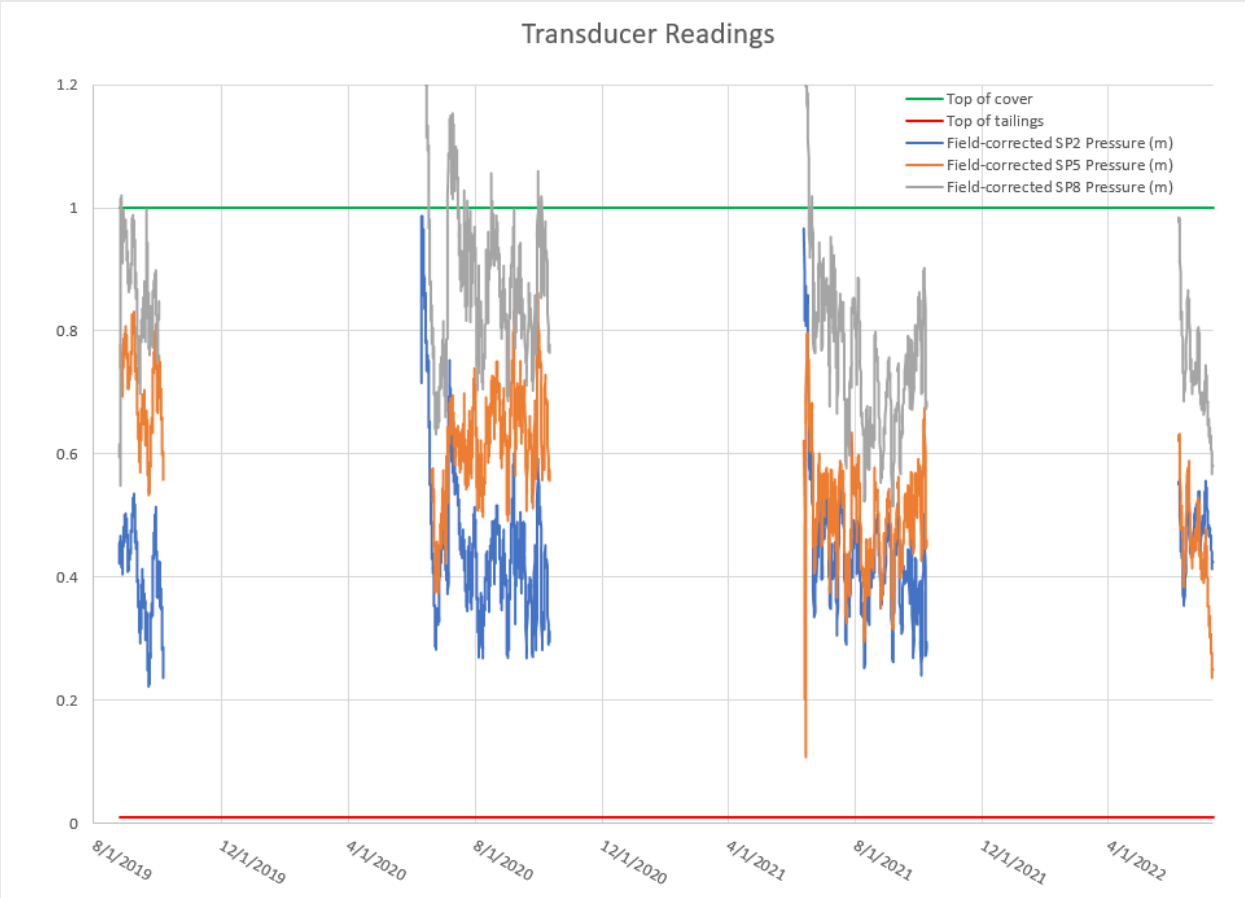

Figure 3-7: Transducer Results

3.3 TCA PERIMETER DAMS

The perimeter dams (Dam 1A through Dam 6) were observed to be in stable condition. Old erosion was observed on some of the dam slopes from historical wave action below the high-water mark (HWM) which remain unchanged based on visual inspection. Most of the surface erosion was observed to be minor, although the slopes will be continually monitored for deformation and repaired as recommended to prevent the erosion from becoming worse and creating preferential surface flow paths prior to final closure. Once the final closure activities are completed, the water level in the TCA will be passively managed to below Dam 1A, 1B, and 1C, Dam 2, and Dam 5 structure elevations where they will no longer be performing as water retaining structures.

Pond 2 water level has lowered significantly from last year's discharge. The observed freeboard at the perimeter dams was around 4.5m or greater. This well exceeds the minimum requirement of 1m freeboard as stated in the water license. Dam 1B, 1C, Dam 5 and Dam 6 do not have water on the upstream face of the dams.

Previous annual inspections noted seepage from the northern toe buttress of Dam 2 into the seepage collection pond. Since the 2021 closure work, the Pond 2 water level is now lower than the seepage collection pond. This supports the conclusion that the source of water in the Dam 2 collection pond is not seepage from the TCA, but likely to be overland flow from up gradient. Regardless, the water in the collection pond was pumped back into the TCA.

Some recently developed erosions were identified along the downstream slope of Dam 4. This was communicated to site services and was repaired by the end of the inspection. There are historical minor erosions along the downstream slopes of other dams which were compared to previous photographs and progressive deterioration was not observed. Since there is no active erosion, immediate mitigation is not needed. These minor erosions could be addressed during final closure spillways construction for post-closure monitoring.

3.4 INTERNAL DAMS

Various earthwork was completed in 2022 as part the closure activities and maintenance. The summary of work done is listed below:

- The Dam K crest was regraded to ensure surface water will not flow over the downstream slope but instead toward the drainage ditch along the edge of Cell 3 aligned with Dam K.
- Cell N was fully covered, and water management was built along the northern edge along the to limit run-on into the uncover area.

Freeboard upwards of 3.5m was measured at the Dam J relative to Pond 1 on July 5th. Dam L freeboard was measured at 4.3m relative to Cell 4, and Dam 1A through C all have freeboard upward of 5.4m. Dam 2 freeboard was measured at 6m.

Regrading was completed over the Dam K crest. Additional fill was placed and compacted to create drainage towards the ditch along the edge of Cell 3. A diversion berm was construction along the downstream crest to provide additional protection against freshet flow over the dam slope. The thermistor on Dam K was damaged during the regrading work and it should be repaired in 2023.

Cell N was fully covered as part of the 2022 closure activities. The surface water diversion ditch was constructed at the northern edge to limit run-on from the upstream area into the covered area. With the cover fully in place, there will be no freeboard concerns in Cell N.

Cell 3 cover was completed in 2021 along with the surface water channel and outlet through Dam L. Cell 5 cover was also completed last year with the surface water channel and outlet through northern abutment of Dam J. No deteriorative erosion and deformation were observed in both areas. Minor surface erosions are expected as part of new construction reach post-construction equilibrium.

The sand boils observed last year along the toe of Dam N were not observed to be active. This area should be monitored in 2023 to confirm the cause is associated with upstream cover construction and ponding in the uncovered areas.

4.0 RECOMMENDATIONS

Table 4.1 summarizes the observations and recommendations from the 2022 inspection, together with the findings from the 2021 inspection for comparison. The freeboards were recorded by the site engineering representative on July 5th, 2022.

Table 4-1: Inspection Observation and Recommendations

Inspection Item	2022 Inspection			2021 Inspection	
	Estimated Freeboard (m)[(2)]	Observation	Recommendations	Observations	Recommendations
Perimeter Dams					
Dam 1A	5.96	No progressive deteriorations are observed on the historical erosion gullies.	The erosion gullies should be monitored for any progressive deterioration. Otherwise, the repair can be done during the final spillway active if deemed needed.	Minor erosion on slopes with some deep erosion gullies. The damaged thermistor was repaired.	Repair deep erosion gullies if new deformation is observed.
Dam 1B	5.45	No progressive deteriorations are observed. Pond 2 water was approximately >50m upstream from the dam.	The erosion gullies should be monitored for any progressive deterioration. Otherwise, the repair can be done during the final spillway active if deemed needed.	Pond 2 water was approximately >50m upstream from the dam.	Surface maintenance, e.g., grading and backfilling if new deformation is observed.
Dam 1C	5.38	No progressive deteriorations are observed. Pond 2 water was approximately >50m upstream from the dam.	The erosion gullies should be monitored for any progressive deterioration. Otherwise, the repair can be done during the final spillway active if deemed needed.	Pond 2 water was approximately >50m upstream from the dam.	Surface maintenance e.g., grading and backfilling if new deformation is observed.
Dam 2	6.01	The source of water in the collection pond is concluded not to be seepage from Pond 2 due to elevation difference. Water was pumped back into TCA. Damaged thermistor was not repaired.	Repair the thermistor if practicable.	Minor erosion in the slopes. Seepage was not observed. Water was found in the seepage collection pond.	Repair the thermistor if practicable. Surface maintenance e.g., grading and backfilling if new deformation is observed. Pump seepage back into Pond 2.

Recommendations

Inspection Item	2022 Inspection			2021 Inspection	
	Estimated Freeboard (m)[2]	Observation	Recommendations	Observations	Recommendations
Dam 3	No water is impounded by this dam	No progressive deteriorations are observed.	The erosion gullies should be monitored for any progressive deterioration.	Minor erosion in the downstream slope.	Surface maintenance e.g., grading and backfilling if new deformation is observed.
Dam 4	5.64	Minor erosion in the slopes were repaired. One of the three thermistors is not reporting any readings.	Repair the thermistor if practicable.	Minor erosion in the slopes and wave erosion at HWM. One of the thermistors is damaged but could not be repaired in 2021 due to timing.	Surface and toe maintenance e.g., grading and backfilling if new deformation is observed. Repair the thermistor if practicable.
Dam 5	N/A[1]	No progressive deteriorations are observed.	The erosion gullies should be monitored for any progressive deterioration.	Minor erosion on surface.	Surface maintenance e.g., grading and backfilling if new deformation is observed.
Dam 6	N/A[1]	No progressive deteriorations are observed.	The erosion gullies should be monitored for any progressive deterioration.	Shallow erosion occurred near the north abutment and immediately repaired with coarse sand gravel.	Monitor the repaired location for deformation and future freshet flow.
Internal Dams					
Dam 3D	No water is impounded by this dam	No progressive deteriorations are observed.	The erosion gullies should be monitored for any progressive deterioration.	Minor erosion in the slopes.	Surface and slope maintenance e.g., grading and backfilling if new deformation is observed.
Dam J	3.55	No progressive deteriorations are observed.	The erosion gullies should be monitored for any progressive deterioration. Otherwise, the repair can be done during the final spillway active if deemed needed.	Over-steepened slope due to previous highwater erosion.	Repair the eroded slope with compacted sand and gravel if new deformation is observed prior to final closure.
Dam K	N/A[1]	Crest of regraded and diversion berm constructed. Thermistor was damaged.	Monitor the resloped location for deformation. Repair the thermistor in 2023.	Dam was resloped according to final closure design to 2H:1V or flatter with compacted sand with gravel.	Monitor the resloped location for deformation.

Recommendations

Inspection Item	2022 Inspection			2021 Inspection	
	Estimated Freeboard (m)[2]	Observation	Recommendations	Observations	Recommendations
Dam L	4.26	No deteriorative erosion was observed on the outlet structure.	Monitor the outlet structure for deformation and performance issues.	Cell 3 cover was completed with surface channel leading to the outlet structure near the south abutment in Dam L. Work as done according to closure design and overseen by site engineer. All temporary structure from last year were removed prior to closure construction.	Monitor the outlet structure for deformation and performance issues.
Dam M	N/A[1]	No progressive deteriorations are observed.	Re-slope the buttress to 2H:1V design for final closure.	No new observable deformations along Dam M, including the 2020 incident area. Cell 5 cover is completed, and ponding associated risks are mitigated on along Dam M.	Repair the sloughed section of the buttress and the localized failed section once the water level is lowered. Re-slope the buttress to 2H:1V design for final closure.
Dam N	N/A[1]	The Cell N cover was fully covered. Diversion ditch was built along the north to reroute freshet run-on. With the completion of the cover, freeboard will no longer be a concern for this dam.	Monitor the diversion ditch performance to ensure it is functioning as intended to reroute run-on.	The Cell N cover was partially covered. Temporary water management was built along the north to minimize 2022 freshet run-on. Small sand boils were observed along the toe near the north abutment.	Monitor the water level behind Dam N and manage the water when practicable in 2022. Monitor the sand boils and reroute traffic where necessary.
Divider Dykes	N/A[3]	No progressive deteriorations are observed.	Monitor the spillway for deformation and performance issues.	The closure spillway was constructed as per design. Cell 4 water level will be passively managed to be below the toe of the Divider Dyke. All seepages observed previously stopped and not expected to recur as the water level will be below the dam.	Monitor the spillway for deformation and performance issues.

Notes:
1. Water is not adjacent to the dam to determine available freeboard.
2. Freeboard was last measured on July 5th, 2022.
3. A spillway is constructed to passively manage water to be below the dam structure.

4.1 DAM 2 COLLECTION POND AND DSR

With the Pond 2 water level lowered in 2021, the water level in 2022 was found to be lower than the Dam 2 collection pond. This supports the conclusion that the source of water in the collection pond is not seepage from Pond 2, but surface run-on from the surrounding natural ground upstream of the pond. The operation procedures should be reconsidered as the water in the pond should no longer be considered as impacted water.

Considering the last DSR was completed in 2015, it is recommended that another be completed in 2023. This DSR should be completed by a 3rd party qualified professional to review the dam safety and protocols.

4.2 MAINTENANCE AND REPAIR PRIORITIES

In regard to the repairs and maintenance documented in Table 4.1, it is recommended that the following repairs be prioritized:

1. Reslope Dam M according to the closure design.

After the completion of the priority repairs, LMI should consider carrying out the following repairs:

- Repair the thermistor at Dam 4 if practicable.
- Repair the thermistor at Dam K if practicable.
- Monitor the dam slopes for progressive deterioration and erosion. If no deterioration or erosion is observed repair of the existing historical minor erosion can be done during the final spillway construction at the end of the closure.

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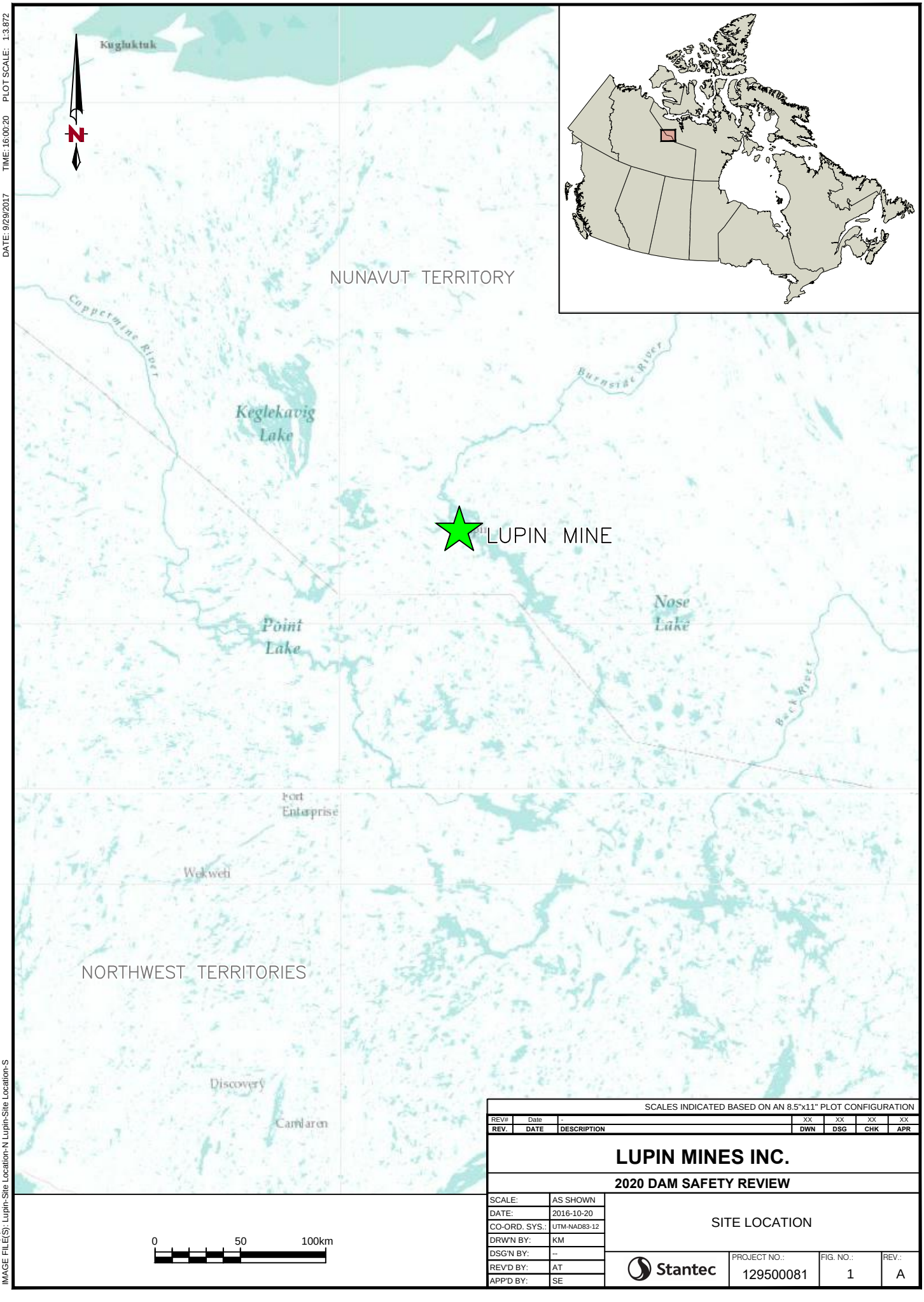

SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

REV#	Date	-	XX	XX	XX	XX
REV.	DATE	DESCRIPTION	DWN	DSG	CHK	APR

LUPIN MINES INC.

2020 DAM SAFETY REVIEW

SCALE:	AS SHOWN
DATE:	2016-10-20
CO-ORD. SYS.:	UTM-NAD83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

SITE LOCATION

Stantec

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IMAGE FILE(S): Lupin-Site Location-N Lupin-Site Location-S

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SCALE 1:50,000

SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

REV#	Date	-	XX	XX	XX	XX
REV.	DATE	DESCRIPTION	DWN	DSG	CHK	APR

LUPIN MINES INC.

2020 DAM SAFETY REVIEW

SCALE:	AS SHOWN
DATE:	2016-10-20
CO-ORD. SYS.:	UTM-NAD83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

SITE OVERVIEW

Stantec

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100m 0 100 200 400m

SCALE 1:6000

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REV.	DATE	DESCRIPTION	DWN	DSG	CHK	APR

LUPIN MINES INC.

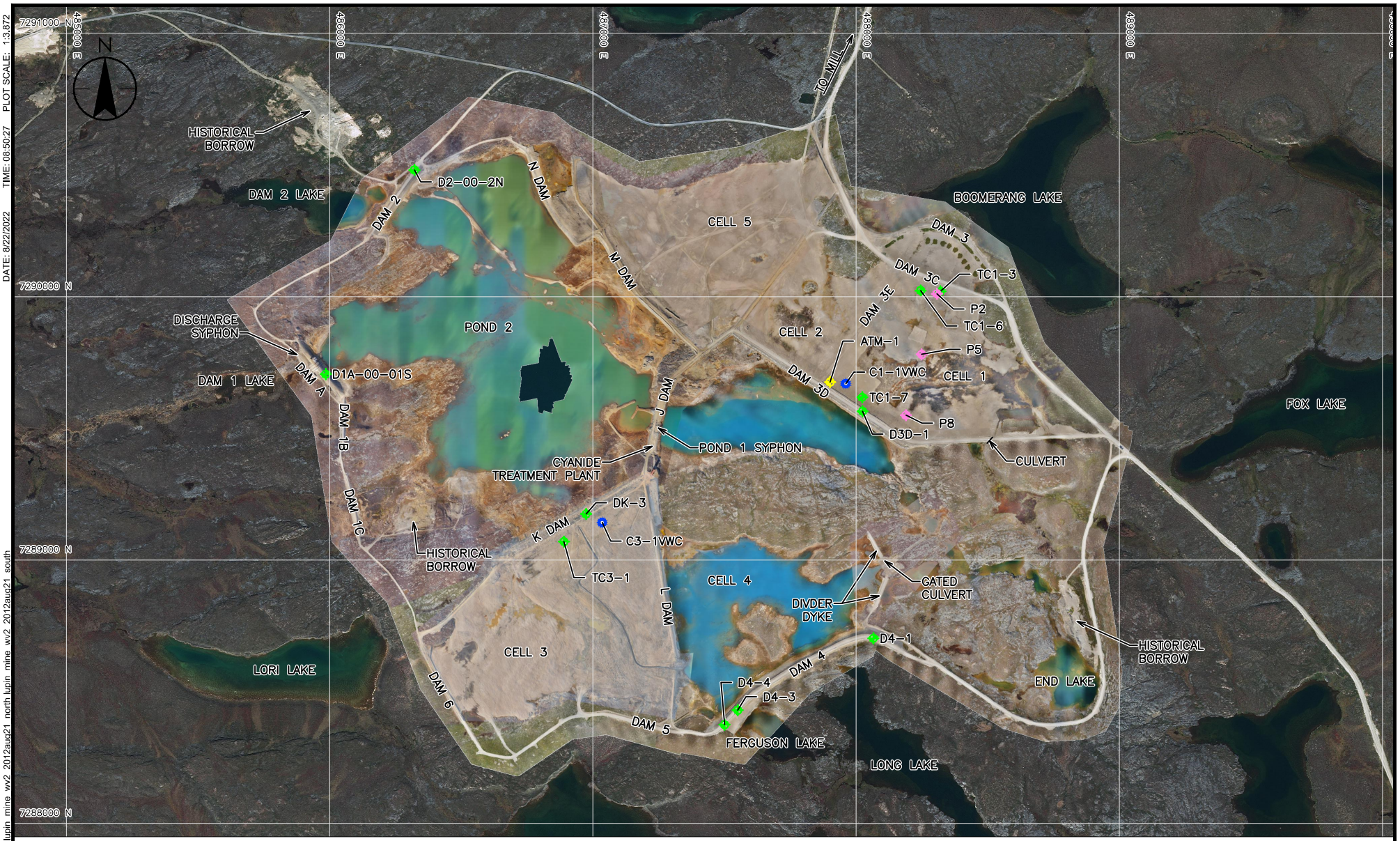
2020 DAM SAFETY REVIEW

SCALE:	AS SHOWN
DATE:	2016-10-20
CO-ORD. SYS.:	UTM-NAD83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

MILL SITE AND SUPPORT FACILITY PLAN

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500081	3	A



LEGEND

THERMISTORS STATUS

- ACTIVELY MONITORED
- STANDPIPE
- ATMOSPHERIC PRESSURE GAUGE
- HYDRAULIC WATER LEVEL TRANSDUCERS
- VOLUMETRIC WATER CONTENT SENSOR STRINGS

500m 0 500 1000m

SCALE 1:20,000

SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

LUPIN MINES INC.

TAILINGS CONTAINMENT STUDY AREA

SCALE:	AS SHOWN
DATE:	2022.08.19
CO-ORD. SYS.:	CSRS.UTM-8N
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

TAILINGS CONTAINMENT AREA

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500083	1	0

FILENAME: \\CA0200-PPFSS01\SHARED_PROJECTS\129500081\DISC\DRAFTING\07 WATER LEVEL INSTRUMENTATION\WATER LEVEL INSTRUMENTATION.DWG
XREF FILE(S):
IMAGE FILE(S): 2021 TCA ortho mosaic 10cm lupin mine wv2 2012aug21 north lupin mine wv2 2012aug21 south
DATE: 8/22/2022 TIME: 08:50:27 PLOT SCALE: 1:3,872

Appendix A Photographic Log

Photo 1: Looking northwest at the upstream slope of Dam 1A.

Photo 2: Looking northwest at the crest of Dam 1A.

Photo 3: Looking northwest at the downstream slope of Dam 1A.

Photo 4: Looking south at the crest of Dam 1B.

Photo 5: Looking south at the upstream slope of Dam 1B.

Photo 6: Looking south at the downstream slope of Dam 1B.

LMI	Lupin Mine Incorporated
	2022 Dam Safety Inspection
Site Inspection Photograph Log for Dam 1A and 1B	
Stantec	PN: 129500081 | FIGURE 1 | REV. A

Photo 7: Looking south at the crest of Dam 1C.

Photo 8: Looking south at the upstream slope of Dam 1C.

Photo 9: Looking south at the downstream slope of Dam 1C.

Photo 10: Looking southwest at the upstream slope of Dam 2.

Photo 11: Looking southwest at the downstream slope of Dam 2 with the seepage collection pond.

Photo 12: Looking southwest at the crest of Dam 2.

LMI	**Lupin Mine Incorporated**	
	2022 Dam Safety Inspection	
Site Inspection Photograph Log for Dam 1C and 2		
Stantec	PN: 129500081	FIGURE 2 REV. A

Photo 13: Looking northwest at the crest and diversion ditch of Dam 3.

Photo 14: Looking northwest at downstream slope of Dam 3.

Photo 15: Looking east at the downstream slope of Dam 3.

Photo 16: Looking northeast at diversion ditch outlet 1 of Dam 3.

Photo 17: Looking north at diversion ditch outlet 2 of Dam 3.

Photo 18: Looking east at the diversion ditch of Dam 3.

LMI	**Lupin Mine Incorporated**	
	2022 Dam Safety Inspection	
Site Inspection Photograph Log for Dam 3		
Stantec	PN: 129500081	FIGURE 3 REV. A

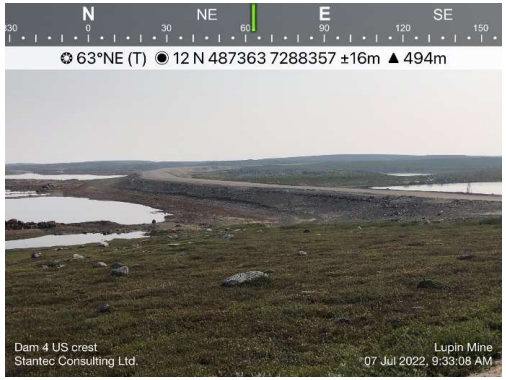


Photo 19: Looking northeast at the upstream crest of Dam 4.

Photo 20: Looking southeast at the upstream slope of Dam 4 with erosion gully.

Photo 21: Looking southwest at the downstream crest of Dam 4 with the repaired completed over the erosion gully.

Photo 22: Looking southwest at the downstream crest of Dam 4.

Photo 23: Looking east at the downstream crest of Dam 4.

Photo 24: Looking southwest at the downstream crest of Dam 4 with the erosion repaired. .

LMI	**Lupin Mine Incorporated**	
	2022 Dam Safety Inspection	
Site Inspection Photograph Log for Dam 4		
Stantec	PN: 129500081	FIGURE 4 REV. A

Photo 25: Looking east at the downstream crest of Dam 5.

Photo 26: Looking east at the upstream slope of Dam 5.

Photo 27: Looking southeast at the downstream slope of Dam 5.

Photo 28: Looking southeast at the crest of Dam 6.

Photo 29: Looking southeast at the crest and diversion berm of Dam 6.

LMI	**Lupin Mine Incorporated**	
	2022 Dam Safety Inspection	
Site Inspection Photograph Log for Dam 5 and 6		
Stantec	PN: 129500081	FIGURE 5 REV. A

Photo 30: Looking southwest at the upstream slope of Dam J, adjacent to Pond 1.

Photo 31: Looking north at the downstream slope of Dam J, adjacent to Pond 2.

Photo 32: Looking north at the crest of Dam J.

LMI	**Lupin Mine Incorporated**		
	2022 Dam Safety Inspection		
Site Inspection Photograph Log for Dam 3D and J			
Stantec	PN: 129500081	FIGURE 6	REV. A

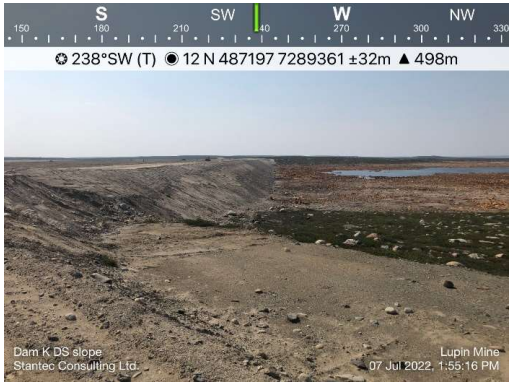


Photo 33: Looking southwest at the downstream slope of Dam K.

Photo 34: Looking southwest at the downstream slope of Dam K.

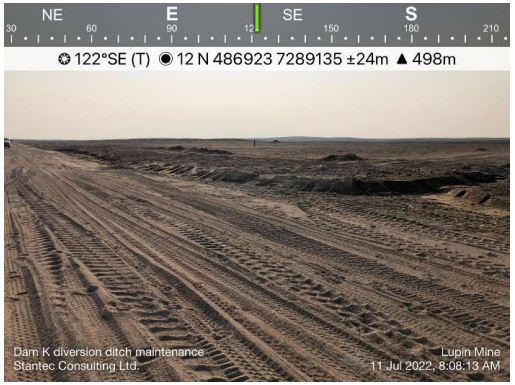


Photo 35: Looking southeast at the upstream ditch along Dam K.

Photo 36: Looking southwest at the regraded crest and diversion berm of Dam K.

Photo 37: Looking northeast at the downstream slope of Dam K.

LMI	**Lupin Mine Incorporated**	
	2022 Dam Safety Inspection	
Site Inspection Photograph Log for Dam K		
Stantec	PN: 129500081	FIGURE 7 REV. A

Photo 38: Looking southwest at the Cell 3 outlet and surface channel.

Photo 39: Looking south at the Cell 3 outlet that transitions into the shoreline.

Photo 40: Cell 3 cover channel.

Photo 41: Looking north at the Dam L crest from the south abutment.

LMI	**Lupin Mine Incorporated**	
	2022 Dam Safety Inspection	
Site Inspection Photograph Log for Cell 3 Surface Ditch and Dam L		
Stantec	PN: 129500081	FIGURE 8 REV. A

Photo 42: Looking northwest at the crest of Dam M with Cell 5 to the right.

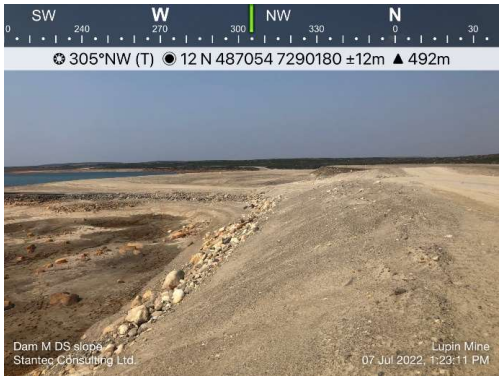


Photo 43: Looking northwest at the downstream slope of Dam M with Cell N in the background.

Photo 44: Looking at the D/S of Dam M.

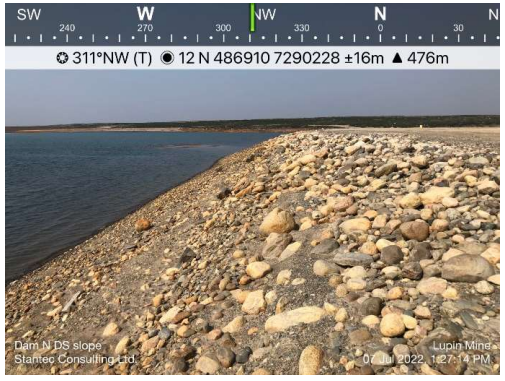


Photo 45: Looking northwest at the downstream slope of Dam N with Pond 2.

Photo 46: Downstream slope of Dam N with old sand boils near the north abutment.

LMI	**Lupin Mine Incorporated**	
	2022 Dam Safety Inspection	
Site Inspection Photograph Log for Dam M and N		
Stantec	PN: 129500081	FIGURE 9 REV. A

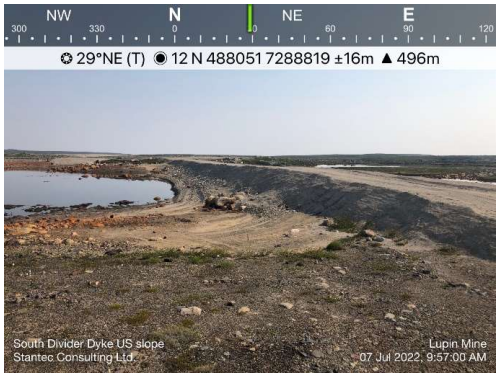


Photo 47: Looking northeast at the upstream slope of the south divider dyke.

Photo 48: Looking north at the downstream slope of the south divider dyke.

Photo 49: Looking northwest at the upstream slope of the north divider dyke.

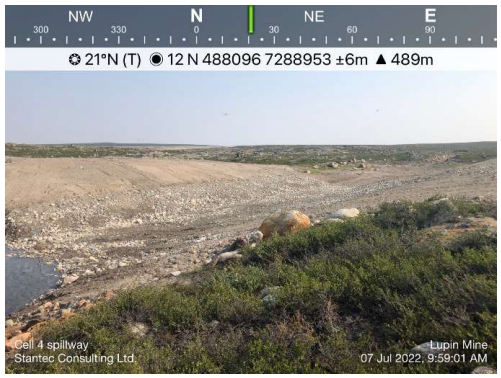


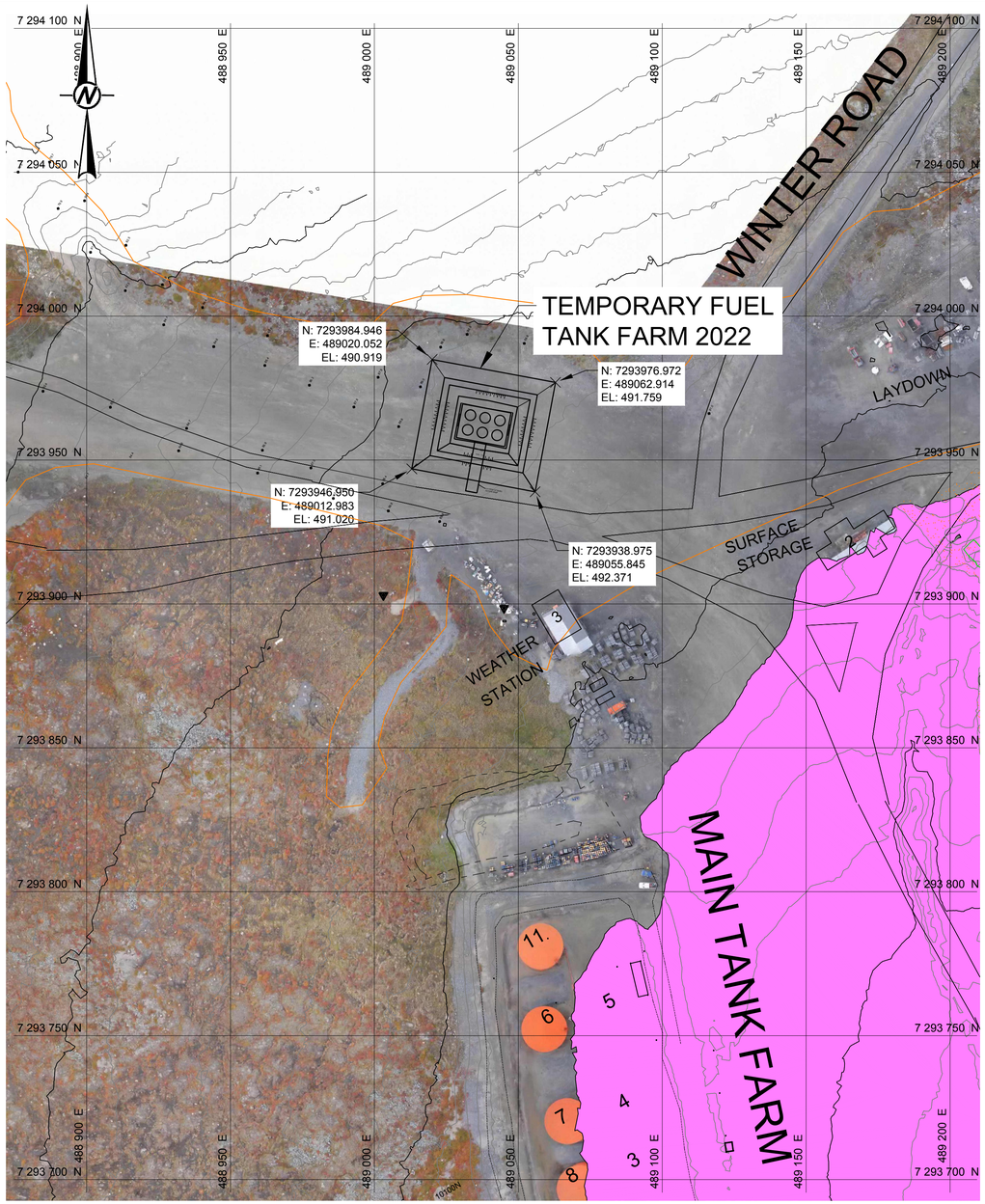
Photo 50: the newly constructed Cell 4 spillway through the Divider Dyke.

Photo 51: Looking northwest at the crest of north divider dyke.

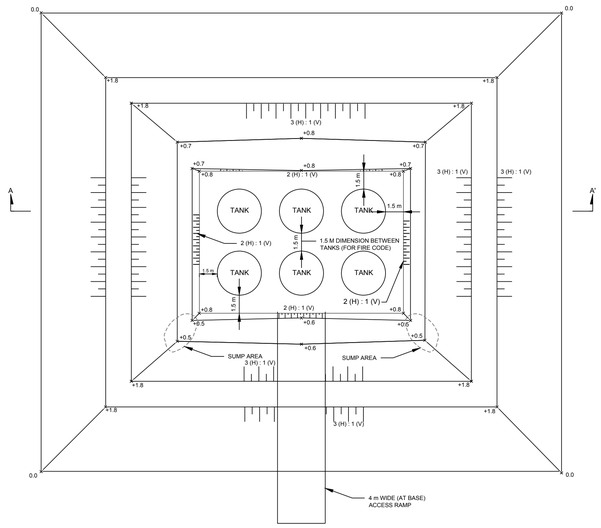
Photo 52: Looking north at the downstream slope of north divider dyke.

LMI	Lupin Mine Incorporated
	2022 Dam Safety Inspection
Site Inspection Photograph Log for Divider Dykes	
Stantec	PN: 129500081 FIGURE 10 REV. A

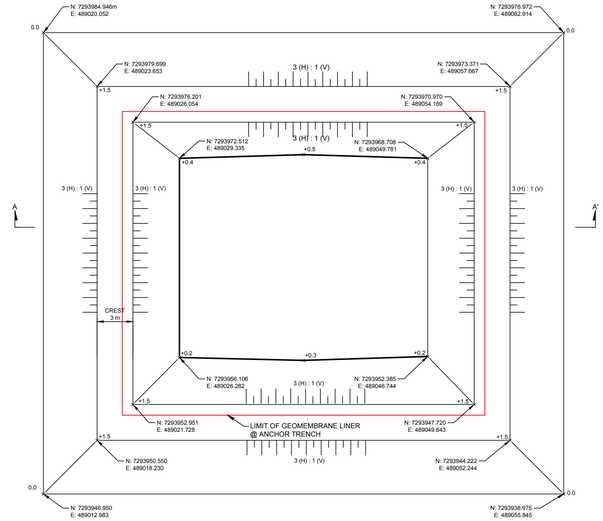
APPENDIX B: TEMPORARY FUEL FARM



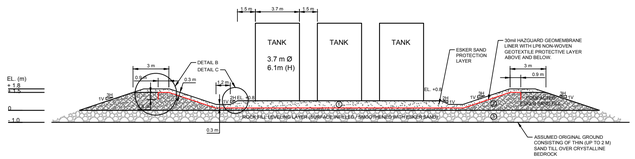
PLAN VIEW
SCALE 1:1000



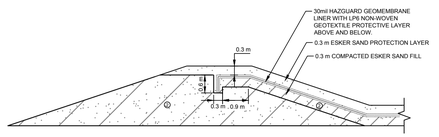
PLAN VIEW TOP OF ESKER SAND PROTECTION LAYER
SCALE 1:250 m



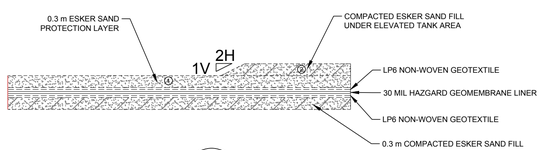
PLAN VIEW TOP OF COMPACTED ESKER SAND FILL [PRIOR TO GEOMEMBRANE PLACEMENT]
SCALE 1:250 m



SCALE 1:250 m A 1 CROSS SECTION A -A'



SCALE N.T.S. B 1 KEY TRENCH DETAIL



SCALE N.T.S. C 1 LINER DETAIL

NOTE(S)

1. HAZGUARD GEOMEMBRANE TO BE SUPPLIED BY LAYFIELD AND INSTALLED AS A SINGLE PANEL.
2. LP6 NON-WOVEN GEOTEXTILE TO BE INSTALLED WITH MINIMUM 0.6 m OVERLAP OF PANELS .
3. ESKER SAND TO BE PLACED/SPREAD IN 150 mm LIFTS USING LOW GROUND PRESSURE EQUIPMENT (e.g., TRACKED BOBCAT). STONES LARGER THAN 75 mm DIAMETER TO BE REMOVED BEFORE PROOF ROLLING COMPACTED SUBGRADE / BERM / TANK AREAS.
4. PROOF ROLLING TO BE COMPLETED OVER SPECIFIED AREAS USING A SMALL ROLLER TO GENTLY COMPACT ESKER SAND UNTIL A MAXIMUM DEFLECTION OF 20mm IS ACHIEVED.

LEGEND

①	ESKER SAND PROTECTION LAYER
②	COMPACTED ESKER SAND FILL
③	ROCK FILL LEVELING LAYER (SURFACE INFILLED / SMOOTHENED WITH ESKER SAND)
× +1.8	ELEVATION RELATIVE TO FINISHED SURFACE OF ROCKFILL LEVELLING LAYER

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 27 JUNE 2022
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
0	2022-06-27	ISSUED FOR CONSTRUCTION	FB	JG	PD	KAB

SEAL

CLIENT
LUPIN MINES INCORPORATED

CONSULTANT
GOLDER
MISSISSAUGA OFFICE
6925 CENTURY AVE. SUITE 100
MISSISSAUGA, ONTARIO
COUNTRY
[+1] (995) 567 4444
www.golder.com

PROJECT
LUPIN MINE CLOSURE
NUNAVUT, CANADA

TITLE
PROPOSED TEMPORARY FUEL STORAGE

PROJECT NO.	CONTROL	REV.		FIGURE
21503000	0001	0	1 of 1	1

0 25 mm
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: \\golder.gds\complexdata\office\Ontario\SIM\Clients\Mandalay_Resources\Lupin_Mine\99_PROJ\21503000_LupinMine_Closure\40_PROD\0001_2022_Mine_Closure\ | File Name: 21503000-0001-MC-0001.dwg | Last Edited By: jjinge Date: 2022-06-27 Time:5:28:28 PM | Printed By: JinGe Date: 2022-06-27 Time:5:29:03 PM

APPENDIX C: ADDENDA TO PLANS, REPORTS OR MANUALS

C-1: Approved Final Closure and Reclamation Plan dated August 2020

Addenda Update to Table 14: Summary of Measures for Final Closure

C-2: Approved Post Closure Monitoring Plan dated April 2021

Addenda Update to Table 9: Water Quality Monitoring Requirements for Active and Passive Closure at Lupin Mine

Appendix C-1: Addenda to approved Final Closure and Reclamation Plan dated August 2020, Table 14 - Summary of Measures for Final Closure

Component	Description	Closure Phase					Post-Closure Phase				
		2018	2019-2022	2022-2023	2024	2025	2026	2027	2028	2029	2030
		Preparatory Work	Active	C&M	Active Stage		Passive Stage				
Underground Mine	Construction of spillways in Dam 1A and J Dam; place geotextile and rip rap to 2 m depth							X			X
	Operate Winter Ice Road for salvage removal					X	X				
	Backfilling of shafts to prevent animal or human entrance					X					
	Blasting down crown pillars where required for stability or disposal – to be carried out under approved care and maintenance plan		X								
	Disposing of contaminated soil, waste rock and demolition rubble into open crown pillars – to be carried out under approved care and maintenance plan		X		X	X					
	Backfilling of crown pillars with rock fill (to 1.5 m above surface to allow for settlement) – to be carried out under approved care and maintenance plan					X					
	Capping rock fill in crown pillars with 1.0 m of esker material					X					
Waste Rock	Excavate waste rock from perimeter areas and dispose in the open crown pillars, landfill(s) or central waste rock area[(a)] – to be carried out under approved care and maintenance plan					X					
	Excavate waste rock containing high levels[(b)] of As, CN or P_bNO_3 and dispose in shafts or crown pillars to be carried out under approved care and maintenance plan		X								
	Contouring remaining waste rock and capping with 1.0 m of esker material					X					
	Place a 10 m long plug of rock fill in the adit and portal area		X								
Tailings Containment Area	Removal of tailings pipeline; bury in landfill		X								
	Remove any tailings from emergency dump and dispose in crown pillar					X					
	Complete covering of remaining tailings area with 1.0 m of esker material – to be carried out under approved Final TCA Closure Plan	X	X	X	X	X					
	Demolish treatment plant; dispose in landfill(s)					X	X				
	Installation of permanent monitoring instrumentation – to be carried out under approved Final TCA Closure Plan					X					
	Regrading granular slopes on M Dam					X					
Buildings and Equipment	Removal of asbestos containing materials, disposal in landfill(s)		X								
	Remove salvageable materials; consolidate for shipment off-site		X				X				
	Removal of above-ground mechanical and electrical equipment		X								
	Demolition of ancillary buildings (shops, storage, camp); disposal of rubble in open crown pillars or landfill(s)		X								
	Demolition of mine and mill buildings; disposal of rubble in open crown pillars or landfill(s)		X			X					
	Hoe ram concrete foundation slabs; leave in place and cover		X								
	Removal of freshwater supply system pumphouse; remove pipeline and dispose in the landfill(s)		X								
	Placement of 0.3 granular fill over slabs		X								
	Rehabilitation of roads (cut through access roads and removal of culverts scarify and grade)					X					
	Dismantling and removal of sewage pipeline, lagoon shack and pumping facilities					X					
	Disposal of unsalvageable / un-recyclable non-hazardous waste in landfill(s) – to be carried out under existing approved management plan		X			X					
	Burn combustible material – to be carried out under existing approved licence/permit	X	X	X		X					
Borrow and Quarry Areas	Contouring esker area and placement of erosion protection in drainage paths					X					
Chemicals	Decontaminate: oil, fuel and glycol systems		X	X		X					
	Drum paints, solvents, chemicals, glycols, and hazardous materials collection for shipment to off-site disposal		X	X	X	X					
	Remove ashes from burn pit and bury in landfill(s) > 2m below final grade – to be carried out under existing approved licence/permit					X					
	Burn waste oil – to be carried out under existing approved licence/permit		X			X					
Chemicals	Consume most of diesel fuel for closure operations		X	X	X	X					
	Burn excess fuel at end of closure activities – to be carried out under existing approved licence/permit					X					
	Empty and purge fuel tanks and dispose in accordance with the Canadian Environmental Protection Act Regulation		X	X	X	X					
	Excavation of hydrocarbon contaminated soils, consolidate into containers and bury in open crown pillars		X		X	X					
	Soil currently in landfarm to be removed and disposed of into the crown pillar.;				X						

Component	Description	Closure Phase					Post-Closure Phase				
		2018	2019-2022	2022-2023	2024	2025	2026	2027	2028	2029	2030
		Preparatory Work	Active	C&M	Active Stage		Passive Stage				
Machinery and Mobile Equipment	Drain fluid from equipment to be left on-site and dispose equipment in landfill(s)					X					
	Drain fluid from equipment used for long-term maintenance (e.g., excavators)[c] and dispose in landfill(s) or off-site										X
Landfill	Place wastes into existing landfill(s) – to be carried out under existing approved management plan		X			X					
	Use waste rock to infill voids and create a stable contoured surface which drains freely					X					
	Cover contoured landfill(s) with 1 m of esker material					X					
Site Roads	Scarify all-weather roads; remove culverts										X
Water Management Facilities	Treat water inventory with lime and release to lower water level – to be carried out under existing approved licence/permit	X	X	X		X					
	Construction of spillways in Dam 1A and J Dam; place geotextile and rip rap to 2 m depth							X			X
	Excavation of spillways on Upper and Lower Sewage Lakes					X					
Mob/Demob	Move Mobile equipment from Ulu to Lupin - Cancelled										
	Operate Winter Ice Road for salvage removal					X	X				

Appendix C-2: Addenda Update to Table 9 - Water Quality Monitoring Requirements for Active and Passive Closure at Lupin Mine

Station Name[a]	Station Description	Phase 1 – Active Closure			Phase 2 – Passive Closure					Parameters and Sampling Frequency[b]
		2019-2023	2024	2025	2026	2027	2028	2029	2030	
		Preparatory Work and C&M	Active Monitoring		Passive Monitoring					
LUP-01	Freshwater Intake from Contwoyto Lake	Yes	Yes	Yes	Only if still active					Volume: Monthly totals Field, conventional, total metals, and biological: Annually
LUP-10	Pond 2 discharge at Dam 1A	Yes	Yes	Yes	No – Recognized Closured Mine Status anticipated 30 January 2022					Volume: Quantity of treated effluent discharged, measured, and recorded in cubic metres Field, conventional, total metals, and cyanide, no visible sheen oil & grease: Daily during periods of discharge Nutrients, radium: Weekly during discharge Cyanide and bioassay: Monthly (no less than one-month intervals) commencing with the first day of decant
LUP-10a (LUP-102)	Internal station in TCA Pond 2, approximately 100 m upstream from siphon intake	Yes	Yes	Yes	No					Field, conventional, nutrients, total metals, cyanide, radium, and bioassay: Once prior to initiation of decant and once prior to termination of decant
LUP-10b	Pond 2 TCA spillway	Not active	Not active	Not active	Yes – new monitoring station installed at Dam 1A spillway. See Section 6.2.1 for TCA pH triggers and adaptive monitoring requirements.					Field, conventional, nutrients, total metals, cyanide, radium, and bioassay: Twice-yearly, once in freshet and once in late open-water season (aligned with seepage sampling program at TCA and Waste Rock Dome)
LUP-11	Mine-water discharge at automatic sample in the mill	Not active	Not active	Not active	Not active					2AM-LUP2032 confirms station as “Inactive”. Refer to Schedule J, Table 1.
LUP-12	Mill tailings taken at the mill	Not active	Not active	Not active	Not active					2AM-LUP2032 confirms station as “Inactive”. Refer to Schedule J, Table 1
LUP-14	Decant structure from the Sewage Lakes Disposal Facilities	Yes	Yes	Yes	No – decant structure will be decommissioned during Phase 1					Volume: Monthly quantity of treated effluent discharged in cubic meters Field, conventional, nutrients, total metals, biological Other (biochemical oxygen demand), total phosphorus, total orthophosphorus, total Kjeldahl nitrogen: First day of discharge and then monthly thereafter during periods of flow
LUP-15	Discharge from TCA Pond 1 (east pond) not TCA Pond 2 (west pond)	Not active	Not active	Not active	Not active					2AM-LUP2032 confirms station as “Inactive”. Refer to Schedule J, Table 1.
LUP-16	TCA Pond 2 at Centre	Not active	Not active	Not active	Not active					2AM-LUP2032 confirms station as “Inactive”. Refer to Schedule J, Table 1.
LUP-17	TCA Pond 2 upstream of LUP-10	Not active	Not active	Not active	Not active					2AM-LUP2032 confirms station as “Inactive”. Refer to Schedule J, Table 1.
LUP-19	East End of Seep Creek in Dam 2 Lake	Not active	Not active	Not active	Not active					2AM-LUP2032 confirms station as “Inactive”. Refer to Schedule J, Table 1.
LUP-20	West end of Seep Creek before discharge into Unnamed Lake (also known as East Lake)	Yes	Yes	Yes	No – Lupin anticipated to have ceased discharge from TCA in 2021; no further monitoring required in Seep Creek or Sun Bay					Field, conventional, nutrients, total metals, cyanide, and radium: Weekly during discharge from the TCA, commencing with the fist day of decant
LUP-21	North end of Concession Creek before discharge into Unnamed Lake (also known as East Lake). MDMER Reference Area.	Yes	Yes	Yes	No – Lupin anticipated to have ceased discharge from TCA in 2021; no further monitoring required in Seep Creek or Sun Bay					Field, conventional, nutrients, total metals, cyanide, and radium: Weekly during discharge from the TCA, commencing with the fist day of decant
LUP-22	Inner Sun Bay near center and midway between end of peninsula and west shore	Yes	Yes	Yes	No – Lupin anticipated to have ceased discharge from TCA in 2021; no further monitoring required in Seep Creek or Sun Bay					Field, conventional, nutrients, total metals, cyanide, and radium: Weekly at mid-depth commencing one week prior to discharge from the TCA and concluding two weeks after cessation of the discharge

Station Name[a]	Station Description	Phase 1 – Active Closure			Phase 2 – Passive Closure					Parameters and Sampling Frequency[b]
		2019-2023	2024	2025	2026	2027	2028	2029	2030	
		Preparatory Work and C&M	Active Monitoring		Passive Monitoring					
LUP-24	Inner Sun Bay at mid-way point in narrows. MDMER Exposure Area.	Yes	Yes	Yes	No – Lupin anticipated to have ceased discharge from TCA in 2021; no further monitoring required in Seep Creek or Sun Bay					Field, conventional, nutrients, total metals, cyanide, and radium: Weekly at mid-depth commencing one week prior to discharge from the TCA and concluding two weeks after cessation of the discharge and when bioassay sample is collected at LUP-10 just prior to termination of decant
LUP-25	Outer Sun Bay	Yes	Yes	No	No – Lupin anticipated to have ceased discharge from TCA in 2021; no further monitoring required in Seep Creek or Sun Bay					Field, conventional, nutrients, total metals, cyanide, and radium: Weekly at mid-depth commencing one week prior to discharge from the TCA and concluding two weeks after cessation of the discharge
LUP-26	Contwoyto Lake in bay east of water intake	Not active	Not active	Not active	Not active					2AM-LUP2032 confirms station "Inactive". Refer to Schedule J, Table 1
LUP-27	Bulk Fuel Storage Facility	Yes	Yes	Yes	No – will be remediated by the end of Phase 1					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Once prior to discharge and weekly during periods of discharge
LUP-28	Discharge from the Landfarm Facility	No	No	Yes	Only if not yet remediated					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Once prior to discharge and weekly during periods of discharge
LUP-29[c]	Landfarm Facility Monitoring Well – Upgradient	Not required	Not required	Not required	Not required, assuming wells remain inactive					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-30a[c]	Landfarm Facility Monitoring Well – Downgradient	Not required	Not required	Not required	Not required, assuming wells remain inactive					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-30b[c]	Landfarm Facility Monitoring Well – Downgradient	Not required	Not required	Not required	Not required, assuming wells remain inactive					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-31	Seepage from the Landfill Facility	No	No	Yes	Yes – continue confirmatory sampling to check for any residual contaminated soils and inputs into seepage.					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-32	Landfill Facility Monitoring Well – Upgradient	Well locations will be confirmed after footprint of landfill is confirmed								Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-33a	Landfill Facility Monitoring Well – Downgradient	Well locations will be confirmed after footprint of landfill is confirmed								Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-34b	Landfill Facility Monitoring Well – Downgradient	Well locations will be confirmed after footprint of landfill is confirmed								Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-35	Seepage from the Landfill Facility	No	No	Yes	Yes – continue confirmatory sampling to check for any residual contaminated soils and inputs into seepage.					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-36	Demolition Landfill Facility Monitoring Well – Upgradient	No	No	No	Demolition landfill is not planned for construction					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-37a	Demolition Landfill Facility Monitoring Well – Downgradient	No	No	No	Demolition landfill is not planned for construction					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-37b	Demolition Landfill Facility Monitoring Well – Downgradient	No	No	No	Demolition landfill is not planned for construction					Field, conventional, nutrients, total metals, total oil and grease, and BTEX: Monthly during periods of observed flow (June to September)
LUP-EL-01	Unnamed Lake (also known as East Lake) near shoreline near the potential seepage inputs	Yes	Yes	Yes	Yes – confirmatory sampling for model predictions					Field, conventional, total metals: Twice-yearly; once in freshet and once in late open-water season, ensuring that baseline samples are collected prior to construction of the waste rock dome.

Station Name[a]	Station Description	Phase 1 – Active Closure			Phase 2 – Passive Closure					Parameters and Sampling Frequency[b]
		2019-2023	2024	2025	2026	2027	2028	2029	2030	
		Preparatory Work and C&M	Active Monitoring		Passive Monitoring					
LUP-BL-01	Boot Lake near shoreline near the potential seepage inputs	Yes	Yes	Yes	Yes – confirmatory sampling for model predictions					Field, conventional, total metals: Twice-yearly; once in freshet and once in late open-water season, ensuring that baseline samples are collected prior to construction of the waste rock dome.
LUP-LSL-01	Lower Sewage Lake near shoreline near the potential seepage inputs	Yes	Yes	Yes	Yes – confirmatory sampling for model predictions					Field, conventional, total metals: Twice-yearly; once in freshet and once in late open-water season, ensuring that baseline samples are collected prior to construction of the waste rock dome.
LUP-SP-01 to LUP-SP-XX[d]	Seeps from the Waste Rock Dome, locations of observed seepage or flow from the waste rock pile	Yes	No	Yes, if flowing	Yes, if flowing – continue confirmatory sampling to check for any residual contaminated soils and inputs into seepage. Combine sampling programs with landfill seepage monitoring (LUP-31 and LUP-35).					Field, conventional, total metals: Twice-yearly; once in freshet and once in late open-water season. [Add oil and grease and BTEX as additional parameters not required by Water Licence due to hydrological connectivity with landfill – see parameter list for LUP-31 and LUP-35]
LUP-TCA-01 to LUP-TCA-XX[d]	Seeps from the TCA, locations of observed seepage	No	No	Yes, if flowing	Yes, if flowing					Field, conventional, total metals: Twice-yearly; once in freshet and once in late open-water season.

a) Previous EEM sampling locations are not included unless they are also Water Licence monitoring locations.

b) Parameter list provided in Table 10.

c) Landfarm wells are inactive and monitoring is not required per letter from Nunavut Water Board to LMI (dated 17 April 2017)

d) Seep sampling locations will be added to the post-closure monitoring program as new seeps are documented. MDMER = Metal Diamond Mining Effluent Regulations; EL = East Lake; BL = Boot Lake; LSL = Lower Sewage Lake; SP = seep; TCA = Tailings Containment Area; BTEX = Benzene, toluene, ethylbenzene, and xylenes.