2AM-LUP2032
LUPIN MINE SITE
2021 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 was in Active Closure phase in 2021. The Lupin Mine camp opened on May 4, 2021 for 174 days, through October 24, 2021, During this period, 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;
- reclamation activities included:
    - Annual geotechnical inspection of engineered facilities including the Tailings Containment Area (TCA).
    - Collecting and analyzing post-freshet water quality samples in accordance with the Water Licence and to inform the technical team.
    - Treatment and discharge of water from Pond 2.
    - In-situ treatment and water transfers at Pond 1 and Cell 4 to support closure activities.
    - Water transfers at Cell 3 and Cell 5 to facilitate material placement.
    - Drilling and blasting at the crown pillar.
    - Completion of 1.0 m of clean esker cover at Cell 3 and Cell 5.
    - Construction of outfall structures in accordance with the final design at Cell 3 and Cell 5.
    - Construction of the drainage channel at Cell 3 and associated sub-excavation, haulage, and disposal of Cell 3 tailings to a location adjacent to the NW corner of Cell 4.
    - Construction of the spillway in accordance with the final design at Cell 4.
    - Completion of a “tailings forensics identification” program within the TCA.
    - Routine pH monitoring at Pond 1 and Pond 2 during discharge.
    - Consolidation of potential acid generating (PAG) waste rock and cover with 1.0 m of clean esker at the mill site.
    - Excavation of hydrocarbon-contaminated soil and disposal into underground workings.
    - Installation of thermistor strings and moisture meters in accordance with the approved monitoring plan. Repairs to malfunctioning instruments.
    - Consolidation of hazardous material and shipping offsite for disposal.
    - Reclamation/backfill of the historical mine portal.
    - Completion of K Dam re-sloping to the closure design of 2.1H:1V.
    - Cover of approximately half of the exposed tailings at Cell N in 1.0 m of clean esker material.
    - Excavating material considered to be suitable for construction purposes at the Finger Lakes Esker area.
    - Hauling and stockpiling clean esker material.
    - Transfer of water from upper sewage lagoon to lower sewage lagoon, discharge of water from lower sewage lagoon.
    - Hauling and disposing of remaining pallets of shotcrete onsite within the Cell 5 void area.
    - Ongoing cleanup of contaminated soils in the mill area.

EXECUTIVE SUMMARY INUKTITUT

2021 ᐅᑭᐅᒧᑦ ᑐᓴᖅᓯᑕᐅᑦ ᐊᖏᓴᖅᖏᑐᔪᓄᑦ ᓯᕕᑭᓇᖅᓯᒪᔪᑦ (ᐱᓴᓕᑦ ᑕᒪᑦᑭᖅᓂ ᐅᖅᑲᐅᓯᑦ)

ᑕᑦᓇ ᓗᐱᓘ ᐅᓴᖅᓯᐅᖅᖃᕐᐱᖅ ᐱᓕᕆᐃᐅᓯᒪᔪᖅ ᐅᒥᐅᑎᖅᓂᖏᑐ ᐱᓕᕆᐊᖏᑐ ᑕᒡᒐᓂ 2021. ᑕᑦᓇ ᓗᐱᓘ ᐅᓴᖅᓯᐅᖅᖃᕐᐱᖅ ᓴᓂᓇᕐᖏᑐ ᐊᖏᒪᖅᑐᑐᖅ ᑕᒡᒐᓂ ᒪᐃ 4, 2021 ᑕᕐᔪᓇᖏᑐ 174 ᐅᕐᓗᑦ, ᑎᑭᑦᓗᒍ ᐊᐅᑐᐱᓕᓐ 24, 2021, ᐊᑐᖅᑎᑦᓗᒍ ᐅᓇ ᐱᓕᕆᐃᖏᑐ, ᐅᒥᐅᓂᖏᓄᑦ ᐱᓕᕆᐊᑦ ᐃᓕᓴᑦᑦ ᑕᒪᔪᓂᖏᑐ:

- ᓴᓂᓇᖅᐹ ᐊᖏᒪᖅᑐᖅ ᐊᒻᒪ ᐅᒥᐅᑐᖅ, ᐊᑐᖅᓂᖏᑐ ᐃᒥᒃᐅᕐᔪᖏᓐᓇᕐᑐᖅ ᐃᒪᖅ, ᐊᒻᒪ ᔪᕐᑕᖅᓂᖏᑦ ᕿᔪᖅᑕᐃᖅ ᑕᒃᓂᖏᑐ ᕿᔪᖅᑕᐃᑦ ᑕᓯᑦ ᔪᕐᑕᖅᕕᖅ ᐱᓕᕆᐊᖅ, ᐊᒻᒪ ᐃᔪᐊᓕᑦᑎᓂᖏᑦ ᑕᒪᐃᑦᓄᑦ ᓴᓂᓇᖅᐹᒥ ᐊᐅᑕᔪᑦ
- ᓴᓗᒪᖅᓴᓂᖏᑐ ᐱᓕᕆᐊᖓᔪᑦ ᐃᓕᓴᑦᑦ:
  - ᐅᑭᐅᒧᑦ ᓄᓇᓕᕕᔪᑎᑦ ᖃᐅᔨᓴᖅᓂᖏᑦ ᖃᐅᔨᒪᓕᐅᔪᑦ ᐱᓕᕆᑕᔪᑎᑦ ᐃᓕᓴᑦᑦ ᑕᑦᓇ ᐅᓴᖅᑕᖅᓂᔪᑦ ᓄᑦᓯᐅᑦᑎᓂᖓᓐᓂᖅ (TCA).
  - ᑲᑎᑎᖅᓂᖏᑦ ᐊᒻᒪ ᖃᐅᔨᓴᖅᓂᖏᑦ ᐊᐅᓐᑐᓕᖅᑎᑦᓗᒍ ᐃᒪᖅ ᐊᖃᐅᓂᖓ ᓇᓗᓇᐃᖅᑐᑐᖅᓂᖏᑦ ᒪᓕᓐᓴᓕᑦ ᑕᑦᓯᐊᖅ ᐃᒪᖅ ᑕᑐᖅᑐᓂᖓ ᓴᓇᔪᓕᔪᓂᖏᑦ ᕿᓇᖃᑎᑦ.
  - ᓴᓗᒪᖅᓴᓂᖏᑦ ᐊᒻᒪ ᔪᕐᑎᑎᑦᓂᖏᑦ ᐃᒪᖅ ᑕᑦᓯᖏᓐ ᑕᔪᖅᖃᖅ 2.
  - ᑕᐃᒪᓕᑕᐅᑦ ᓴᓗᒪᖅᓴᓂᖏᓐ ᐊᒻᒪ ᐃᒪᖅ ᓄᑎᖅᓂᖏᑦ ᑕᑦᓯᖏᓐ ᑕᔪᖅᖃᖅ 1 ᐊᒻᒪ ᔪᕐᑕᖅᕕᖅ 4 ᐃᑲᔪᖅᑐᖅᓴᓗᒍ ᐅᒥᐅᓂᖏᓄᑦ ᐱᓕᕆᐊᑦ.
  - ᐃᒪᖅ ᓄᑎᖅᓂᖏᑦ ᑕᑦᓯᖏᓐ ᔪᕐᑕᖅᕕᖅ 3 ᐊᒻᒪ ᔪᕐᑕᖅᕕᖅ 5 ᐃᑲᔪᖅᑐᖅᓂᖏᓄᑦ ᓭᓇᑦ ᐃᓕᐅᕆᖅᓂᖏᑦ.
  - ᐃᔨᑕᕐᓂᖅ ᐊᒻᒪ ᖃᖅᑕᐃᓂᖅ ᑕᑦᓯᖏᓂ >ᖅᑐᓂᖓᓂ >ᖅᑐᓂᐊ.
  - ᐱᐊᓂᑎᖅᓂᖓ ᑕᑦᓇ 1.0 ᒋᑕᑦ ᓴᓗᒪᓕᔪᖅ ᖃᒋᖅ ᖃᓄᖅᑐᑕᑎᖓ ᑕᑦᓯᖏᓂ ᔪᕐᑕᖅᕕᖅ 3 ᐊᒻᒪ ᔪᕐᑕᖅᕕᖅ 5.
  - ᓴᓇᔨᐅᓂᖓ ᔪᕐᔪᕐᕕᖓ ᓴᓇᓭᒪᓂᖏᑐ ᒪᓄᑲᓕᑦ ᑕᒪᔪᐊᑦ ᑭᖓᔨᓄᖅᐸᒥᑲ ᓴᓇᑦᔪᓭᐦᓴᑦ ᑕᑦᓯᖏᓂ ᔪᕐᑕᖅᕕᖅ 3 ᐊᒻᒪ ᔪᕐᑕᖅᕕᖅ 5.
  - Cᓴᓇᓂᖓ ᑯᐦᕕᐅᓂᖓ ᐊᐢᕐᔪᑎᖓ ᑕᑦᓯᖏᓂ ᔪᕐᑕᖅᕕᖅ 3 ᐊᒻᒪ ᐱᖃᑎᖓᑦ ᐊᒧᖃᐃᕆᐅᖅᑕᖅᑎᑦᓗᒍ, ᐊᒡᓴᖅᑐᖅᓂᖓᑦ, ᐊᒻᒪ ᔪᕐᑕᖅᕕᓂᖓᑦ ᔪᕐᑕᖅᕕᕕᖓ 3 ᐅᓴᖅᑕᖅᓂᕐᔪᑦ ᐃᓂᓕᓄᖅᐸᑦ ᑕᕐᕕᒃᓴᓂᖓ ᐅᐊᓇᖓᓂ ᑎᑭᑦᕐᔪᐊᓂ ᔪᕐᑕᖅᕕᖅ 4.
  - ᓴᓇᓂᖓ ᔪᕐᔪᕐᕕᖅᓴᖓ ᒪᓄᑲᓗᒍ ᑕᒪᔪᐊᑦ ᑭᖓᔨᓄᖅᐸᖅ ᓴᓇᑦᔪᓭᐦᓴᖓ ᑕᑦᓯᖏᓂ ᔪᕐᑕᖅᕕᖅ 4.
  - ᐱᐊᓂᑎᖅᓂᖓ ᑕᑦᓇ “ᐅᓴᖅᑕᖅᓂᔪᑦ ᐊᑐᖅᑐᑐᖅᐅᓂᖓ ᓇᓗᓇᐃᕐᔪᑎᑦᑎᓂᑦ” ᐱᓕᕆᑦᔪᑦ ᐃᓗᐊᓂ ᑕᑦᓇ ᐅᓴᖅᑕᖅᓂᔪᑦ ᔪᕐᑕᖅᕕᖅ (TCA).
  - ᐊᑐᖅᑕᐅᓕᖅᓂᖓ ᐃᒪᐅᕐ ᖁᓇᓱᑦᓂᖓ (Ph) ᒥᐊᓂᓇᓂᖓ ᑕᑦᓯᖏᓂ ᑕᔪᖅᖃᖅ 1 ᐊᒻᒪ ᑕᔪᖅᖃᖅ 2 ᐊᑐᖅᑎᑦᓗᒍ ᔪᕐᑎᑕᐅᓂᖓ
  - ᑲᑎᑦᑕᐅᓂᖓ ᔪᑭᐃᕋᖅᑐᑦ (PAG) ᐊᓕᑕᔪᑦ ᐅᑦᖁᑦ ᐊᒻᒪ ᖁᓕᖅᑐᑦᑎᓂ ᑕᑦᓯᖏᓐ 1.0 ᒋᑕᑦ ᓴᓗᒪᓕᔪᖅ ᖃᒥᖅ ᑕᑦᓯᖏᓂ ᓴᐃᓕᓴᐅᖅᕕᖅ ᓴᓂᓇᖅᐹᓂᓂ.

- ᐊᒍᖏᖅᓂᖅ ᐅᖅᓯᓂᓗᖅᓂᖅᓂᒃ–ᓴᓗᒪᐃᖅᓯᒪᔪᑦ ᓄᓇ ᐊᓚᒪ ᐊᐅᑕᖅᓂᖅᑎ ᓄᓇᕐᓂ ᐃᓗᐊᓄᑦ ᓴᓐᓇᕆᖅᓂ.
- ᐃᓕᐅᖅᖢᖅᓂᖅ ᐅᓇᖅᓂᖅᓄᓂᑦ ᖃᐅᔨᐃᑦ ᐊᓚᒪ ᖢᐅᓯᖅᓂᖅᑎᓄᑦ ᒥᑕᑦ ᒪᓕᐅᔪᑐᒍ ᐊᖅᑎᖅᑕᐅᓂᖅᑎ ᒥᐊᓂᖅᓯᔪᕐᑎᑦ ᕿᖏᓇᐅᑦ. ᓇᓇᓂᖅᑎ ᐊᑐᕐᑎᐊᖅᑎᑐᑦ ᐅᐅᑐᕋᐅᑎᑦ.
- ᑲᑎᑕᐅᓂᖅᑎ ᓯᐅᕋᓇᖅᑐᑦ ᓯᓇᑦ ᓴᐅᓇᕐᓕᒧᑦ ᐊᐅᑕᒪᐅᔪᖅᓴᓴᑦ.
- ᓴᓗᒪᖏᖅᓂᖅ/ᑭᖏᐅᓯᖅᓂᖅᑎ ᐊᑐᖅᑐᑐᖅᑦ ᐅᓴᕐᓯᐅᐅᖅᓴᖅ ᓄᓇᕆᑦ ᐃᓯᖅᑕᖅᓴᖅᓗ.
- ᐱᐊᓂᑎᖅᓂᖅᓗ ᑕᒪᓇ K ᓴᐳᑦ ᐅᓴᖅᓗᓂᖅᑐᓕᐅᑲᓂᖅᓂᖅᓗ ᐅᒥᑎᖅᓂᖅᓗᓄᑦ ᓴᓇᑦᓯᓯᖅᓗ 2.1H:1V.
- ᖃᓕᖅᑐᖅᓂᖅᓗ ᒥᑦᓴᓂ ᓇᐸᐸᖅᓗ ᓴᑦᕈᐅᒪᓂᖅᓗ ᐅᓴᕐᑕᖅᓂᔨᑦ ᑕᒪᓂᖅᓂᖅᓴᖅ N ᑕᓪᓕᓂ 1.0 ᖁᑕᑦ ᓴᓗᒪᔪᒥᑦ ᕈᒥᖅᒥᑦ ᓯᓇᒥᑦ.
- ᐊᒍᖏᓴᓂᖅᓗ ᓯᓇ ᐃᓯᒪᒋᐅᔨᓴᖅ ᓀᒪᑦᓂᖅᓗ ᓴᓇᔨᓄᑦ ᐱᐸᓗᑦ ᑕᒪᓕᓂ ᑎᑭᖅ ᑕᔪᑦ ᕈᒥᖅ ᐃᓂᖅᓗᓂ.
- ᐊᓱᖏᖅᑐᖅᓂ ᐊᒪᒪ ᖃᓕᓵᑎᑕᖅᓂᖅᑎ ᓴᓗᒪᔪᑦ ᕈᒥᖅᒥᑦ.
- ᓄᑦᑎᖅᓂᖅᓗ ᐃᒪᖅ ᕈᓕᓂᓕᑦ ᕆᔨᖅᑕᐃᑦ ᔨᐃᖅᑕᖅᓴᖅ ᑕᓱᖅᓗ ᐊᑦᐸᓄᑦ ᕆᔨᖅᑕᐃᑦ ᔨᐃᖅᑕᖅᓴᖅ, ᔨᐃᑎᑦᓂᖅᓗ ᐃᒪᖅ ᑕᓱᓂᓪᓕᑦ ᕆᔨᖅᑕᐃᑦ ᔨᐃᕆᖅᓴᖅᓗᓂᑦ.
- ᐊᓱᖏᖅᑐᖅᓂᖅᓗ ᐊᒪᒪ ᐊᑦᑕᖅᓂᖅᓗ ᐊᒥᐊᔨᑦ ᑐᓪᖅᓂᐃᑦ ᐅᑦᕈᐅᑎᓴᑦ ᓴᓪᓇᕆᖅᒥ ᐃᓗᐊᓄᑦ ᔨᐃᐅᖅᓴᖅᒥ 5 ᐃᓗᓕᖅᖢᑦᑕᓂᖅᓗᓄᑦ.
- ᐊᑐᐃᓇᖅᓂᖅᓗ ᓴᓗᒪᖅᑎᖅᓂᖅᑎ ᓴᓗᒪᐃᖅᓯᒪᔪᑦ ᓄᓇᑦ ᐃᓗᐊᓂ ᓴᐲᓴᓕᐅᖅᓴᖅ.

EXECUTIVE SUMMARY INNUINAQTUN

2021 Ukiumut Tuhaqhitaut Ataniuyunut Nainaqhimayuq (piyalik tamatkiknik uqauhit)
Tamna Lupin Uyarakhiuqvik Atuqta Umiktaunia havarinia talvani 2021. Tamna Lupin Uyarakhiuqvik havakvia angmaqtuq talvani Mai 4, 2021 tapkununga 174 ublut, tikittiqhugu Aktuupa 24, 2021, Atuqtitlugu una pivigiya, huliniit ilalgit tahapkuninga:

- havakvia angmaqnia umiknialu, kuviraqni quqtait talvunga Quqtait Tahiit Kuviraqvia Havaguta, ikualattinilu tamaita havakvikmi iqakut;
- halumaqtiqni ilalgit tahapkuninga:
  - Ukiumuty nunaliqutit qauyihaqni qauyihaiyit havagutai ilalgit tamna Uyaraktaqnikut Kuviraqvia Hiamaktailivia (TCA).
  - Katitiqni qauyihaqnilu auktuliqaqtitlugu immap nakuunia naunaiyaqni malikhugu tamna Imaqmut Laisas tuhaqhitnilu pitquhiliqutit havaqatigit.
  - Halumaqtiqni kuviraqnilu imaq talvanga Tahiraq 2.
  - Havakviani halumaqtiqni imaqlu nuktiqni talvani Tahiraq 1 tamnalu Kuviraqvik 4 ikayuqturiangi umiktiqnia havarini.
  - Imaq nuktiqni talvani Kuviraqvik 3 tamnalu Kuviraqvik 5 ikayuqtuqni hanalrutit iliuqaqnit.
  - Ikuutaqni qagaqtaqnilu puqtiyaqnimi puqtuniani.
  - Iniqtiqni tamna 1.0 miitat halumayuq qimiuyuq qaliqtutit talvani Kuviraqvik 3 tamnalu Kiviraqvik 5.
  - Hanayaunia Kuviraqviuyuq hanahimani malikhugit tapkuat kingulliqpamik hanatyuhikhai talvani Kuviraqvik 3 tamnalu Kuviraqvik 5.
  - Hanayauni tapkuat kukviuni apquta talvani Kuviraqvik 3 piqatailu amuqhaiviuninilu, agyaqtuqni, kuviraqnilu talvani Kuviraqvik 3 uyaraktaqnikut inaani talvunga NW tiqitquanut taphuma Kuviraqvik 4.
  - Hanyaunia kuvitaqviup apquta malikhugu tamna kingulliqpaq hanatyuhikha talvani Kuviraqvik 4.
  - Iniqtiqnia tamna “uyaraktaqnikut atukhaqni naunaiqtuqni” havaguta iluani TCA-nga.
  - Atuqpaknit immap nakuuni (pH) nunariyauni talvani Tahiraq 1 tamnalu Tahiraq 2 atuqtitlugu kuviraqnia.
  - Katqihuqni piqalaqni huruqtailaqnit (PAG) iqakut uyaqat qaliqtuqlugitlu taphuminga 1.0 miitat halumayuq qimiuyumit talvani havikhaliuqvik inaa.
  - Amuqhaqni uqhuqvaluqaqni (hydrocarbon)-halumaiqhimani nunat iqaqnilu nunap iluanut havakvinut.
  - Iliuqaqni uunaqnianut uukturautit akhunat kinipanianutlu miitat malikhugit angiqtauhimayut munaqninut parnaut. Hanayauni atuttiaqngittut hanalrutit.
  - Katiqhuqni hivuranaqnit hunat aulaqtitnilu havakvilrumut iqaqtauyukhat.
  - Halumaqtigauni/kivviuhiqni atuqtutuqat uyarakhiuqvik nunap iluanuktaqvia.
  - Iniqtamna K Haputa uvinganianut tamna umiktiqnia hanatyuhikha tamna 2.1H:1V.
  - Qaliqtuqnia mikhaani nappaa hatqiumayuq kuviraqvia talvani Kuviraqvik N talvani 1.0 miitat halumayuq qimiqmit hunat.
  - Amuqhaqni hunat ihumagiyauni naamaktut hanayakhat piplugit talvani Finger Tahiit Qimiq inaa.
  - Agyaqtuqni qaliriktitaqnilu halumayuq qimiqmit hunat.
  - Nuktiqni imaq talvanga qulaani quqtait kuviraqvia, kuvititni imaq atpanit quqtait kuviraqvia.
  - Agyaqtuqni iqaqnilu amiakut tunngavit hanahimayut havakvikmit ilauni Kuviraqvik 5 ilulittuq inaa.
  - Atuinaqni halumaqtiqni halumaiqhimayut nunat havikhaliuqvik inaani.

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 20 October 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 which continued into 2021.

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 May 4, 2021. Pumping water from Contwoyto Lake at the causeway began on May 6, 2021 until October 24, 2021 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 174 days in 2021, through October 24, 2021, using a total of approximately 3,132 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.

2021	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Water Use (m^3/day)					18	18	18	18	18	18			3,132 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 210 m3 of water was pumped from ponds against roads, or ponds or lakes proximal to the road for industrial purpose or for dust suppression in August 2021.

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 2021.

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

No minewater effluent discharge at Station LUP-11 occurred in 2021.

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 2021.

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	3,000 litres (3 ea - 1000L totes) in equipment shop; 14,350 litres (70 ea - 205L drums) in TPDS; 15,000 litres (15 ea - 1000L Steel totes) in TPDS; 15,750 litres (21 ea - 750L plastic totes) in TPDS
Contaminated (old) Diesel Fuel	Approx. 9,000 litres expired diesel in Fuel Berm
Contaminated (old) Jet Fuel	None
Contaminated (old) Gasoline	None
Oily Water	3,000 litres (3 ea - 1,000L tanks) in TPDS
Acid Filled Batteries	8 ea - 12V lead/acid batteries in Shop
Hydrated Lime	Unknown
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 2021, 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 2021 includes approximately: 562,366 litres of diesel fuel, and 380,281 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	540 m^3/month
LUP-10	Pond 2 discharge at Dam 1A	Daily during periods of Discharge	Field, Conventional, Total Metals, Cyanide, no visible sheen of Oil & Grease	Refer to Appendix A; Table A1
			Quantity of treated effluent discharged, measured and recorded in cubic metres	2,453,115 m^3/year
		Weekly during periods of discharge from the Tailings Containment Area	Nutrients Radium (^{226}RA)	Refer to Appendix A; Table A1
		Monthly (no less than one month Intervals) commencing with the first day of decant	Cyanide Bioassay	Refer to Appendix A; Table A1
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	Refer to Appendix A; Table A1
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))	Refer to Appendix A; Table A2

Station ID	Location	Frequency	Parameter	Annual Update
		Monthly	Quantity of treated effluent discharged in cubic metres	
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)	Refer to Appendix A; Table A3
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)	Refer to Appendix A; Table A3
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)	Refer to Appendix A; Table A3
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)	Refer to Appendix A; Table A3
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)	Refer to Appendix A; Table A3

Station ID	Location	Frequency	Parameter	Annual Update
LUP-26	Contwoyto Lake in bay east of water intake	Not Active		
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	Not sampled
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	Not sampled
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	Not sampled
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	Not sampled
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	Not sampled
LUP-31	Seepage from the Landfill Facility	Monthly during periods of observed flow	Field, Conventional, Nutrients, Total Metals, Total Oil and Grease, BTEX	Not sampled
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	Not sampled
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	Not sampled
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	Not sampled

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	Not sampled
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	Not sampled
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	Not sampled
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	Not sampled
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	Refer to Appendix A; Table A4
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	Refer to Appendix A; Table A4
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	Refer to Appendix A; Table A4
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 was included in the Dam Safety Inspection and results were submitted to the NWB on November 19, 2021.

Treated effluent monitoring results from the TCA at sampling stations LUP-10 and LUP-10 and from the Sewage Lake (LUP-14) were compared against the maximum concentrations specified in the Water License (2AM-LUP2032). Results from the exposure and reference areas were compared with the applicable Canadian Water Quality Guidelines (CWQG; CCME 1999)[1] All results are presented in Appendix A.

No exceedances to the Water License maximum concentrations were recorded for LUP-10, LUP-10a or LUP-14. Water quality guidelines were exceeded for a number of samples from the receiving environment for pH, total aluminum and total zinc. For East Lake, Boot Lake and Lower Sewage Lake exceedances were recorded for pH, total aluminum, total iron, total copper, total nickel and total zinc. Exceedances to water quality guidelines have been recorded historically in exposure and reference areas of previous monitoring studies (Golder, 2017).

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 completed inspection of camp, reclamation works on October 10, 2021 and did not identify any deficiencies or areas of non-compliance to the Act or Licence. Inspection was also completed to asses status of remediation efforts in consideration of security reduction.

The only observation made by the Inspector was with respect to overall timeline put forward by LMI to complete remediation efforts. LMI commits to provide update schedule in the 2022 Annual Report.

On January 13, 2022, LMI requested a reduction in the security for the site in recognition of closure work completed in 2021. After review and consultation, CIRNAC issued a memorandum dated February 24, 2022 providing their recommendation for the amount of the security release. LMI notes CIRNAC

[1] CCME (Canadian Council of Ministers of the Environment). 1999 (with updates to 2021). Canadian Environmental Quality Guidelines for the Protection of Aquatic Life – Summary Table. Available at: http://st-ts.ccme.ca/. Accessed: 29 November 2021.

assessment and recommendations not on file with NWB an therefor appended to this annual report. Refer to Appendix B.

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, 2021[2])

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, and ongoing closure activities associated with Cell 3 exposed tailings cover, Cell 5 exposed tailings cover, and K Dam resloping efforts. 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, fugitive 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 (Dam 1A through Dam 6) and internal dams were in stable condition. Existing erosional features related to wave action were observed on the dam embankments, though these features were relatively unchanged in 2021 when compared to historical observations. While most of the surface erosion was observed to be minor, it should continue to be monitored for deformation, and repaired as recommended to prevent the erosion from becoming worse and creating preferential surface flow paths prior to final closure. Fresh erosion was observed at the crest of Dam 3D, J Dam, and L Dam. Previous annual inspections noted seepage from the northern toe buttress of Dam 2 into the seepage collection pond adjacent to the Dam 2 Lake. Seepage was not observed during the 2021 inspection, but water was seen to be present in the seepage collection pond. It was communicated that the seepage water should be pumped back to Pond 2 as stipulated by the Water Licence.

Pond 2 water levels were reduced significantly due to discharge efforts in 2020 and 2021. The observed freeboard at the perimeter dams were approximately 4.5m or greater. This was in exceedance of the minimum requirement of 1.0m of freeboard as stipulated by the Water Licence. Dam 1B, Dam 1C, Dam 5, and Dam 6 did not have water impounded against the upstream face of the dams.

Stantec identified that a minor surface erosion gulley occurred on Dam 6 during early freshet. The erosion gully was approximately 2m wide and 0.5m deep and occurred on the dam crest near its north abutment and extending to the downstream embankment. Water pumping commenced immediately to reroute the freshet water towards the centre of Cell 3, and the erosion was repaired with compacted coarse sand, gravel and cobbles, under the supervision of the site representative with direction from the EoR.

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 geotechnical inspection filed with the NWB on November 19, 2021.

[2] Stantec. 2021Lupin Mine Tailing Area Inspection Report, Annual Geotechnical Inspection of the Tailings Containment Area. November 5, 2021. Prepared for: Lupin Mines Incorporated. Prepared by: Alvin Tong, P.Eng.

In lieu of a cover letter to the DSI, LMI commits to the following in 2022 to 2025:

1. Finish the cover at Cell N.
2. Reslope Dam M according to the closure design.
3. Monitor for sand boils in Dam N and reroute traffic if identified.
4. Monitor and manage the water level behind Dam N to maintain minimum freeboard.

Additional Works

Issued for construction drawing for the waste rock dome were submitted and reviewed by NWB in 2021. Based on parties input drawings for the proposed covered waste rock dome were updated to Revision 2.

In addition, revisions were made to existing engineering drawing for the portal cover and proposed landfill. Portal cover was issued for construction and approved by the Chief Mines Inspector. Based on CIRNAC inspection of October 10, 2021, the CIRNAC inspector confirmed the Portal has been cut down and the hole has been filled. LMI still needs to add approximately 1 to 2 m of fill across the top as part of the overall cap.

LMI also completed design refinements to the approved landfill currently still in use pending final cover before project completion. Drawings for the proposed landfill cover were updated to Revision 1.

Updated drawing for waste rock dome, portal cover and landfill provided in Appendix C.

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.

No revisions as addenda for Plans, Reports or Manuals filed with NWB in 2021. LMI implemented during active closure phase NWB approved Plans.

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.

Public consultation was undertaken in accordance with the Type A Water Licence 2AM-LUP2032, Schedule J, Item 1 related to the Post Closure Monitoring Plan. Fulsome responses to community concerns were provided in LMI's Technical comment responses to NWB and provide on the public registry. In summary, on February 26, 2021, LMI and their consultants reached out CIRNAC, Environment and Climate Change Canada (ECCC) and the Kitikmeot Inuit Association (KIA) to participate in a consultation process (see below) prior to submitting the draft PCMP to the NWB on April 9, 2021. The draft PCMP was emailed to the interested parties later that same day.

The timeline for consultation, receipt of comments, and PCMP submissions was as follows[3]:

- 9 March: Conference call 2-4 pm ET and comments received from interested parties
- 16 March: Feedback and comments incorporated and revised plan circulated for comment
- 25 March: Second consultation session if needed to resolve final comments

[3] LMI. 2021 Post Closure Monitoring Plan Technical Comment Responses. Submitted to: Nunavut Water Board by K. Lewis, Project Manager. June 15, 2021. 39 pages.

- 9 April: Submission of the PCMP to the Nunavut Water Board

The first consultation call/presentation, via Teams, was held on March 9, 2021 with CIRNAC, ECCC, the KIA and SteveJan Consultants Inc (SJCJ) on behalf of the KIA. Following the call, on the same date, LMI received comments from KIA/SJCJ.

On March 16, 2021, LMI emailed CIRNAC, ECCC and the KIA the updated draft PCMP, incorporating the relevant comments from the KIA/SJCJ, 2019 Annual Report, Water Quality Monitoring and QA/QC Plan August 2020, KIA/SJCJ Comments dated March 9, 2021 and LMI Response to KIA/SJCJ comments.

A second call was held on March 25, 2021 with CIRNAC, ECCC, the KIA/SJCJ. CIRNAC provided LMI with their written comments on the same date prior to the call, ECCC provided one verbal comment during the call and KIA/SJCJ provided their written comments after the call on March 26, 2021.

LMI did not provide a written response to the comments received on March 25/26, 2021 as all concerns were discussed during the call and relevant comments were incorporated into the final PCMP prior to submission to the NWB for review and comment.

Due to COVID restrictions, LMI was not able to carry out in-person consultation with the community of Kugluktuk, but we hope that we will be able to provide an in-person update at some point in the near future.

On April 8, 2021, LMI held a conference call with community of Kugluktuk which was attended by community member. A call with a community member, was also held after the consultation session, noting she had no questions of concern. The Hunters and Trappers Association (HTO) advised that they were not available to attend the call but emailed a couple of questions.

The NWB formal review process of the final PCMP triggered additional engagement and consultation. LMI submitted the PCMP to the NWB on April 9, 2021. The NWB sent out the PCMP to interested parties on April 21, 2021 to provide comments by May 26, 2021.

Technical review submissions were received from ECCC on May 18, 2021, SteveJan Consultants Inc (SJCJ) on behalf of the Kitikmeot Inuit Association (KIA) on May 26, 2021 and from CIRNAC on June 1, 2021. In response to the submissions, LMI has provided a response document (June 15, 2021), which included the responses from LMI to each of the comments as presented including references and attachments where necessary, as well as responses to the comments submitted by CIRNAC and ECCC on April 8-9, 2021, respectively, on the Water Quality Monitoring Plan and Water and Soil Quality Control and Quality Assurance Plan.

LMI held a second conference call with community organizations and community members on June 24, 2021. This conference call included an update on the closure and reclamation work program as well as an overview of the PCMP to inquire if the community has any comments they would like the LMI to address. The KIA, HTO, GN (Cambridge Bay), and two community members were on the conference call.

On June 23, 2021, CIRNAC, ECCC and KIA/SJCJ submitted comments, or advised they were satisfied with LMI's responses, to the NWB in response to LMI's June 15, 2021 submission of the PCMP. Additional technical review of PCMP was completed in July and August with KIA, CIRNCA and ECCC to which LMI provide technical responses. The NWB approved the PCMP on September 27, 2021.

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 2021 and work anticipated in 2022 is summarized in the table below.

Summary of Abandonment and Reclamation Work

Component	Works completed in 2021	Works proposed in 2022
Underground Mine	▪ Cleaned out crown pillar to provide access for drilling equipment. ▪ Drilling and blasting adjacent to the crown pillar opening to provide additional space to deposit contaminated soils from mine site area. ▪ Plugged portal using local waste rock covered with esker to prevent ingress into underground.	▪ No reclamation work planned for 2022
Contaminated Soil	▪ Approximately 34,805 m3 of contaminated soil was excavated from 23 excavations in 2020 and 2021. ▪ Placed excess contaminated soils that did not fit into crown pillar into a sloped pile along the east edge of crown pillar. ▪ Refer to Appendix D.	▪ Place approximately 6,000 m3 of stockpiled petroleum hydrocarbon contaminated material in crown pillar
Waste Rock	▪ Placement of waste rock in low elevation areas of the dome footprint	▪ Drilling and blasting to extend Crown Pillar to provide additional capacity. ▪ Place blasted rock from the crown pillar in low elevation areas of the dome footprint
Tailings Containment Area	▪ Treated Cell 4 with soda ash to assess water quality stability over the winter season ▪ Pumped effluent from Cell 3 to Cell 4 to expose tailings in Cell 3. ▪ Excavated and relocated approx. 6,500 m3 of tailings from Cell 3 ditch to Cell 5 ▪ Covered Cell 3 with approx. 76,000 m3 of esker at a 1m lift. ▪ Excavated approx. 1,000 m3 to install spillway channel from Cell 3 to Cell 4, including geomembrane and rip rap as per design. ▪ Cleaned out divider dike between Cell 4 and Pond 1 and installed 2”-6” cobble as per design. ▪ Pumped effluent from Cell 4 through divider dike into Pond 1 to drop elevation below divider dike spillway elevation. ▪ 800m3 of tailings from cell 3 outflow channel and 800m3 of cell 5 tailings were excavated and placed in cell 4, and covered with approx. 4,500m3 of esker in 1m lifts.	▪ Dam Safety Inspection (DSI) ▪ Address any outstanding findings and recommendations from 2021 geotechnical inspection ▪ Place esker cover on exposed tailings at Cell N

Component	Works completed in 2021	Works proposed in 2022
	▪ Placed approx. 155,000 m3 of esker in Cell 5 ▪ Installed Cell 5 outflow channel with geomembrane and approx. 1,900 m3 of rip rap ▪ Resloped and repacked K Dam. Installed approx. 7,500m3 of esker along K Dam. ▪ Repaired eroded areas of Dam 6. ▪ Installed approx. 32,000 m3 of esker in N Dam.	
Buildings and Equipment	▪ Drainage holes drilled in concrete pads of Mill Area.	▪ No demolition or reclamation work planned for 2022.
Borrow and Quarry Areas	▪ Excavated esker and hauled to TCA to be utilized in reclamation activities (See Tailing Containment Area section above)	▪ Excavate esker and haul to TCA to be utilized for Cell N Tailings Cover
Chemicals and Fuel	▪ Consolidated used oil totes to TPDS	▪ Maintain organization of chemicals and fuel for future demobilization. ▪ Design a Temporary Fuel Farm to store fuel for the completion of closure operations and allow for the decommissioning of the Main Tank Farm.
Machinery and Mobile Equipment	▪ Pickup truck drained of fluids and disposed of in Landfill.	▪ 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 completed in 2021	▪ No reclamation work planned for 2022
Site Roads	▪ Maintained site roads for reclamation activities.	▪ Maintain site roads for reclamation activities.
Water Management Facilities	▪ Treated Pond 1 and Pond 2 with soda ash to assess water quality stability over the winter season. Dosed Ponds Pond 2 and Pond 1 (Stantec/SLR comment)	▪ Transfer water from Pond 1 to Pond 2
Mobilization/Demobilization	▪ No equipment mobilization or demobilization in 2021	▪ No equipment mobilization or demobilization planned for 2022
Explosives Magazine	▪ Utilized explosives for blasting of Crown Pillar. ▪ Explosives magazines placed in Explosives Laydown in TCA.	▪ Explosives to be utilized to extend crown pillar.
Emergency Dump Ponds	▪ No reclamation work completed in 2021.	▪ No reclamation work planned for 2022.
Sewage Lagoons	▪ No reclamation work completed in 2021.	▪ No reclamation work planned for 2022.

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 Resourced received additional requests from the NWB on details associated with water use or waste disposal activities in the 2021 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, refer to Item 1 (l) above, 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 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: TABULAR SUMMARY OF MONITORING

Table A1: Effluent Quality Results from Tailings Containment Area (TCA) at stations LUP-10 and LUP-10a

Parameter	Unit	Water License Effluent Discharge Criteria		LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10
		Maximum Average Concentration	Maximum Concentration of any Grab Sample	2021-07-22	2021-07-23	2021-07-24	2021-07-25	2021-07-26	2021-07-27	2021-07-28	2021-07-29	2021-07-30	2021-07-31	2021-08-01	2021-08-02	2021-08-03	2021-08-04	2021-08-05	2021-08-06	2021-08-07	2021-08-08	2021-08-09	2021-08-10
Field Measured																						
pH	-	6.5 - 9.0	6.5 - 9.0	7.3	7.2	7.3	7.3	7.2	7.2	7.4	7.5	7.5	7.4	7.3	7.5	7.6	7.6	7.7	7.1	7.0	7.3	7.3	7.0
Specific conductivity	µS/cm	-	-	352	339	322	321	320	312	465	314	317	324	325	339	329	318	314	314	312	304	305	305
Temperature	°C	-	-	16	15	13	12	12	11	12	12	12	13	13	15	14	13	12	12	12	11	11	10
Dissolved oxygen	mg/L	-	6.5	-	-	-	-	-	-	-	10	10	10	10	9.8	9.7	9.8	9.9	9.9	9.9	10	10	10
Conventional Parameters																							
pH	-	6.5 - 9.0	6.5 - 9.0	7.4	7.4	7.4	7.5	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.4	7.5	7.5	7.4	7.4	7.5	7.4	7.4	7.4
Specific conductivity	µS/cm	-	-	419	420	423	425	427	422	427	422	421	420	421	426	420	421	422	417	414	414	421	416
Hardness, as $CaCO_3$	mg/L	-	-	115	114	114	118	118	118	114	111	108	109	108	115	111	113	110	112	110	112	114	110
Total alkalinity, as $CaCO_3$	mg/L	-	-	17	17	17	16	16	16	17	17	17	16	16	15	17	16	16	16	16	16	15	15
Total suspended solids	mg/L	15	30	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.3	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	1.2	<1.0	<1.0	1.2
Major Ions																							
Bromide	mg/L	-	-	0.22	0.22	0.22	0.22	0.22	0.21	0.22	0.20	0.21	0.21	0.21	0.21	0.20	0.20	-	-	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	-	17	17	17	17	17	17	17	17	17	16	16	17	16	16	-	-	-	-	-	-
Cyanide	mg/L	0.8	1.6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	-	0.084	0.089	0.089	0.095	0.097	0.097	0.098	0.095	0.095	0.097	0.095	0.10	0.098	0.098	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	-	-	148	149	150	152	153	152	153	149	149	149	149	154	149	149	-	-	-	-	-	-
Nutrients																							
Nitrate	mg-N/L	-	-	0.47	0.48	0.48	0.47	0.47	0.47	0.47	0.46	0.46	0.45	0.45	0.45	0.44	0.44	-	-	-	-	-	-
Nitrite	mg-N/L	-	-	0.0031	0.0030	0.0030	0.0023	0.0025	0.0025	0.0024	0.0029	0.0028	0.0029	0.0030	0.0032	0.0028	0.0025	-	-	-	-	-	-
Total ammonia	mg-N/L	-	-	0.059	-	-	-	-	-	0.081	-	-	-	-	0.097	-	-	-	-	-	-	0.12	-
Total phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.002	<0.05
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-
Nitrogen, kjeldahl	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19	-
Total Metals																							
Aluminum	mg/L	-	-	0.064	0.068	0.066	0.071	0.074	0.077	0.079	0.079	0.082	0.095	0.090	0.092	0.092	0.089	0.088	0.085	0.083	0.081	0.088	0.085
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	0.5	1	0.014	0.015	0.015	0.014	0.014	0.014	0.013	0.013	0.013	0.012	0.012	0.013	0.014	0.013	0.014	0.014	0.015	0.014	0.016	0.018
Barium	mg/L	-	-	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.010	0.011	0.011	0.012	0.011	0.011	0.012	0.012	0.012	0.012	0.012	0.012
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Boron	mg/L	-	-	0.033	0.034	0.034	0.037	0.037	0.037	0.036	0.036	0.035	0.034	0.034	0.037	0.034	0.035	0.034	0.033	0.033	0.033	0.034	0.033
Cadmium	mg/L	-	-	0.000083	0.000075	0.000072	0.000077	0.000070	0.000073	0.000075	0.000073	0.000062	0.000073	0.000075	0.000080	0.000079	0.000071	0.000071	0.000069	0.000067	0.000069	0.000071	0.000066
Calcium	mg/L	-	-	34	34	34	35	36	35	34	33	32	33	32	35	33	33	33	34	33	33	34	33
Cesium	mg/L	-	-	0.000036	0.000038	0.000033	0.000037	0.000038	0.000040	0.000040	0.000039	0.000038	0.000037	0.000038	0.000043	0.000042	0.000039	0.000044	0.000043	0.000047	0.000046	0.000045	0.000048
Chromium	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00053	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	mg/L	-	-	0.023	0.022	0.022	0.023	0.023	0.023	0.022	0.021	0.021	0.022	0.022	0.023	0.022	0.022	0.023	0.023	0.023	0.022	0.022	0.022
Copper	mg/L	0.15	0.30	0.0021	0.0022	0.0021	0.0024	0.0022	0.0022	0.0023	0.0023	0.0024	0.0029	0.0029	0.003	0.0031	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.003
Iron	mg/L	-	-	0.18	0.19	0.18	0.17	0.18	0.17	0.17	0.17	0.17	0.19	0.18	0.18	0.20	0.18	0.20	0.20	0.22	0.21	0.23	0.25
Lead	mg/L	0.1	0.2	0.00019	0.00022	0.00020	0.00019	0.00019	0.00020	0.00019	0.00022	0.00021	0.00024	0.00024	0.00024	0.00025	0.00022	0.00022	0.00023	0.00024	0.00024	0.00029	0.00032
Lithium	mg/L	-	-	0.018	0.019	0.018	0.019	0.020	0.020	0.019	0.021	0.020	0.021	0.020	0.022	0.021	0.021	0.020	0.020	0.020	0.020	0.021	0.020
Magnesium	mg/L	-	-	7.2	6.9	7.0	7.2	7.2	7.2	6.8	6.8	6.8	6.9	6.8	7.1	7.2	7.3	7.1	6.9	6.8	7.0	7.0	6.9
Manganese	mg/L	-	-	0.62	0.61	0.61	0.68	0.65	0.64	0.65	0.59	0.59	0.58	0.59	0.61	0.60	0.59	0.58	0.58	0.59	0.58	0.59	0.58
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	0.00036	0.00037	0.00037	0.00041	0.00041	0.00039	0.00038	0.00039	0.00035	0.00037	0.00036	0.00039	0.00036	0.00039	0.00040	0.00035	0.00037	0.00039	0.00042	0.00041
Nickel	mg/L	0.2	0.4	0.046	0.045	0.045	0.047	0.046	0.047	0.046	0.044	0.044	0.046	0.046	0.048	0.046	0.047	0.047	0.047	0.047	0.047	0.046	0.046
Potassium	mg/L	-	-	3.2	3.2	3.2	3.4	3.3	3.3	3.2	3.0	3.0	3.0	3.0	3.2	3.1	3.2	3.1	3.1	3.1	3.1	3.1	3.1
Rubidium	mg/L	-	-	0.0017	0.0016	0.0017	0.0018	0.0018	0.0018	0.0017	0.0017	0.0016	0.0017	0.0017	0.0018	0.0018	0.0019	0.0019	0.0018	0.0018	0.0018	0.0018	0.0019
Selenium	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00011	0.000070	<0.00005	<0.00005	<0.00005	<0.00005	0.000053	<0.00005	<0.00005	<0.00005	0.000053	<0.00005	0.000063	0.000063
Silicon	mg/L	-	-	1.7	1.6	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.9	1.8
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	32	32	32	35	34	34	33	31	31	31	31	32	32	32	32	31	31	32	31	31
Strontium	mg/L	-	-	0.17	0.17	0.17	0.18	0.19	0.18	0.18	0.17	0.16	0.16	0.16	0.18	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.17
Sulphur	mg/L	-	-	53	53	54	55	54	55	52	52	52	51	51	53	52	52	51	50	49	50	50	50
Tellurium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium	mg/L	-	-	0.00031	0.00047	0.00044	0.00031	<0.0006	<0.0003	<0.0003	0.00044	0.00044	0.00033	<0.0003	0.00032	0.00037	<0.0003	<0.0003	<0.0003	0.00035	<0.0003	0.00031	0.00039
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Uranium	mg/L	-	-	0.000041	0.000044	0.000041	0.000042	0.000050	0.000048	0.000050	0.000052	0.000057	0.000059	0.000064	0.000062	0.000064	0.000067	0.000064	0.000064	0.000069	0.000063	0.000064	0.000058
Vanadium	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Zinc	mg/L	0.4	0.8	0.1	0.097	0.094	0.1	0.098	0.098	0.093	0.093	0.091	0.096	0.098	0.099	0.095	0.096	0.094	0.094	0.092	0.093	0.092	0.088
Zirconium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Radionuclides																							
Radium-226	Bq/l	-	-	<0.0075	-	-	-	-	-	0.010	-	-	-	-	<0.007	-	-	-	-	-	-	0.012	-

Table A1: Effluent Quality Results from Tailings Containment Area (TCA) at stations LUP-10 and LUP-10a

Parameter	Unit	Water License Effluent Discharge Criteria		Sampling Sites																			
				LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10
		Maximum Average Concentration	Maximum Concentration of any Grab Sample	2021-08-11	2021-08-12	2021-08-13	2021-08-14	2021-08-15	2021-08-16	2021-08-17	2021-08-17	2021-08-18	2021-08-19	2021-08-20	2021-08-21	2021-08-22	2021-08-23	2021-08-24	2021-08-25	2021-08-26	2021-08-27	2021-08-28	2021-08-29
Field Measured																							
pH	-	6.5 - 9.0	6.5 - 9.0	7.4	7.4	7.1	-	7.2	-	-	7.3	7.7	7.4	6.6	**6.3**[(C)]	**6.3**[(C)]	7.4	7.2	**6.4**[(C)]	6.8	6.8	7.2	6.7
Specific conductivity	µS/cm	-	-	302	303	307	-	305	-	-	311	140	306	292	297	315	300	303	305	283	311	316	317
Temperature	°C	-	-	10	10	11	-	10	-	-	11	11	11	9.0	9.4	11	10	10	10	11	11	12	12
Dissolved oxygen	mg/L	-	6.5	10	10	10	-	10	-	-	10	10	10	11	11	10	11	11	10	10	10	10	10
Conventional Parameters																							
pH	-	6.5 - 9.0	6.5 - 9.0	7.4	7.4	7.4	7.4	7.4	7.4	-	7.4	7.4	7.1	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
Specific conductivity	µS/cm	-	-	418	418	446	446	448	448	-	425	425	254	396	420	421	417	421	420	424	420	420	426
Hardness, as $CaCO_3$	mg/L	-	-	111	114	114	110	113	115	-	111	111	94	114	118	118	119	115	118	116	113	116	116
Total alkalinity, as $CaCO_3$	mg/L	-	-	15	14	15	15	15	15	-	15	14	8.0	13	13	13	13	13	12	12	12	12	12
Total suspended solids	mg/L	15	30	<1.0	1.8	<1.0	1.4	<1.0	<1.0	-	<1.0	<1.0	5.1	1.8	<1.0	3.1	<1.0	1.7	<1.0	2.3	<1.0	1.0	1.0
Major Ions																							
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	0.21	-	-	-	0.20	-	-	0.22	-	-	-	-
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	-	-	-	-	-	-	-	-	-	16	-	-	-	16	-	-	16	-	-	-	-
Cyanide	mg/L	0.8	1.6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	0.099	-	-	0.11	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	-	-	-	-	-	-	-	-	-	-	154	-	-	-	154	-	-	160	-	-	-	-
Nutrients																							
Nitrate	mg-N/L	-	-	-	-	-	-	-	-	-	-	0.41	-	-	-	0.41	-	-	0.42	-	-	-	-
Nitrite	mg-N/L	-	-	-	-	-	-	-	-	-	-	0.0021	-	-	-	0.0026	-	-	0.0024	-	-	-	-
Total ammonia	mg-N/L	-	-	-	-	-	-	-	-	-	-	0.13	-	-	-	0.13	-	-	-	-	-	-	0.14
Total phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	0.0033	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	<0.001	-	-	-	<0.001
Nitrogen, kjeldahl	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28	-	-	-	-	-	-	0.24
Total Metals																							
Aluminum	mg/L	-	-	0.081	0.093	0.089	0.094	0.088	0.098	-	0.11	0.11	0.17	0.11	0.094	0.087	0.12	0.11	0.11	0.13	0.095	0.092	0.089
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	0.5	1	0.016	0.018	0.017	0.017	0.016	0.017	-	0.018	0.015	0.021	0.018	0.016	0.0093	0.016	0.016	0.014	0.022	0.014	0.015	0.015
Barium	mg/L	-	-	0.012	0.012	0.012	0.012	0.012	0.013	-	0.012	0.012	0.0099	0.012	0.012	0.013	0.013	0.012	0.012	0.013	0.012	0.013	0.012
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Boron	mg/L	-	-	0.032	0.037	0.036	0.036	0.036	0.037	-	0.037	0.035	0.028	0.035	0.035	0.036	0.035	0.035	0.035	0.034	0.033	0.033	0.034
Cadmium	mg/L	-	-	0.000070	0.000069	0.000064	0.000075	0.000066	0.000071	-	0.000071	0.000073	0.000061	0.000075	0.000078	0.000081	0.000070	0.000075	0.000076	0.000079	0.000070	0.000081	0.000077
Calcium	mg/L	-	-	33	34	34	33	33	34	-	33	33	28	34	36	35	36	34	35	35	33	35	35
Cesium	mg/L	-	-	0.000043	0.000048	0.000048	0.000050	0.000048	0.000047	-	0.000046	0.000048	0.000072	0.000044	0.000043	0.000060	0.000058	0.000054	0.000057	0.000053	0.000046	0.000046	0.000043
Chromium	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	mg/L	-	-	0.022	0.022	0.022	0.022	0.022	0.023	-	0.022	0.023	0.017	0.021	0.021	0.022	0.022	0.022	0.023	0.023	0.023	0.023	0.022
Copper	mg/L	0.15	0.30	0.0028	0.0038	0.0031	0.0032	0.0032	0.0034	-	0.0037	0.0039	0.0038	0.0037	0.0036	0.0024	0.0038	0.0038	0.0042	0.005	0.0041	0.004	0.0038
Iron	mg/L	-	-	0.22	0.26	0.23	0.25	0.24	0.25	-	0.28	0.26	0.42	0.29	0.26	0.17	0.29	0.28	0.27	0.41	0.25	0.25	0.25
Lead	mg/L	0.1	0.2	0.00030	0.00038	0.00032	0.00035	0.00031	0.00033	-	0.00038	0.00038	0.00048	0.00039	0.00036	0.00072	0.0011	0.00050	0.00042	0.00051	0.00035	0.00035	0.00034
Lithium	mg/L	-	-	0.020	0.021	0.021	0.021	0.021	0.021	-	0.021	0.021	0.017	0.021	0.021	0.022	0.021	0.021	0.022	0.024	0.024	0.023	0.023
Magnesium	mg/L	-	-	7.1	7.0	7.2	7.0	7.3	7.5	-	7.0	7.2	5.6	7.0	7.0	7.2	7.3	7.1	7.2	7.1	7.4	7.1	6.8
Manganese	mg/L	-	-	0.57	0.58	0.60	0.60	0.59	0.61	-	0.59	0.60	0.44	0.55	0.54	0.56	0.55	0.55	0.55	0.56	0.56	0.54	0.54
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	0.00039	0.00044	0.00042	0.00043	0.00044	0.00041	-	0.00043	0.00044	0.00034	0.00044	0.00040	0.00044	0.00044	0.00041	0.00039	0.00042	0.00042	0.00042	0.00040
Nickel	mg/L	0.2	0.4	0.046	0.047	0.048	0.048	0.048	0.050	-	0.048	0.050	0.039	0.048	0.047	0.049	0.050	0.049	0.052	0.053	0.054	0.052	0.052
Potassium	mg/L	-	-	3.1	3.2	3.3	3.2	3.2	3.4	-	3.2	3.3	2.5	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.1
Rubidium	mg/L	-	-	0.0019	0.0019	0.0019	0.0020	0.0019	0.0021	-	0.0020	0.0020	0.0016	0.0019	0.0019	0.0020	0.0019	0.0020	0.0020	0.0019	0.0021	0.0021	0.0020
Selenium	mg/L	-	-	<0.00005	0.000063	0.000062	0.000068	0.000056	0.000058	-	<0.00005	0.000062	<0.00005	0.000065	<0.00005	0.000064	<0.00005	0.000052	0.000052	<0.00005	<0.00005	<0.00005	<0.00005
Silicon	mg/L	-	-	1.9	1.8	1.9	1.9	1.9	1.9	-	1.9	1.9	1.6	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.0	2.0
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	31	31	32	31	32	33	-	31	31	24	30	31	31	31	30	30	31	32	31	31
Strontium	mg/L	-	-	0.17	0.18	0.18	0.18	0.18	0.18	-	0.18	0.18	0.14	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.20	0.20	0.20
Sulphur	mg/L	-	-	50	55	56	54	55	57	-	56	55	42	53	53	53	53	53	54	54	52	53	53
Tellurium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium	mg/L	-	-	<0.0003	0.00044	0.00036	<0.0003	<0.0003	<0.0003	-	0.00036	<0.0003	0.0035	0.00074	<0.0003	0.0021	0.0015	0.00089	<0.0006	0.0010	<0.0003	<0.0003	<0.0003
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Uranium	mg/L	-	-	0.000059	0.000068	0.000063	0.000068	0.000058	0.000067	-	0.000064	0.000069	0.000075	0.000061	0.000062	0.000049	0.000064	0.000065	0.000061	0.000069	0.000053	0.000050	0.000054
Vanadium	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Zinc	mg/L	0.4	0.8	0.088	0.09	0.091	0.093	0.091	0.097	-	0.095	0.1	0.08	0.095	0.095	0.094	0.1	0.1	0.11	0.11	0.11	0.11	0.11
Zirconium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Radionuclides																							
Radium-226	Bq/l	-	-	-	-	-	-	-	-	-	-	0.0069	-	-	-	<0.0064	-	-	-	-	-	-	<0.0068

Table A1: Effluent Quality Results from Tailings Containment Area (TCA) at stations LUP-10 and LUP-10a

Parameter	Unit	Water License Effluent Discharge Criteria		LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10	LUP-10A (102)	LUP-10A (LUP-102)
		Maximum Average Concentration	Maximum Concentration of any Grab Sample	2021-08-30	2021-08-31	2021-09-01	2021-09-02	2021-09-03	2021-09-04	2021-09-05	2021-09-06	2021-09-07	2021-09-08	2021-09-09	2021-09-01	2021-07-14
Field Measured																
pH	-	6.5 - 9.0	6.5 - 9.0	6.9	6.9	7.0	6.9	7.1	7.6	7.5	7.4	7.5	7.5	7.4	7.1	7.7
Specific conductivity	µS/cm	-	-	316	313	315	310	310	305	309	312	304	301	287	315	319
Temperature	°C	-	-	12	11	11	11	11	10	11	11	11	9.4	7.9	11	13
Dissolved oxygen	mg/L	-	6.5	10	10	10	10	10	10	11	11	11	11	12	10	-
Conventional Parameters																
pH	-	6.5 - 9.0	6.5 - 9.0	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.1	7.1	7.3	7.4
Specific conductivity	µS/cm	-	-	425	425	427	428	429	425	430	427	426	428	425	431	410
Hardness, as $CaCO_3$	mg/L	-	-	116	113	118	117	118	114	113	117	116	116	119	117	114
Total alkalinity, as $CaCO_3$	mg/L	-	-	12	12	12	12	12	12	12	12	11	10	9.6	12	15
Total suspended solids	mg/L	15	30	1.8	<1.0	1.0	<1.0	1.3	<1.0	<1.0	1.5	1.5	<1.0	<1.0	1.4	<1.0
Major Ions																
Bromide	mg/L	-	-	-	-	0.21	0.19	0.18	0.18	0.18	0.19	0.18	0.21	0.19	-	0.22
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	-	-	-	16	16	16	16	16	16	16	16	16	-	17
Cyanide	mg/L	0.8	1.6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	-	-	-	-	0.11	0.10	0.11	0.11	0.10	0.11	0.11	0.11	0.11	-	0.081
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	-	-	-	-	161	157	157	158	158	158	159	161	159	-	146
Nutrients																
Nitrate	mg-N/L	-	-	-	-	0.42	0.41	0.41	0.42	0.41	0.42	0.41	0.42	0.41	-	0.49
Nitrite	mg-N/L	-	-	-	-	0.0024	0.0024	0.0025	0.0022	0.0019	0.0021	0.0019	0.0022	0.0017	-	0.0029
Total ammonia	mg-N/L	-	-	-	-	0.15	-	-	-	-	0.14	-	0.18	-	0.15	0.062
Total phosphorus	mg-P/L	-	-	<0.05	<0.05	<0.002	<0.05	<0.05	<0.05	<0.05	0.0053	<0.05	<0.05	<0.05	<0.05	<0.05
Dissolved phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	<0.001	-	-	-	-	-
Nitrogen, kjeldahl	mg-N/L	-	-	-	-	-	-	-	-	-	0.30	-	-	-	-	-
Total Metals																
Aluminum	mg/L	-	-	0.1	0.084	0.081	0.087	0.083	0.085	0.082	0.088	0.096	0.1	0.11	0.083	0.050
Antimony	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	mg/L	0.5	1	0.019	0.014	0.014	0.015	0.013	0.013	0.014	0.015	0.013	0.014	0.016	0.014	0.012
Barium	mg/L	-	-	0.013	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.011
Beryllium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Bismuth	mg/L	-	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Boron	mg/L	-	-	0.034	0.034	0.034	0.034	0.034	0.034	0.033	0.035	0.033	0.035	0.034	0.034	0.036
Cadmium	mg/L	-	-	0.000078	0.000086	0.000078	0.000078	0.000085	0.000071	0.000074	0.000080	0.000084	0.000088	0.000084	0.000081	0.000089
Calcium	mg/L	-	-	35	34	36	36	36	34	34	35	35	35	35	35	35
Cesium	mg/L	-	-	0.000054	0.000048	0.000047	0.000052	0.000048	0.000051	0.000053	0.000050	0.000052	0.000051	0.000043	0.000049	0.000031
Chromium	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	mg/L	-	-	0.023	0.022	0.022	0.022	0.022	0.022	0.021	0.021	0.022	0.021	0.022	0.022	0.024
Copper	mg/L	0.15	0.30	0.0043	0.004	0.0039	0.0038	0.0036	0.0036	0.0036	0.0038	0.0043	0.0046	0.0051	0.004	0.0023
Iron	mg/L	-	-	0.32	0.25	0.24	0.26	0.24	0.24	0.25	0.26	0.25	0.26	0.33	0.24	0.19
Lead	mg/L	0.1	0.2	0.00042	0.00035	0.00033	0.00035	0.00033	0.00032	0.00035	0.00035	0.00042	0.00042	0.00043	0.00033	0.00021
Lithium	mg/L	-	-	0.024	0.023	0.025	0.023	0.022	0.022	0.022	0.023	0.022	0.023	0.024	0.024	0.018
Magnesium	mg/L	-	-	7.2	6.9	6.9	7.0	7.1	7.1	7.0	7.0	7.0	7.0	7.4	7.0	6.9
Manganese	mg/L	-	-	0.55	0.54	0.53	0.51	0.51	0.51	0.50	0.50	0.50	0.50	0.53	0.55	0.63
Mercury	mg/L	-	-	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum	mg/L	-	-	0.00044	0.00041	0.00039	0.00040	0.00040	0.00040	0.00040	0.00041	0.00039	0.00042	0.00038	0.00042	0.00027
Nickel	mg/L	0.2	0.4	0.053	0.053	0.052	0.053	0.053	0.053	0.052	0.052	0.054	0.055	0.056	0.054	0.049
Potassium	mg/L	-	-	3.2	3.1	3.2	3.1	3.2	3.2	3.1	3.1	3.1	3.2	3.3	3.3	3.0
Rubidium	mg/L	-	-	0.0020	0.0019	0.0023	0.0021	0.0020	0.0021	0.0021	0.0020	0.0021	0.0021	0.0021	0.0021	0.0016
Selenium	mg/L	-	-	<0.00005	<0.00005	<0.00005	0.000052	<0.00005	0.000076	<0.00005	0.000075	0.000066	<0.00005	0.000061	<0.00005	0.000058
Silicon	mg/L	-	-	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.0	1.8
Silver	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Sodium	mg/L	-	-	31	30	31	32	32	32	31	31	31	31	31	31	30
Strontium	mg/L	-	-	0.20	0.20	0.20	0.19	0.20	0.19	0.19	0.19	0.19	0.20	0.18	0.20	0.17
Sulphur	mg/L	-	-	51	53	53	55	54	55	55	53	56	55	55	53	51
Tellurium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Thallium	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Thorium	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Tin	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Titanium	mg/L	-	-	<0.0006	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Tungsten	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Uranium	mg/L	-	-	0.000057	0.000052	0.000048	0.000053	0.000054	0.000052	0.000054	0.000051	0.000056	0.000064	0.000058	0.000046	0.000031
Vanadium	mg/L	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Zinc	mg/L	0.4	0.8	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.13	0.11	0.13
Zirconium	mg/L	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Radionuclides																
Radium-226	Bq/l	-	-	-	-	0.0094	-	-	-	-	0.0072	-	0.0090	-	<0.0075	-

Bolded concentrations are higher than water quality guidelines.
Water quality data and guidelines shown in this table were rounded to reflect laboratory or field instrument precision *after* comparisons to guidelines. Therefore, values slightly above guidelines may be displayed as being equal to the guidelines and identified as exceedances. Concentrations equal to the guideline values were not identified as exceedances.
- = no guideline or no data

APPENDIX B: CIRNAC SECURITY DETERMINATION

Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Water Resources Division
Resource Management Directorate
Nunavut Regional Office
P.O. Box 100
Iqaluit, NU, X0A 0H0

Your file - Votre référence
2AM-LUP2032
Our file - Notre référence
GCDocs # 101220598

February 22, 2022

Karyn Lewis
Project Manager
Lupin Mines Incorporated
76 Richmond Street East, Suite 330
Toronto, ON M5C 1P1
Email: k.lewis@mandalayresources.com

Re: Crown-Indigenous Relations and Northern Affairs Canada's Review of the Lupin Mines Inc. request for consideration of a Security Reduction for the Lupin Mine Type A water License 2AM-LUP2032

Dear Ms. Lewis,

Thank you for the Security Reduction Request (SRR) submitted by Lupin Mines Inc. (LMI) on January 13, 2022 based on the closure and reclamation work completed in 2021 in accordance with Water Licence 2AM-LUP2032 , and the supporting documents, and follow-up meetings with members of your team.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), in consultation with Arcadis Canada Inc, (Arcadis) examined the request pursuant to its mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act.*

Please find attached the result of our comprehensive technical and policy review.

If there are any questions or concerns, please contact me at (867) 975-4731 or marcus.bermann@rcaanc-cirnac.gc.ca or Vincent Okonkwo at (867) 975-4738 and vincent.okonkwo@rcaanc-cirnac.gc.ca

Sincerely,

Marcus Bermann
A/Director, Resource Management

Canada

Technical Review and Summary

Date: Feb 22, 2022

To: Karyn Lewis, Project Manager, Lupin Mines Inc.

From: Vincent Okonkwo, CIRNAC

Subject: **Crown-Indigenous Relations and Northern Affairs Canada's Review of the Lupin Mines Inc. (LMI) request for consideration of a Security Reduction for the Lupin Mine Type A Water License 2AM-LUP2032**

Region: ☒ Kitikmeot ☐ Kivalliq ☐ Qikiqtani

A. BACKGROUND

On February 28, 2020, the Nunavut Water Board issued a renewed licence to LMI in which reclamation security for the project was set at $26,107,303. Schedule C of the water licence includes a framework for reduction in security agreed on by LMI and CIRNAC upon progressive reclamation of the site.

On April 14, 2020, LMI requested a first reduction in security for $6,549,072, which was approved by the minister of Northern Affairs on May 12, 2020. The second request for reduction in security was made on July 20, 2020 in the amount of $6,954,519. This request is principally for the demolition of buildings on site. After detailed evaluation by CIRNAC, a total sum of $4,984,477.14 was approved and released to LMI by the Minister of Northern Affairs.

Consequent to the release, a balance of $14,573,754 was left in security with the Crown, to ensure completion of reclamation work. On January 13, 2022, CIRNAC received the current request for reduction in security for the total sum of $4,471,819.84.

Following a delay in the submission of the necessary documents, CIRNAC initiated a review of the Lupin Mines Inc. (LMI) Security Reduction Request (SRR) on January 14, 2022.

On January 28, 2022 a meeting was held between CIRNAC and LMI to review the SRR and to bring clarity to questions on areas identified in CIRNAC's initial review. The initial review indicated that work plans and materials were modified by the Onsite Engineer for LMI but were not approved by the Nunavut Water Board before being implemented.

A further series of meetings and exchanges of information were conducted throughout January 2022 and February; with February 14, 2022 being the most recent and latest exchange of information between the parties.

LMI's request for Security Reduction is based on their summary and a valuation of work performed in 2021, and has provided documents in support of their estimate throughout the process.

CIRNAC currently holds $ 14,573,754 in security against the cost of mine site reclamation and remediation. CIRNAC has determined that the maximum amount LMI is eligible for in its 2021 Security Reduction Request is $3,061,255.66. This determination is based upon CIRNAC's evaluation of the work completed on site, in accordance with the Water Licence 2AM-LUP2032. , and the amount of work yet to be completed.

B. DOCUMENTS REVIEWED

The following table (Table 1) provides a summary of the documents reviewed to evaluate the current security reduction request:

Table 1: Documents Reviewed

Document Title	Author, File No., Rev., Date
SR-003 - 20211125_2AM-LUP1520 _Reclaim7_FCRP Update_November 2021	LMI, November 25, 2021
Lupin Mine January 2022 Security Reduction Request ACI Evaluation of LMI Claim under Water Licence 2AM-LUP-2032. Third Security Release Request by LMI under Approved Water Licence	Arcadis Canada Inc., February 16, 2022
Nunavut Water Board Water Licence 2AM-LUP 2032	Nunavut Water Board, February 28, 2022
Re: Lupin Mines Incorporated Water Licence 2AM-LUP1520 Request for Security Reduction Pursuant to Part C, Item 1 and Section 76(5) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act, Lupin Mines Incorporated	LMI, November 25, 2022

Appendix 01 - WSCC APV 20211019 Lupin Mine Portal Plug	WSCB, October 19, 2021
App 02 - 20446521-012-TM-Rev0-1000-Crown Pillar_06DEC_21	Golder Inc, December 6, 2021
App 03- 129500081_Lupin 2021 Construction Summary_KDam_FINAL_sign	Stantec, December 6, 2021
Appendix 04 - Stantec _Lupin 2021 Construction Summary_Cell3_FINAL_JM	Stantec, November 18, 2021
Appendix 05 - Stantec _Lupin 2021 Construction Summary Cell 5_FINAL_JM	Stantec, November 24, 2021
Appendix 06 - Golder 2020 2021 CSS Remediation 30NOV_21	Golder Inc, November 30, 2021
Appendix 07 - Golder-011-TM-RevA-1000-Buildings and Infrastructure_30NOV_21	Golder Inc, November 30, 2021
Appendix 08 - Golder-008-TM-Rev0_Foundation Slabs Perforation Documentation 30NOV_21	Golder Inc, November 30, 2021
App 09 - Golder-010-TM-RevA-1000-Landfill Operations 29NOV_21	Golder Inc, November 29, 2021
App 10 - Stantec_Lupin 2021 Construction Summary_WT_FINAL_JM	Stantec, November 26, 2021
App 11 - CIRNAC 2021 KIT 003 BP 2AM LUP2032 LMI Lupin Reclamation Security	CIRNAC, October 10, 2021
App 12 - SR-003 - 20211125_2AM-LUP1520 _Reclaim7_FCRP Update_November 2021	Reclaim Model Estimator, December 1, 2021

Request for Additional Information: Documents provided by LMI on February 4, 7, and 8 2022:

- Cell 3 as built design/construction summary with re-run of cover thickness map;
- Cell 5 as built design/construction summary with re-run of cover thickness map;
- Crown water dewatering and blasting;
- K Dam reinforcement and compaction;
- Water treatment and sampling results;
- Slabs perforations;

- Sewage line flushing document;
- Cutting and backfilling of portal culvert;
- Permanent closure and reclamation of mine portal.

DIRECT COSTS

On the basis of the information provided by LMI, a total of $2,758,394.42 of direct costs were identified. These costs primarily related to the closure of mine openings including drilling and blasting of the crown pillar, tailings impoundment works, demolition of the infrastructure on site and the management of associated wastes, remediation of PHC and metal impacted soils and waste rock, contractor indirect costs for transport of labour, equipment, and supplies including cross shifts, surface water management as well as some interim care and maintenance work elements related to environmental and geotechnical reporting.

Table 2 below, summarizes the security reduction based on the information provided by LMI, as well as other sources of information provided by CIRNAC relating to its October 2021 site visit as well as earlier site visits.

None of the direct requests have been rejected, however a portion of the direct requests (line items 4, 5, 6, 8,12, and 21) have been recommended for modification in order to address additional work required and as such the entire security amount should not be released.

Table 2 – Direct Cost Distribution

Status of Security Reduction	LMI Aggregate Value	CIRNAC Aggregate Value	CIRNAC Direct Cost Percentage	Cost Items Included
Agreed Work Elements	$1,855,774.02	$1,855,774.02	73.90%	1, 2, 3, 7, 9-11, 13-20 and 23-26
Partially Agreed Work Elements	$902,620.00	$655,405.49	26.10%	4, 5, 6, 8,12, and 21
Rejected Work Elements	$0.00	$0.00	0.00%	NA
Total	**$2,758,394.02**	**$2,511,179.35**	100%	NA

With respect to these items, CIRNAC notes the following considerations/adjustments:

Item 4 - Toe Buttress, bulk fill – place esker toe berm to repair erosion to Dam K:
Partial release of **$34,935 (75%)** of this item as the work related to the repair of the K- Dam may be subject to erosion based on the construction methods and materials used. The balance of the work will be released upon additional review of the embankment and performance of the embankment after the 2022 freshet.

Item 5 – Soil Cover and Outflow – Cell 3:
Partial release of **$258,645 (75%)** of this item as the work has not been completed i.e. esker cover has not been installed to the specified 1 m thickness in Cell 3 of the TCA of and the

construction of the surface water outflows are of concern given the amount of fine grained soils present from CIRNAC's review of the photographs in the completion reports.

Item 6 – Soil Cover and Outflow – Cell 5:
Partial release of **$314,284 (75%)** of this item as the work has not been completed i.e. esker cover has not been installed to the specified 1 m thickness in Cell 5 of the TCA of and the construction of the surface water outflows are of concern given the amount of fine grained soils present from CIRNAC's review of the photographs in the completion reports.

Item 8 – Load, Haul and Dump into Crown Pillar – PHC Soils:
On the basis of the information provided in the Golder report for this item, more material is required to manage the PHC impacted soil remedial work. In order to ensure sufficient security CIRNAC is releasing **$17,707** of security.

Item 12 – Pump House:
Based on the information provided by LMI, the demolition of the pump house still requires the wet well to be decommissioned. As a result CIRNAC is releasing **$6,911.25 (75%)** of the security for this work element.

Item 21 – Geotechnical Assessment:
LMI will require a geotechnical inspection in 2022. As a result, CIRNAC is releasing **$22,923.49** in order to complete future geotechnical inspection work.

INDIRECT COSTS

Mobilization:
On the basis of the information provided, it was confirmed that LMI has completed approximately 60% of the closure and reclamation works on site. Pursuant to the terms of the Water Licence, LMI is allowed to make a security reduction claim equaling the percentage of work done, when compared to the original security amount. Thus the security reduction for these line items would be **$1,185,194.01**

Engineering. Project Management, Bonding, Contingency:
CIRNAC could not reproduce the Indirect Costs provided by LMI, however on the basis of its evaluation the amounts being claimed by LMI for reduction are less than what would have expected for the Direct Costs noted. This would entail the release of **$421,517.03**.

Contingency:
For Line Item 31, which relates to the Contingency associated within the RECLAIM estimate, the original Contingency from the approved 2019 security estimate was derived on the basis of a 5% contingency on Direct Costs including the costs associated with the Contractor Indirect costs. LMI claim for $445,978.98 is based on 29.58% of Direct Costs. LMI's justification for claiming this percentage is unclear and is not consistent with the record on this file. As such, CIRNAC rejects the LMI value and will use the amount calculated as

outlined in the water licence security estimate resulting in the release of **$125,558.97** for line item 31.

For Line Item 32, which relates to the security for potential unforeseen risks or unknowns, the NWB accepted CIRNAC's position that Security in the amount of $2,773,194 ($26,107,303 - $23,334,109) should remain in place to deal with unknowns and items not identified in the 2019 RECLAIM estimate for reclamation and closure works.

The issues of concern relate primarily to potentially exposed tailings as water levels are drawn down and additional water treatment is required. To date, LMI has not undertaken any closure or reclamation works on potential unforeseen risks or unknowns and as such the concerns raised at the January 2020 Kugluktuk Water Board Hearing remain in place. As such LMI's request to release **$1,176,011** of security is rejected as the full amount of security for unforeseen risks and unknowns should remain in place.

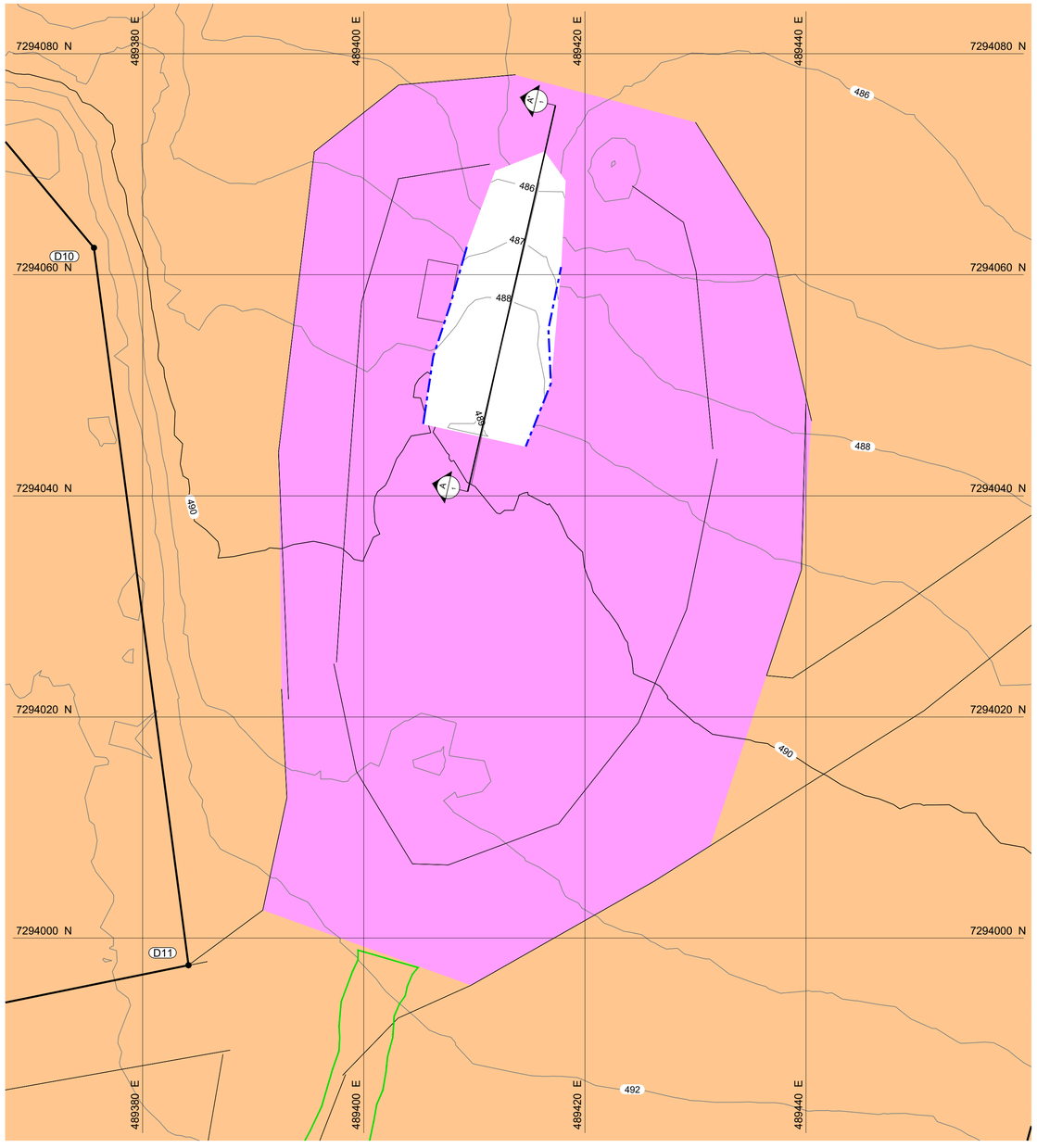
C. LMI TOTAL SECURITY REDUCTION SUMMARY

The Security Reduction request as submitted by LMI for a total of **$4,471,819.84** could not be reproduced based on the numbers provided by LMI, particularly when compared to the contingency set up in the 2019 RECLAIM model. It is also noted that, a roll-up of the values provided by LMI in their letter (table) dated November 25, 2021 total to **$4,801,901.43**.

On the basis of an evaluation of both the initial and the supplementary documents provided and records of visual inspections of site completed throughout the 2021 field season, CIRNAC is releasing the total security amount of **$ 3,061,255.66**

CIRNAC is open for a discussion on this release, Thursday February 24 or Friday February 25, 2022, if you need further clarifications.

APPENDIX C: UPDATED DESIGN DRAWINGS



PLAN SOWING EXISTING CONTOURS

0 10 20
1:250 METRES

LEGEND

- 495 — EXISTING GROUND SURFACE CONTOUR (1 m INTERVAL)
- PROPOSED WASTE ROCK REMOVAL AREA
- PROPOSED COVER AREA
- AREA CURRENTLY CLEARED FOR WASTE ROCK REMOVAL
- A4 — PROPOSED WASTE ROCK REMOVAL AREA LAYOUT POINT
- SURFACE PROJECTION OF UNDERGROUND DRIFTS
- DITCH CENTRELINE

MATERIAL ZONATION

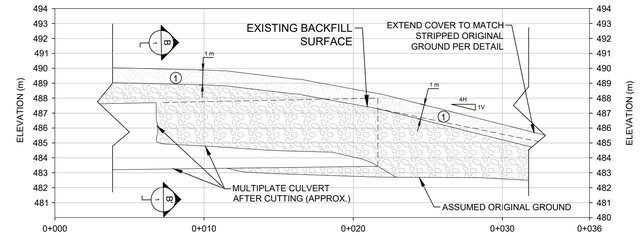
- 1 — ESKER SAND AND GRAVEL
- 3 — 25 kg EROSION PROTECTION
- NON-WOVEN GEOTEXTILE

NOTES

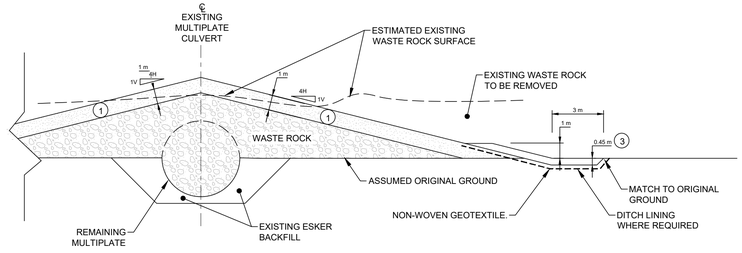
1. GEOTEXTILE TO BE NON-WOVEN NEEDLE-PUNCHED MINIMUM 300 g/m^2.
2. 25 kg EROSION PROTECTION TO HAVE D_{50} OF 300 mm MINIMUM AND MAXIMUM SIZE 450 mm.

REFERENCE(S)

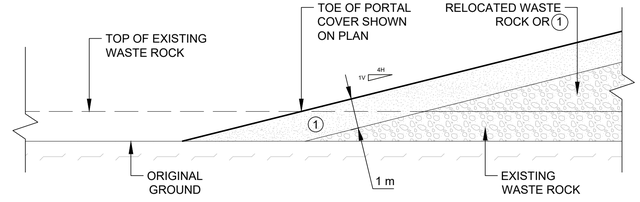
1. EXISTING GROUND TOPOGRAPHY FROM STANTEC, SURVEYED AUGUST 23 TO 25, 2019.
2. TOPOGRAPHY IN CULVERT AREA PROVIDED BY JDS IN FILE "20210712_portal_postdemo_asbuilt".
3. BASE PLAN DATA PROVIDED BY NORTHWEST CORP., FILE NO. 180125 draft_Figure 6 Surface Projection of Underground Mine Workings.dwg, RECEIVED JANUARY 1, 2018.
4. COORDINATES ARE IN METRES TO UTM NAD83, NRCS ZONE 12N.
5. PORTAL COVER TO BE EXTENDED TO MATCH STRIPPED ORIGINAL GROUND AS PER DETAIL. COVER EXTENT SHOWN IS APPROXIMATE ONLY.



SECTION A - A'
N.T.S.



SECTION B - B'
N.T.S.



TYPICAL DETAIL OF EDGE OF PORTAL COVER
N.T.S.

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date Aug 12, 2021
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

PROFESSIONAL ENGINEER
K. A. BOCKING
LICENSEE
NWT.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
0	2021-08-12	ISSUED FOR CONSTRUCTION	KAB	TDR	KAB	KAB
A	2021-08-06	ISSUED FOR REVIEW	KAB	TDR	KAB	KAB

SEAL

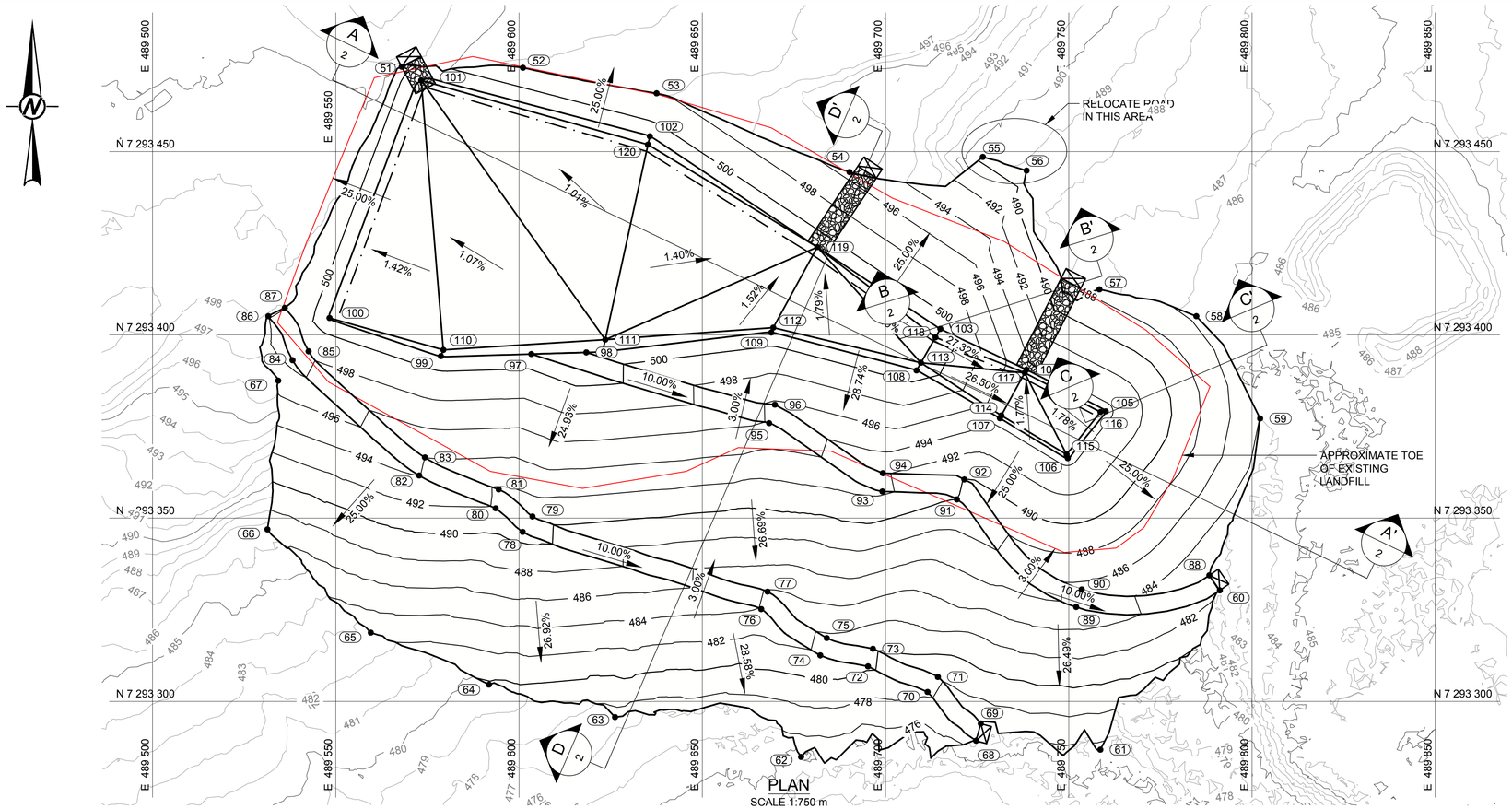
CLIENT
LUPIN MINES INCORPORATED

CONSULTANT
GOLDER
MEMBER OF WSP
MISSISSAUGA OFFICE
6925 CENTURY AVE. SUITE 100
MISSISSAUGA, ONTARIO
CANADA
1-995-567-4444
www.golder.com

PROJECT
PORTAL COVER DESIGN
LUPIN MINE CLOSURE
NUNAVUT, CANADA

TITLE
PROPOSED PORTAL COVER

PROJECT NO.	CONTROL	REV.		FIGURE
19136158	0006	0	1 of 1	1



PLAN
SCALE 1:750 m

LEGEND

- EXISTING GROUND SURFACE CONTOUR (1 m INTERVAL)
- 490 — PROPOSED LANDFILL EXPANSION COVER CONTOUR (2 m INTERVAL)
- 83 — PROPOSED LANDFILL EXPANSION COVER LAYOUT POINT
- PERIMETER BERM
- DRAINAGE CHUTE
- STILLING BASIN

NOTE(S)

1. PLACEMENT OF WASTE MATERIALS TO COMPLY WITH WATER LICENSE NO. 2AM - LUP2032 AND THE LUPIN MINE LANDFILL MANAGEMENT PLAN. WASTE SHALL CONSIST OF NON-COMBUSTIBLE NON-HAZARDOUS SOLID WASTE LISTED AS ACCEPTABLE UNDER THE PLAN.
2. WASTE MATERIALS SHALL NOT BE PLACED ON TOP OF SNOW.
3. WASTE ROCK SHALL BE USED TO INFILL VOIDS IN WASTE AND TO PROVIDE A 1 m CAP OVER THE FINAL WASTE SURFACE.
4. THE FINAL SURFACE OF WASTE / WASTE ROCK SHALL BE COVERED BY 1.0 m MINIMUM OF ESKER SAND AND GRAVEL COVER TO BE PLACED PROGRESSIVELY.
5. SURFACE SHOWN PROVIDES CAPACITY FOR ABOUT 106,000 m^3 OF WASTE AND WASTE ROCK. IF LESS CAPACITY IS REQUIRED, A LOWER TOP ELEVATION SHALL BE USED WHILE MAINTAINING THE GRADES AND DRAINAGE PATTERN SHOWN
6. EXISTING CORE BOXES TO BE RELOCATED AS DIRECTED BY OWNER.

REFERENCE(S)

1. EXISTING GROUND TOPOGRAPHY FROM STANTEC, SURVEYED AUGUST 23 TO 25, 2019.
2. COORDINATES ARE IN METERS TO UTM NAD83, NRCS ZONE 12N.

0 25 50
1:750 METRES

LANDFILL EXPANSION COVER SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
51	489567.95	7293473.16	499.43
52	489601.06	7293472.85	498.69
53	489637.52	7293465.88	498.08
54	489690.17	7293444.41	495.52
55	489726.54	7293448.53	489.63
56	489738.48	7293444.80	488.75
57	489758.35	7293412.39	487.37
58	489784.82	7293405.08	485.57
59	489802.21	7293377.16	483.96
60	489791.21	7293330.27	482.19
61	489758.62	7293286.82	475.47
62	489676.94	7293284.83	474.55
63	489626.19	7293295.71	477.31
64	489591.77	7293304.57	479.75

LANDFILL EXPANSION COVER SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
65	489559.53	7293318.75	482.52
66	489531.33	7293346.90	486.58
67	489534.29	7293387.50	496.72
68	489724.71	7293289.26	475.87
69	489725.99	7293293.93	476.32
70	489711.45	7293302.56	478.31
71	489714.28	7293306.66	478.17
72	489695.23	7293309.54	480.27
73	489696.56	7293314.34	480.16
74	489682.18	7293312.55	481.72
75	489683.96	7293317.26	481.65
76	489666.07	7293325.18	483.86
77	489667.79	7293329.94	483.85
78	489600.97	7293346.22	490.76

LANDFILL EXPANSION COVER SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
79	489603.65	7293350.45	490.62
80	489593.60	7293352.67	491.79
81	489594.44	7293357.83	491.81
82	489572.75	7293361.62	494.03
83	489574.30	7293366.55	494.00
84	489538.18	7293393.08	498.50
85	489542.55	7293395.50	498.31
86	489531.58	7293405.07	497.84
87	489536.07	7293407.35	497.93
88	489788.35	7293334.38	482.00
89	489752.02	7293325.76	485.61
90	489753.53	7293330.52	485.46
91	489719.47	7293355.10	490.00
92	489721.49	7293360.54	489.97

LANDFILL EXPANSION COVER SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
93	489699.13	7293357.25	492.28
94	489699.27	7293362.25	492.21
95	489668.23	7293375.89	495.83
96	489669.81	7293380.94	495.71
97	489603.34	7293394.76	501.00
98	489618.34	7293395.21	501.00
99	489578.65	7293394.17	501.00
100	489548.28	7293404.59	501.00
101	489573.29	7293469.42	501.00
102	489635.67	7293454.16	501.00
103	489714.95	7293401.62	501.00
104	489738.45	7293390.50	494.50
105	489760.08	7293379.14	494.50
106	489749.73	7293366.35	494.50

LANDFILL EXPANSION COVER SETOUT TABLE

POINT No.	EASTING (m)	NORTHING (m)	ELEVATION (m)
107	489731.20	7293377.24	494.50
108	489708.46	7293390.28	501.00
109	489668.83	7293400.63	501.00
110	489579.34	7293395.89	501.46
111	489623.51	7293398.68	501.85
112	489669.36	7293401.96	501.38
113	489709.66	7293392.38	501.60
114	489731.60	7293378.00	494.71
115	489749.42	7293367.36	494.92
116	489758.65	7293378.94	494.92
117	489737.98	7293389.65	494.51
118	489713.63	7293399.31	501.60
119	489681.36	7293423.94	501.00
120	489635.17	7293451.89	501.58

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
1	2021-06-29	ISSUED FOR CONSTRUCTION	DB	TDR	KAB	KAB
0	2020-06-24	ISSUED FOR CONSTRUCTION	DB	MR	KAB	KAB
A	2020-05-29	ISSUED FOR REVIEW	DB	MR	KAB	KAB

SEAL

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 29 JUN 2021
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

CLIENT
LUPIN MINES INCORPORATED

CONSULTANT
GOLDER
MEMBER OF WSP
GOLDER ASSOCIATES LTD.
6925 CENTURY AVENUE, SUITE #100
MISSISSAUGA, ONTARIO, L5N 7K2
CANADA
[+1] (905) 567-4444
www.golder.com

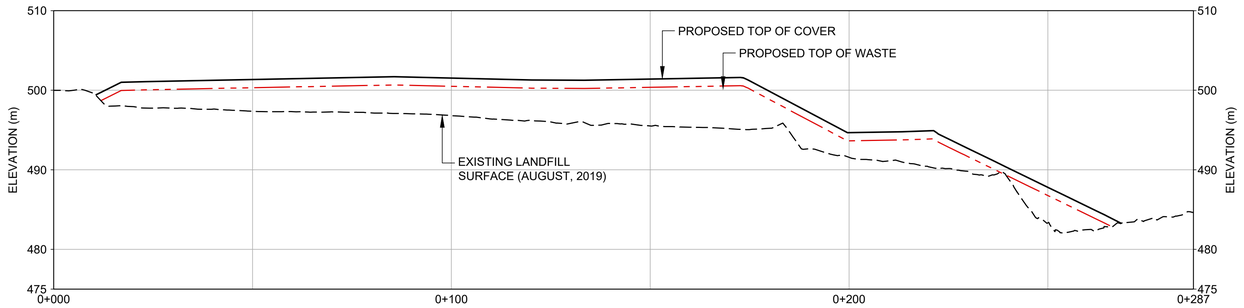
PROJECT
LANDFILL EXPANSION DETAILED DESIGN
LUPIN MINE CLOSURE
NUNAVUT, CANADA

TITLE
PROPOSED LANDFILL EXPANSION AND COVER

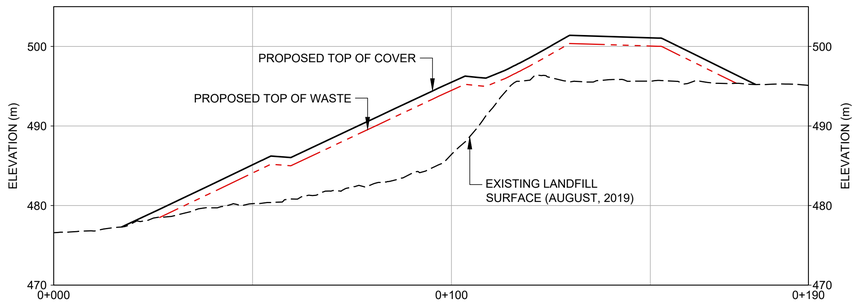
PROJECT NO.	CONTROL	REV.		DRAWING
19136158	0001	1	1 of 2	1

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

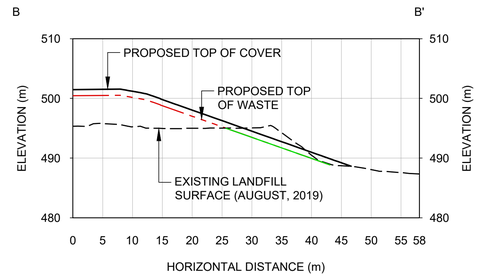
0 25 mm



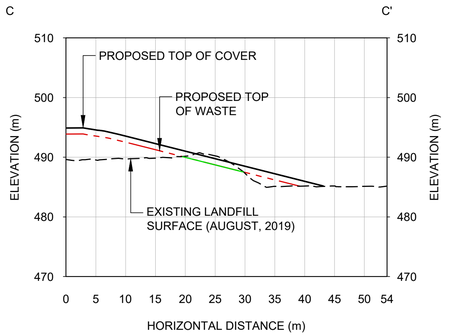
SCALE 1:750 m, 2 X V.E. — A-1 — CROSS-SECTION A-A'



SCALE 1:750 m, 2 X V.E. — D-1 — CROSS-SECTION D-D'



SCALE 1:500 m — B-1 — CROSS-SECTION B-B'



SCALE 1:500 m — C-1 — CROSS-SECTION C-C'

LEGEND

- PROPOSED TOP OF COVER IN SECTION
- PROPOSED TOP OF WASTE / WASTE ROCK IN SECTION
- PROPOSED BASE REGRADE
- EXISTING LANDFILL SURFACE (AUGUST, 2019)

MATERIAL ZONATION

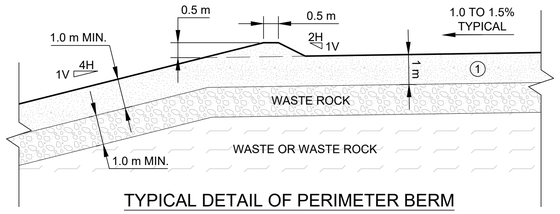
- (1) ESKER SAND AND GRAVEL
- (2) 10 kg EROSION PROTECTION
- (3) 25 kg EROSION PROTECTION
- NON-WOVEN GEOTEXTILE

NOTE(S)

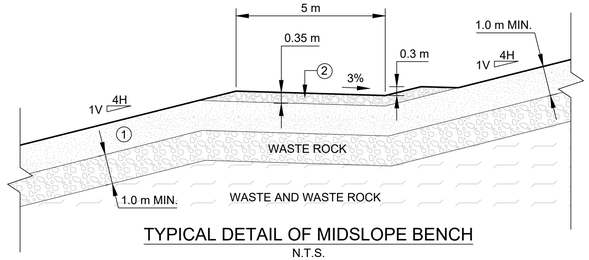
1. REFER TO DRAWING 1 FOR LOCATIONS OF CROSS-SECTIONS, PERIMETER BERMS, DRAINAGE CHUTES AND STILLING BASINS.
2. GEOTEXTILE TO BE NON-WOVEN NEEDLE-PUNCHED MINIMUM 350 g/m^2.
3. 10 kg EROSION PROTECTION TO HAVE D_{50} OF 190 mm MINIMUM AND MAXIMUM SIZE 350 mm.
4. 25 kg EROSION PROTECTION TO HAVE D_{50} OF 260 mm MINIMUM AND MAXIMUM SIZE 450 mm.

REFERENCE(S)

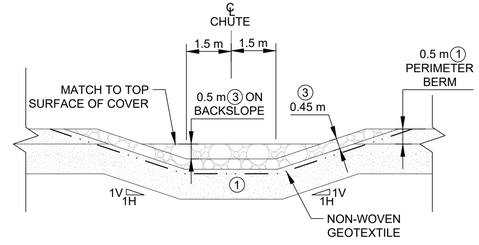
1. EXISTING GROUND TOPOGRAPHY FROM STANTEC, SURVEYED AUGUST 23 TO 25, 2019.



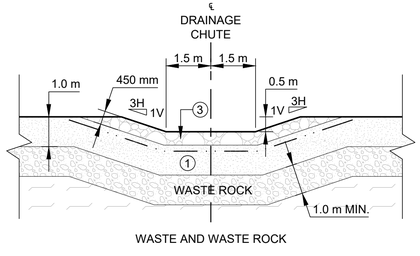
TYPICAL DETAIL OF PERIMETER BERM
N.T.S.



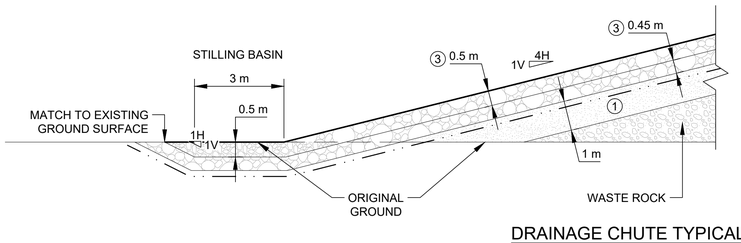
TYPICAL DETAIL OF MIDSLOPE BENCH
N.T.S.

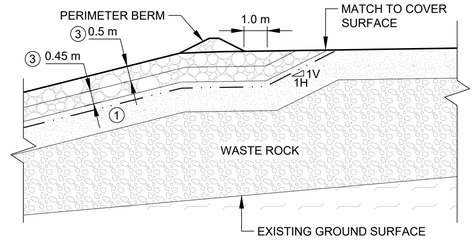


SECTION OF ENTRANCE TO DRAINAGE CHUTE 1
N.T.S.



DRAINAGE CHUTE TYPICAL CROSS-SECTION
N.T.S.





DRAINAGE CHUTE TYPICAL PROFILE 1
N.T.S.

0 20 40
1:500 METRES

0 25 50
1:750 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
1	2021-06-29	ISSUED FOR CONSTRUCTION	KAB	TDR	KAB	KAB
0	2020-06-24	ISSUED FOR CONSTRUCTION	KAB	MR	KAB	KAB
A	2020-05-29	ISSUED FOR REVIEW	KAB	MR	KAB	KAB

SEAL

PERMIT TO PRACTICE GOLDER ASSOCIATES LTD.
Signature
Date 29 JUNE 2021
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

CLIENT
LUPIN MINES INCORPORATED

CONSULTANT
GOLDER
MEMBER OF WSP
GOLDER ASSOCIATES LTD.
6925 CENTURY AVENUE, SUITE #100
MISSISSAUGA, ONTARIO, L5N 7K2
CANADA
[+1] (905) 567-4444
www.golder.com

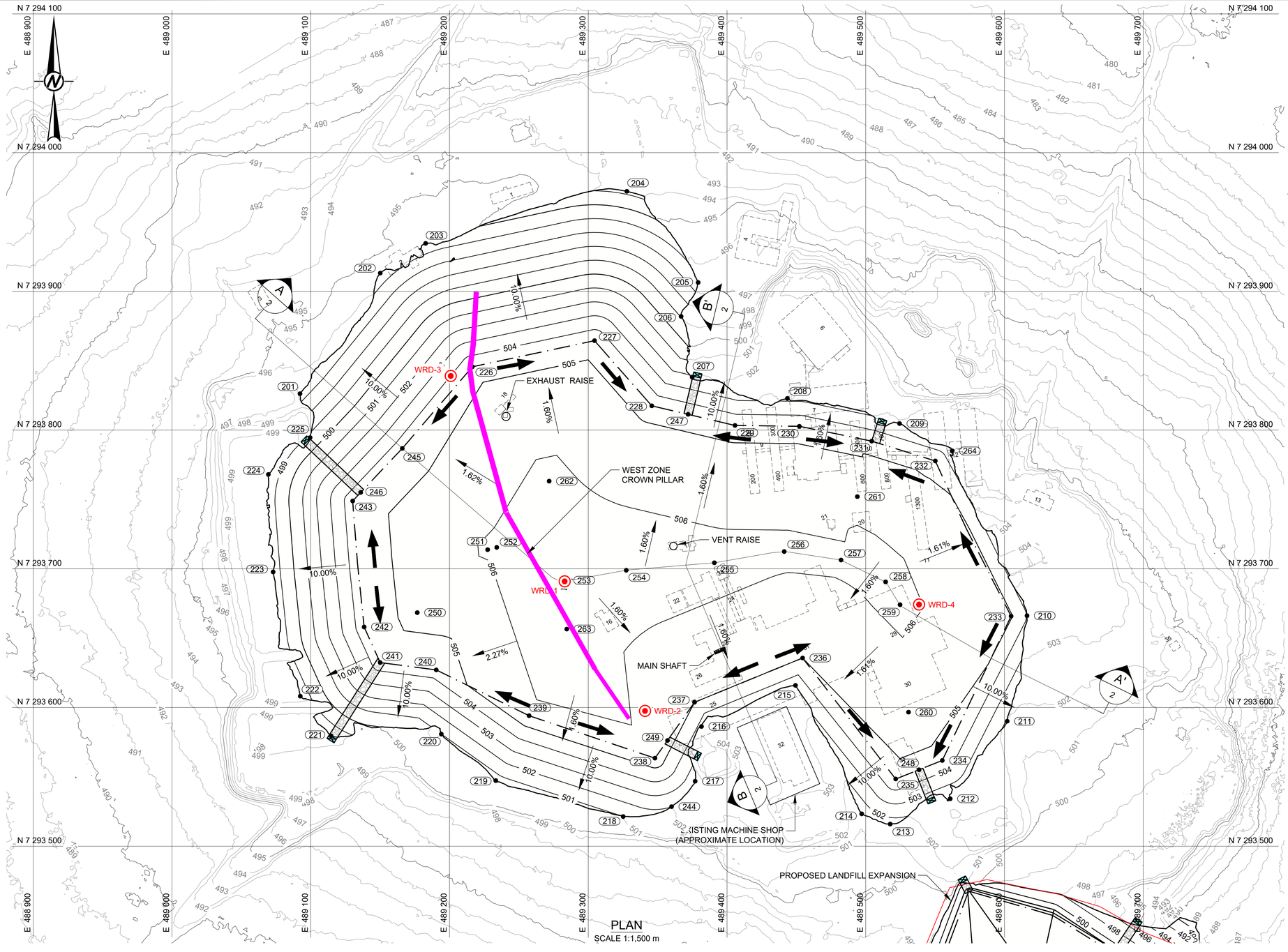
PROJECT
LANDFILL EXPANSION DETAILED DESIGN
LUPIN MINE CLOSURE
NUNAVUT, CANADA

TITLE
PROPOSED LANDFILL EXPANSION SECTIONS AND DETAILS

PROJECT NO.	CONTROL	REV.		DRAWING
19136158	0001	1	2 of 2	2

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

0 — 25 mm



PLAN
SCALE 1:1,500 m

LEGEND

- EXISTING GROUND SURFACE CONTOUR (1 m INTERVAL)
- PROPOSED WASTE ROCK COVER CONTOUR (2 m INTERVAL)
- PERIMETER BERM
- DRAINAGE CHUTE
- STILLING BASIN
- PROPOSED WASTE ROCK COVER LAYOUT POINT
- PROPOSED THERMISTOR STRING
- SLAB FROM FORMER BUILDING
- DRAINAGE DIRECTION ALONG PERIMETER BERM

NOTE(S)

1. THE SUBGRADE UNDER THE DOME AREA IS TO BE PREPARED IN ACCORDANCE WITH THE WATER LICENCE AND WITH THE FINAL CLOSURE AND RECLAMATION PLAN (FCRP). ENGINEER'S APPROVAL OF CLEANUP IS REQUIRED BEFORE WASTE ROCK OR COVER MATERIALS ARE PLACED.
2. THE FOLLOWING MATERIALS SHALL BE REMOVED FROM THE EXISTING SUBGRADE BEFORE WASTE ROCK IS PLACED: DEMOLITION WASTE, PETROLEUM HYDROCARBON CONTAMINATED SOILS, ARSENIC "HOT SPOTS", SOIL OR ROCK MATERIALS IMPACTED WITH CYANIDE OR LEAD NITRATE AND ANY HAZARDOUS WASTE.
3. FLOOR SLABS LEFT IN PLACE IN THE SUBGRADE SHALL BE PUNCTURED WITH A HOE RAM BEFORE WASTE ROCK AND/OR COVER MATERIALS ARE PLACED ON TOP.
4. THE CROWN PILLAR OPENINGS AND MINE SHAFTS ARE TO BE FILLED BEFORE WASTE ROCK IS PLACED ON TOP. PLACE A RIDGE OF ADDITIONAL WASTE ROCK TO ALLOW FOR SETTLEMENT IF SO DIRECTED BY THE ENGINEER.
5. NO WASTE ROCK SHALL BE PLACED ON THE PREPARED SUBGRADE UNTIL THE SUBGRADE PREPARATION HAS BEEN APPROVED BY THE ENGINEER.
6. WASTE ROCK OR ESKER COVER MATERIALS SHALL NOT BE PLACED ON TOP OF SNOW OR ICE.
7. THE DESIGN SURFACE SHOWN PROVIDES CAPACITY FOR ABOUT 269,000 m^3 OF WASTE ROCK. IF LESS CAPACITY IS REQUIRED, A LOWER TOP SURFACE ELEVATION SHALL BE USED WHILE MAINTAINING THE GRADES AND DRAINAGE PATTERN SHOWN.
8. TOPOGRAPHY BEYOND THE TOE OF WASTE ROCK DOME IS EXISTING TOPOGRAPHY BEFORE RELOCATION OF WASTE ROCK. WHERE WASTE ROCK IS PRESENT, THE COVER IS TO BE EXTENDED AT THE DESIGN SLOPE TO INTERSECT ORIGINAL GROUND.
9. EXISTING MACHINE SHOP TO BE LEFT IN PLACE TO SUPPORT CLOSURE CONSTRUCTION.
10. CO-ORDINATES OF SETOUT POINTS ARE PROVIDED IN FILE 'SETOUT_POINTS_FOR_PROPOSED_WASTE_ROCK_DOME_REVC.csv.
11. CONSTRUCT DITCHES OR BERMS AS NECESSARY TO DIRECT FLOW FROM DRAINAGE CHUTES AND GENERAL RUNOFF AWAY FROM TOE OF DOME FILL,

REFERENCE(S)

1. EXISTING GROUND SURFACE TOPOGRAPHY FROM STANTEC, SURVEYED AUGUST 23 TO 25, 2019.
2. COORDINATES ARE IN METRES TO UTM NAD83, NRCS ZONE 12N.
3. FOR PLAN VIEW OF EXPANDED LANDFILL REFER TO DRAWING 19136158-0001-1.
4. UNDERGROUND WORKINGS INFORMATION PROVIDED BY CLIENT FILENAME 180125 draft_Figure 6 Surface Projection of Underground Mine Workings.DWG

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 05 Aug 2021
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

0 50 100
1:1,500 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2021-08-05	ISSUED FOR CONSTRUCTION	DB	TDR	KAB	KAB
1	2021-06-18	ISSUED FOR CONSTRUCTION	DB	TDR	KAB	KAB
0	2021-05-18	ISSUED FOR CONSTRUCTION	DB	TDR	KAB	KAB
C	2021-05-03	ISSUED FOR REVIEW	DB	TDR	KAB	KAB
B	2020-06-19	ISSUED FOR REVIEW	DB	MR	KAB	KAB
A	2020-06-08	ISSUED FOR REVIEW	DB	MR	KAB	KAB

SEAL

CLIENT
LUPIN MINES INCORPORATED

CONSULTANT
GOLDER
MEMBER OF WSP
GOLDER ASSOCIATES LTD.
6925 CENTURY AVENUE, SUITE #100
MISSISSAUGA, ONTARIO, L5N 7K2
CANADA
[+1] (905) 567-4444
www.golder.com

PROJECT
WASTE ROCK DOME DESIGN
LUPIN MINE CLOSURE
NUNAVUT, CANADA

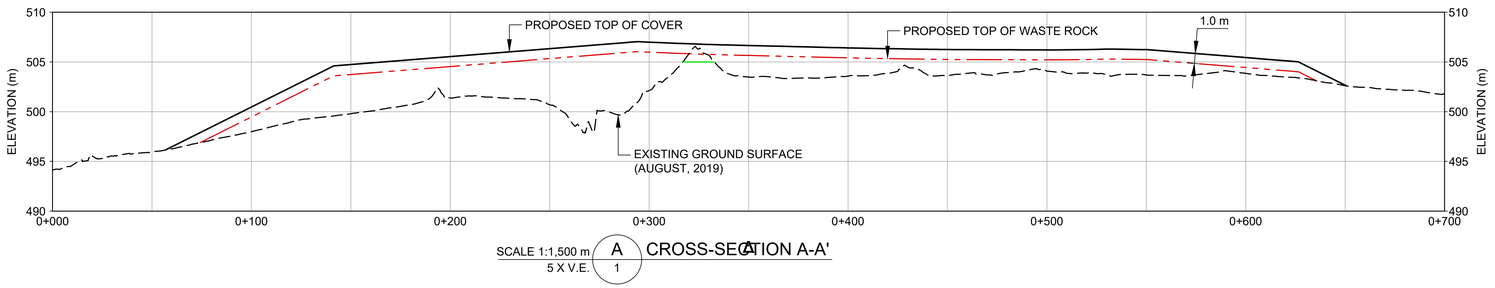
TITLE
PROPOSED WASTE ROCK DOME

PROJECT NO.	CONTROL	REV.	DRAWING
19136158	0002	2	1 of 2 1

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

0 25 mm

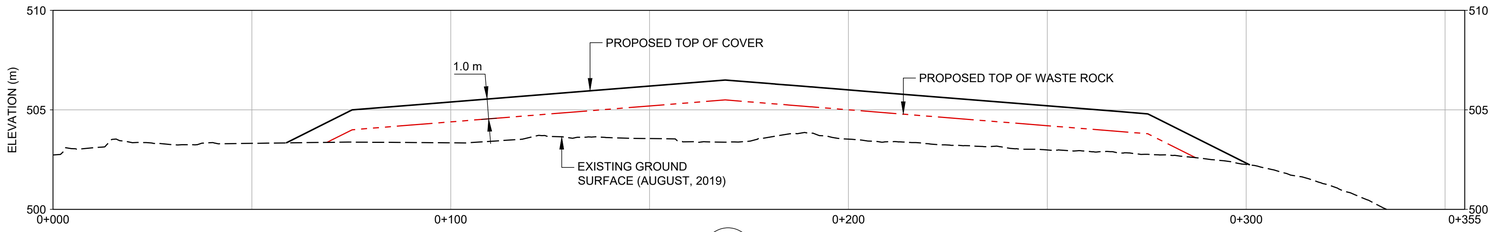
Path: \\golder.gds\complexdata\office\mississauga\SIM\Clients\Mandalay_Resources\Lupin_Mine\99_PROJ\19136158_Regulatory_Support\40_PROD\0002_Waste_Rock_Dome_Design\ | File Name: 19136158-0002-CM-0001.dwg | Last Edited By: tcrose Date: 2021-08-06 Time:9:28:45 AM | Printed By: tcrose Date: 2021-08-06 Time:9:38:11 AM



SCALE 1:1,500 m
5 X V.E.

A
1

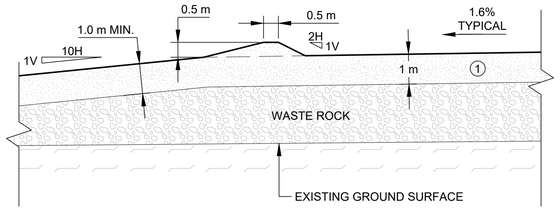
CROSS-SECTION A-A'



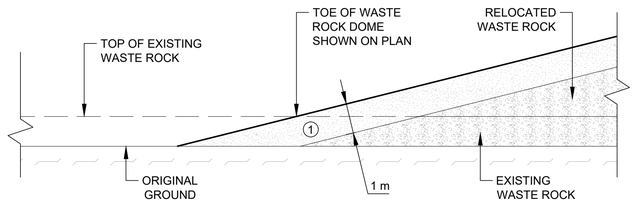
SCALE 1:750 m
5 X V.E.

B
1

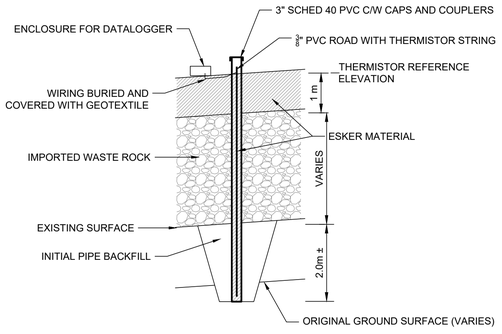
CROSS-SECTION B-B'



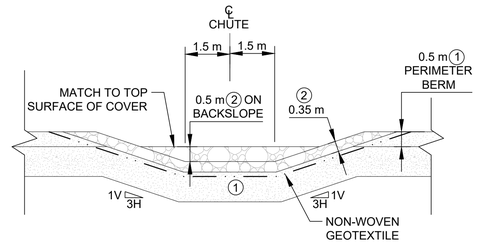
TYPICAL DETAIL OF PERIMETER BERM
N.T.S.



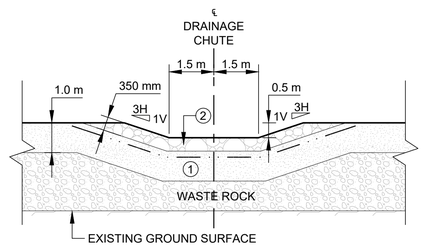
TYPICAL DETAIL OF EDGE OF WASTE ROCK DOME
N.T.S.



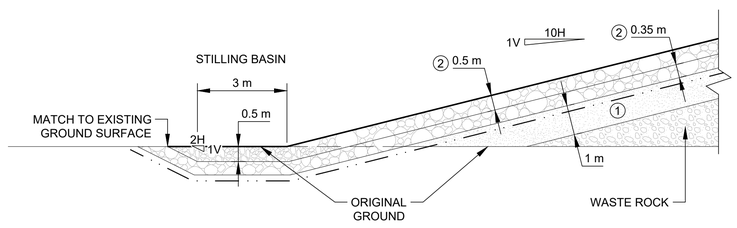
TYPICAL DETAIL OF THEMISTOR STRING INSTALLATION
N.T.S.



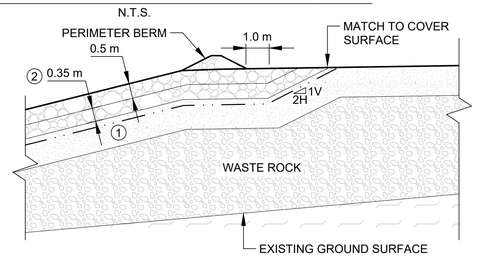
SECTION OF ENTRANCE TO DRAINAGE CHUTE
N.T.S.



DRAINAGE CHUTE TYPICAL CROSS-SECTION
N.T.S.



DRAINAGE CHUTE TYPICAL PROFILE
N.T.S.



LEGEND

- PROPOSED TOP OF COVER IN SECTION
- PROPOSED TOP OF WASTE ROCK IN SECTION
- PROPOSED BASE REGRADE
- EXISTING GROUND SURFACE (AUGUST, 2019)

MATERIAL ZONATION

- 1 — ESKER SAND AND GRAVEL
- 2 — 10 kg EROSION PROTECTION
- NON-WOVEN GEOTEXTILE

NOTES

1. REFER TO DRAWING 1 FOR LOCATIONS OF CROSS-SECTIONS, PERIMETER BERMS, DRAINAGE CHUTES, STILLING BASINS AND INSTRUMENTATION.
2. GEOTEXTILE TO BE NON-WOVEN NEEDLE-PUNCHED MINIMUM 350 g/m^2.
3. 10 kg EROSION PROTECTION TO HAVE D_{50} OF 190 mm MINIMUM AND MAXIMUM SIZE 350 mm.

INSTRUMENTATION NOTES

1. THE REFERENCE LEVEL FOR EACH THERMISTOR STRING SHALL BE THE FINAL FINISHED GRADE OF THE ESKER COVER. THIS GRADE MAY VARY FROM THE CURRENT DESIGN ELEVATION DUE TO VARIATIONS IN THE AMOUNT OF WASTE ROCK RELOCATED; THEREFORE THE THERMSITOR STRINGS SHALL BE INSTALLED IN THE TUBES ONLY AFTER THE COVER GRADE IS FINALIZED.
2. PITS UP TO 2-M DEEP SHALL BE EXCAVATED INTO THE EXISTING GROUND SURFACE (EXISTING WASTE ROCK OR SOIL) AT ALL FOUR LOCATIONS.
3. A 2-M LONG 3" PVC PIPE SHALL BE PLACED UPRIGHT IN THE CENTER OF THE PIT, WITH EXISTING GROUND MATERIAL PLACED AROUND THE PIPE TO SUPPORT IT. ONCE THE PIPE IS STABLE AND IN AN UPRIGHT POSITION, THE PIT SHALL BE BACKFILLED USING EXISTING GROUND MATERIAL UNTIL ABOUT 0.3 M OF PIPE LENGTH IS LEFT STICKING OUT.
4. 1-M LONG 3" PVC EXTENSION SEGMENTS SHALL BE ATTACHED PROGRESSIVELY TO THE PIPE DURING PLACEMENT OF IMPORTED WASTE ROCK DOME UNTIL THE FINAL GRADE OF THE DOME IS REACHED. PLACEMENT OF WASTE ROCK SURROUNDING THE PIPE SHALL BE CONDUCTED CAREFULLY TO PREVENT DAMAGE OR BENDING OF THE PVC PIPE.
5. PRIOR TO PLACEMENT OF THE 1-M THICK ESKER COVER, ADDITIONAL PVC PIPE EXTENSION SEGMENTS SHALL BE ATTACHED WITH AT LEAST 1 M OF PIPE LEFT ABOVE THE COVER SURFACE.
6. ALL THERMISTOR STRINGS SHALL BE CALIBRATED AGAINST AMBIENT TEMPERATURE BEFORE THE STRINGS ARE LOWERED INTO THE PVC PIPE.
7. EACH STRING SHALL BE ATTACHED TO A 3/8" PVC ROD ENSURING THAT THE CABLE IS STRAIGHT AND BEAD SPACINGS ARE AS PER DESIGN. THE ROD WITH THE ATTACHED STRING SHALL THEN BE LOWERED INTO THE 3" PVC PIPE ENSURING THAT THE UPPERMOST BEAD IS 0.25 M BELOW THE SURFACE OF THE COVER.
8. THE PVC PIPE SHALL THEN BE BACKFILLED TO THE LEVEL OF THE TOP OF COVER USING A 1" MINUS ESKER COVER MATERIAL. THE TOP OF THE PVC PIPE SHALL BE CAPPED TO PREVENT INGRESS OF WATER OR SNOW.
9. INSTALL A ROBUST STANDARD ENCLOSURE TO HOUSE THE BATTERY AND DATALOGGER ADJACENT TO THE PVC PIPES AT EACH MONITORING LOCATION. WIRING CONNECTING THE PVC PIPE AND THE ENCLOSURE SHALL BE BURIED IN THE ESKER COVER AND COVERED WITH GEOTEXTILE TO REDUCE THE RISK OF CABLES BEING DAMAGED BY WILDLIFE.
10. THE STILLING BASIN SHALL BE DELETED IF THE CHUTE ENDS ON A BEDROCK OUTCROP.
11. CONSTRUCT DITCHES OR BERMS AS NECESSARY TO DIRECT FLOW FROM DRAINAGE CHUTES OR GENERAL RUNOFF AWAY FROM TOE OF DOME COVER.

REFERENCE(S)

1. EXISTING GROUND TOPOGRAPHY FROM STANTEC, SURVEYED AUGUST 23 TO 25, 2019.

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 05 Aug 2021
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

0 20 40
1:500 METRES

0 25 50
1:750 METRES

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2021-08-05	ISSUED FOR CONSTRUCTION	DB	TDR	KAB	KAB
1	2021-06-18	ISSUED FOR CONSTRUCTION	DB	TDR	KAB	KAB
0	2021-05-18	ISSUED FOR CONSTRUCTION	DB	TDR	KAB	KAB
C	2021-05-03	ISSUED FOR REVIEW	DB	TDR	KAB	KAB
B	2020-06-19	ISSUED FOR REVIEW	DB	MR	KAB	KAB
A	2020-06-08	ISSUED FOR REVIEW	DB	MR	KAB	KAB

SEAL

CLIENT
LUPIN MINES INCORPORATED

CONSULTANT
GOLDER
MEMBER OF WSP
GOLDER ASSOCIATES LTD.
6925 CENTURY AVENUE, SUITE #100
MISSISSAUGA, ONTARIO, L5N 7K2
CANADA
[+1] (905) 567-4444
www.golder.com

PROJECT
WASTE ROCK DOME DESIGN
LUPIN MINE CLOSURE
NUNAVUT, CANADA

TITLE
PROPOSED WASTE ROCK DOME SECTIONS AND DETAILS

PROJECT NO.	CONTROL	REV.		DRAWING
19136158	0002	2	2 of 2	2

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

0 25 mm

APPENDIX D: CONTAMINATED SOILS REPORT