Baffinland Iron Mines Corporation
Mary River Project

Construction Summary Report: Mine Site Tank Farm & Dispensing Package

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 21 JAN 15
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
M. J. BUYKX
LICENSEE
21 JAN 15
NT/NU

2015-01-15	0	Approved for Use	S. Hess	T. Bruce	J. Cleland	D. Matthews
DATE	REV.	STATUS	PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY
			HATCH			CLIENT

Table of Contents

List of Appendices

1. Facility Description

Baffinland Iron Mines Corporation (Baffinland) recently constructed a new fuel tank farm storage and distribution facility at the Mary River Mine Site on Baffin Island, Nunavut.

Fuel is delivered to the mine site via bulk fuel truck loaded from the project's Milne Port facility at Milne Inlet, Baffin Island, Nunavut (approximately 100km from Milne Inlet along the Tote Road).

1.1 Purpose and Design Basis

The Mine Site Tank Farm and Dispensing Package includes a new tank farm facility within a secondary containment earth dyke with synthetic liner, fuel dispensing system, and all interconnecting piping. The package was designed for tank truck loading/offloading, vehicle fueling, and genset fuel feed at the Mine Site camp facility.

The tank farm includes four (4) arctic diesel pre-fabricated storage tanks with tag numbers 4613-TK-001, 4613-TK-002, 4613-TK-003, and 4613-TK-004. These tanks are 0.5ML each, vertical single wall steel construction, designed to API Standard 650.

The tank assembly has been inspected and tested to API 650 Section 8 which includes visual inspections of all welds, radiograph inspection, vacuum box test of welds, liquid penetration tests, shell to floor joint, magnetic particle and UT tests on reinforcing pads. In lieu of hydrostatic testing, additional liquid penetration tests and vacuum box tests have been completed in compliance with API 650 Section 7.3.5. All inspection and test reports have been confirmed by the contractor and construction management personnel.

Quality documentation for the tanks and piping installed at the Mine Site are available in Appendix F.

The secondary containment dyke is designed to the requirements of the National Fire Code of Canada.

The fuel dispensing system includes one (1) prefabricated fuel dispensing module: the Arctic Diesel Fuel Module. This module is an insulated and heated 40 ft ISO shipping container, complete with piping, fuel transfer equipment, temperature corrected delivery system, electrical and control components, and code compliant fire suppression system.

For more information on fuel module's operation, refer to the Operations and Maintenance manuals included in Appendix G.

The facility was designed and constructed to the following codes and standards:

a. Tank construction will adopt the API 650 12th Edition, 2013, Welded Steel tanks for Oil Storage.

b. Tank inspection, repair, alteration and reconstruction will use API 653 4th Edition, 2009; including Addendums 1 and 2.

c. National Building Code of Canada (NBC) 2010.

d. National Fire Code of Canada (NFCC) 2010.

e. NFPA 30, 2012 Edition, Flammable and Combustible Liquids Code.

f. CCME Environmental Code of Practice for Aboveground Storage Tank Systems containing Petroleum Products, 2003.

g. ANSI B31.3-2012, Process Piping.

h. CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.

i. CSA W59-03 (R2008) – Welded Steel Construction (Metal Arc Welding)

j. Canadian Environmental Protection Act 1999 (2008 Update), Storage Tank System for Petroleum Products and Allied Petroleum Products Regulations.

k. CSA W178.2-08, Certification of Welding Inspectors.

A mobile oil-water separator (OWS) water treatment system is used to treat storm water runoff, overfills, or spills from within the secondary containment area in order to meet the water licence discharge criteria. For more information on the mobile OWS, refer to E349000-00-118-0001Sub01 Portable Oil Water Separator (OWS) Operation and Maintenance Manual, included in Appendix E.

A list of the contractors involved in construction of the Mine Site fuel tank farm and dispensing package has been included in Appendix C.

1.2 Location and Base Elevations

The tank farm and dispensing package are located southwest of the new accommodation buildings at the Mine Site facility with northing between N7 913 329 and N7 913 290 and easting between E561 235.7 and E561 292.9. The diesel dispensing module is located on the plant-south side of the tank farm. The refueling area consists of a ramp up to and down from the fuel modules with a vehicle containment area surrounding the fuel module to ensure appropriate management of potential spills during fueling operations. The lined refueling area drains into the secondary containment dyke.

The containment area's elevation at the inside toe of the dyke is EL. 195.40m and at the top of the dyke is EL. 196.10m.

1.3 Geometry and Access

The tank farm has been constructed as rectangular shaped to optimize the earthworks materials (granular fills and liner). The tank farm is surrounded by dykes with side slopes not steeper than 2H:1V and a berm top width of 600mm. The secondary containment area includes four (4) tank foundation pads, ramp loading areas, dyke access roads and dyke walls, and dyke access stairs on the south side behind the fuelling module.

The ramp up to and out of the fuelling module has a 5% grade at the high points. Between these high points, there is a 6% grade down to the low point where contained liquids drain into the secondary containment area with a 2% grade.

Inside the primary dyke containment area, there is a 1% slope towards the sump.

The hard piping connections to the genset area run overtop the truck containment area on an overhead piping/cable tray.

The tanks are equipped with spiral access stairways and guardrails at the roof of each tank.

Access to the fuelling equipment is through lockable equipment doors and side rollup door.

1.4 Earthworks Materials Details

The containment area around the tank farm and dispensing package has been constructed with raised earthworks and synthetic welded liner for the containment of spills. Additionally, the facility is designed for containment of rainwater and snowmelt that can potentially be contaminated by contact with fuel originating from leakage or spills. Contact water is removed and treated if required before it is discharged to the receiving environment.

The liner is buried 450mm below the floor of the dyke.

2. Construction Activity Summary

Construction activities on the Mine Site tank farm and dispensing package started in September 2013. The handover certificate was completed in May 2014. The construction punch list remains open, with the most recent item closed out in November 2014. The remaining punch list items are scheduled for completion in 2015.

The following summarizes the construction activities:

a. Crushed blast rock and fill material was quarried, crushed, screened, and hauled from the Mine Site Quarry (QMR2).

2.1 Tank Farm Containment

a. Constructed tank farm containment dyke including placing quarried rock and fill materials with rigid insulation, geotextile and geomembrane liner.

b. Constructed four (4) tank foundation pads, ramp loading areas, dyke roads and dyke walls.

c. Installed dyke access stairs.

d. Installed new tank grounding system in conjunction with earthworks.

2.2 Fuel Piping and Tanks

a. Installed fuel tank bodies.

b. Installed fuel dispensing module.

c. Installed piping, valves and fittings for all tanks to interconnect the inlet/outlet piping and low suction piping per design to the fuel module supply piping.

d. Installed piping vents and drain assemblies.

e. Installed pressure relief valves, piping and gate valve assemblies.

f. Installed tank emergency vent/gauge hatch.

g. Installed radar gauge assembly and components.

h. Installed new pre-cast pipe supports and structural steel to match existing.

i. Installed miscellaneous bolting, gaskets for all piping systems.

j. Installed cable tray supports, cable tray and teck cable for tank gauging system, tank lighting and tank obstruction light.

k. Installed tank obstruction lights (where indicated).

l. Installed tank/ stairway station and light fixture.

m. Tested and calibrated tank level gauges and display units.

2.3 Quality Assurance and Quality Control

The quality assurance and quality control (QA/QC) for earthworks and liner installation was conducted by Layfield and Nuna East Ltd, documents the preparation of the subgrade, installation and testing of the membrane with a final inspection of the completed liner. The following documents are contained in Section 8 of Appendix D.

a. A certificate of acceptance of the soil subgrade for installation of the liner was verified and signed by the NUNA project coordinator and Layfield Environmental supervisor.

b. A geomembrane deployment log describes the location, size, temperature when placed, visually observed and initialled that the panel had been checked

c. A geomembrane trial seam log tested the welding before the entire installation proceeded. Connection of the trial panels checked and signed off.

d. An air lance test log had been completed for each seam and signed off.

e. Layout drawings show all of the panel numbers, as described in the log documents.

f. A certificate of final inspection and acceptance was signed by Layfield and Nuna East Ltd. representatives.

3. Photographic Records

Figure 1: Earthworks pad in-progress [northeast view]

Figure 2: Graded sub-base

Figure 3: Installation of sand below liner

Figure 4: Compaction of sand layer

Figure 5: Installation of insulation layer

Figure 6: Liner installation in-progress [north view]

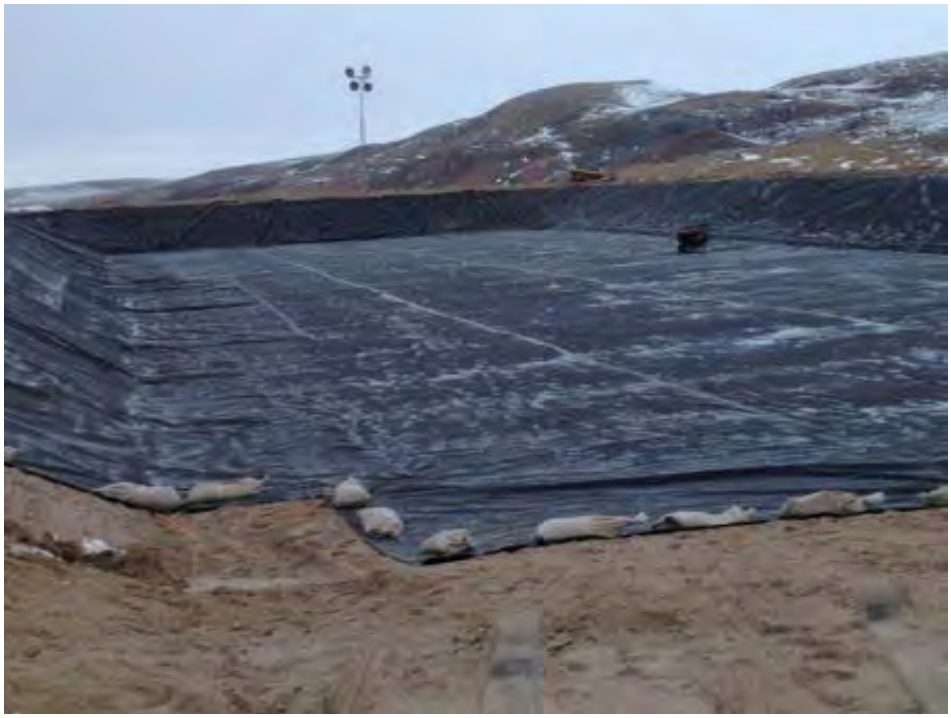


Figure 7: Liner installation in-progress

Figure 8: Installation of cover material over liner

Figure 9: Finished side slopes [southeast view]

Figure 10: Valves and piping between tanks and dispensing module (at tanks)

Figure 11: Fuel dispensing module and overhead piping tray

Figure 12: Valves and piping between tanks and dispensing module (at dispensing module)

Figure 13: Tanks, piping, dispensing module, and overhead piping tray [northwest view]

Figure 14: Completed Fuel Farm [south view]

4. As-Built Drawings

The as-built drawings incorporate contractor red line markups, field instructions, requests for information, field sketches, and all other inputs provided by the field engineering team.

The Hatch as-built drawings are attached in Appendix A.

Table 4-1: Hatch 'As-Built' Drawing List

Drawing Number	Title	Revision
H349000-4613-10-014-0001	Mine Site Tank Farm - Site General Arrangement	2
H349000-4613-10-014-0002	Mine Site Tank Farm - Site Grading Plan	1
H349000-4613-10-035-0001	Mine Site Dyke Sections and Details	1
H349000-4613-10-035-0002	Mine Site Sections Thru Truck Containment	1
H349000-4613-10-035-0003	Mine Site Dyke Sections and Details	1
H349000-4610-05-031-0001	Mine Site Tank Farm P&ID	1

Contractor supplied as-built drawings for the tank construction and piping installation have been attached in Appendix F. Contractor supplied as-built drawings for the fuel dispensing module has been attached in Appendix G.

5. Field Decisions

The following describes the most relevant field decisions made during construction:

5.1 Earthworks

a. The berm material was changed from Type 8 (150mm jaw run) to select run of quarry (ROQ) from QMR2 due to schedule restraints and equipment availability for the berm construction. The select ROQ from QMR2 was loaded from the quarry to assure no oversized material was utilized for the berm construction.

b. Surface material was changed from Type 5 (32mm minus) to borrow material with appropriate size distribution to specified material. The screener on site was not capable of accepting material blasted from the ROQ due to the configuration and size of the blast rock.

c. The fuel dispensing modules all required grounding which was not shown on the design. Grounding was attached to the tank grounding cables in conjunction with completion of the earthworks.

d. Due to limited material availability on-site, the Type 7 (-32mm clear) material was not installed. This scope item was transferred to Baffinland scope for completion. As of the data collection cut-off date for this report (November 24, 2014) the Type 7 (-32mm clear) material has not yet been installed.

e. Due to the limited scheduling availability of Nuna on-site (fixed time contract), the corrugated steel sump culverts, perimeter fencing and concrete barriers were not installed. These scope items were transferred to Baffinland scope for completion. As of the data collection cut-off date for this report (November 24, 2014) these items have not yet been installed.

5.2 Mechanical and Piping

a. A cross-over support was required and added for the pipes, electric and fibre optic cable behind the diesel fuel module.

b. Stair access was rotated by 10 degrees on the tanks to correct the interference between the stairs and tank man-ways on the issued for construction (IFC) drawings for tanks 4613-TK-002 and 4613-TK-004.

c. Modifications were made to the fuel module piping to allow installation of flexible connections.

d. Pipe supports were added under the outdoor 100mm (4 inch) valves on the fuel module piping to support the valve body weight.

e. Installed two 45 deg elbows immediately after the elevated pipe crossing where the diesel fill line and the suction line connect to the fuel module and run north to the header running east/west. Installed additional 3-pipe cable tray support between new 45 deg elbows and existing 90 deg elbows. Installed additional drain on the tank fill header between the 150x150x150 tee and PS-10.

f. The second drain shown on the IFC drawings between 4613-TK-001 and 4613-TK-002 near PS-08 and between 4613-TK-003 and 4613-TK-004 near PS-13 were deleted as unnecessary (only one drain was required).

g. Bolt type A320 L7 was replaced by A325M structural bolts due to material sourcing restrictions onsite.

5.3 Electrical and Instrumentation and Controls

a. The fuel dispensing module required installation of an exterior weatherproof junction box to reduce the feeder cable size to meet site availability.

b. The fuel system e-house 600v location was moved to simplify the layout and shorten cable runs.

c. 100mm (4 inch) channel tray was used for the vertical climb of each tank, dividers provided between LV and MV/control cables in the common tray, and 2-1PR#18 AWG Twisted Teck to be replaced by 1-2PR#18 AWG Twisted Shield Teck Armoured Cable.

d. 3m standard length obstruction light support brackets were installed instead of specialty 4m lengths due to restrictive project scheduling.

6. Performance Evaluation

As of the data collection cut-off date for this report (November 24, 2014) there have been no adverse observations in operational performance of the Mine Site tank farm and dispensing package.

7. Vibration Monitoring and Quarrying Activity

No vibration monitoring was conducted during the construction of the Mine Site tank farm and dispensing package as it was not deemed necessary based on scope of activities required for construction.

Control for quarrying activity was conducted as per the project's specific management plan:

- BAF-PH1-830-P16-0040 (H349000-4100-07-245-0001): Quarry Management Plan Mine Site Quarry (QMR2)
- BAF-PH1-830-P16-0004 (H349000-1000-07-126-0011): Borrow Pit and Quarry Management Plan

8. Environmental Monitoring

Environmental monitoring during the construction of the tank farm and dispensing package was conducted as per the BAF-PH1-830-P16-0008 Environmental Protection Plan (EPP) recently updated in July 2014.

The Baffinland on-site Environmental Management Team was responsible for environmental monitoring during construction and following-up with the construction team(s) if there were any reported environmental incidents or non-conformances.

Tank farm and dispensing package construction on site was also required to follow the requirements of the Surface Water and Aquatic Ecosystems Management Plan (March 2014), BAF-PH1-830-P16-0026. This Management Plan outlines the best management practices implemented to limit the potential for adverse impacts to receiving waters, aquatic ecosystems, fish and fish habitats. In addition this plan details the systems in place to mitigate and manage drainage and runoff at building sites, address point and non-point discharges to surface waters and assess those discharges on water quality and quantity relative to their receiving water systems.

The Spill Contingency Plan (March 2014), BAF-PH1-830-P16-0036, in conjunction with the Emergency Response Plan (March 2014), BAF-PH1-830-P16-0007, provides guidance and instructions for first responders and Baffinland Management in the event of a spill event or other emergency such as fire or accident.

The risks to the water quality in the respective rivers and streams as a result of construction of the tank farm and dispensing package would originate from following sources based on construction methodology:

- Spills from equipment

  During the period of construction, there were no reported spills from equipment used in the construction of the tank farm and dispensing package.

- Increase in sediment load in the water

During the period of construction, water quality monitoring conducted at downstream stations under Part D, Section 16 and Part I, of the Type "A" Water Licence 2AM-MRY1325 indicated total suspended solids (TSS) and other parameter at levels below the specified Water Licence criteria. The results for water quality monitoring were provided in monthly reports submitted to the Nunavut Water Board and other stakeholders. In consideration of the above, the environmental mitigation strategies were effective in maintaining runoff water quality.

9. Fuel Storage System

The facility design and construction has been reviewed with the specific requirements of the CCME Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products, 2003. The results are tabulated in Appendix I. With regards to the specific sections that apply to construction; it is Hatch's opinion that the facility conforms to the requirements as laid out in the CCME document.

10. Earthworks Data

Completion surveys were conducted for each material required to build the fuel tank farm containment. NUNA East Ltd's completion of construction report for the Tank Farm Containment Dyke Mary River Mine (E349000-YX001-00-124-0008 Sub01) includes this information in Section 4 in Appendix D.

Additional survey data collected in 2014 for the tank farm area has been included in Appendix E.

Two geotechnical inspections (early August and late September) were conducted in 2014 by a 3rd party, independent, Nunavut certified engineer under Part D, Section 19 of Type "A" Water Licence 2AM-MRY1325. The inspection is inclusive of waste containment structures at the Mary River Mine Site and Milne Port site including the new Mine Site fuel tank farm containment. The inspector noted in Section 3.14, "All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure". The Annual Geotechnical Investigation Report – 2014 Inspections is provided in Appendix B.

11. Unanticipated Observations

Not applicable.

12. Surface Monitoring

None conducted.

13. Required Maintenance

None conducted to-date.

14. Adaptive Management

For discussion of adaptive management principles and practices applied during the Construction Phase of the Project and their overall effectiveness please refer to the 2013 Annual Report to the Nunavut Impact Review Board. Any additional adaptive management practices implemented as a result of works completed in 2014 will be reported in the updated 2014 Annual Report to the Nunavut Impact Review Board.

15. Concordance with Type "A" Water Licence

The Nunavut Water Board Type "A" Licence 2AM-MRY1325, Schedule D, outlines the requirements for Construction Monitoring Reports. The following table provides a concordance of the report, herein, with the requirements included in Part D.

Table 15-1: Table of Concordance for Schedule D

Schedule D Item No.	Schedule D Description	Corresponding Section in this Report
1a	description of all infrastructure and facilities designed and constructed to contain, withhold, divert or retain Water and/or Waste;	1
1b	a summary of construction activities including photographic records before, during and after construction of the facilities and infrastructure designed to contain, withhold, divert or retain Water and/or Waste;	2, 3
1c	as-built drawings and design for facilities and infrastructure, in Item 1(a) of this schedule, designed and constructed to contain, withhold, divert or retain Water and/or Waste;	4
1d	documentation of field decisions that deviate from the original plans and any data used to support or developed facilities and infrastructure to withhold, divert or retain Water and/or Waste;	5
1e	a comparison of measured versus predicted performance of infrastructure and facilities;	6
1f	any blast vibration monitoring and control for quarrying activity carried out in close proximity to fish bearing waters;	7
1g	monitoring conducted for sediment and explosives residue release from construction areas;	8
1h	monitoring undertaken in accordance with Part D of the during the Construction Phase of the Project;	8

Schedule D Item No.	Schedule D Description	Corresponding Section in this Report
1i	details confirming that the requirements of the CCME guidance document entitled “Aboveground Storage Tank Systems for Petroleum and Allied Petroleum Products (2003)” have been met by the Licensee;	9
1j	data collected from instrumentation used to monitor earthworks and the interpretation of that data;	10
1k	a discussion of any unanticipated observations including changes in risk and mitigation measures implemented to reduce risk during construction;	11
1l	an overview of any method including frequency used to monitor deformations, seepage and geothermal responses;	12
1m	a summary of maintenance work undertaken as a result of settlement or deformation of dikes and dams;	13
1n	a summary of adaptive management principles and practices applied during the relevant phases of the Project and their overall effectiveness.	14

Appendix A

As-Built Drawings

A. H349000-4613-10-014-0001 Rev02: Mine Site Tank Farm - Site General Arrangement ***[1 page]***

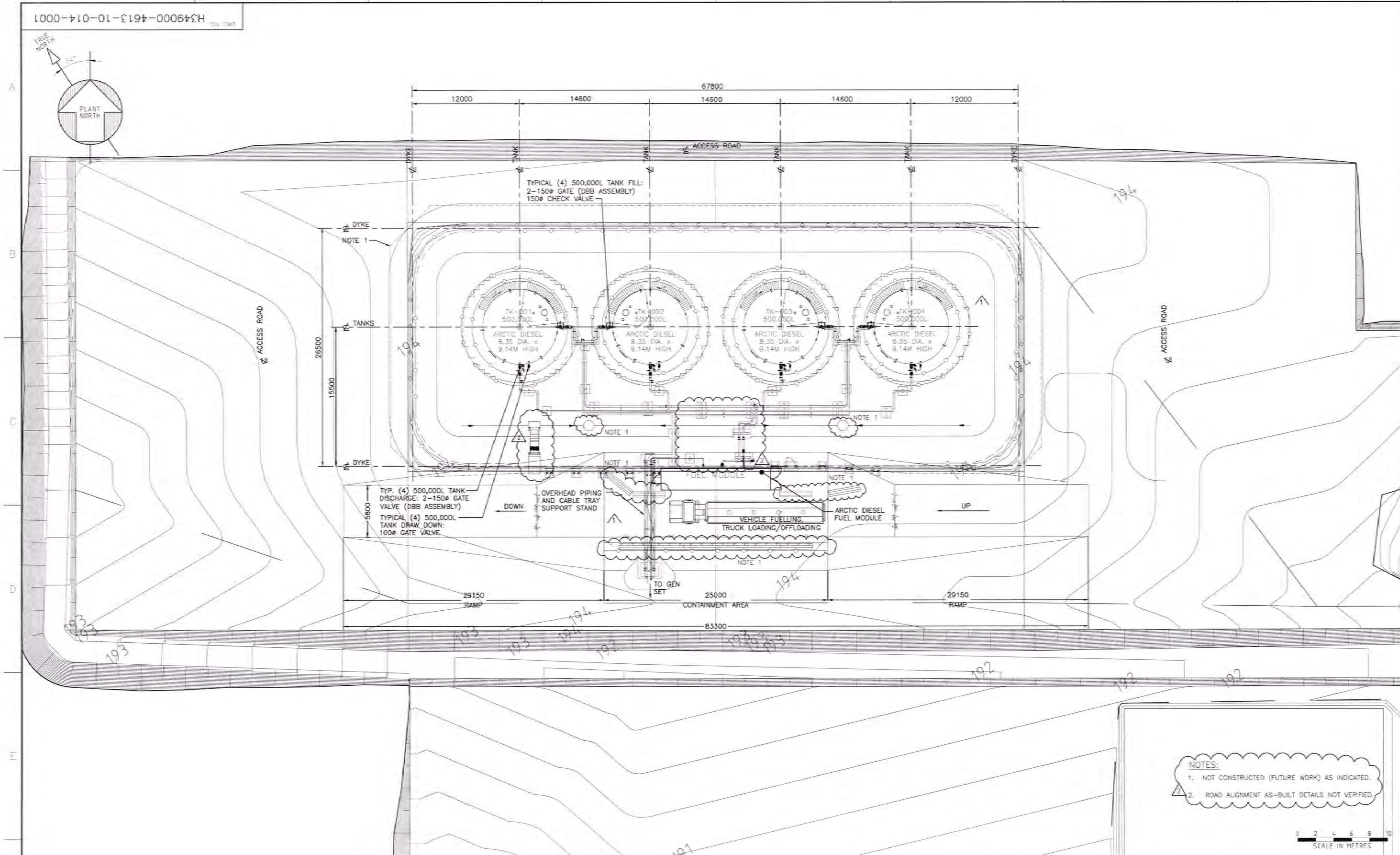
B. H349000-4613-10-014-0002 Rev01: Mine Site Tank Farm - Site Grading Plan ***[1 page]***

C. H349000-4613-10-035-0001 Rev01: Mine Site Dyke Sections and Details ***[1 page]***

D. H349000-4613-10-035-0002 Rev01: Mine Site Sections Thru Truck Containment ***[1 page]***

E. H349000-4613-10-035-0003 Rev01: Mine Site Dyke Sections and Details ***[1 page]***

F. H349000-4610-05-031-0001 Rev01: Mine Site Tank Farm P&ID ***[1 page]***



DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

THIS AS-BUILT DOCUMENT HAS BEEN PREPARED BASED ON INFORMATION PROVIDED BY THIRD PARTIES. HATCH HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THIS INFORMATION AND SHALL NOT BE RESPOSIBLE FOR, AND DISCLAIMS ANY LIABILITY IN CONJUNCTION WITH, ANY ERRORS OR OMISSIONS THAT MAY BE INCORPORATED HEREIN AS A RESULT.

REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
2	AS-BUILT	PC	SH	JC	2015-01-15
1	DIESEL GENERATOR FUEL PIPING AND CABLE TRAY ROUTING REVISED. SUPPORT STRUCTURE ADDED		BB	DS	13-06-24

AS BUILT

REVISED AS MARKED. ALL OTHER DETAILS CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH.	BY	DATE
2	AS-BUILT	SH	JC	15-01-15
1	ISSUED FOR CONSTRUCTION	DS	FB	13-06-24
0	ISSUED FOR CONSTRUCTION	DS	FB	13-04-26

HATCH

DESIGNED BY: D. STEPHENSON DATE: 13-04-26	DRAWN BY: M. PETERSON DATE: 13-04-26
CHECKED BY: B. BROPHY DATE: 13-06-24	DISCIP. ENGR.: F. BUTTS DATE: 13-06-24
PROJ. DES. COORD.: T. THERTELL DATE: 13-06-24	PROJ. ENGR.: J. CLELAND DATE: 13-06-24
PROJ. MGR.: S. PERRY DATE: 13-06-24	

Baffinland

MARY RIVER PROJECT

MINE SITE
TANK FARM
SITE GENERAL ARRANGEMENT

SCALE: 1:200 OR AS NOTED
DWG. NO. H349000-4613-10-014-0001
REV. 2

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

H349000-4613-10-014-0002

NOTES:
1. NOT CONSTRUCTED (FUTURE WORK) AS INDICATED.
2. ROAD ALIGNMENT AS-BUILT DETAILS NOT VERIFIED.

ACCESS ROAD

TRUE NORTH

PLANT NORTH

67800

12000 | 14600 | 14600 | 14600 | 12000

N 7913328.184
E 561235.839

DYKE

TANK

OUTSIDE TOE OF DYKE VARIES

TOP OF DYKE EL. 196.10M

N 7913290.276
E 561292.052

INSIDE TOE OF DYKE EL.194.60M

TANK PAD DETAIL SEE DETAIL-1 ON DWG. H349000-4613-10-035-0001

SLOPE

TANKS

N 7913312.354
E 561239.639
ELEV. 195.645M

N 7913304.191
E 561251.743
ELEV. 195.645M

N 7913296.028
E 561263.848
ELEV. 195.645M

N 7913287.866
E 561275.953
ELEV. 195.645M

RIGID INSULATION HD60 76MM THK. 2-LAYERS 1200MMX2400MMX38MM NOM. SHEETS EXTENDING 2M BEYOND TANK FLOOR

4613-10-035-0001

26000

15500

NOTE 1

SUMP DETAIL SEE DETAIL-1 ON DWG. H349000-4613-10-035-0003

BOTTOM OF SWALE EL. 194.11M

BOTTOM OF SWALE HIGH POINT EL. 194.25M

BOTTOM OF SWALE EL. 194.25M

T.O. SUMP EL. 194.56M

BOTTOM OF SWALE EL. 194.25M

N 7913268.305
E 561277.236

T.O. GRANULAR DYKE EL.195.79M

N 7913306.212
E 561221.023

FUEL MODULE

DOWN

UP

5200

TOE OF DYKE EL.195.98M

TOP OF CONTAINMENT DYKE EL. 196.28M

CONCRETE BARRIERS

4613-10-035-0002

4613-10-035-0001

29150 RAMP | 25000 CONTAINMENT AREA | 29150 RAMP

83300

0 1.25 2.5 3.75 5.0 6.25
SCALE IN METRES

THIS AS-BUILT DOCUMENT HAS BEEN PREPARED BASED ON INFORMATION PROVIDED BY THIRD PARTIES. HATCH HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR, AND DISCLAIMS ANY LIABILITY IN CONJUNCTION WITH, ANY ERRORS OR OMISSIONS THAT MAY BE INCORPORATED HEREIN AS A RESULT.

AS BUILT

REVISED AS MARKED ALL OTHER DETAILS CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

NO.	DESCRIPTION	BY (INITIALS)	DATE
1	AS-BUILT	BC	2015-01-15

REV	ISSUE FOR	WITH BY	DATE
0	ISSUED FOR CONSTRUCTION	GS	FEB 13-07-29
1	AS-BUILT		2015-01-15

HATCH

DESIGNED BY: D. STEPHENSON DATE 13-02-20
DRAWN BY: M. PETERSON DATE 13-02-20
CHECKED BY: F. BOND DATE 13-07-12
DSGN. ENGR.: F. BUTTS DATE 13-07-12
PROJ. DSN. COORD.: T. THERRELL DATE 13-07-22
PROJ. ENGR.: J. CLELAND DATE 13-07-22
PROJ. MGR.: S. PERRY DATE 13-07-22

Baffinland

MARY RIVER PROJECT

MINE SITE
TANK FARM
SITE GRADING PLAN

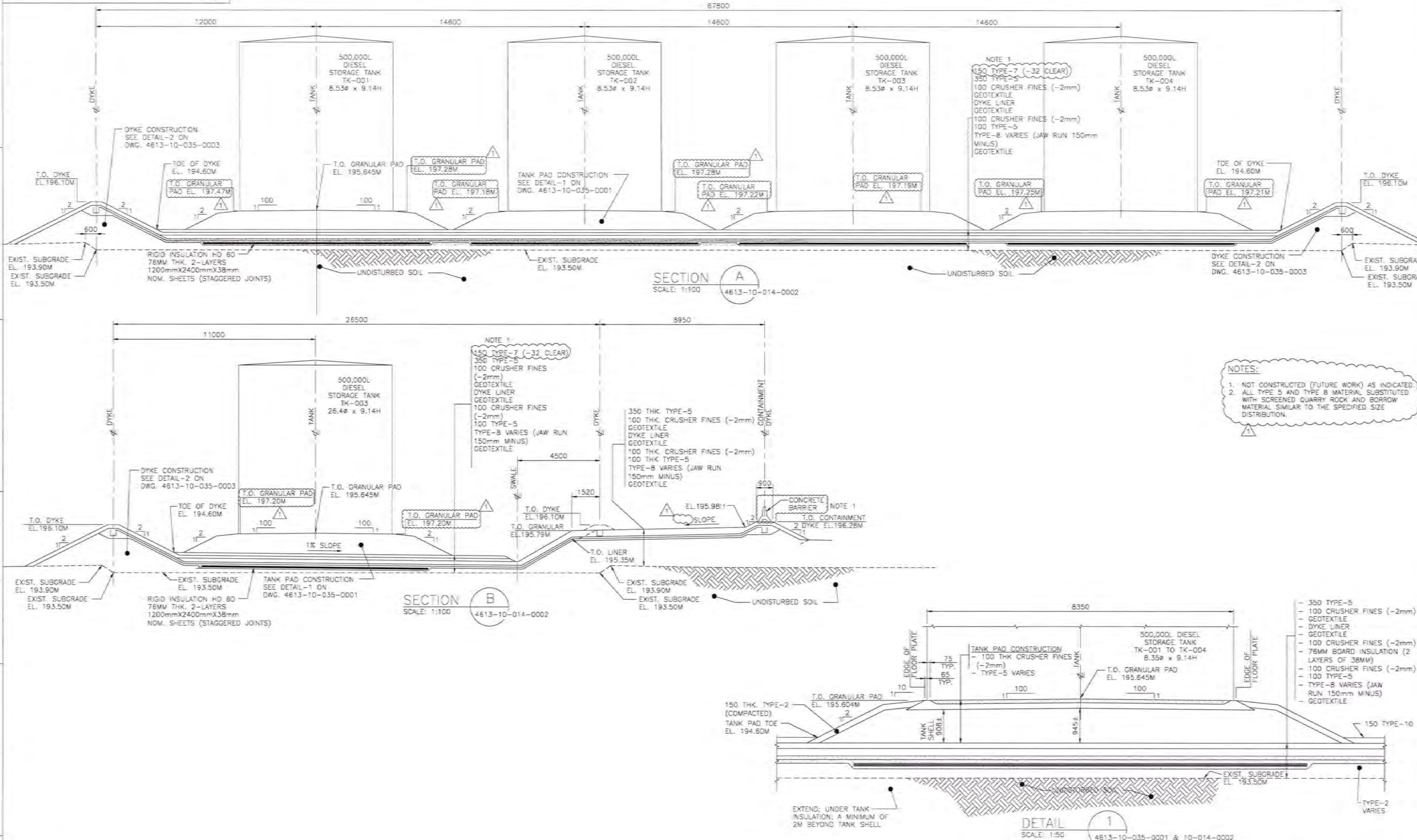
SCALE	DWG. NO.	REV.
1:125	H349000-4613-10-014-0002	1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

REFERENCE DRAWINGS

REVISIONS

ISSUE AUTHORIZATION



NOTES:

1. NOT CONSTRUCTED (FUTURE WORK) AS INDICATED.
2. ALL TYPE 5 AND TYPE 8 MATERIAL SUBSTITUTED WITH SCREENED QUARRY ROCK AND BORROW MATERIAL SIMILAR TO THE SPECIFIED SIZE DISTRIBUTION.

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

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NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS-BUILT				2015-01-13

REVISIONS

AS BUILT

REVISED AS MARKED. ALL OTHER DETAILS CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

REV.	ISSUE FOR	AUTH.	BY	DATE
1	AS-BUILT		JC	2015-01-13
0	ISSUED_FOR_CONSTRUCTION	DS	FB	13-07-23

ISSUE AUTHORIZATION

HATCH

DESIGNED BY D. STEPHENSON DATE 13-02-20	DRAWN BY M. PETERSON DATE 13-02-20
CHECKED BY E. BOND DATE 13-07-22	DISCIP. ENGR. F. BUTTS DATE 13-07-22
PROJ. DES. COORD. T. THERTELL DATE 13-07-22	PROJ. ENGR. J. CLELAND DATE 13-07-22
PROJ. MGR. S. PERRY DATE 13-07-22	

Baffinland

MARY RIVER PROJECT

MINE SITE
DYKE SECTIONS & DETAILS

SCALE 1:100 OR AS NOTED | DWG. NO. H349000-4613-10-035-0001 | REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

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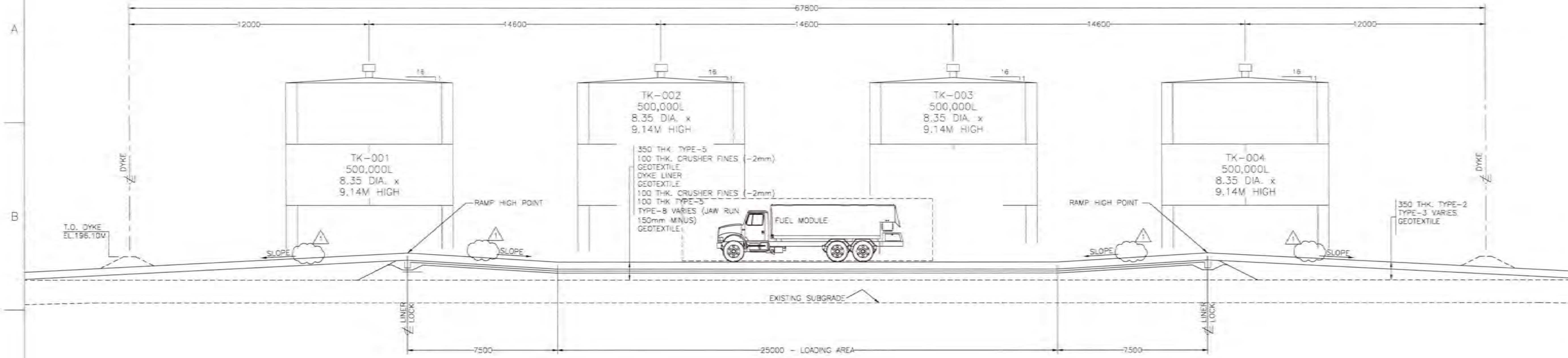
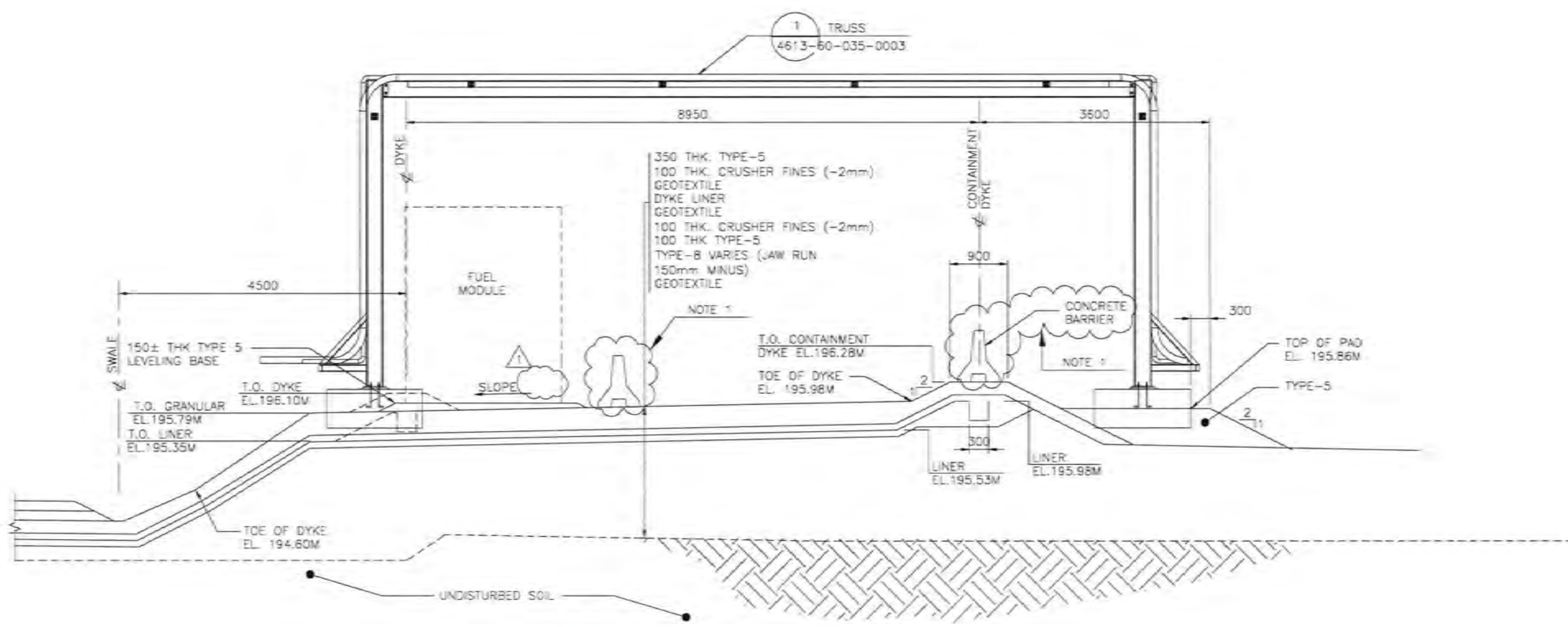


SECTION C
SCALE: 1:100
4613-10-014-0002

NOTES:
1. NOT CONSTRUCTED (FUTURE WORK) AS INDICATED.
2. ALL TYPE 5 AND TYPE 8 MATERIAL SUBSTITUTED WITH SCREENED QUARRY ROCK AND BORROW MATERIAL SIMILAR TO THE SPECIFIED SIZE DISTRIBUTION.



SECTION D
SCALE: 1:50
4613-10-014-0002

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

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NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS-BUILT	JB	SH	JC	2015-01-13

REVISIONS

AS BUILT

NO CHANGES. CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

REV.	ISSUE FOR	AUTH.	BY	DATE
1	AS-BUILT	SH	JC	2015-01-13
0	ISSUED_FOR_CONSTRUCTION	DS	FB	13-07-23

ISSUE AUTHORIZATION

HATCH

DESIGNED BY D. STEPHENSON DATE 13-02-20	DRAWN BY M. PETERSON DATE 13-02-20
CHECKED BY E. BOND DATE 13-07-12	DISCIP. ENGR. F. BUTTS DATE 13-07-12
PROJ. DES. COORD. T. THERTELL DATE 13-07-22	PROJ. ENGR. J. CLELAND DATE 13-07-22
PROJ. MGR. S. PERRY DATE 13-07-22	

Baffinland

MARY RIVER PROJECT

MINE SITE
SECTIONS THRU TRUCK CONTAINMENT

SCALE 1:100 OR AS NOTED | DWG. NO. H349000-4613-10-035-0002 | REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

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1/12/2015 3:44:37 PM

DWG. NO. H349000-4613-10-035-0003

NOTES:

1. NOT CONSTRUCTED (FUTURE WORK) AS INDICATED.
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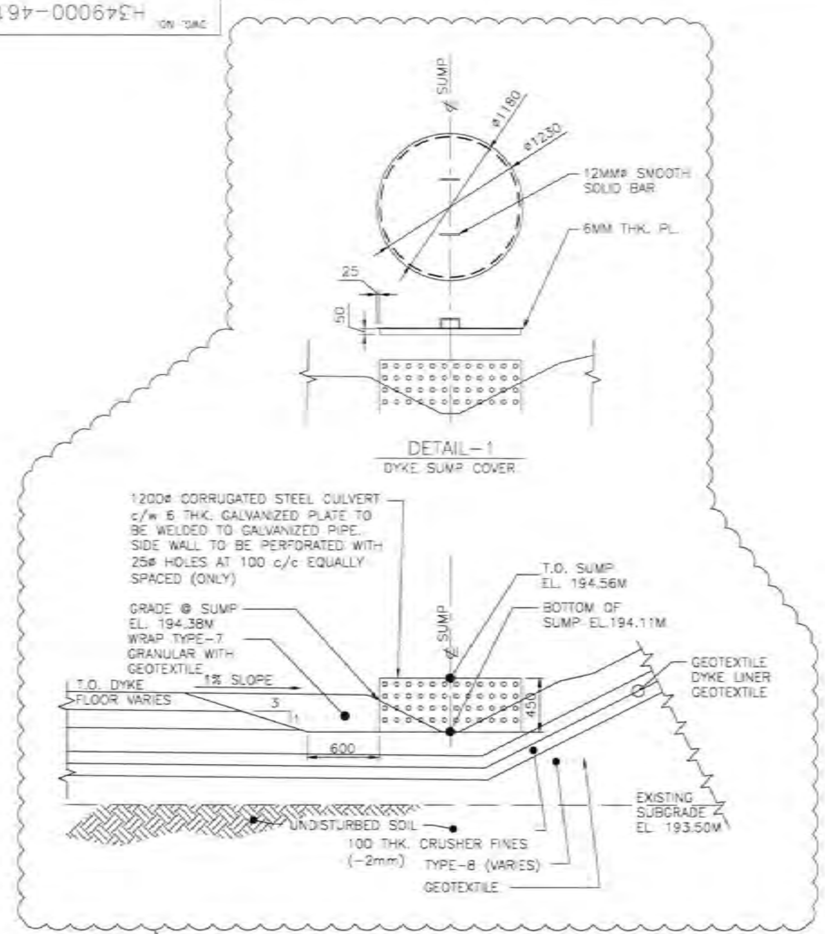

DETAIL-1
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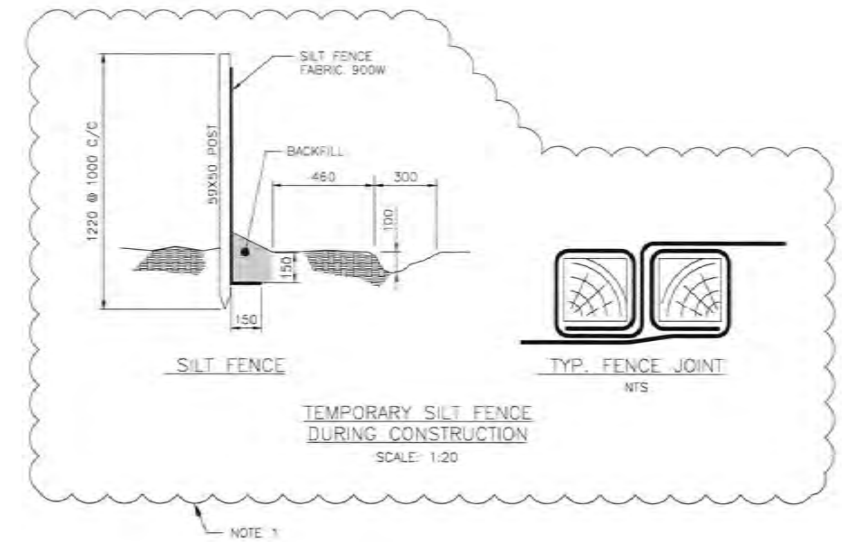
REFER H349000-4613-10-014-0002



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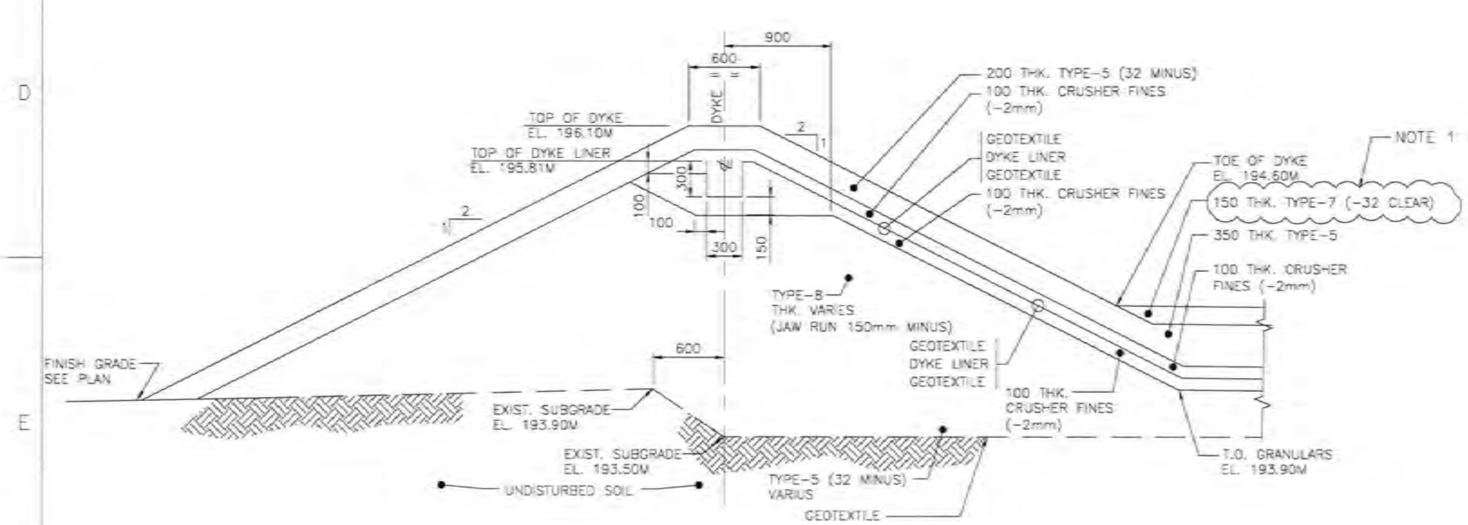

DETAIL-2
DYKE CONSTRUCTION
REFER H349000-4613-035-0001

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

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NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS-BUILT	JB	SP	JC	2015-01-13

REVISIONS

AS BUILT

REVISED AS MARKED. ALL OTHER DETAILS CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

REV.	ISSUE FOR	AUTH.	BY	DATE
1	AS-BUILT	SH	JC	2015-01-13
0	ISSUED FOR CONSTRUCTION	DS	FB	13-07-23

ISSUE AUTHORIZATION

HATCH

DESIGNED BY D. STEPHENSON DATE 13-03-18	DRAWN BY M. PETERSON DATE 13-03-18
CHECKED BY E. BOND DATE 13-07-12	DISCIP. ENGR. F. BUTTS DATE 13-07-12
PROJ. DES. COORD. T. THERTELL DATE 13-07-22	PROJ. ENGR. J. CLELAND DATE 13-07-22
PROJ. MGR. S. PERRY DATE 13-07-22	

Baffinland

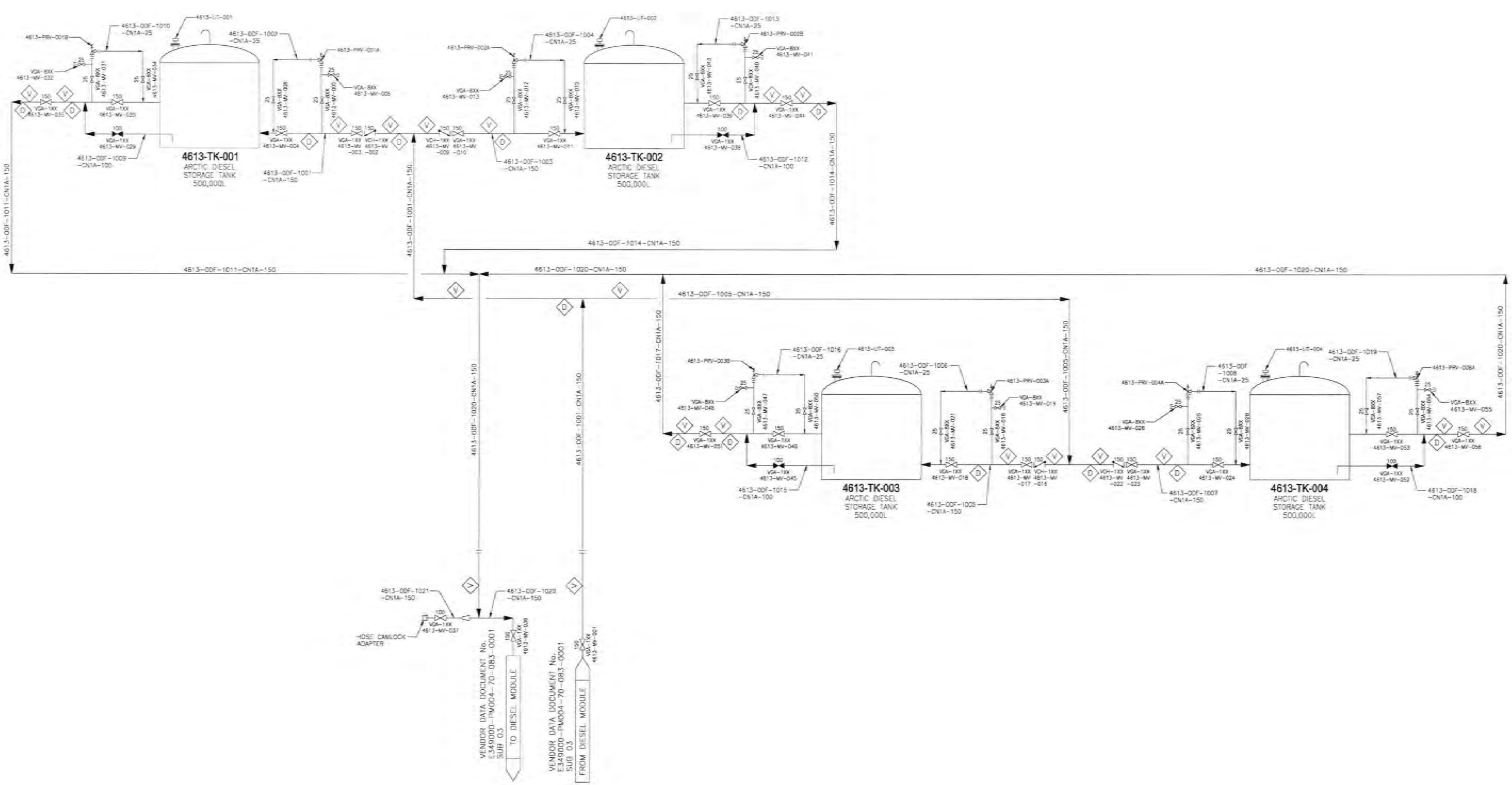
MARY RIVER PROJECT

MINE SITE
DYKE SECTIONS AND DETAILS

SCALE 1:30 OR AS NOTED | DWG. NO. H349000-4613-10-035-0003 | REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

H349000-4610-05-031-0001
DWG. NO.



DRAWING NO.	DRAWING TITLE
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H349000-1000-75-041-0006	LEGEND SHEET 6 OF 7 - EQUIPMENT
H349000-1000-75-041-0005	LEGEND SHEET 5 OF 7 - INSTRUMENTATION
H349000-1000-75-041-0004	LEGEND SHEET 4 OF 7 - INSTRUMENTATION
H349000-1000-75-041-0003	LEGEND SHEET 3 OF 7 - PIPING
H349000-1000-75-041-0002	LEGEND SHEET 2 OF 7 - ASSET TAGGING
H349000-1000-75-041-0001	LEGEND SHEET 1 OF 7 - ASSET TAGGING

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NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS BUILT	JB	SH	JC	2015-01-07

REVISIONS

AS BUILT

NO CHANGES, CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

REV.	ISSUE FOR	AUTH.	BY	DATE
1	AS-BUILT	SH	JC	2015-01-07
0	ISSUED FOR CONSTRUCTION	DS	FB	13-10-11

ISSUE AUTHORIZATION

HATCH

DESIGNED BY D. STEPHERSON DATE 08-16-2013	DRAWN BY H. CURRIE DATE 08-16-2013
CHECKED BY D. STEPHERSON DATE 10-10-2013	DISCIP. ENGR. F. BUTTS DATE 10-10-2013
PROJ. DES. COORD. T. THERTELL DATE 10-10-2013	PROJ. ENGR. J. CLELAND DATE 10-10-2013
PROJ. MGR. S. PERRY DATE 10-10-2013	

Baffinland

MARY RIVER PROJECT

MINE SITE
TANK FARM
P&ID

SCALE NTS OR AS NOTED
DWG. NO. H349000-4610-05-031-0001
REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

2013-03-08

Appendix B

Annual Geotechnical Inspection

A. BHM 14-084: Annual Geotechnical Inspection Baffinland Iron Mines Corporation Mary River Project – 2014 Inspections ***[59 pages]***

Baffinland
Iron Mines Corporation

BHM Project No.: 14-084

BAFFINLAND IRON MINES CORPORATION

ANNUAL GEOTECHNICAL INVESTIGATION
MARY RIVER PROJECT
2014 INSPECTIONS

Prepared for:

Mr. Jeff Bush
Site Services Superintendent
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

BARRY H. MARTIN

Barry H. Martin P.Eng., MRAIC, Consulting Engineer and Architect
1499 Kraft Creek Rd,
Timmins, ON P4N 7C3
Tel : 705.268.5621
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INDEX

PHOTOS

DRAWINGS

BARRY H. MARTIN

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Timmins, ON., P4N 7C3
T: 705.268.5621

October 28, 2014

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario L6H 0C3

Attention: Jeff Bush
Jeff.bush@baffinland.com

RE: ANNUAL GEOTECHNICAL INSPECTIONS
BAFFINLAND IRON MINES CORPORATION
OUR REFERENCE NO. 14-084

1.0 INTRODUCTION

Barry H. Martin, P. Eng., Consulting Engineer completed the 7th annual water licence geotechnical inspection of the following on-site engineered facilities:

Pit Walls
Quarries
Landfills
Land farms
Bulk Fuel Storage Facilities
Sediment Ponds
Collection Ponds
Polishing and Waste Stabilization Ponds

The inspection that took place July 31st/August 5th is the first phase of a biannual inspection to be carried out within the open water shipping season at the two Baffinland sites in Mary River at the mine site and at Milne Inlet at the port facility. A second inspection took place September 25th/30th.

The inspections were carried out in accordance with the guidelines set out in "Dam Safety Guidelines 2007" as published by the Canadian Dam Association.

The inspections were completed by Mr. Barry H. Martin, P. Eng., the design Engineer for the initial containment facilities at both Mary River and Milne Inlet, the runway extension, initial bridges on the connecting road plus the solid waste disposal site.

The previous 6 annual water license geotechnical inspections were completed by Mr. Martin.

The facilities inspected are as per the following:

Mary River Site

1. Bulk Fuel Storage Containment
2. Genorator Fuel Storage Facility Containment
3. Polishing/Waste Stabilization Pond No. 1
4. Polishing/Waste Stabilization Ponds No. 2 and No. 3 (Constructed as a 2 cell structure)
5. Helicopter Fuel Cell Containment
6. Barrel Fuel Containment (Constructed as a 2 cell structure)
7. Hazardous Waste Storage
8. Enviro-Tank Storage (Constructed contiguous with hazardous waste storage and stove oil storage)
9. Stove Oil Storage
10. Jet Fuel Tank and Pump Containment
11. Solid Waste Disposal Site
12. Waste Oil Storage Containment
13. Minesite Steel Fuel Tank Farm Containment
14. Quarry

A site plan for the Mary River site showing most structures reviewed is attached.

Milne Inlet Site

1. Bulk Fuel Containment Facility
2. Existing Polishing/Waste Stabilization Pond
3. Barrel Fuel Storage (Constructed as a 2 cell structure)
4. Hazardous Waste Storage (Constructed as a 2 cell structure)
5. Oil and Antifreeze Containment
6. Jet “A” Pump Containment

7. Fuel Tank Farm

8. New Sewage Effluent Pond

9. Land farm

10. Contaminated Snow Containment

11. Sediment Ponds East and West

12. Quarry

A site plan for the Milne Inlet site is attached.

2.0 METHODOLOGY FOR INSPECTION

The geotechnical inspector was Barry H. Martin, P. Eng., who reviewed the two sites for the first of the biannual inspections on July 31st, 2014 to August 4th, 201, just as the annual shipping season commenced and on Sept 25th, 2014 to Sept. 30th, 2014 for the second inspection, just as the shipping season ended.

The inspections primarily focused on the following aspects:

1. The structures were inspected for conformance with the design basis as presented in "as-constructed" and "as-built drawings (provided in the first and subsequent reports).

2. The structures were specifically inspected for settlement, cracking, and seepage through the berms.

3. The areas around the structures were examined for evidence of seepage.

4. Quarry walls were reviewed for relative stability. I note that the quarries were active removal areas and long term stability was not yet established.

5. New structures under construction were reviewed for conformity with design drawings.

6. Photographs were taken to document observations made during the inspection and are attached.

3.0 MARY RIVER CAMP

3.01 General

As with other years, there had been a fair amount of rainfall at Mary River preceding the first inspection and it was expected that there would be some water in the containment dykes. Such was the case. During the second inspection we found ice at the bottom of the containment areas.

A monitoring program is in place to test storm water that does accumulate within the containment structures. As reviewed, the water that does not meet the water license effluent requirements is treated on site prior to release.

At the Bulk Fuel Storage Facility Containment, the water that collects within the dyke is treated at the end of the containment structure.

We report on the quarry and the steel fuel tank containment structure for the first time.

The bulk fuel storage containment is coming due for decommissioning and shall only be in use to accommodate jet "A" fuel until the end of this summer/autumn season.

3.02 Bulk Fuel Storage Facility

General Conditions

A new steel tank storage facility has been constructed at the mine site and it is intended that this facility shall replace the bulk fuel storage facility during this summer season at which time the remaining bladders still containing product shall be emptied.

Only Jet A fuel shall be accommodate by this facility until November at the latest when the total use of this facility shall be discontinued and it shall be due for decommissioning and a final decision has been made on land farming of oil impacted granular cover within the structure.

Stability

At the time of our first review, water had not been removed for a period from within the containment and water was ponding above the level of the gravel within the bottom of the containment. There was still considerable factor of safety against failure of oil holding bladders within the dykes with the water level as it exists. Such was the case during the second inspection, but the water had frozen.

The structure was visually inspected for any signs of cracking or subsidence. There was no indication of any settlement, seepage, or cracking in the soil structures that formed the dykes. As well, there was no indication of seepage at the base of the structure around the exterior.

The soil structure is considered stable in the present condition and is in conformance with the design basis for the facility.

The presence of water within the structure is an indication of the integrity of the liner.

Recommendations

We have one recommendation. There is limited storage for spills at the load out end of the facility. Water currently ponds above the gravel in this area confirming the integrity of the liner but minimizing the capacity of the structure for spill containment.

We recommend that this water be removed on a regular basis. If the water proves to be oil impacted, it may be pumped to within the storage containment for treatment at a future date.

3.03 Generator Fuel Storage Containment

General Conditions

The containment structure has not varied from its use since our 2010 annual inspection. At that time our recommendation was to limit the fuel contained in this containment facility to 77,376 litres.

There is currently one bladder in this containment facility that has a capacity when full of 120,000 litres. This bladder contains 77,376 litres when the bladder is 32" high. The guideline for Baffinland Iron Mines is to fill this bladder to no more than 76 cm (30") which represents 70,097 litres.

There is a sign posted to limit the bladder height at 30".

At the time of our visit on August 1, 2013, the bladder height was measured at 21". There was water ponding in the bottom of the containment at the time of our review. At the time of our seond review on Sept 26, 2014 the bladder height was measured at 20" and there was ice just above the gravel in the bottom of the containment.

Stability

The structure was visually inspected for any signs of subsidence or cracking and no such indications were noted. There was no sign of seepage at the base of the structure noted. The soil structure is considered to be stable in its present condition and is in conformance with our design principles.

Recommendation

We recommended that the water ponding above the bottom of the containment gravel cover be removed regularly by creating a sump in the gravel and pumping out the water to below the gravel surface.

We recommend that Baffinland Iron Mines continue to control the fuel in the bladder at a height of 30".

3.04 Polishing/Waste Stabilization Pond No. 1

General Conditions

PWSP No. 1 continues to be utilized as a holding facility for sewage plant effluent that does not meet water effluent quality criteria.

Currently the pond is being used primarily as a repository for sewage sludge that is periodically removed from the RBC.

The supernatant from PWSP No. 1 is periodically decanted to PWSPs Nos. 2 and 3 where it is tested and treated as required to meet Water Licence effluent requirements.

At the time of our first visit there was approximately 4' of freeboard to accommodate further sewage and the structure readily conforms to its design intent. At the time of our second visist, there was approximately 6' of freeboard.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing sewage and there are no tears or ruptures in the membrane, excepting some minor tears from past activity at the top of the dyke well above the allowable effluent level in the structure in the horizontal portion of the membrane.

A review of the top of the dyke showed no indication of cracking or settlement which would indicate stresses within the structure.

Many of the tears that had occurred in the liner on the top of the dyke have been patched during the period between reviews in 2008 and 2009 and are holding well. As well, there are no signs of weather related deterioration of the liner where it is exposed.

Monitoring points have been set up on the top of the dyke and have been monitored since 2009. Settlements have occurred since that time. These settlements have not led to any stress cracks in the structure. These settlements are an indication of consolidation in the berm structure and the active layer beneath the dyke and are not considered to be of any concern.

It now can be seen where the structure has settled slightly relative to the soils away from the structure.

There appears to be no sign of erosion of the dykes, even with the large amount of precipitation that occurred this current summer season.

The settlements have had little effect on the integrity of the structure.

Recommendations

We see no reason to continue the monitoring of the top of the berm on an annual basis. With the excellent condition of the dyke construction, we see no reason to continue this function.

3.05 Polishing Ponds/Waste Stabilization Ponds #2 and #3

General Conditions

This structure was designed and constructed as a 2 cell structure.

The supernatant from PWSP #1 is currently discharged to PWSPs Nos. 2 and 3. The treated effluent is tested for Water Licence effluent requirements, treated if necessary, and discharged to the environment.

At the time of our visits there was considerable freeboard to accommodate further sewage and the structure readily conforms to its design intent. There was 5' of freeboard in one cell and the second cell was empty at the time of our second inspection.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage and hence we conclude that the liner has been effective in containing the sewage and there are no tears or ruptures in the membrane.

Longitudinal cracking which appeared in the dykes of PWSP#3 due to the melt of permafrost wedges in 2009 has not reoccurred and we consider this structure to be stable in its present condition.

Monitoring points have been set upon the top of the dyke and have been monitored since 2009. Settlements have occurred since that time. These settlements have not led to any stress cracks in the structure.

There appears to be no sign of erosion of the dykes and plants are continuing to seed themselves on the dykes. This growth is minimal however.

Recommendations

We see no reason to continue the monitoring of the top of the berm on an annual basis. With the excellent condition of the dyke construction, we see no reason to continue this function.

3.06 Helicopter Fuel Tank Containment

General Conditions

The structure was designed and constructed as a single cell structure that contains a 1000 gal fuel storage tank.

The structure currently conforms to its design intent,

In the past, a liner clad wood curb had been added to the top of the berm to prevent the erosion of gravel off the berm, caused by pulling the fuel hose from within the dyke out to the helicopters to provide them with fuel.

Stability

Our review of the area around the pond at the base of the slopes showed no sign of seepage. There is a minor amount of water ponding in the bottom of the containment indicating the integrity of the liner.

A review of the exterior and the top of the berms showed no sign of cracking or settlement which would indicate stress within the structure.

The structure is considered to be stable in its present condition.

Recommendation

We have no recommendations with respect to this structure.

3.07 Barrel Fuel Containment

General Conditions

This particular structure which we called “Barrel Fuel Containment” in our previous inspection reports is a two cell structure which is currently used to accommodate cubes of lubricant and barrels in the east cell and cubes of lubricant and antifreeze in the west cell.

Stability

Our review of the area around this containment structure showed no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and top of the dyke showed no sign of cracking or settlement which would indicate stresses within the structure.

The structure is considered to be stable in its present condition.

Recommendations

We have no recommendations with respect to this structure.

3.08 Hazardous Waste Storage

General Conditions

This particular cell was constructed contiguous with an existing cell, which is referred to on site as the “Enviro Tank Storage”, from drawings by our office in 2010 and conforms to our drawings. It is also contiguous with the Stove Oil Storage cell.

This structure contains barrels and bags of hazardous waste.

Stability

Our review of the area around this cell at the base of the slopes, showed no sign of seepage.

The structure appears stable in its present condition.

Recommendation

There are no recommendations at this time.

3.09 Enviro Tank Storage

General Conditions

This particular structure is constructed contiguous with the Hazardous Waste Storage constructed in 2010 and the Stove Oil Storage cell. It is now utilized as a wash down cell.

There was concern for the integrity of this cell as the cell was dry and the geotextile is exposed from heavy traffic during our initial inspection. During our second inspection, the cell was holding a small amount of water confirming the integrity of the liner.

Recommendations

We recommend that the geotextile over the liner and the granular cover be made good prior to continuing use of this cell as a wash down cell.

3.10 Stove Oil Storage

General Conditions

This particular structure had been used to store barrels of stove fuel in 2011

The structure again contains barrels of stove oil and some Jet "A" fuel.

This structure was constructed in accordance with a standardized drawing provided by this office utilizing a one piece liner.

Stability

Our review of the area around the containment structure shows no sign of seepage. This shows that there is reasonably little chance of tearing or rupture of the membrane having taken place.

A review of the exterior and the top of the dyke showed no sign of cracking or settlement which would indicate stresses with the structure.

The structure is considered to be stable in its present condition.

3.11 Jet Fuel Tank and Pump Containment

This particular structure was reconstructed based on our recommendation of the 2012 Geotechnical Inspection.

The construction was completed in accordance with our recommendations for such structures and the liner was constructed as a one piece liner with geotextile protection on both sides and gravel over the geotextile as protection.

The construction appears proper and the structure is in good condition.

Minor water ponding confirms the integrity of the liner.

Stability

Our review of the area around this cell at the base of the slopes showed no sign of seepage.

The structure is stable in its present condition.

Recommendations.

There are no recommendations at this time.

3.12 Solid Waste Disposal Site

Berms appear stable and no erosion appears to have taken place on the back and both sides of the site.

Solid waste was being placed at the front edge of the site and was awaiting salvage of wood and lumber prior to the placing of cover at the time of our first site review in August. There was considerably more waste covered during the time of our second review on September 25th.

The disposal was being done in exact conformity with plans prepared and guidelines set out for the disposal of solid waste.

The current footprint as established by the existing covered material and the "blow control" fence at the front of the immediate site shall soon be filled and the site footprint shall have to be expanded within the plans and guidelines set out for this solid waste disposal site.

Surveying for the expansion of the site was taking place at the time of our second review in September.

3.13 Waste Oil Storage Containment

This facility has been decommissioned and removed from the site.

3.14 Minesite Steel Fuel Tank Farm Containment

This fuel tank farm has been constructed since the last annual inspection in 2013 in accordance with drawings and specifications prepared by Hatch Engineering under their supervision.
Drawings setting out the construction details are attached to this report.

All work appears to be complete excepting the installation of the sump pits that are on site awaiting installation and which shall be utilized to facilitate the removal of water that collects from precipitation.

Stability

All work appears to have been completed in accordance with drawings and we have no concerns with the stability of this containment structure.

Recommendations

We have no recommendations to make with respect to this containment once the sump is installed.

3.15 Quarry

General Conditions

The quarry has well defined benches. The quarry faces at the benches shall be scaled when quarry operations cease and the benches shall be cleaned and berms placed at the edges of the bench to control the movement of weather induced loose in the long term.

Currently overburden from the top surface is being cleaned and pushed as thawing permits, to serve as long term protection against moving aggregate and the establishment of long term stability.

It is expected that the quarry shall be closed on a permanent basis by next year in 2015.

Stability

The quarry shall be closed in a manner as set out to maintain long term stability.

3.16 Overview

This report is the 7th annual Geotechnical Inspection at Mary River and Milne Inlet completed by this author on behalf of Baffinland Iron Mines Corporation and the first report covering two inspections in one shipping season.

As set out in our past reports, there has been little or no erosion take place from wind or rain and the dykes constructed of the sand/gravel soil have remained stable at slopes of 3:1 and 4:1.

There are only just now, signs of settlement appearing at PSWP's 1, 2 and 3. The settlements are not differential settlements of the dykes but are minor overall settlements of the total structures with respect to the surrounding area.

These settlements appear to be settlements within the one metre ± active layer above the permafrost and are of little concern as the PWSP's are temporary structures and the settlements have no effect on the dyke stability.

It is expected that many of the structures that form the basis for the inspections set out in the biannual Geotechnical inspections shall be decommissioned as the mine facilities are finalized.

PHOTOS

Mary River August Inspection

Minesite Steel Fuel Tank Farm Containment

Generator Fuel Storage Facility Containment

Polishing/Waste Stabilization Pond #1.

Polishing/Waste Stabilization Ponds #2 and #3.

Helicopter Fuel Tank Containment.

Bulk Fuel Storage Containment.

Barrel Fuel Containment.

Jet Fuel Containment.

Solid Waste Disposal Site.

Enviro Tank Storage

Hazardous Waste Storage.

Stove Oil Storage.

Quarry at Mary River.

PHOTOS

Mary River September Inspection

Mary River Steel Fuel Tanks Containment

Quarry

Solid Waste Disposal Site

Bulk Fuel Storage Containment

Generator Fuel Containment

PWSP No 1

PWSP No 2 and 3

Helicopter Fuel Containment

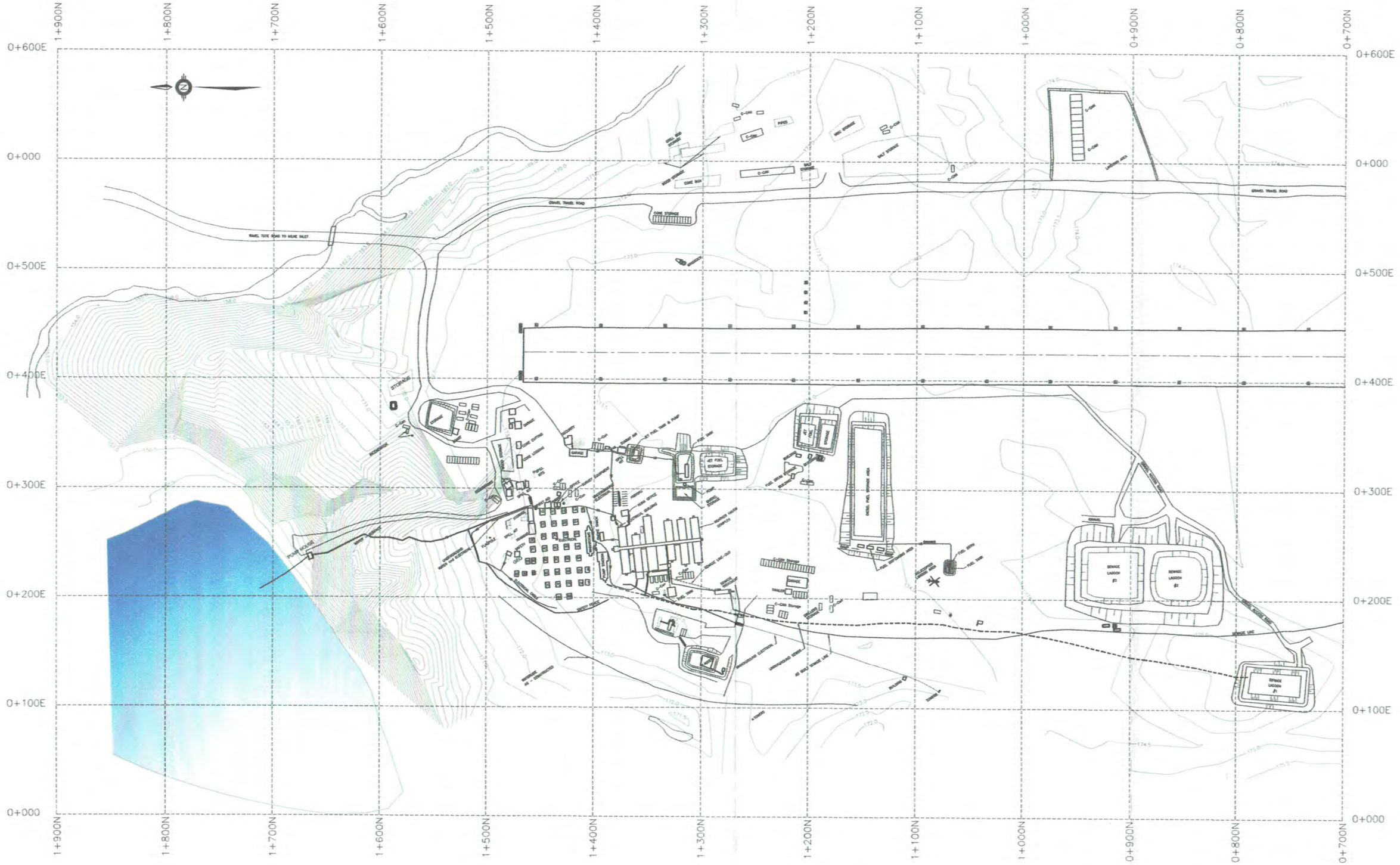
Barrel Fuel Storage Containment

Hazardous Waste Containment

Stove Oil Barrel Containment

Enviro Tank Storage (Wash Bay)

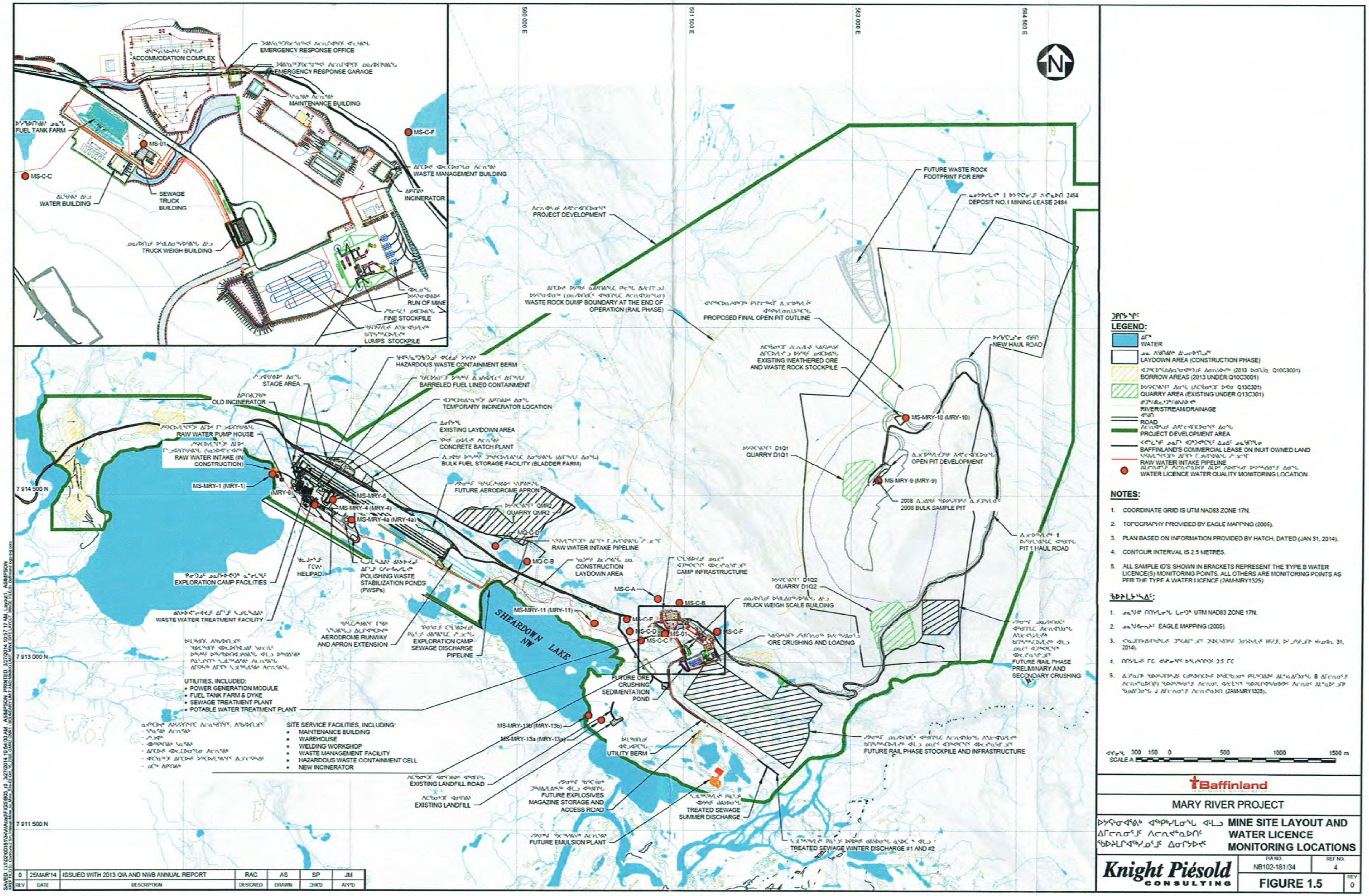
Jet Fuel Containment



SITE PLAN
BAFFINLAND – MARY RIVER CAMP

JULY 2010

NOTE :
THE GRID SHOWN ON THIS PLAN IS TO BE USED AS A LOCAL GRID ONLY. THE GRID IS BASED ON THE RUNWAY LIGHTS AT THE WEST SIDE OF THE EXISTING AIRSTRIP. THE LIGHT AT THE SOUTH WEST CORNER IS GRID STATION 0+000, 0+400E AND THE 0+000 GRID LINE IS BASED ON THE LINE BETWEEN THE SOUTH WEST AND NORTH WEST RUNWAY LIGHTS.



ACCOMMODATION COMPLEX
EMERGENCY RESPONSE OFFICE
EMERGENCY RESPONSE GARAGE
MAINTENANCE BUILDING
FUEL TANK FARM
MS-01
MS-C-F
MS-C-C
SEWAGE TRUCK BUILDING
WATER BUILDING
WASTE MANAGEMENT BUILDING
INCINERATOR
TRUCK WEIGH BUILDING
RUN OF MINE
FINE STOCKPILE
LUMPS STOCKPILE
560 000 E
561 500 E
563 000 E
564 500 E
7 914 500 N
7 913 000 N
7 911 500 N
HAZARDOUS WASTE CONTAINMENT BERM
STAGE AREA
BARRELED FUEL LINED CONTAINMENT
OLD INCINERATOR
TEMPORARY INCINERATOR LOCATION
EXISTING LAYDOWN AREA
RAW WATER PUMP HOUSE
CONCRETE BATCH PLANT
RAW WATER INTAKE (IN CONSTRUCTION)
BULK FUEL STORAGE FACILITY (BLADDER FARM)
MS-MRY-1 (MRY-1)
MS-MRY-5
MS-MRY-4 (MRY-4)
MS-MRY-4a (MRY-4a)
FUTURE AERODROME APRON
QUARRY QMR2
MQ-C-D
MQ-C-B
RAW WATER INTAKE PIPELINE
CONSTRUCTION LAYDOWN AREA
HELIPAD
POLISHING WASTE STABILIZATION PONDS (PWSPs)
EXPLORATION CAMP FACILITIES
WASTE WATER TREATMENT FACILITY
AERODROME RUNWAY AND APRON EXTENSION
EXPLORATION CAMP SEWAGE DISCHARGE PIPELINE
SHEARDOWN LAKE NW
MS-MRY-11 (MRY-11)
UTILITIES, INCLUDED:
• POWER GENERATION MODULE
• FUEL TANK FARM & DYKE
• SEWAGE TREATMENT PLANT
• POTABLE WATER TREATMENT PLANT
SITE SERVICE FACILITIES, INCLUDING:
• MAINTENANCE BUILDING
• WAREHOUSE
• WELDING WORKSHOP
• WASTE MANAGEMENT FACILITY
• HAZARDOUS WASTE CONTAINMENT CELL
• NEW INCINERATOR
EXISTING LANDFILL ROAD
EXISTING LANDFILL
MS-MRY-13b (MRY-13b)
MS-MRY-13a (MRY-13a)
UTILITY BERM
FUTURE EXPLOSIVES MAGAZINE STORAGE AND ACCESS ROAD
FUTURE EMULSION PLANT
TREATED SEWAGE SUMMER DISCHARGE
TREATED SEWAGE WINTER DISCHARGE #1 AND #2
FUTURE ORE CRUSHING SEDIMENTATION POND
MS-C-A
MS-C-B
MS-C-E
MS-C-D
MS-C-C
MS-01
MS-C-F
CAMP INFRASTRUCTURE
TRUCK WEIGH SCALE BUILDING
ORE CRUSHING AND LOADING
QUARRY D1Q2
FUTURE RAIL PHASE STOCKPILE AND INFRASTRUCTURE
FUTURE RAIL PHASE PRELIMINARY AND SECONDARY CRUSHING
PROJECT DEVELOPMENT
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION (RAIL PHASE)
PROPOSED FINAL OPEN PIT OUTLINE
FUTURE WASTE ROCK FOOTPRINT FOR ERP
DEPOSIT NO.1 MINING LEASE 2484
EXISTING WEATHERED ORE AND WASTE ROCK STOCKPILE
NEW HAUL ROAD
MS-MRY-10 (MRY-10)
QUARRY D1Q1
OPEN PIT DEVELOPMENT
MS-MRY-9 (MRY-9)
2008 BULK SAMPLE PIT
PIT 1 HAUL ROAD
LEGEND:
WATER
LAYDOWN AREA (CONSTRUCTION PHASE)
BORROW AREAS (2013 UNDER Q10C3001)
QUARRY AREA (EXISTING UNDER Q13C301)
RIVER/STREAM/DRAINAGE
ROAD
PROJECT DEVELOPMENT AREA
BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
RAW WATER INTAKE PIPELINE
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 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).
SCALE A 300 150 0 500 1000 1500 m
Baffinland
MARY RIVER PROJECT
MINE SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS
Knight Piésold CONSULTING
P/A NO. NB102-181/34
REF NO. 4
FIGURE 1.5
REV 0
0 25MAR'14 ISSUED WITH 2013 QIA AND NWB ANNUAL REPORT RAC AS SP JM
REV DATE DESCRIPTION DESIGNED DRAWN CHK'D APP'D

DWG. NO. H349000-4613-10-014-0002

TRUE NORTH
34°
PLANT NORTH
ACCESS ROAD
67800
12000
14600
14600
14600
12000
N 7913328.184
E 561235.839
DYKE
TANK
OUTSIDE TOE OF DYKE VARIES
TOP OF DYKE EL. 196.10M
N 7913290.276
E 561292.052
INSIDE TOE OF DYKE EL.194.60M
TANK PAD DETAIL SEE DETAIL-1 ON DWG. H349000-4613-10-035-0001
1% SLOPE
TANKS
TOP OF DYKE EL. 196.10M
N 7913312.354
E 561239.639
ELEV. 195.645M
N 7913304.191
E 561251.743
ELEV. 195.645M
N 7913296.028
E 561263.848
ELEV. 195.645M
N 7913287.866
E 561275.953
ELEV. 195.645M
RIGID INSULATION HD60 76MM THK. 2-LAYERS 1200MMX2400MMX38MM NOM. SHEETS EXTENDING 2M BEYOND TANK FLOOR
OUTSIDE TOE OF DYKE VARIES
4613-10-035-0001
26500
15500
SUMP DETAIL SEE DETAIL-1 ON DWG. H349000-4613-10-035-0003
BOTTOM OF SWALE EL. 194.11M
ACCESS STAIRS DETAIL SEE DETAIL-3 ON DWG. H349000-4613-10-035-0003
BOTTOM OF SWALE HIGH POINT EL. 194.25M
BOTTOM OF SWALE EL. 194.11M
SUMP DETAIL SEE DETAIL-1 ON DWG. H349000-4613-10-035-0003
BOTTOM OF SWALE EL. 194.25M
INSIDE TOE OF DYKE EL.194.60M
T.O. SUMP EL. 194.56M
BOTTOM OF SWALE EL. 194.25M
DYKE
N 7913306.212
E 561221.023
T.O. GRANULAR DYKE EL.195.79M
T.O. GRANULAR DYKE EL.195.79M
N 7913268.305
E 561277.236
FUEL MODULE
DOWN
5200
2% SLOPE
UP
C
4613-10-035-0002
TOE OF DYKE EL.195.98M
TOE OF DYKE EL.195.98M
TOP OF CONTAINMENT DYKE EL. 196.28M
CONCRETE BARRIERS
4613-10-035-0002
4613-10-035-0001
29150 RAMP
25000 CONTAINMENT AREA
29150 RAMP
83300
0 1.25 2.5 3.75 5.0 6.25
SCALE IN METRES

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE

REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH. BY	DATE
0	ISSUED FOR CONSTRUCTION	DS	13-07-23

HATCH

DESIGNED BY	DRAWN BY
D. STEPHENSON DATE 13-02-20	M. PETERSON DATE 13-02-20
CHECKED BY DATE 13-07-12	DISCIP. ENGR. DATE 13-07-12
PROJ. DES. COORD. T. THERTELL DATE 13-07-22	PROJ. ENGR. J. CLELAND DATE 13-07-22
PROJ. MGR. S. PERRY DATE 13-07-22	

Baffinland

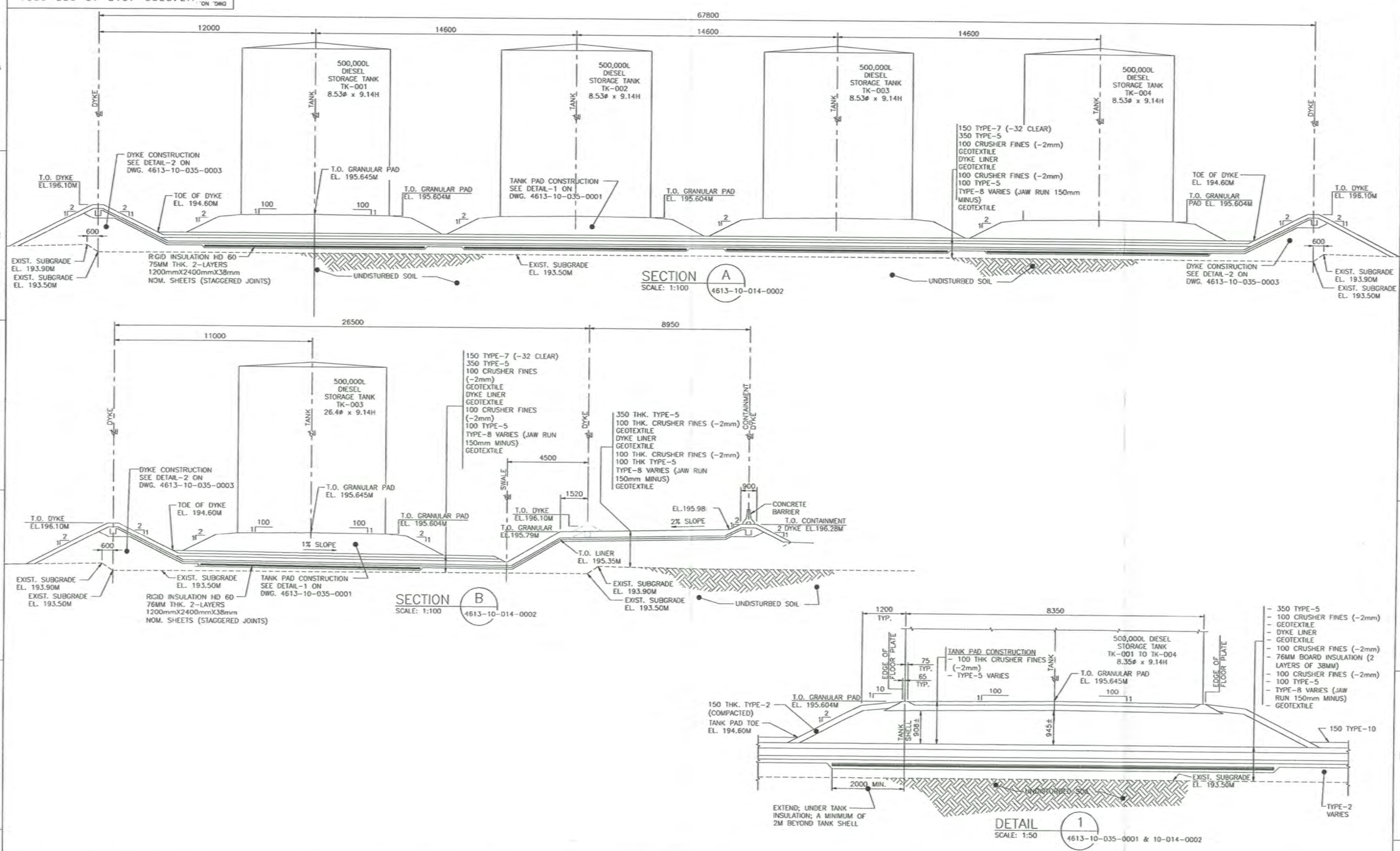
MARY RIVER PROJECT

MINE SITE
SITE GRADING PLAN

SCALE	DWG. NO.	REV.
1:125 OR AS NOTED	H349000-4613-10-014-0002	0

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

$FILE$
$DATE$
$USERNAME$
$TIME$



DWG. NO. H349000-4613-10-035-0001

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
0	ISSUED FOR CONSTRUCTION	DS / FB	13-07-23
ISSUE AUTHORIZATION			

HATCH

DESIGNED BY D. STEPHENSON DATE 13-02-20	DRAWN BY M. PETERSON DATE 13-02-20
CHECKED BY DATE 13-07-22	DISCIP. ENGR. DATE 13-07-22
PROJ. DES. COORD. T. THERTELL DATE 13-07-22	PROJ. ENGR. J. CLELAND DATE 13-07-22
PROJ. MGR. S. PERRY DATE 13-07-22	

Baffinland

MARY RIVER PROJECT

MINE SITE
DYKE SECTIONS & DETAILS

SCALE	DWG. NO.	REV.
1:100 OR AS NOTED	H349000-4613-10-035-0001	0

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

4.0 MILNE INLET

4.01 General

The containment facilities that we have been doing inspections on for the last 6 years are now rapidly changing in function with the construction underway at the Milne Inlet site.

Structures and facilities that were under construction during our inspection in 2013 have now been completed and new facilities are under construction.

Currently under construction is a large landfarm and contaminated snow containment facility which are being designed as contiguous structures.

Also reviewed was the active quarry from which blasted rock was being removed.

New facilities, just now under construction in August, were the two ore sediment ponds upon which construction was beginning and due for inspection and reporting in the second of two geotechnical inspections in the latter part of September from September 25th until September 30th as the shipping season draws to a close. This was done but the settling ponds were as yet incomplete as noted during thisfinal review

4.02 Bulk Fuel Containment Facility

This particular facility started to undergo decommissioning last summer season after having been in operation in excess of 5 years.

The oil impacted water had been removed and treated and the oil impacted sand/ gravel that was in the bottom of the structure and over the liner on the dykes had been removed from the south end of the structure and had been piled up in the north end where it had been covered to prevent an accumulation of further oil impacted water as noted during our first review in August. By September this facility had been decommissioned and the oil impacted material had been placed in the landfarm.

At the time of our August review roughly 60% of the former Bulk Fuel Containment Facility had been decommissioned and the facility was gone in September.

Stability

Our review of the area around the south end of the former Bulk Fuel Containment Facility showed no sign of oil or oil/water mixture and we conclude that the integrity of the liner has been maintained during the decommissioning process.

Recommendations

We have no recommendations at this time.

4.03 Existing Polishing/Waste Stabilization Pond

This particular PWSP is no longer part of the treatment process for sanitary sewage and in August was being pumped of effluent which was being transferred to the new effluent pond.

This transfer of effluent was part of the decommissioning of this PWSP. At the time of our second review in September, all effluent had been removed and the dykes were awaiting removal.

Stability

The structure is considered stable over the projected short life of the structure.

Recommendations

We have no recommendations at this time pending the immediate decommissioning.

4.04 Barrel Fuel Storage

General Conditions

As set out in our 2013 Geotechnical Inspection, this structure is constructed as a two cell structure.

This structure was originally intended for use as barrel fuel storage. However, with time, this structure's use changed to that of storing lubricant cubes as well as barrel storage.

For continuity, we continue to refer to this two cell structure as Barrel Fuel Storage.

This structure around these two cells conforms to standardized drawings prepared by myself for such a structure.

The structure was in place during our first review but had been decommissioned at the time of our second review in September.

Stability

At the time of my August inspection, there was wet sand in the bottom of the two cells indicating the integrity of the liner.

Our review of the area around the cells, at the base of the exterior dyke slopes showed no sign of seepage, at that time.

There was no sign of oil impacted granular in the area following decommissioning.

Recommendations.

We have no recommendations with respect to this structure at this time.

4.05 Hazardous Waste Storage

General Conditions

This particular structure has been constructed as a two cell structure.

Due to an excess of hazardous waste in the two cells, a third temporary cell has been constructed for the very short term until the ship picks up the hazardous waste at the end of this summer season.

The third cell is constructed with a one piece liner and wood timber curb for this very short term and is contiguous with the south side of the structure.

This cell actually stores hazardous waste in containers, barrel fuel, and lubricant cubes.

Stability

There is water ponding in both cells of the original structure confirming the integrity of the liner at this time.

Our review of the area around the dykes, at the base of the slopes, showed no sign of seepage. The structure is considered stable.

Recommendations

We recommend that the use of the temporary third cell, recently constructed, be discontinued when the currently stored hazardous waste is shipped out by the end of this shipping season.

4.06 Oil and Antifreeze Containment

This structure has been decommissioned and totally removed.

4.07 Jet ”A” Pump Containment

This structure has been decommissioned and totally removed since our 2013 inspection.

4.08 Fuel Tank Farm

General Conditions

This particular structure has been reported on both our 2012 and 2013 inspection reports.

Since both 2012 and 2013 the fuel tank farm has been expanded considerably with the addition of a number of new tanks.

At the time of our last inspection in 2013, the containment structure had been put in place for the entire tank farm but not all tanks were in place.

Since that time, all fuel tanks have been constructed.

There existed in place, a temporary ramp at the north west corner of the containment structure to facilitate the construction of the last tank and entry of crane(s) into the containment structure at the time of our August review.

This temporary ramp did not affect the integrity of the containment structure nor infringe upon the required capacity of the structure. The reamp had been removed by the time of our September review.

We noted no sign of weakness in any of the structure construction.

Stability

We attach the Hatch Bulk Fuel Storage Site Grading Plan setting out the final tank and containment layout.

At both inspections we noted minor water ponding at the low end of the containment confirming the integrity of the liner.

Recommendations

We have no recommendation for this structure.

4.09 New Effluent Pond

General Conditions

This particular effluent pond was first reported up on in 2013 but had not yet been put into operation.

This effluent pond has now been put into operation and sewage effluent from the Polishing/Waste Stabilization Pond was being transferred to permit the decommissioning of that structure at the time of our August review.

There was approximately 5’ of freeboard at the time of our September review.

Stability

We noted no sign of weakness in any of the construction.

Recommendations

We have no recommendations with respect to the use of this structure having no negative comments on the construction of this structure.

4.10 Landfarm

General Conditions

The Landfarm was just under construction to facilitate the decommissioning of the contaminated soil in the north end of the former Bulk Fuel Containment Facility during our August review.

The Landform was constructed to accommodate approximately 9000 m^3 of oil contaminated soil and seasonal water accumulations.

At the time of our August review, the base and dykes of the structure had been formed and the HDPE liner had been installed with a geotextile protection on each side. At the time of our September review the cover had yet to be installed on a small section of the dyke but other areas were covered.

The landfarm had been put into operation at the time of our September review.

It appears as though the structure is being constructed in accordance with good construction practice for structures of this type.

Stability

We see no reason to expect that the construction underway shall not produce a stable structure.

Recommendations

We recommend that the remaining dyke structure without protective cover over it be covered as per the design drawings.

4.11 Contaminated Snow Containment

General Conditions

The construction of the contaminated snow containment structure is contiguous with the east end of the Landfarm.

At the time of our August review, the base and dykes of the structure had been formed and the HDPE liner had been placed with a geotextile protection on each side. At the time of our September review construction had been completed in accordance with design drawings.

It appears as though the structure has been constructed in accordance with good construction practice for structures of this type.

The snow containment facility has a containment volume of 929 m^3 based on estimates of snow volume provided by the Owner.

The structure has been constructed with good quality control.

Stability

We have no reason to expect that the construction shall not produce a stable structure.

Recommendations

We have no recommendations with respect to this construction at this time.

4.12 Sediment Pond East

General Conditions

The construction of this sedimentation pond for drainage from the east side of the site is nearing completion.

The basin is shaped and the liner has been installed throughout the basin from inlet to the berms on the north side of the basin.

There has been no cover placed over the liner to this point and rip rap has not yet been placed in the outlet weir.

Stability

We have no reason to expect that construction underway shall not produce a stable structure when complete.

Recommendations

We have no recommendations with respect to this construction at this time.

4.13 Sediment Pond West

General Conditions

The construction of this sedimentation pond for drainage from the west side of the site is nearing completion in a manner similar to that on the east side.

As with the east side, the liner is in place over the basin but the liner has yet to be covered

Stability

We have no reason to expect that construction underway shall not produce a stable structure when complete.

Recommendations

We have no recommendations with respect to the construction at this time.

4.14 Quarry

General Conditions

There is an active quarry to the south of the port development on the high rock outcrop.

As with our review in August, quarrying was underway in September and benches had been developed for the removal of substantial quantities of rock.

Stability

Rock faces appear stable.

Recommendation

We have no recommendations to be made with respect to the existing operation.

4.15 Overview

Decommissioning is underway with the former structures constructed of sand and gravel and new long term structures are recently completed or under construction utilizing crushed quarried material with a projected long term serviceability.

Respectfully submitted,

Barry H. Martin, P. Eng., MRAIC
BHM/jw

PHOTOS

Milne Inlet August Inspections

Photo taken from the south east corner of the steel storage tank containment outside the containment looking north west.

Photo taken from atop the containment dyke looking west into the containment.

Photo taken from atop the soon to be decommissioned PWSP looking south.

Photo taken of central dyke in barrel fuel storage looking west.

Photos taken along rear dyke at hazardous waste storage area. Note water contained within dyke.

Photo shows temporary curbed area for hazardous waste awaiting immediate shipment.

Photo taken looking north at the covered contaminated granular from the bulk fuel storage facility undergoing decommissioning.

Photo taken from atop the south west corner of the New Sewage Effluent Pond looking north east.

Photo taken looking into the sump at the north east corner of the Landfarm.

Photo taken from atop the dyke looking into the contaminated snow containment.

Photo taken looking at the quarry face in the quarry showing the well developed benches and cover removed from atop solid rock.

PHOTOS

Milne Inlet September Inspection

Site of recently decommissioned bulk fuel containment

Existing PWSP now empty and being decommissioned

Site of recently decommissioned barrel fuel containment.

Hazardous waste storage containing bladder of contaminated material.

Fuel tank farm containment

New effluent pond