ARCADIS Design & Consultancy for natural and built assets

Indigenous and Northern Affairs Canada

REPORT

GEOTECHNICAL INSPECTIONS

Mary River Mine, Nunavut

October 31, 2017

702751

Barry Cooke, P.Eng.
Senior Consultant

Charles Gravelle, P.Eng.
Canadian Resource Manager for Engineering Design and Construction

GEOTECHNICAL INSPECTIONS

Mary River Mine, Nunavut

Prepared for:

Indigenous and Northern Affairs Canada
INAC Nunavut Regional Office
P.O Box 100, Iqaluit, NU

Prepared by:

Arcadis Canada Inc.
121 Granton Drive, Suite 12
Richmond Hill, Ontario L4B 3N4
Tel 905 882 5984
Fax 905 882 8962

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CONTENTS

APPENDICES

1 INTRODUCTION

Arcadis Canada Inc. (Arcadis) was retained by Indigenous and Northern Affairs Canada (INAC) to complete geotechnical inspections of major earthworks at the Mary River Mine in Nunavut. This work was carried out in accordance with our proposal to INAC dated July 21, 2017, and as authorized by Call Up 4500367659 issued under Standing Offer 4600001036. Our proposal was prepared following review of the Statement of Work (SOW) issued July 12, 2017 by INAC.

The principal objective of this work was to conduct a geotechnical inspection, by a professional engineer licensed to practise in Nunavut, of major earthworks at the Mary River Mine, consistent with the requirements specified in the NWB Type A Water Licence No.2AM-MRY1325 amendment #1.

The scope of work for the geotechnical inspections comprised:

- Review of the SNC Lavalin 2016 geotechnical inspection report as well as other relevant documents identified in the SOW;
- Completion of a geotechnical inspection of the major earthworks at the Mary River Mine (including the Milne Port) on August 22, 23 and 24, 2017. Arcadis staff took field notes and photographs of relevant features as discussed in the SOW. The inspection complied with the Canadian Dam Safety Guidelines (2007, revised 2013); and
- Preparation of a report containing the results of the geotechnical inspections at the Mary River Mine.

The geotechnical inspections took place on August 22, 23 and 24, 2017. The Arcadis inspector, Mr Barry Cooke, P.Eng. was accompanied during the inspections by INAC personnel, and by representatives of the Mary River Mine's owner, Baffinland Iron Mines Corporation (BIMC).

The following features and structures were inspected as part of this assignment:

Mary River Mine Site

- Bulk Fuel/Jet A Fuel ASTs
- Waste Rock Sedimentation Pond
- Crusher Pad Sedimentation Pond
- Polishing Waste Stabilization Ponds
- Hazardous Waste Areas
- Landfill
- Effluent Discharge Point
- Water Intake Jetty

Milne Port

- Bulk Fuel/Jet A Fuel ASTs
- East Ore Pile Sedimentation Pond
- West Ore Pile Sedimentation Pond
- Polishing Waste Stabilization Pond
- Hazardous Waste Areas
- Land Farm/Snow Dump
- Quarry Q1

The locations of these features and structures are shown on the figures provided in Appendix A.

The following pages provide the results of the geotechnical inspections of each of the features and structures listed above, complemented by photographs provided in Appendices B and C of the report.

2 MARY RIVER MINE SITE

2.1 Bulk Fuel/Jet A Fuel ASTs (Photos in Appendix B1)

The Bulk Fuel and Jet A Fuel aboveground storage tanks (ASTs) are located near the air strip. There are four bulk fuel ASTs and two Jet A fuel ASTs. The bulk fuel ASTs and the Jet A fuel ASTs are located within separate containment berms, which comprise a geomembrane laid on a granular soil berm and secured in anchor trenches, with the geomembrane overlain by a granular soil cover.

The AST storage areas were inspected on August 24, 2017. The berms appeared stable with no evidence of tension cracks or erosion. The cover over the geomembrane was intact with no geomembrane being exposed. The Jet A fuel storage area is capable of housing at least one more AST, and the floor of the storage area where a future AST may be located was noted to be heavily rutted. Other than repairing the ruts in the Jet A fuel storage area, no remedial work is believed warranted in the fuel storage AST area.

2.2 Waste Rock Sedimentation Pond (Photos in Appendix B2)

The waste rock sedimentation pond is located north of the Waste Rock Pile, and consists of a semi circular berm behind (south) which is impounded surface water draining from the waste rock pile and the land between the waste rock pile and the pond. The berm comprises granular fill soils on which a geomembrane is present, with no cover over the geomembrane (i.e. the geomembrane is fully exposed). The geomembrane is secured in place via an anchor trench extending around the entirety of the pond's perimeter. Impounded water is periodically discharged to the environment in order to manage the water level within the pond.

In addition to surface water reporting directly to the pond, a drainage ditch has been constructed east and south of the pond that is supposed to collect surface waters in that area and to discharge to the pond. However, it was determined during the inspection period that the invert of the ditch in the vicinity of the pond was too low to allow discharge into the pond.

At the time of the inspection on August 22 preparations were being made to discharge water from the pond to the environment. The pH of the impounded water was determined to be in the range of 4 to 5, too acidic for direct discharge to the environment. It is understood that acidic runoff from the waste rock had not been expected, so BIMC were mixing soda ash into the ponded water to raise the pH of the water in the pond sufficiently to allow for discharge. This process was successful and the ponded water was discharged on August 24, 2017 with a pH close to 7.

The berm on the north side of the pond was inspected on August 22 and 24, 2017. It was noted to be stable, with no evidence of tension cracks or crest subsidence. The exposed geomembrane was noted to be wrinkled. Water at the downstream (north) toe of the berm was noted, and the pH of the leakage was noted to be acidic, suggesting the water was possibly due to leakage from the pond, through a discontinuity in the geomembrane. It is also possible that water running off the waste rock pile seeped under the geomembrane in the anchor trench on the upstream (south) limit of the pond, with that water ultimately reporting to the downstream toe of the berm. It is understood that BIMC were planning to

attempt to prevent surface water from the area south of the pond from seeping under the pond through repairs to the geomembrane anchor trench on the south side of the pond.

Except for remedial work to cut off the leakage from the pond to the downstream toe of the berm, it is not believed that the pond requires other remedial efforts prior to freeze up. However, if the re-anchoring of the geomembrane in the anchor trench south of the pond is unsuccessful, it may be necessary to inspect the geomembrane inside the pond and repair any discontinuities identified by the inspection. Alternatively, a new seepage control dam could be constructed north of the existing pond.

2.3 Crusher Pad Sedimentation Pond (Photos in Appendix B3)

The Crusher Pad Sedimentation Pond is located south of the ore crusher. The pond is contained on the north side by the ore crusher area, and on the east, west and south by a berm, which comprises granular fill soils on which a geomembrane has been laid. The geomembrane is fully exposed (i.e. no cover). On the north side of the pond the geomembrane is keyed into the slope via an anchor trench, with the geomembrane similarly keyed into the berm on the other three sides. Surface water reports to the pond either directly as run off from the north (the ore crusher area) or via a ditch located surrounding the crusher pad.

The berm was inspected on August 24, 2017 and was noted to be stable with no evidence of tension cracking or settlement. However, a section of the berm defining the ditch leading to the pond, located east of the pond, was noted to have experienced subsidence, suggesting basal instability. This zone of subsidence warrants repair, preferably through removal of the inferred weak soils below the berm.

2.4 Polishing Waste Stabilization Ponds (Photos in Appendix B4)

Three polishing waste stabilization ponds (PWSPs) are present at the mine site. The berms surrounding the ponds comprise granular fill soils on which a geomembrane has been placed, secured in anchor trenches. The geomembrane is fully exposed (i.e no cover) and wrinkles are present on the surface of the geomembrane.

The PWSPs were inspected on August 22, 2017. The berms were observed to be stable with no evidence of tension cracks or crest subsidence. Wrinkles were noted in the surface of the exposed geomembrane. Minor discontinuities were observed in the geomembrane on the crest of the berm of PWSP #1. Whales (i.e geomembrane that has floated to the water surface) were observed in PWSP #2. Except for the repair of discontinuities and eliminating the ‘whales’ in PWSP #2, no remedial work is believed warranted.

2.5 Hazardous Waste Areas (Photos in Appendix B5)

Five hazardous waste areas (#s 1, 3, 4, 5, & 7), located near the airstrip, were inspected on August 22, 2017 and were noted to be bordered by low earthen berms upon which a geomembrane had been placed. Exposed geomembrane on the berms was noted to be wrinkled. The hazardous waste areas

were noted to be relatively free of waste materials, and to contain standing water. Hazardous waste area #3 was empty, as BIMC had determined that the area did not retain water (i.e it leaked) and so no material was being stored in this area. The berms were observed to be stable, with no evidence of tension cracking or crest subsidence.

If Hazardous Waste Area #3 is to be put back into service, the geomembrane liner on the floor and berms will need to be exposed and the discontinuities responsible for the leakage repaired. No other remedial work on the other hazardous waste areas is believed warranted.

2.6 Landfill (Photos in Appendix B6)

The landfill is located south of the main mine complex, and receives waste from both the Mary River Mine and the Milne Port. Only non-hazardous solid waste is interred, and the landfill has not been provided with a liner or leachate collection and management system. At the time of the inspection on August 24, 2017 the first lift (~3 m thick) of waste had been interred and some solid waste was waiting to be interred in the second lift. The south face of the landfill was inspected and was observed to comprise granular fill soils. The southern crest of the landfill was observed to be stable, with no evidence of tension cracking or subsidence. No issues of a geotechnical nature were identified.

2.7 Effluent Discharge Point (Photos in Appendix B7)

The effluent discharge point is located south of the main mine complex and consists of three separate discharge pipes. Effluent is discharged from a single pipe until, in the winter, ice build up interferes with discharge and one of the other two discharge pipes is then put into use. The pipes discharge effluent onto a waste rock surface, and no evidence of surface erosion or instability was observed during the inspection on August 24, 2017. No issues of a geotechnical nature were identified.

2.8 Water Intake Jetty (Photos in Appendix B8)

Fresh water for the Mary River Mine complex is drawn from a lake located west of the airstrip. The water intake pipeline extends into the lake on a waste rock jetty, upon which a pump house has been constructed. During the inspection on August 22, 2017 no evidence of instability of the jetty was observed. No issues of a geotechnical nature were identified.

3 MILNE PORT

3.1 Bulk Fuel/Jet A Fuel ASTs (Photos in Appendix C1)

The bulk fuel and Jet A fuel above ground storage tanks (ASTs) are located east of the ore stockpiles. Five diesel fuel ASTs and three Jet A ASTs are located in fenced compounds, with containment berms comprising granular fill soils on which a geomembrane has been placed, and the geomembrane covered with a layer of granular fill soils.

The berms were inspected on August 23, 2017 and were noted to be stable, with no evidence of tension cracking or surface subsidence. Standing water was observed within the berms, indicating the geomembrane liner is effective in preventing leakage of fluids through or under the berms to the environment. The cover over the geomembrane was intact, with no exposed areas of geomembrane. No issues of a geotechnical nature were identified in either the bulk fuel or Jet A fuel AST areas.

3.2 East Ore Pile Sedimentation Pond (Photos in Appendix C2)

The East Ore Pile Sedimentation Pond is located north of the east ore pile, just south of the bay. The pond is defined by a granular fill soil berm on which a geomembrane has been placed. The berm was inspected on August 23, 2017 and the berm was noted to be stable, with no evidence of tension cracking or crest subsidence. The geomembrane was not covered (i.e fully exposed) and the geomembrane was noted to be wrinkled. It is understood that concern over the capacity of the pond has been raised, as it appears that the catchment area reporting to the pond is larger than had been assumed in the design of the pond.

No issues of a geotechnical nature were identified related to the pond.

3.3 West Ore Pile Sedimentation Pond (Photos in Appendix C3)

The West Ore Pile Sedimentation Pond is located north of the west ore pile, just south of the bay. The pond is defined by a granular fill soil berm on which a geomembrane has been placed. The berm was inspected on August 23, 2017 and was noted to be stable, with no evidence of tension cracking or crest subsidence. The geomembrane was not covered (i.e. fully exposed) and the geomembrane was noted to be wrinkled.

No issues of a geotechnical nature were identified related to the pond.

3.4 Polishing Waste Stabilization Pond (Photo in Appendix C4)

The Polishing Waste Stabilization Pond (PWSP) is located south of the AST farm and is defined by a rectangular granular fill soil berm on which a geomembrane has been placed. The PWSP berm was inspected on August 23, 2017 and was noted to be stable, with no evidence of tension cracking or crest subsidence. The membrane was wrinkled and fully exposed (i.e not provided with a cover).

No issues of a geotechnical nature were identified related to the pond.

3.5 Hazardous Waste Area (Photos in Appendix C5)

The hazardous waste storage area is located southwest of the PWSP and is defined by a granular fill soil berm on which a geomembrane has been placed. The hazardous waste area comprised two bermed areas, and based on the inspection made on August 23, 2017 the berms appear to be stable, with no evidence of tension cracking or crest subsidence. Much of the geomembrane was observed to be exposed.

No concerns were identified with respect to the hazardous waste area, from a geotechnical perspective.

3.6 Land Farm/Snow Dump (Photos in Appendix C6)

The land farm and the snow dump are located south of the main structures at Milne Port, and are defined by berms comprising granular fill soils on which a geomembrane has been placed. Based on the inspection made on August 23, 2018 the berms appeared stable with no evidence of tension cracking or crest subsidence. While much of the land farm berm's geomembrane was covered with granular soils, a portion of the berm in the southwest corner of the land farm was exposed.

No concerns were identified with respect to the land farm or snow dump from a geotechnical perspective.

3.7 Quarry Q1 (Photos in Appendix C7)

Quarry Q1 is an active quarry located south of the land farm and snow dump. The quarry has been developed by opening up drifts on the west face of the slope, with multiple benches. At the time of the site inspection on August 24, 2017 no work was occurring in the quarry.

No concerns were identified with respect to Quarry 1 from a geotechnical perspective.

4 SUMMARY AND RECOMMENDATIONS

Arcadis completed geotechnical inspection of major earthworks at the Mary River main mine complex and the Milne Port in Nunavut on August 22, 23 and 24, 2017. The inspections were carried out visually, following review of relevant documents, especially the 2016 Geotechnical Inspection report for the mine prepared by SNC Lavalin. Arcadis was accompanied during the inspections by representatives of INAC and BIMC.

The inspections focused on the containment berms at the bulk fuel storage facilities, containment berms for sedimentation ponds and containment berms for polishing ponds and hazardous waste storage areas. The inspected structures were investigated to assess if there was readily apparent evidence of features (e.g. tension cracks, subsidences, turbid discharges, etc) that could be harbingers of future instabilities of the structures, and requiring monitoring and/or mitigative measures. Arcadis took field notes and photographs, with the latter provided in appendices to this report.

In general, the overall condition of the earthworks and ancillary structures that were inspected was good, No geotechnical issues warranting immediate mitigation were identified for the following facilities at the main Mary River Mine site:

Bulk Fuel/Jet A Fuel AST farm;

Hazardous Waste Storage Areas;

Landfill;

Effluent Discharge Point; and

Water Intake Jetty

No geotechnical issues warranting immediate mitigation were identified for the following facilities at the Milne Port site:

Bulk Fuel/Jet A fuel AST farm;

East Ore Sedimentation Pond;

West Ore Sedimentation Pond;

Polishing Waste Stabilization Pond;

Hazardous Waste Storage Areas;

Land Farm/Snow Dump; and

Quarry Q1

4.1 Recommendations

The following issues of a geotechnical nature were identified at the Mary River Mine property during the course of the inspections that warrant either mitigative action to improve the situation, or at least warrant clarification from BIMC.

4.1.1 Waste Rock Sedimentation Pond

Seepage or leakage from the toe of the waste rock sedimentation pond berm has been observed, and may be due to discontinuities in the pond's geomembrane liner or seepage under the liner originating from surface flow from the area between the waste rock pile and the pond. It is understood BIMC are intending to attempt to effect repairs to the geomembrane liner anchor trench on the south side of the pond to prevent seepage under the liner. This work is to occur before freeze up this fall, and it will be necessary to wait until the thaw in 2018 to determine the efficacy of this work. If seepage from the toe of the containment berm continues in 2018, then discontinuities in the geomembrane (e.g. perforations, failed welds, etc.) may be the source of the leakage. In order to effect repairs to the geomembrane it would be necessary to drain the pond and inspect the liner, and patch any discontinuities. Alternatively, a seepage control dam could be constructed north of the existing pond berm to collect the leakage for assessment and possible treatment prior to discharge.

It has been determined that the pH of the water in the existing pond is acidic, with a pH in the range of 4 to 5. It is understood that BIMC did not anticipate that water reporting to the pond would be acidic to the degree observed. BIMC should determine if the geomembrane liner in the pond is compatible with liquid with pH in the range observed. That is, will continued exposure of the geomembrane to acidic water lead to deterioration of the liner to the point it could no longer perform as intended.

4.1.2 Crusher Pad Sedimentation Pond Perimeter Ditch

An area of the perimeter ditch east of the crusher pad sedimentation pond was observed to have experienced subsidence, likely due to the presence of a weak soil zone under the berm and ditch. It is recommended that this area be repaired so as to restore the design grade within the ditch. BIMC should investigate the area of subsidence to determine the cause of the subsidence. If in fact the cause of the subsidence is a zone of weak soil under the berm and ditch, a possible solution would be to excavate the soft soils to expose a competent subgrade, and then restore grades with suitable backfill.

4.1.3 Exposed Geomembranes

Except for the bulk fuel and Jet A fuel AST containment berms, the berms of structures at both the Mary River Mine site and the Milne Port site that included a geomembrane liner did not have a cover over the liner. Granular soil covers over HDPE liners provide both protection against physical abuse as well as deterioration of the HDPE's competence from UV attack. BIMC is requested to provide the rationale for leaving the HDPE geomembrane exposed.

Much of the exposed geomembrane was observed to be wrinkled, which is not desirable. Wrinkling of HDPE geomembranes can be reduced if white geomembrane is used instead of black geomembrane. For future geomembrane installation BIMC is encouraged to consider use of white geomembranes.

4.1.4 Polishing Waste Stabilization Pond #2

Areas of exposed geomembrane were observed floating in PWSP #2 at the Mary River Mine site, a phenomenon known as ‘whales’. It is recommended that BIMC drain the pond and effect repairs to the liner to remove the ‘whales’.

5 REFERENCES

- Canadian Dam Safety Guidelines, 2007 (2013 edition).

- Technical Report, Geotechnical Site Inspection, SNC Lavalin, September 22, 2016

- Construction Summary Report: Mine Site Waste Rock Sedimentation Pond and Drainage Ditech, Hatch Associates, January 24, 2017

- Annual Geotechnical Inspection, Barry Martin, P.Eng. July 31, 2016

6 CLOSURE

We trust that the contents of this geotechnical inspection report are sufficient for your present purposes. If you have any questions, or require additional information, please do not hesitate to call.

Sincerely

Arcadis Canada Inc.

Barry H Cooke, P.Eng.
Senior Consultant

Charles Gravelle, P.Eng.
Canadian Resource Manager for
Engineering Design and Construction

APPENDIX A

Plans and Figures

HATCH BUILDING
ACCOMMODATION COMPLEX
EMERGENCY RESPONSE OFFICE
WELDING SHOP
MAINTENANCE BUILDING
FUEL TANK FARM
MS-01
MS-C-F
TRUCK WASH BUILDING
POWER HOUSE
MS-C-C
TOROMONT SHOP
WATER BUILDING
SEWAGE TRUCK BUILDING
TRUCK WEIGH SCALE
LUMPS STOCKPILE
MS-08
RUN OF MINE STOCKPILE
FINE STOCKPILE
CRUSHER AND ORE LOADING PAD

559 000 E
561 500 E
563 000 E
564 500 E

WASTE ROCK SEDIMENTATION POND
FUTURE WASTE ROCK FOOTPRINT FOR ERP
DEPOSIT NO.1 MINING LEASE 2484
MS-08
NEW HAUL ROAD
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION (RAIL PHASE)
PROPOSED FINAL OPEN PIT OUTLINE
110 KM LAYDOWN AREA
QUARRY D1Q1
OPEN PIT DEVELOPMENT
PIT 1 HAUL ROAD
QUARRY D1Q2
TRUCK WEIGH SCALE
ORE CRUSHING AND LOADING
MINE OPERATIONS OFFICE
MS-C-E
ORE CRUSHING SEDIMENTATION POND
EXPLOSIVE MAGAZINE

KM 67 BORROW LOCATIONS
WASTE MANAGEMENT FACILITY
EXISTING LAYDOWN AREA
SITE SERVICES GARAGE
RAW WATER INTAKE
RAW WATER PUMP HOUSE
MS-MRY-1
MS-MRY-4
MS-MRY-4a
BULK FUEL STORAGE FACILITY (BLADDER FARM)
AERODROME APRON
QUARRY QMR2
MQ-C-A
MQ-C-D
NEW ROAD ALIGNMENT
EXPLORATION CAMP FACILITIES
WASTE WATER TREATMENT FACILITY
CONSTRUCTION LAYDOWN AREA
MQ-C-B
HELIPAD
POLISHING WASTE STABILIZATION PONDS (PWSPs)
EXPANDED LAYDOWN
CAMP INFRASTRUCTURE
MS-C-C
MS-C-A
MS-03
MS-01
MS-C-B
MS-C-F
AERODROME RUNWAY
MINE SITE CAMP
MS-C-E
MS-C-D
POLISHING WASTE STABILIZATION PONDS TREATED WATER DISCHARGE POINT
MS-MRY-13b
MS-MRY-13a
EXISTING LANDFILL ROAD
EXISTING LANDFILL
MS-C-H
MS-C-G
EMULSION PLANT
EFFLUENT DISCHARGE POINT

7 914 500 N
7 913 000 N
7 911 500 N

UTILITIES, INCLUDED:
- POWER GENERATION MODULE
- FUEL TANK FARM & DYKE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT

SITE SERVICE FACILITIES, INCLUDING:
- MAINTENANCE BUILDING
- WELDING WORKSHOP
- TRUCK WASH STATION
- TOROMONT SHOP
- EMERGENCY RESPONSE OFFICE

LEGEND:
- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
- WATER
- BORROW AREAS (2013 UNDER Q10C3001)
- QUARRY AREA (EXISTING UNDER Q13C301)
- WASTE STORAGE AREA
- RIVER/STREAM/DRAINAGE
- ROAD
- CIA SURFACE COMMERCIAL LEASE BOUNDARY
- WATER LICENCE WATER QUALITY MONITORING LOCATION

NOTES:
1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PLAN BASED ON INFORMATION PROVIDED BY HATCH, DATED (JAN 13, 2015)
4. CONTOUR INTERVAL IS 2.5 METRES.
5. ALL SAMPLE ID'S SHOWN IN BRACKETS REPRESENT THE TYPE B WATER LICENCE(S) MONITORING POINTS. ALL OTHERS ARE MONITORING POINTS AS PER THE TYPE A WATER LICENCE (ZAM-MRY1325).

SCALE A 300 150 0 500 1000 1500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	25MAY'17	ISSUED WITH 2017 WORK PLAN AMENDMENT	AG	AS	AK

Baffinland

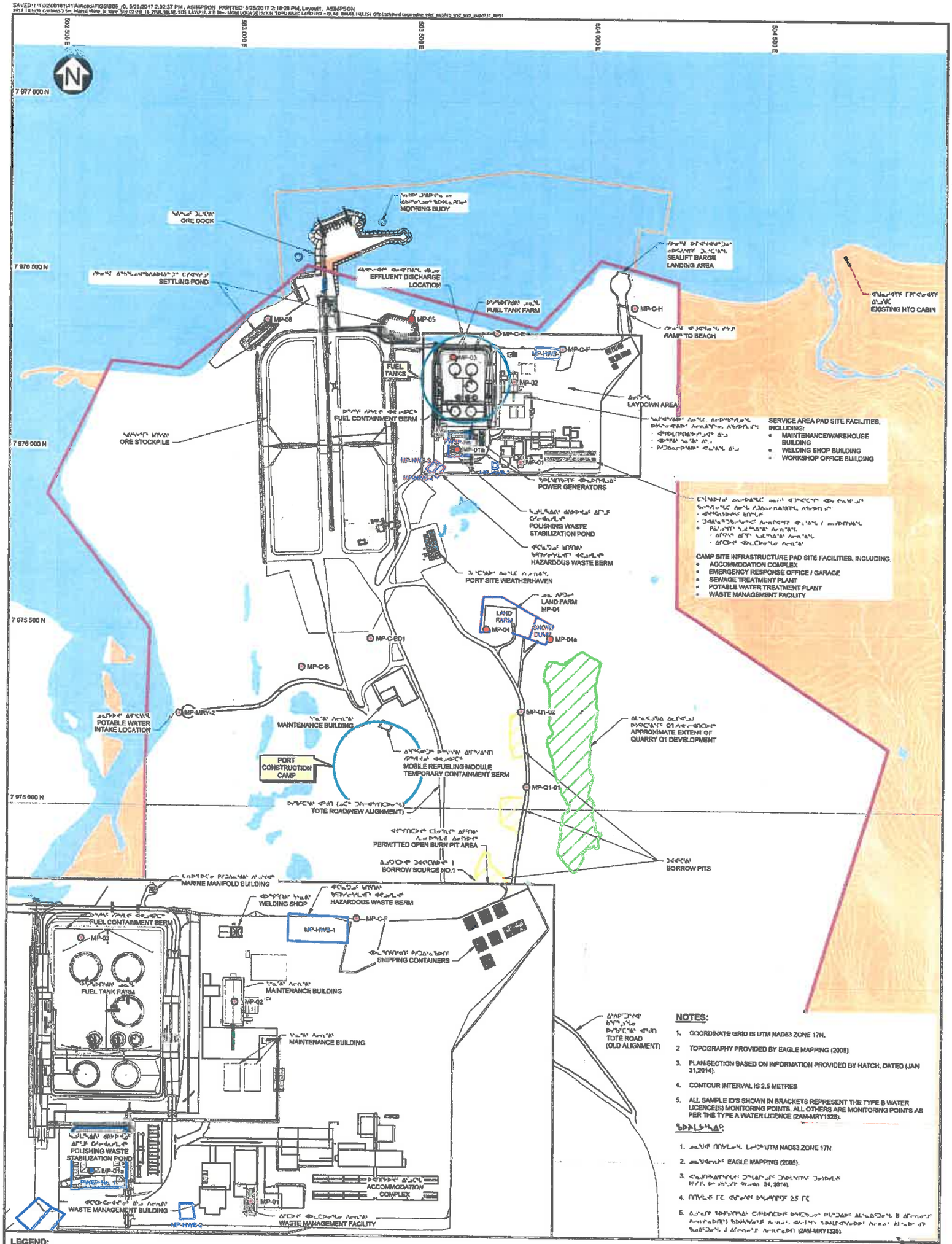
MARY RIVER PROJECT

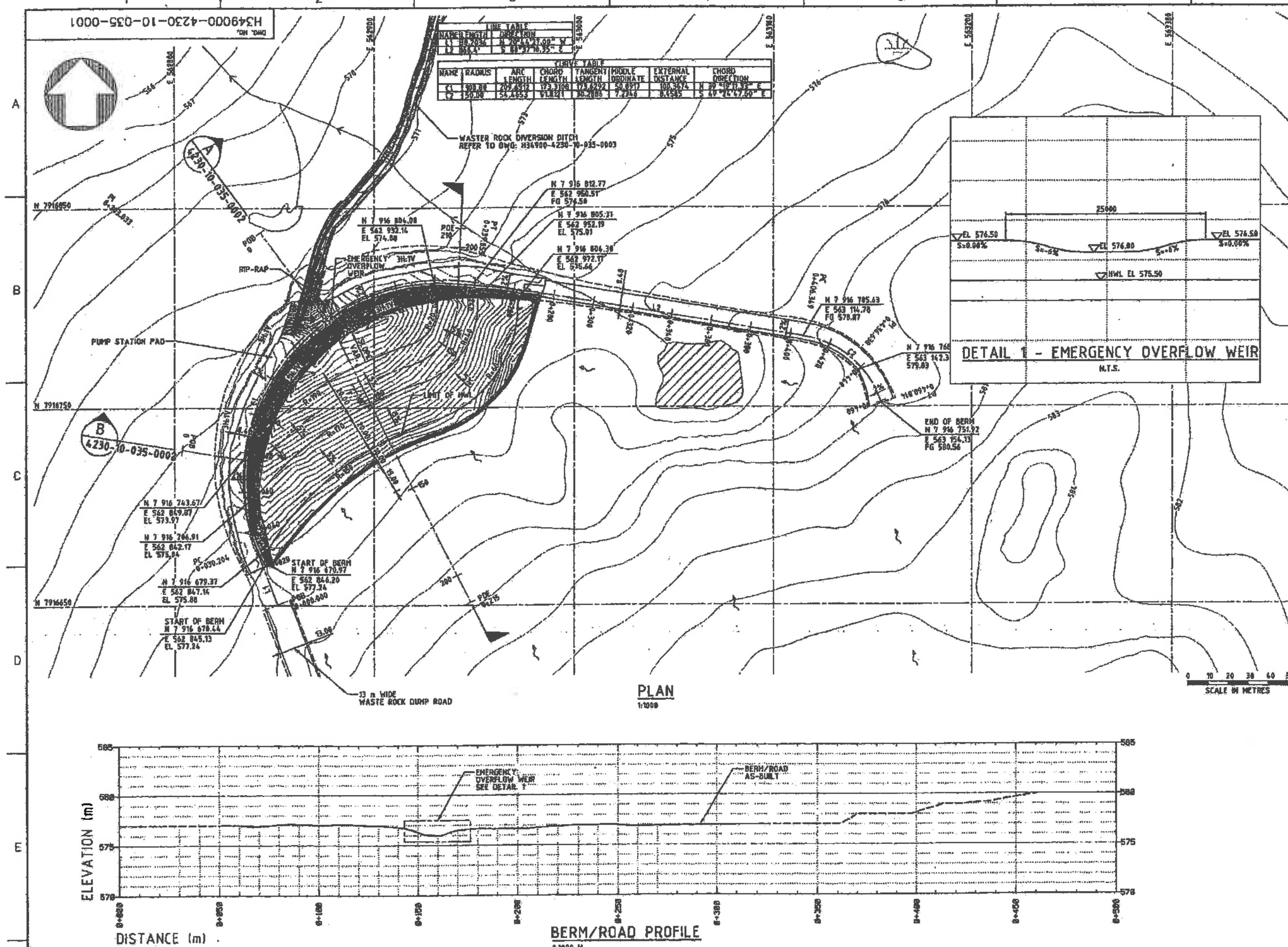
MINE SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS

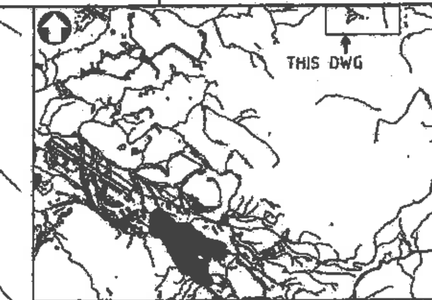
Knight Piésold CONSULTING

PA NO NB102-181/41 | REF NO NB17-00326 | REV 0

FIGURE 1.0


603 500 E
603 600 E
604 000 E
604 500 E
7 977 000 N
7 976 500 N
7 976 000 N
7 975 500 N
7 975 000 N
MOORING BUOY
ORE DOCK
SETTLING POND
EFFLUENT DISCHARGE LOCATION
FUEL TANK FARM
SEALIFT BARGE LANDING AREA
EXISTING HTO CABIN
RAMP TO BEACH
MP-08
MP-05
MP-C-E
MP-C-H
MP-C-F
MP-HWB-1
MP-03
MP-02
MP-01
MP-DTB
FUEL TANKS
FUEL CONTAINMENT BERM
LAYDOWN AREA
ORE STOCKPILE
SERVICE AREA PAD SITE FACILITIES, INCLUDING:
MAINTENANCE/WAREHOUSE BUILDING
WELDING SHOP BUILDING
WORKSHOP OFFICE BUILDING
POWER GENERATORS
POLISHING WASTE STABILIZATION POND
HAZARDOUS WASTE BERM
PORT SITE WEATHERHAVEN
CAMP SITE INFRASTRUCTURE PAD SITE FACILITIES, INCLUDING:
ACCOMMODATION COMPLEX
EMERGENCY RESPONSE OFFICE / GARAGE
SEWAGE TREATMENT PLANT
POTABLE WATER TREATMENT PLANT
WASTE MANAGEMENT FACILITY
LAND FARM
MP-04
LAND FARM
MP-01
SNOW DUMP
MP-04a
MP-C-BD1
MP-C-B
MP-MRY-2
POTABLE WATER INTAKE LOCATION
MAINTENANCE BUILDING
MP-Q1-02
APPROXIMATE EXTENT OF QUARRY Q1 DEVELOPMENT
PORT CONSTRUCTION CAMP
MOBILE REFUELING MODULE TEMPORARY CONTAINMENT BERM
MP-Q1-01
TOTE ROAD(NEW ALIGNMENT)
PERMITTED OPEN BURN PIT AREA
BORROW SOURCE NO.1
BORROW PITS
MARINE MANIFOLD BUILDING
WELDING SHOP
HAZARDOUS WASTE BERM
FUEL CONTAINMENT BERM
SHIPPING CONTAINERS
FUEL TANK FARM
MAINTENANCE BUILDING
MAINTENANCE BUILDING
TOTE ROAD (OLD ALIGNMENT)
POLISHING WASTE STABILIZATION POND
MP-DTB
PWSP No. 2
ACCOMMODATION COMPLEX
WASTE MANAGEMENT BUILDING
MP-01
WASTE MANAGEMENT FACILITY
MP-HWB-2
NOTES:
1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2 TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PLAN/SECTION BASED ON INFORMATION PROVIDED BY HATCH, DATED (JAN 31,2014).
4. CONTOUR INTERVAL IS 2.5 METRES
5. ALL SAMPLE ID'S SHOWN IN BRACKETS REPRESENT THE TYPE B WATER LICENCE(S) MONITORING POINTS. ALL OTHERS ARE MONITORING POINTS AS PER THE TYPE A WATER LICENCE (2AM-MRY1325).
LEGEND:
WATER
BORROW AREAS (2013 UNDER Q10C3001)
QUARRY AREA (EXISTING UNDER Q13C301)
INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
WASTE STORAGE AREA
RIVER/STREAM/DRAINAGE
ROAD
QIA SURFACE COMMERCIAL LEASE IMPACT BOUNDARY
WATER LICENCE WATER QUALITY MONITORING LOCATION
SCALE A 100 50 0 100 200 300 400 500 m
Baffinland
MARY RIVER PROJECT
MILNE PORT SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS
Knight Piésold CONSULTING
PROJECT NO NB102-181/41
REF NO NB17-00356
FIGURE 2.0
REV 0
0 25MAY17 ISSUED WITH 2017 WORK PLAN AMENDMENT AV AS AK





KEY PLAN

LEGEND:

	EXISTING WATER BODY
	EXISTING DEPRESSION
	EXISTING GROUND CONTOUR
	FILL SLOPE
	TOE OF SLOPE
	GRADING SLOPE
	FLOW DIRECTION
	RIP RAP
	CROSS SECTION DISTANCE
PT	POINT OF TANGENT
PC	POINT OF CURVE
PI	POINT OF INTERSECTION
POB	POINT OF BEGINNING
POE	POINT OF END
HWL	HIGH WATER LEVEL
FB	FREEBOARD

NOTES:

1. WASTE ROCK SEDIMENTATION POND AND DIVERSION DITCH AS-BUILT DATA PROVIDED BY BAFFINLAND. FILE NAME: CAB160918 WR POND-DITCH.CSV & CAB160918 WR POND-DITCH.DWG
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. EXISTING GROUND CONTOUR INTERVAL IS 1.0m. AS-BUILT DIVERSION DITCH AND SEDIMENTATION POND CONTOUR INTERVAL IS 0.1m
4. ALL DIMENSIONS AND ELEVATIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.

AS BUILT

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
H349000-4320-10-035-0003	WASTE ROCK DRAINAGE-DIVERSION DITCH PLAN & PROFILE
H349000-4320-10-035-0002	WASTE ROCK SEDIMENTATION POND-EARTHWORKS & DRAINAGE-SECTIONS
H349000-6000-00-014-0001	MINE SITE - SITE LAYOUT

REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS-BUILT	AN	LJ	MB	2017-01-23

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH. BY		DATE
1	AS-BUILT	MB	AM	2017-01-23
0	CONSTRUCTION	SH	RM	2013-08-30

HATCH

DESIGNED BY R.MANOOCHEHRI DATE 2013-08-28	DRAWN BY R. MANOOCHEHRI DATE 2013-08-28
CHECKED BY A. SAMELI DATE 2013-08-30	DISCIP. ENGR. S. HASSAN DATE 2013-08-30
PROJ. DES. COORD. T. THERTELL DATE 2013-08-30	PROJ. ENGR. J. CLELAND DATE 2013-08-30
PROJ. MGR. S. PERRY DATE 2013-08-30	

Baffinland

MARY RIVER PROJECT

MINE SITE
WASTE ROCK SEDIMENTATION POND
EARTHWORKS & DRAINAGE - PLAN

SCALE 1:1000 OR AS NOTED — DWG. NO. H349000-4230-10-035-0001 — REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

APPENDIX B

Mary River Mine Site Photographs

B1 Bulk Fuel/Jet A Fuel ASTs

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 24, 2017

Description:
Bulk Fuel Diesel ASTs – looking west along south berm. Note granular cover over geomembrane.

Location:
Mary River Main Mine Site

Photo: 2

Date:
August 24, 2017

Description:
Bulk Fuel Diesel ASTs – looking west along south berm. Note standing water.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 24, 2017

Description:
Bulk Fuel Diesel ASTs – looking west along north berm. Note slope protection and an area where repairs made to berm.

Location:
Mary River Main Mine Site

Photo: 4

Date:
August 24, 2017

Description:
Bulk Fuel Diesel ASTs – note debris inside berm.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 5

Date:
August 24, 2017

Description:
Jet A Fuel ASTs – looking west along south berm. Note granular cover over geomembrane.

Location:
Mary River Main Mine Site

Photo: 6

Date:
August 24, 2017

Description:
Jet A Fuel AST – looking north along east berm. Note slope protection.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 7

Date:
August 24, 2017

Description:
Jet A Fuel AST – rutting inside north half of bermed area.

Location:
Mary River Main Mine site

Photo: 8

Date:
August 24, 2017

Description:
Jet A Fuel AST – entrance ramp to bermed area.

Location:
Mary River Main Mine Site

B2 Waste Rock Sedimentation Pond

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 22, 2017

Description:
Waste Rock Sedimentation Pond – looking east along berm. Note exposed geomembrane.

Location:
Mary River Main Mine Site

Photo: 2

Date:
August 23, 2017

Description:
Waste Rock Sedimentation Pond – looking west along berm. Note exposed geomembrane.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 22, 2017

Description:
Waste Rock Sedimentation Pond – looking south across pond toward waste rock.

Location:
Mary River Main Mine Site

Photo: 4

Date:
August 22, 2017

Description:
Waste Rock Sedimentation Pond – looking northeast at downstream area from pond. Note seepage water.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 5

Date:
August 24, 2017

Description:
Waste Rock Sedimentation Pond – seepage water downstream of berm.

Location:
Mary River Main Mine Site

Photo: 6

Date:
August 24, 2017

Description:
Waste Rock Sedimentation Pond – seepage water downstream of berm.

Location:
Mary River Main Mine Site

B3 Crusher Pad Sedimentation Pond

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 24, 2017

Description:
Crusher Pad Sedimentation Pond – looking east along north berm. Note exposed geomembrane.

Location:
Mary River Main Mine Site

Photo: 2

Date:
August 24, 2017

Description:
Crusher Pad Sedimentation Pond – looking west along south perimeter ditch.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 24, 2017

Description:
Crusher Pad Sedimentation Pond – looking west along perimeter ditch at area of subsidence.

Location:
Mary River Main Mine Site

Photo: 4

Date:
August 24, 2017

Description:
Crusher Pad Sedimentation Pond – looking west along perimeter ditch.

Location:
Mary River Main Mine Site

B4 Polishing Waste Stabilization Ponds

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 22, 2017

Description:
Polishing Waste Stabilization Pond #1 – note exposed liner with many wrinkles.

Location:
Mary River Main Mine Site

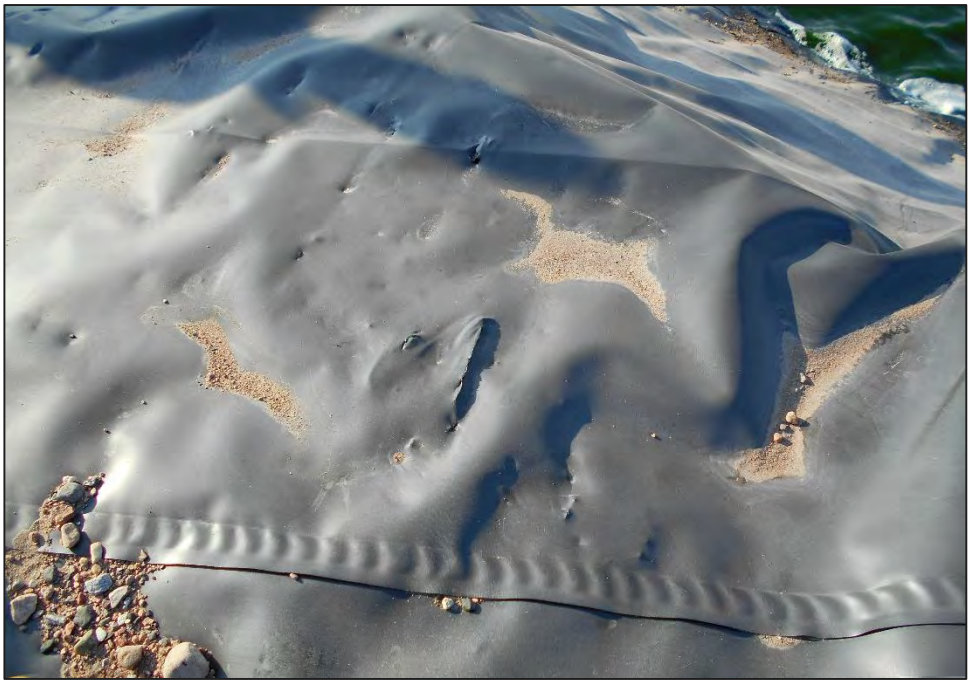


Photo: 2

Date:
August 22, 2017

Description:
Polishing Waste Stabilization Pond #1 – minor perforation in liner.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

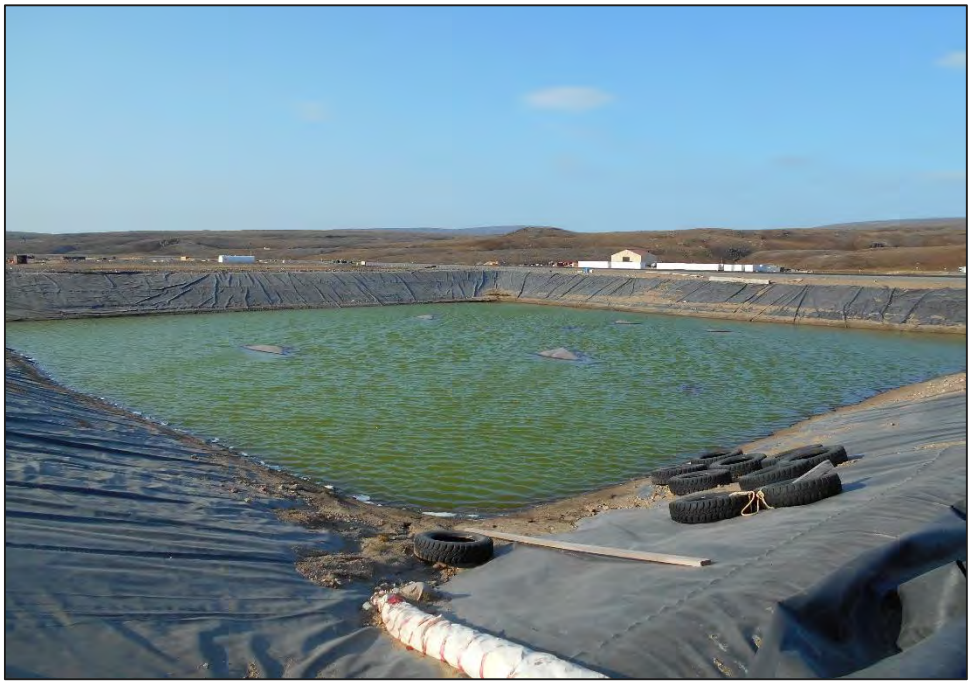


Photo: 3

Date:
August 22, 2017

Description:
Polishing Waste Stabilization Pond #2 – stable berm exposed liner. Note “whales” in pond.

Location:
Mary River Main Mine Site

Photo: 4

Date:
August 22, 2017

Description:
Polishing Waste Stabilization Pond #2.. Note “whales” in pond

Location:
Mary River Main Mine site

B5 Hazardous Waste Areas

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 22, 2017

Description:
Hazardous Waste Berm #7 – view of set up for treating standing water in contained area.

Location:
Mary River Main Mine SSite

Photo: 2

Date:
August 22, 2017

Description:
Hazardous Waste Berm #7 – general view. Note very little waste.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 22, 2017

Description:
Hazardous Waste Berm #4 – view of drums of Waste Jet A fuel.

Location:
Mary River Main Mine Site

Photo: 4

Date:
August 22, 2017

Description:
Hazardous Waste Berm #5 – note standing water and debris.

Location:
Mary River Main Mine Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

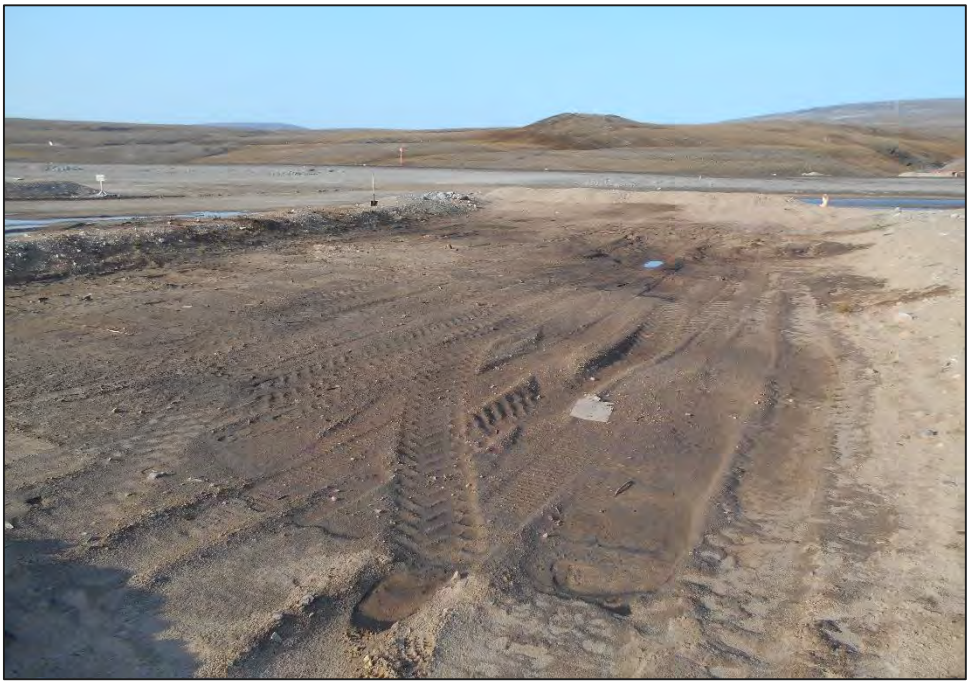


Photo: 5

Date:
August 22, 2017

Description:
Hazardous Berm #3 – area is not used due to leakage.

Location:
Mary River Main Mine Site

B6 Landfill

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

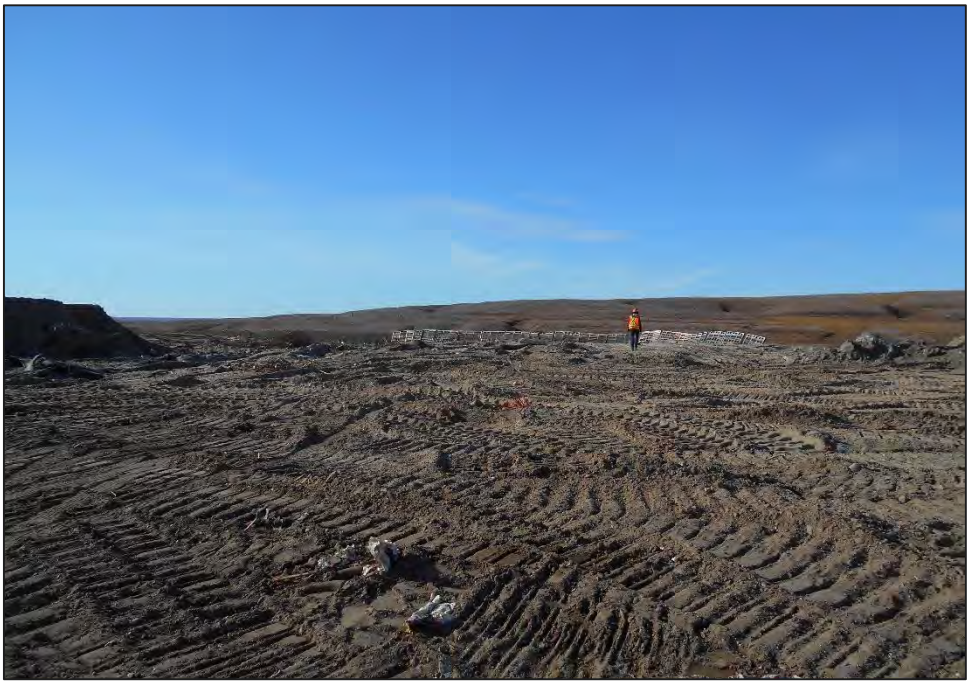


Photo: 1

Date:
August 24, 2017

Description:
Landfill -general view.

Location:
Mary River Main Mine Site

Photo: 2

Date:
August 24, 2017

Description:
Landfill – solid waste waiting to be interred.

Location:
Mary River Main Mine Ste

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

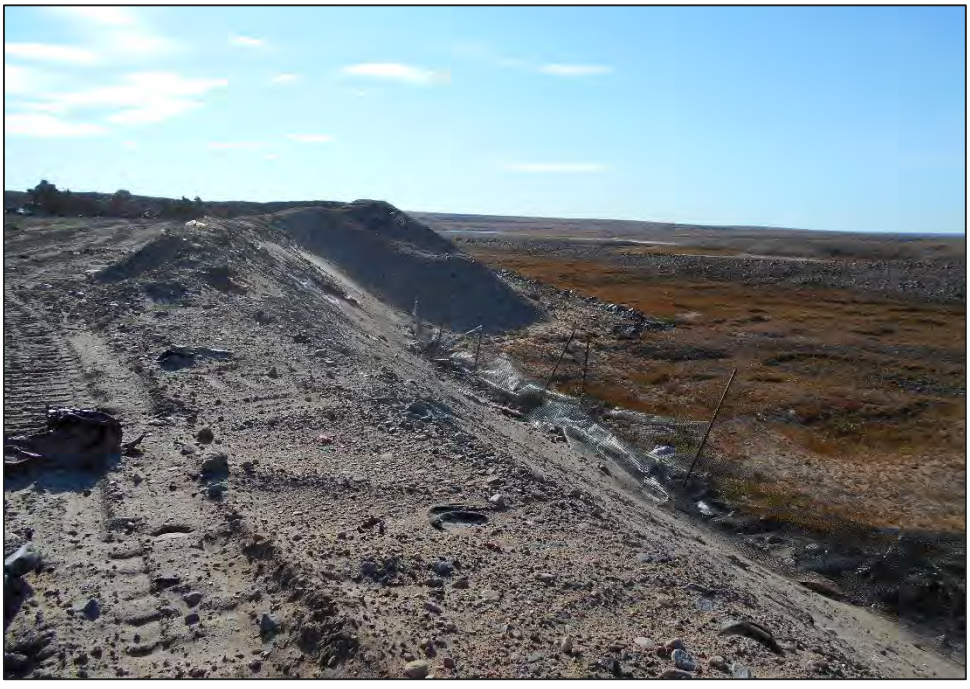


Photo: 3

Date:
August 24, 2017

Description:
View of southern toe of landfill.

Location:
Mary River Main Mine Site

Photo: 4

Date:
August 24, 2017

Description:
Landfill – view of cover material and solid waste.

Location:
Mary River Main Mine Site

B7 Effluent Discharge Point

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 24, 2017

Description:
Effluent Discharge Point.

Location:
Mary River Main Mine Site

Photo: 2

Date:
August 24, 2017

Description:
View of a second effluent discharge point.

Location:
Mary River Main Mine Site

B8 Water Intake Jetty

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 22, 2017

Description:
Fresh Water Intake – pumphouse and jetty.

Location:
Mary River Main Mine Site

Photo: 2

Date:
August 22, 2017

Description:
Fresh Water Intake – view along jetty.

Location:
Mary River Main Mine Site

APPENDIX C

Milne Port Photographs

C1 Bulk Fuel/Jet A Fuel ASTs

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 23, 2017

Description:
Milne Fuel AST Farm – looking north. Note granular cover over geomembrane and ponded water.

Location:
Milne Port Site

Photo: 2

Date:
August 23, 2017

Description:
Looking north along east berm.

Location:
Milne Port Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 23, 2017

Description:
Stained area within contained area.

Location:
Milne Port Site

Photo: 4

Date:
August 23, 2017

Description:
General view of Jet A and diesel ASTs.

Location:
Milne Port Site

C2 East Ore Pile Sedimentation Pond

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 23, 2017

Description:
East Ore Pile Sedimentation Pond – general view. Note exposed geomembrane.

Location:
Milne Port Site

Photo: 2

Date:
August 23, 2017

Description:
East Ore Pile Sedimentation Pond – general view. Note exposed geomembrane.

Location:
Milne Port Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 23, 2017

Description:
East Ore Pile Sedimentation Pond -general view – looking west.

Location:
Milne Port Site

Photo: 4

Date:
August 23, 2017

Description:
Entrance Ditch into East Ore Pile Sedimentation Pond – note wrinkles in exposed geomembrane.

Location:
Milne Port Site

C3 West Ore Pile Sedimentation Pond

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

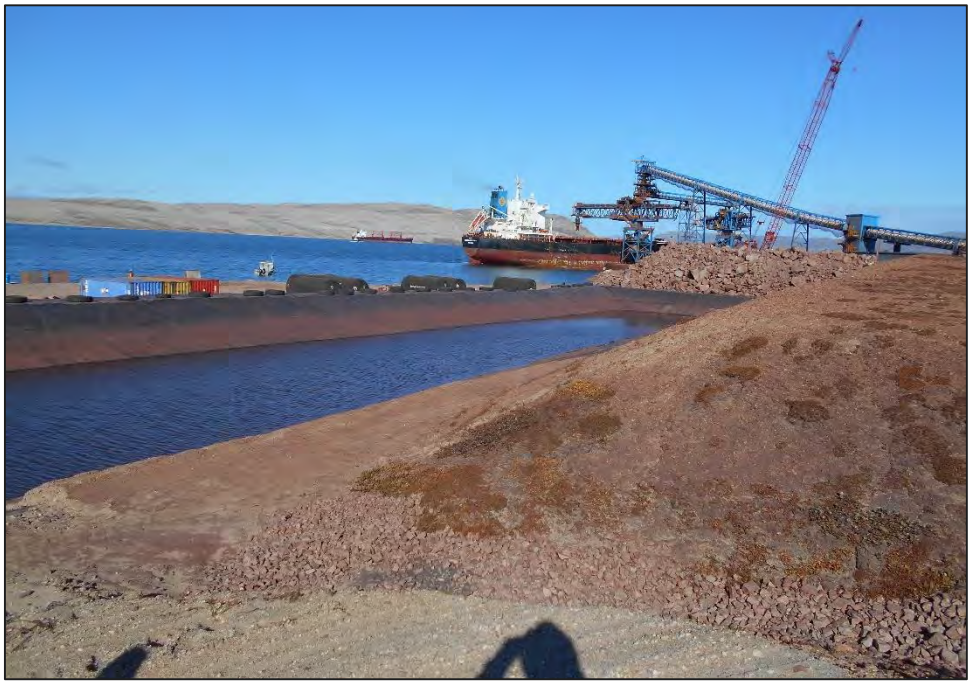


Photo: 1

Date:
August 23, 2017

Description:
Waste Ore Pile Sedimentation Pond – note exposed geomembrane.

Location:
Milne Port Site

Photo: 2

Date:
August 23, 2017

Description:
Waste Ore Pile Sedimentation Pond – note exposed geomembrane.

Location:
Milne Port Site

C4 Polishing Waste Stabilization Pond

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 23, 2017

Description:
Polishing Waste Stabilization Pond - general view. Note exposed geomembrane.

Location:
Milne Port Site

C5 Hazardous Waste Areas

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 23, 2017

Description:
Hazardous Waste Storage Area – general view.

Location:
Milne Port Site

Photo: 2

Date:
August 23, 2017

Description:
Hazardous Waste Storage Area – note exposed geomembrane and ponded water.

Location:
Milne Port Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 23, 2017

Description:
Hazardous Waste Areas 4 & 5 – note partially covered geomembrane.

Location:
Milne Port Site

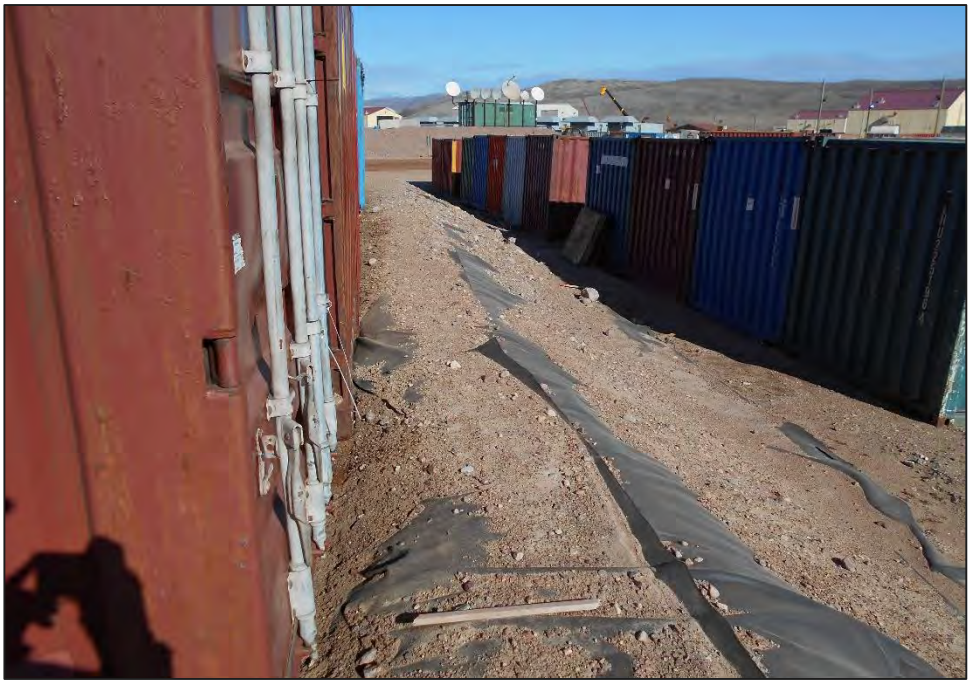


Photo: 4

Date:
August 23, 2017

Description:
Hazardous Waste Area 4 & 5 – note stable berm and exposed geomembrane.

Location:
Milne Port Site

C6 Land Farm/Snow Dump

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 23, 2017

Description:
General view of Land farm. Note partial granular cover of geomembrane.

Location:
Milne Port Site

Photo: 2

Date:
August 23, 2017

Description:
General view of Land farm. Looking toward piled material.

Location:
Milne Port Site

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 3

Date:
August 23, 2017

Description:
Looking along snow dump berm.

Location:
Milne Port Site

Photo: 4

Date:
August 23, 2017

Description:
General view of snow dump.

Location:
Milne Port Site

C7 Quarry Q1

Project Photographs

Geotechnical Inspections
Mary River, Nunavut

Photo: 1

Date:
August 23, 2017

Description:
General view of Quarry Q1.

Location:
Milne Port Site

Photo: 2

Date:
August 23, 2017

Description:
View of equipment in Quarry Q1.

Location:
Milne Port Site

Arcadis Canada Inc.

121 Granton Drive, Suite 12, Richmond Hill, Ontario L4B 3N4

Tel 905 882 5984

Fax 905 882 8962

www.arcadis.com