2015 Waste Management Facilities Geotechnical Inspection

Prepared for

Lupin Mines Incorporated

Prepared by

SRK Consulting (Canada) Inc.
1CL008.002
October 2015

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1 Introduction

The Lupin Mine site is currently under care and maintenance status, and operating under Nunavut Water Licence 2AM-LUP0914 (NWB 2009) by Lupin Mines Incorporated (LMI), a wholly-owned indirect subsidiary of Elgin Mining Inc. Elgin acquired LMI from MMG Resources Inc. in July 2011. The mine is located on the western shore of Contwoyto Lake, approximately 285 km southeast of Kugluktuk, Nunavut and 400 km northeast of Yellowknife (Figure 1.1). As part of the Inspector's Water Licence Inspection Form provided on July 15, 2014, section 3.4 of the document under Action Required (AANDC 2014), states that:

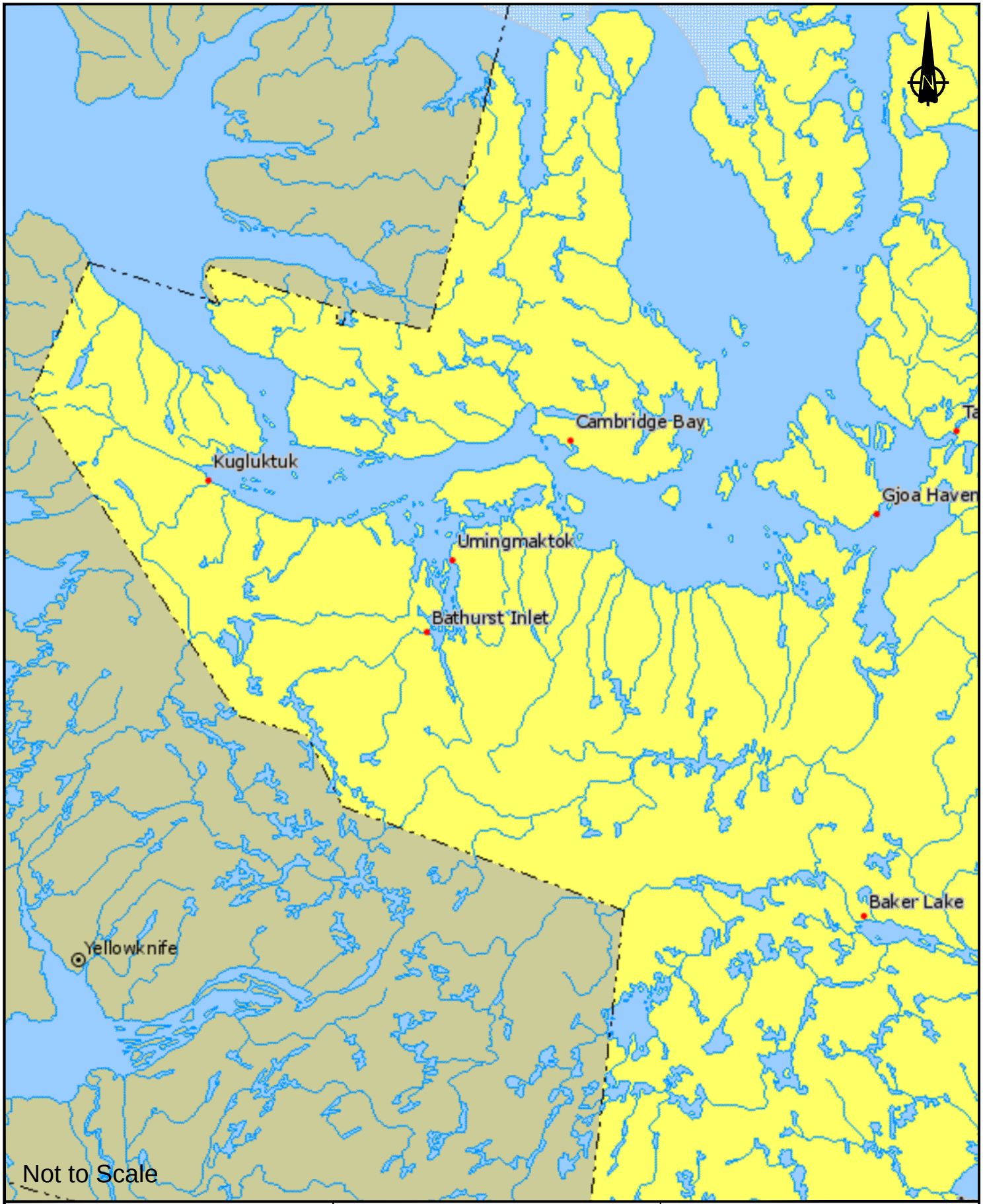
"A geotechnical inspection is to be conducted on all engineered water management structures, including but not limited to: Main and Satellite Tank Farms, Upper and Lower Sewage Lagoon, and waste management areas. The engineer's report is to be submitted to the NWB and to the Inspector by October 31, 2014, accompanied by a plan and timelines to implement the engineer's recommendations."

SRK completed geotechnical inspections at the sewage pond dams, fuel tank farm containment systems and at the tailings containment area (TCA) in 2014. The inspections at the sewage pond dams and fuel containment are direct actions taken as per request from the July 2014 Water Licence Inspection Form. The inspection at the TCA was done as part of the annual requirement as per the Clause E.6 of the Water Licence agreement. Subsequently, the Inspector's Water Licence Inspection Form provided on July 14, 2015, section 3.3 of the document under Action Required (AANDC 2015) states that:

"Geotechnical inspection of Waste Containment Areas – report to be received by Inspector by October 31, 2015."

Clarification from the Inspector in 2015 indicated that the subject area is the waste oil management facility (WOMF) that is located immediately south of the main tank farm. This area was not understood to be a "water management structure", because it is not intended to hold water, hence it was not inspected in 2014. A geotechnical inspection was completed in 2015 as per requested in the July 2015 Water Licence Inspection Form.

This report summarizes SRK's observation of the sewage pond dams and waste oil management area.



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LUPIN MINE

Location Plan

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Lupin Mine Incorporated

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2 Site Conditions

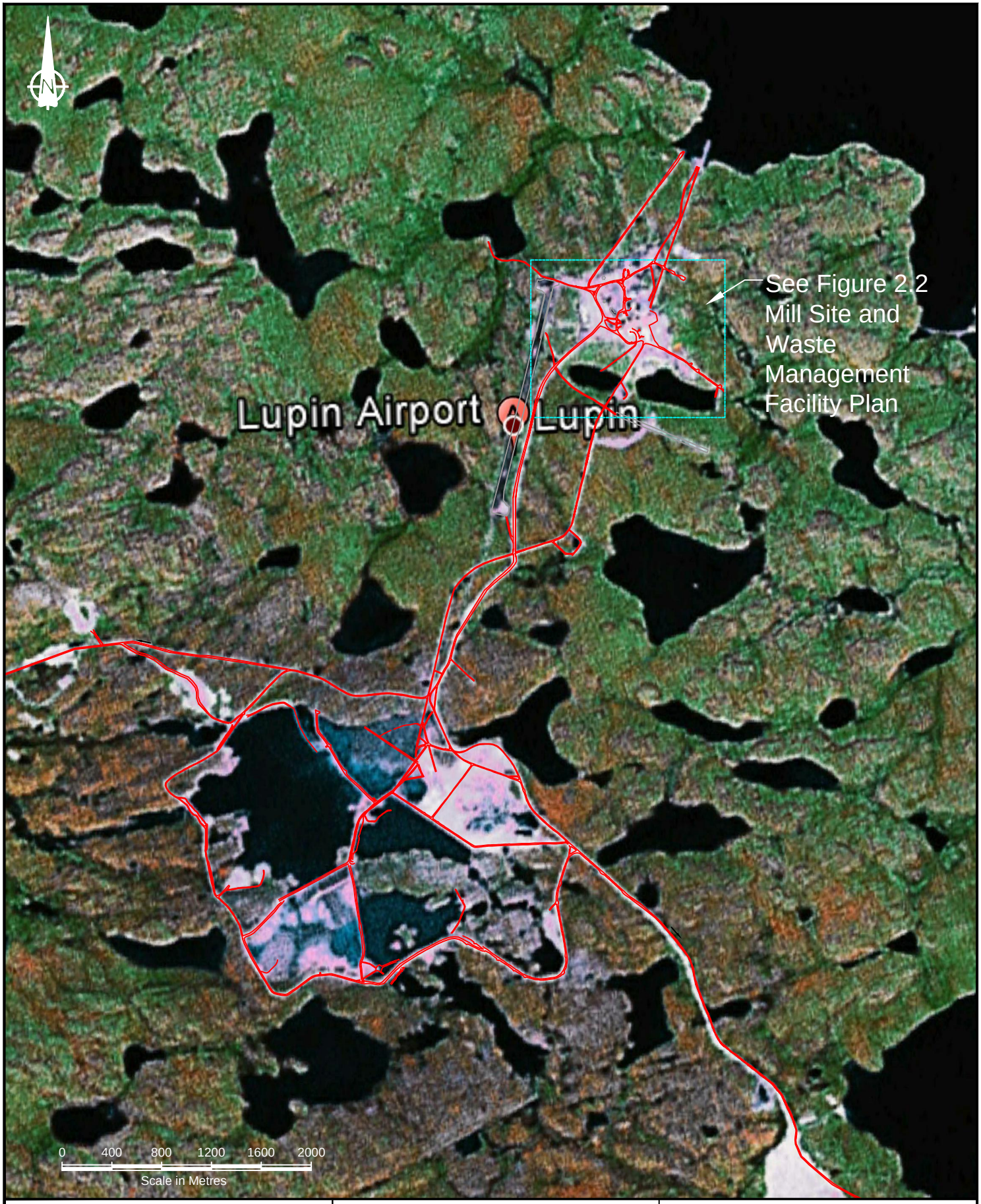
2.1 Sewage Management Facility

The Lupin Mine consists of a mill facility, camps, airstrip and tailings containment area (Figure 2.1). The sewage management facility consists of two lagoon lakes located south of the mill facility (Figure 2.2). The sewage lagoon lakes system was constructed in a natural valley which generally drains from a northwest to southeast direction. The system consists of two lakes, created by Upper and Lower Sewage Dams. The dams are generally aligned in a north to south direction, and observed to be constructed from compacted esker sand and gravel estimated to be 3-4 m high. The Upper Sewage Dam is around 60 m in length and the crest supports the now decommissioned tailings pipeline which discharged tailings to the tailings containment area (TCA) from the mill. A small containment (tailings dump pond #1) is built downstream in the southern section of the upper sewage dam, using it as a buttress. The height of this small containment varies between 3-4 m. The Lower Sewage Dam is around 80 m in length.

The general sewage management requires raw sewage to be hauled and discharged into the western shore of the Upper Sewage Lake. Water from the Upper Sewage Lake was siphoned to the Lower Sewage Lake periodically during mine operation, or as needed during the care and maintenance period. The water in the Lower Sewage Lake will be tested and discharged into the environment through the siphon over the dam as needed.

2.2 Waste Oil Management Facility

The waste oil management facility (WOMF) consist of a single containment berm system located immediately south of the main tank farm. The facility is a flat area constructed from sand and gravel material and surrounded by 0.5 m high berms and a 0.3 m deep ditch to the west and south. LMI informed SRK that a liner system exists underneath the sand and gravel. Used oil containers and drums are transported by fork lifts into the facility for storage. The facility is not designed or intended for long term water storage, but it can support the freshet and seasonal precipitations.



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General Site Plan

SRK JOB NO.: 1CL008.000

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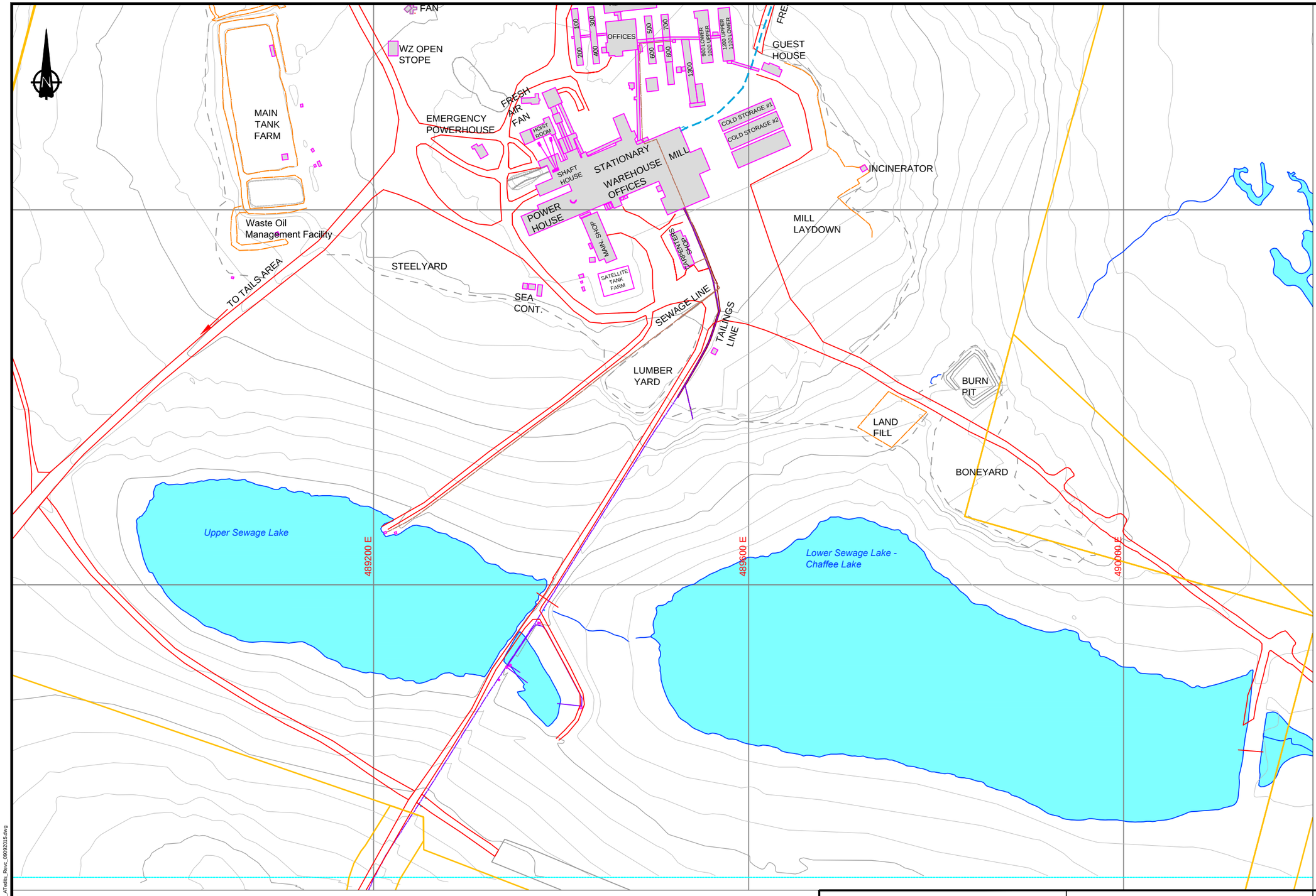

LEGEND

- Lake Pond
- Tank Farm Berm Outline
- Building
- Water Pipeline (8 in Diam) (Not in Use)
- Tailings Line Route (Not in Use)
- Sewage Pipeline (6 in Diam) (Not in Use)
- Lake Shore, Drainage
- Contour 1 m
- Contour 5 m
- Roads
- Site Features Miscellaneous
- Cleared Area
- Berm Area
- Slope Toe
- Slope Top
- Culvert
- Fence

NOTES

1. Topographic information and facilities outline provided by Lupin Mine Inc. on August 13, 2012.

0 40 80 120 160 200

Scale in Metres

Coordinate System: Nad_1983_UTM_Zone_12N
NTS Map Sheets 076E11 and 076E14

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Waste Management Structures

DATE:	APPROVED:	FIGURE:
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2.3 Dam Classifications

According to the Canadian Dam Association guidelines (Table 2-1), the sewage dams are classified as Low where no loss of life is expected and has a minimal short-term impact to the environment and cultural values. The classification of the dams do not require an Emergency Preparedness Plan (EPP) or a dam break inundation study.

Table 2-1: Dam Classifications as per CDA (2007, Revised 2013)

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

[1] Definitions for population at risk:

None—There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure.

Temporary—People are only temporarily in the dam-breach inundation zone (e.g., seasonal cottage use, passing through on transportation routes, participating in recreational activities).

Permanent—The population at risk is ordinarily located in the dam-breach inundation zone (e.g., as permanent residents); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimates of potential loss of life (to assist in decision-making if the appropriate analysis is carried out).

[2] Implications for loss of life:

Unspecified – The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

2.4 Climate

Climate conditions were recorded at the Lupin manned weather station until October 2006. An automated weather station known as Lupin (MAPS) (CWIJ) has recorded data intermittently at the site. Reviewing the data from the end of October 2006 to the present, the station has reported an arctic climate with a mean annual temperature of -9.8°C. Winter is considered to last from October to May and summer is considered to last from June to September. The summer daily temperature averages at 6.8°C, and winter daily temperature averages at -18.5°C. There are persistent winds at an annual mean velocity of 18.0 km/h and gusts up to 95 km/h. Measured site precipitation is reported at an annual mean of around 388 mm. The data does not breakdown the precipitation into rain and snow (WU 2012).

2.5 Site Geology

The Lupin gold deposit is situated in an Archean metaturbidite sequence of the Contwoyto Formation, part of the Yellowknife Supergroup of supracrustal metasedimentary and metavolcanic rocks of the Slave Geologic Province. The rocks have been subjected to both regional and contact metamorphism and to several phases of deformation and intrusion.

The Contwoyto Lake area lies within the Upland unit of the Kazan physiographic region of the Canadian Shield. The area was glaciated during the Pleistocene Epoch. Isostatic rebound after ice melt resulted in emergent landforms, and during this process all parts of the land were washed by runoff and lakes. The easily erodible glaciolacustrine sediment, till and glacio-fluvial sand and gravels were subsequently reworked by melts and runoff. This has resulted in the present day outcrops with thin soil veneers, abandoned beaches and esker formations (Kinross 2005).

3 Sewage Dams Inspection

3.1 General

Mr Alvin Tong, PEng, a Senior Consultant with SRK, conducted two geotechnical inspections on August 4th and on August 19th 2015. After an initial aerial overview of the site, the detailed site visual inspection was done. Mr. Patrick Downing of LMI was present during the August 19th inspection for comment and discussion after the inspection. Discovery Mining Service (DMS) was on site to carryout maintenance work around site, including siphoning the water in the ponds and maintenance earthwork on the dams.

Weather conditions during the inspection were mild and overcast with periods of light rain. A detailed photographic log of the inspection is included in Appendix A.

3.2 Upper Sewage Dam

The dam is in good condition with no geotechnical concerns. Previous damages and deficiencies noted from the 2015 inspection report (AANDC 2015) had been repaired. The crest of the dam was repaired, widened and leveled with new backfill material. Tailings dump pond #1 has been

sufficiently dewatered and has no stability concerns. Geotextile and riprap was placed on the upstream face of the dam as repair. Seepage was observed discharging from the old 200 m long culvert at a rate estimated to be about 0.5 L/min. The condition of the culvert made it very difficult to accurately measure the flow. The freeboard is observed to be approximately 1.8 m.

3.3 Lower Sewage Dam

The dam is in stable condition with no geotechnical concerns. Maintenance work has been completed on the dam. The erosion on the upstream face was repaired with the installation of geotextile and riprap. The crest and the south abutment have been backfilled with additional material to provide a levelled elevation. All the deficiencies noted in the AANDC's 2014 inspection have been addressed. The freeboard is observed to be approximately 1.3 m.

4 Waste Oil Management Facility Inspection

The facility is a stable condition with no geotechnical concern. Minor ponding water was observed in the lowest point of the ditch and in one high traffic area. The berm and collection ditch are in stable condition. The downstream slopes of the facility are observed to be in stable condition without any evidence of erosion and instability. No exposed liner was observed within the facility.

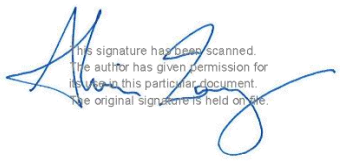
5 Recommendations

Both the sewage dams were repaired according to the 2014 recommendations. The current condition of the Upper Sewage Dam is in good geotechnical condition after the 2015 repairs. Periodic inspections are recommended on the buried culvert to monitor its condition and seepage rate. It appears that this culvert controls the upper lake level. If the seepage stops or further reduces, then the lake level could increase as a result. If the culvert is found to be fully collapsed or blocked and the seepage stops, then it would be recommended that the siphon pipes be reinstalled to transfer water to the lower lake. The upper pond levels is recommended to have minimum 1 m freeboard prior to operations and winterization.

The Lower Sewage Dam is in good geotechnical condition after the 2015 repairs. Visual checks are recommended in the upstream face when practicable during summer seasons for potential major erosion. Repairs should be considered if major erosion damages are found. The lower pond level is recommended to have a minimum 1 m freeboard prior to operations and winterization.

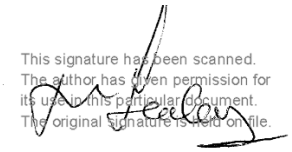
The waste oil management facility is in good geotechnical conditions. Visual checks should be done in the downstream face of the facility for erosion and within the facility for any exposed liner. Monitoring should also be done during freshet to ensure the runoff is contained within the berm and ditches.

This report, 2015 Waste Management Facility Geotechnical Inspection, was prepared by



Alvin Tong, PEng
Senior Consultant

and reviewed by



Peter Healey, PEng
Principal Consultant

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

6 References

[AANDC] Aboriginal Affairs and Northern Development Canada, 2014. Water Licence Inspection Form, issued to LMI on July 15, 2014.

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Appendix A – Photograph Log

Photo 1: Looking north from the Lower Sewage Dam south abutment on the repaired crest and upstream face.

Photo 2: Looking south at the Lower Sewage Dam southern abutment on the additional fill placed to raise the elevation.

Photo 3: Look south from the Lower Sewage Dam North abutment on the repaired upstream slope and crest. Note the 1.3 meter freeboard available at the time of the photo.

Photo 4: Looking south from the Upper Sewage Dam north abutment on the repaired crest with additional fill placement.

Photo 5: Looking at repaired upstream face and crest of the Upper Sewage Dam. Note the 1.8 meter freeboard available at the time of the photo.

srk consulting	**Lupin Mines Incorporated**	2015 Annual Geotechnical Inspection Lupin Tailings Mine **Waste Management Structures Inspection**
Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Sept 2015 / Approved: AT / Figure: **A.1**

Photo 6: Looking east from the back of the WOMF.

Photo 7: Looking west from the from of the front WOMF at the ditch.

Photo 8: Looking south at the back of the WOMF and the ditch.

Photo 9: Looking west at the WOMF and the downstream slope.

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Job No: 1CL008.002 Filename:Appendix_A_Photo_Log_1CL008_002_JN_20141006	Lupin Mine	Date: Sept 2015 / Approved: AT / Figure: **A.2**