2019 WORK PLAN

1 November 2018

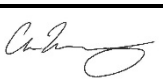
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			C. Murray	G. Goddard	S. Proulx	P. Du Toit	B. Penney
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**			**Approved By**

Table of Contents

Section 1.0 - INTRODUCTION 4

Section 2.0 - LIST OF CURRENT PERMITS 6

Section 3.0 - ANNUAL SCOPE OF OPERATIONS AND WORK 7

3.1 Infrastructure Layout at End of 2019 14

Section 4.0 - MINING AND EXPLORATION ACTIVITES 15

4.1 Exploration Activities and Drilling Plans 15
4.2 Amount and Type of Ore and Waste to Be Mined 15
4.3 Amount and Type of Ore to Be Shipped Each Month 16
4.4 Specified Substances to be Quarried and Expected Uses 16

Section 5.0 - ANNUAL QUANTITIES OF SOLID WASTE 18

5.1 Solid Waste Disposal 18

Section 6.0 - EXPECTED USES OF WATER 19

6.1 Water Use 19

Section 7.0 - MATERIALS TO BE SHIPPED OFF THE PROPERTY 21

7.1 Materials Shipped Out 21

Section 8.0 - MATERIALS TO BE SHIPPED TO THE PROPERTY 22

8.1 Delivery of Fuel 22
8.2 Materials Shipped to the Property 22

Section 9.0 - UPDATES TO ITEMS CONTAINED IN THE SCHEDULES OF THE LEASE 36

9.1 Updates to the Emergency Response Plan 36
9.2 Updates to Environmental Management and Monitoring Plans 36
9.3 Proposed Updates to the Interim Closure and Reclamation Plan 37

Section 10.0 - REQUESTED AMENDMENTS TO THE PROVISIONS OF THE LEASE 40

Section 11.0 - ADDITIONAL REPORTS, INFORMATION OR DATA 41

List of Tables

Table 2-1: Existing Environmental Permits 6
Table 3-1: Scope of Work for 2019 8
Table 4-1: Mine Forecast 2019 15
Table 4-2: Ore Shipping Forecast 2019 16
Table 4-3: 2018 Quarry and Borrow Pit Quantities 17
Table 5-1: Annual Volume of Solid Waste to be Deposited in Waste Storage Areas in 2019 18
Table 6-1: Approved Water Use for Domestic and Industrial Purposes during Construction Phase 19
Table 6-2: Water Use for Dust Suppression 19
Table 7-1: Materials to be shipped out in 2019 21
Table 8-1: Anticipated Fuel Delivery During 2019 22
Table 8-2: Mobile and Mechanical Equipment to be received during 2019 22
Table 8-3: Expansion Project Equipment and Materials 32
Table 9-1: Environmental Monitoring and Management Plans 36
Table 9-2: Mary River Project Total Closure and Reclamation Security Summary[1] – 2019 Work Plan 39
Table 11-1: Additional Reports, Information or Data 41

List of Appendices

Appendix A : 2019 Work Plan Site Layouts

Appendix B : 2019 Marginal Closure and Reclamation Financial Security Estimate

Appendix C : Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012)

Appendix D : Emergency Response Plan (BAF-PH1-840-P16-0002)

Appendix E : Spill Contingency Plan (BAF-PH1-830-P16-0036)

Appendix F : Options Exercise Notices

SECTION 1.0 - INTRODUCTION

The following document presents the 2019 Work Plan for the Mary River Project as required under Section 6.1 of Commercial Lease No. Q13C301 (the Lease) agreed between Baffinland Iron Mines Corporation (Baffinland) and the Qikiqtani Inuit Association (QIA). Additionally, this document is a requirement under Amendment No. 1 of the Type 'A' Water Licence 2AM-MRY1325 for the purposes of an Annual Security Review (ASR). In the event the Project does not advance, the work items as described and constructed in the 2019 Work Plan will be subject to reclamation, as per the Mary River Project Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012, refer to Appendix C) and relevant regulatory and permit obligations.

The 2019 Work Plan has been prepared in accordance with the Lease Operations Guide for the "Annual Work Plan Submission" finalized in 2018. The Operations Guide is a set of procedures developed jointly by QIA and Baffinland to guide the on-going administration of the Lease.

Baffinland continues to expand the operation of the Mary River Project, both through the 6 million tonne per annum (Mtpa) increase sought in 2018 and the submission of the Phase 2 Environmental Impact Statement (EIS) in 2018. Activities outlined in this 2019 Work Plan represent planned works, improvements, infrastructure and equipment required to execute the currently approved phase of the project. Additionally, equipment and materials required for the Phase 2 expansion will be mobilized to the Mary River Project in 2018 in anticipation of the amended permits. For clarity, no earthworks or infrastructure construction associated with the Phase 2 expansion have been included in this 2019 Work Plan. It is anticipated that a 2019 Work Plan Addendum will be required to assess reclamation security and implement the construction of any Phase 2 works following successful receipt of the amended Project Certificate and amended Type 'A' Water Licence.

An overview of the on-going mining operations and works planned for 2019 is provided below, with further details presented in subsequent sections of the document.

1. Development and operation of the mine, ore crushing and land transportation, stockpiling and marine shipment of ore;
2. The continued development and construction of infrastructure required at Milne Port and the Mary River Mine Site (Mine Site) and along the Tote Road for the Mary River Project;
3. Continued operation of Mine Site and Milne Port Camps to support ongoing operations and construction activities which will include the use of water and deposition of waste as authorized under existing permits;
4. On-going operation and expansion of permitted quarry and borrow sources; additionally, four (4) new quarries have been identified along the Tote Road to support ongoing maintenance and construction;
5. At Milne Port, vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port will arrive during open water (approximately between mid-July and mid-October 2019). Material, fuel and supplies required for operational and construction activities will be transported to the Mine Site year round via the Tote Road;
6. Ongoing environmental effects studies and baseline data collection will continue to support the construction and operation of the Project as well as for future engineering requirements;

7. Continued environmental monitoring in accordance with the approved Project Certificate, licenses, authorizations, management plans and environmental effects monitoring plans;
8. On-going exploration activities including drilling, mapping, prospecting, sampling, and geophysics. Planning of the details of the summer drilling and/or trenching program is not yet finalized;
9. Tote Road improvements to address safety concerns, freshet runoff issues and poor road conditions during the spring and summer periods;
10. Continued construction of additional fuel storage at the project;
11. Continued construction of the 800-person hardwall camp at the Mine site to address retention issues and safety concerns with continued long-term use of the tent camp at the Mine;
12. Construction of the 380-person hardwall camp at Milne Port following approval of a Water Licence Modification;
13. Site grading and laydown construction for supplies and equipment to support future construction activities and remove ponding and permafrost degradation issues around current infrastructure.
14. Installation of a floating freight dock to improve efficiencies on offloading of sealift as well as provide an opportunity for shore based connection for fuel ships to potentially avoid future use of floating hose for fuel receipt.
15. Erection of additional maintenance facilities to safely service equipment.

SECTION 2.0 - LIST OF CURRENT PERMITS

The Work Plan is presented within the context of the applicable regulatory authorizations. The main regulatory instruments that allow for the 2019 Work Plan activities are presented in Table 2-1 below.

Table 2-1: Existing Environmental Permits

Permit Name	Permit Number	Regulatory Agency	Expiry
Project Certificate and Amended Project Certificate	005	Nunavut Impact Review Board	No Expiry
Inuit Impact Benefit Agreement	N/A	Qikiqtani Inuit Association	No Expiry
Commercial Lease	Q13C301	Qikiqtani Inuit Association	31-Dec-43
Amendment No.1 Type A Water Licence	2AM-MRY1325	Nunavut Water Board	10-Jun-25
Type B Water License – Exploration	2BE-MRY1421	Nunavut Water Board	16-Apr-21
Land Use Permit - Steensby and Milne	N2014C0013	Crown Indigenous Relations and Northern Affairs Canada (formerly INAC)	30-Jun-19
Land Use Permit - Milne Foreshore	N2014X0012	Crown Indigenous Relations and Northern Affairs Canada (formerly INAC)	30-Jun-19
Land Use and Quarrying Permit - Tote Road (Borrow P1 at Km 63)	N2014Q0016	Crown Indigenous Relations and Northern Affairs Canada (formerly INAC)	30-Jun-19
Land Use Permit - Bruce Head	N2014J0011	Crown Indigenous Relations and Northern Affairs Canada (formerly INAC)	30-Jun-19
Land Lease - Milne Foreshore	47H/16-1-2	Crown Indigenous Relations and Northern Affairs Canada (formerly INAC)	30-Jun-35
Permitted Quarries and Borrows on Inuit Owned Land: Quarries Q1, QMR2,Q7, Q11, Q19, Borrows KM104, Km 2, and Km 97	N/A	Qikiqtani Inuit Association	N/A
Fisheries Authorization - Ore Dock	14-HCAA-00525	Department of Fisheries and Oceans	31-Dec-20
Fisheries Authorization - Tote Road	NU-06-0084	Department of Fisheries and Oceans	No Expiry
Fisheries Authorization – Crossings	06-HCAA-CA7-00084	Department of Fisheries and Oceans	N/A
Fisheries Crossings along Tote Road and Quarries, culvert extensions and replacements	Various Letters of Advice	Department of Fisheries and Oceans	No Expiry
Licence to Fish for Scientific Purposes and Animal Use Protocol [1]	S-16/17-1016-NU, S-16/17-1019-NU, AUP 2016-027 FWI-ACC-2016-017	Department of Fisheries and Oceans	-
Navigable Waters - Crossings	8200-07-10273, 10267, 10269, 10268, 10274, 10272, 10266, 10271	Transport Canada	Until work completed
Marine Facility	4306-2-6- P/B	Transport Canada	24-June-20
Scientific Permit [2]	02 008 15R-M	Government of Nunavut	-
Archaeology Permit [3]	2016-29A	Government of Nunavut	-
Factory Licence [4]	F76068	National Resources Canada	-

NOTE:
1 Held by Minnow Environmental Inc. and North/South Consulting for Licence to Fish for Scientific Purposes associated with the Project
2 Held by Knight Piésold for performance of IQ and Traditional Harvest Studies associated with the Project
3 Held by Claude Pinard for performance of archeology work associated with the Project
4 Held by Dyno Nobel, the explosives contractor on behalf of the Project

SECTION 3.0 - ANNUAL SCOPE OF OPERATIONS AND WORK

Table 3-1 below provides a description of Baffinland's proposed operation and work for 2019, with an emphasis on changes from the previous year, and the anticipated effects that this work would have on the Property and the infrastructure of the mine.

While the activities outlined in this 2019 Work Plan represent planned works, improvements, infrastructure and equipment required to execute the currently approved phase of the project, it is anticipated that additional approvals from the NWB, QIA, and DFO will be required for select activities, and may include;

- Modifications to the existing Type 'A' Water Licence 2AM-MRY1325;
- An Options Exercise Notice (OEN) to modify the boundaries of the Commercial Lease, or to reclassify lands in accordance the terms and conditions of the Commercial Lease;
- A Tote Road Adjustment Notice (TRAN) for changes to the alignment, grade or design of the Tote Road as described in the Lease Operations Guide for the Tote Road Adjustment Notice and in accordance with the terms and conditions of the Commercial Lease;
- Quarry Management Plans (QMPs) will be required for the newly proposed quarries in 2019. Additionally, existing plans may need to be revised to reflect changes in the quarry footprint proposed for 2019; and,
- Authorization or Letter of Advice from DFO for fish habitat.

Where required, these additional approvals have been indicated in Table 3-1 for each activity. These additional approvals and authorizations are considered to be within the scope of the approved Project as described in the Final Environmental Impact Statement (FEIS) and FEIS Addendum for the Early Revenue Phase, and are reasonably anticipated to be required during the course of operation of the Project and therefore have been included in the scope of the 2019 Work Plan and the 2019 Marginal Closure and Reclamation Financial Security Estimate prior to approval. It is anticipated that a 2019 Work Plan Addendum will be required to assess reclamation security and implement the construction of any Phase 2 works following successful receipt of the amended Project Certificate and amended Type 'A' Water Licence.

Table 3-1: Scope of Work for 2019

Item No.	Property Section	Land Use Area	Approximate Location	Description	Description of Effect on Feature(s)	Anticipated Completion Year	Required Permit or QIA Applications	Other Information
	e.g. Milne Inlet/Tote Road/Mine Site	*e.g. Impact Area /Exploration Area*	*Approximate UTM (if known) (Zone 17W)*	*Provide a detailed description of the activity.*	*A description of how the feature(s) (topographical and/or manmade) will be affected*	*N/A*	*List any associated permit applications if applicable.*	*e.g. Issued for construction documentation*
Scope of Work for 2019								
1	Tote Road, Milne Port	Impact Area	Q1 N7975563 E504289 (222,000 m2 + 4,000 m2) Q5 N797200 E506000 (1,225,600 m2) PQ2a N7955289 E522130 (345,500 m2) PQ4a N7942972 E523552 (105,000 m2) PQ6a N7929733 E528240 (194,000 m2) PQ12a N7920935 E539158 (232,300 m2)	Development and expansion of quarries, consisting of; four (4) new quarries along the Tote Road with 8m wide access roads, expansion of previously proposed but not constructed quarry Q5, and expansion of the working limits of existing quarry Q1.	Leveling and grading within Potential Development Area and Tote Road	2019	Security Quarry Management Plans DFO Authorization (PQ6a) CIRNAC Lease (PQ6a)	IFCs
2	Tote Road	Impact Area	Laydown 2 N7972166 E505637 (55,800 m2) Laydown 4 N7960605 E518164 (66,300 m2) Laydown 7 N7940427 E524119 (28,900 m2) Laydown 9 N7929681 E527833 (92,500 m2) Laydown 10 N7921358 E540249 (34,500 m2) Laydown 13 N7915170 E557599 (7,000 m2)	Development of six (6) laydowns adjacent to the existing Tote Road for material stockpiling and storage. The laydowns will be constructed by filling directly over undisturbed ground and 31m away from the high water mark of local water bodies. The laydowns will be constructed of 500 mm thickness quarried rock with granular surfacing, free draining to appropriate ditches and water courses. All laydowns to cover approximately 2 ha, with one laydown at km 7 laydown covering approximately 7.5 ha	Leveling and grading within Potential Development Area	2019	Security OEN CIRNAC Lease (Laydown 9)	IFCs
3	Tote Road	Impact Area	KM8 N7971100 E506250 KM97 N7914750 E554750	Grade adjustments at KM8 and KM97 to improve safety and drainage. No new culvert installations required.	Leveling and grading within Potential Development Area.	2019	Security TRAN	IFCs
4	Tote Road	Impact Area	KM97 N7914719 E555762 KM80 N7922178 E542323 KM63 N7926858 E529302 KM17 N7965904 E513568	Maintenance on Tote Road bridges, including re-decking and adjustment of bridge abutments. Winter ice road bypasses constructed to allow truck traffic during work.	Optimization of existing infrastructure	2019	DFO Notification	N/A
5	Milne Port	Impact Area	LP1 N7976200 E504100 (-13,000 m2) LP2 N7975900 E503775 (30,000 m2)	Expansion of the LP2 laydown (included in 2018 Work Plan but not yet constructed). Combined with LP1 from 2018 Work Plan, which is removed here for clarity.	Leveling and grading within Potential Development Area	2019	Security	Layout Drawing(s)
6	Milne Port	Impact Area	N7975763 E502984 (155,000 m2)	Expansion of the Milne Port Ore Stockpile and water management facilities to optimize stockpiling and shiploading operations, resulting in additional 140,000 m2 of stockpile area and 15,000 m2 lined sedimentation pond.	Leveling and grading within Potential Development Area	2019	Security Water Licence Modification DFO Authorization	IFCs
7	Milne Port	Impact Area	N9775000 E503150 (6,000 m2)	Construction of berm and linear steel support structure on laydown LP3 for receipt and storage of stacker/reclaimer equipment. Berm dimensions are 200m x 30m x 2m, constructed on existing disturbed area.	No effect, will occur on developed laydown within Potential Development Area	2019	None - on existing disturbed area	Layout Drawing(s)
8	Milne Port	Impact Area	N7976033 E503590 (4,180 m2)	Construction of new polishing waste stabilization pond (PWSP) at 380 Person camp to manage off-spec effluent from the 380p camp waste water treatment plant	No effect, will occur on developed laydown within Potential Development Area	2019	Security OEN Water Licence Modification	IFCs

Item No.	Property Section	Land Use Area	Approximate Location	Description	Description of Effect on Feature(s)	Anticipated Completion Year	Required Permit or QIA Applications	Other Information
	e.g. Milne Inlet/Tote Road/Mine Site	*e.g. Impact Area /Exploration Area*	*Approximate UTM (if known) (Zone 17W)*	*Provide a detailed description of the activity.*	*A description of how the feature(s) (topographical and/or manmade) will be affected*	*N/A*	*List any associated permit applications if applicable.*	*e.g. Issued for construction documentation*
9	Milne Port	Impact Area	N7975481 E503779 (2700 m2)	New contaminated water/snow containment pond adjacent to existing pond at Milne Port	Leveling and grading within Potential Development Area	2019	Security OEN Water Licence Modification	IFCs
10	Milne Port	Impact Area	N 7976466 E 504128 (200 m2)	Desalination Plant (Seawater reverse Osmosis System) including utilidor located at beach head	No effect, will occur on developed laydown within Potential Development Area	2019	Security Water Licence Modification	IFCs
11	Milne Port Mine Site	Impact Area	N7914691 E558503 (360m2) N7976251 E503874 (360m2)	Construction of new hazardous waste berm at the Mine site and at Milne Port. Decommissioning of select existing berms to consolidate waste management.	Environmental optimization. Leveling and grading within Potential Development Area	2019	Security OEN Water Licence Modification	IFCs
12	Mine Site	Impact Area	N7914015 E564007 (91,000 m2)	Laydown area for parking and equipment storage at KM107.5	Leveling and grading within Potential Development Area	2019	Security	Layout drawing(s)
13	Mine Site	Impact Area	N7915590 E563181 (180,000 m2)	New KM110.5 Laydown for additional equipment storage and maintenance shop installation	Leveling and grading within Potential Development Area	2019	Security	Layout drawing(s)
14	Mine Site	Impact Area	N7915590 E563181 (1,500 m2)	Heated maintenance shop for pit equipment at KM110.5 Laydown. Tent structure with lined floor. Footprint is approximately 1,500 m2.	No effect, will occur on developed laydown within Potential Development Area	2019	Security	Layout drawing(s)
15	Mine Site	Impact Area	N7914500 E558150 (area m2)	Decommissioning and repurposing of Weatherhaven structures for storage and workspace.	No effect, will occur on developed laydown within Potential Development Area	2019	None - Movement of existing structures	Layout drawing(s)
16	Mine Site	Impact Area	N9713450 E560450 (12,000 m2)	Expansion of the 800 person camp pad to the north by approximately 12,000 m2 to accommodate additional support offices and buildings.	Leveling and grading within Potential Development Area	2019	Security	Layout drawing(s)
17	Mine Site	Impact Area	N9713450 E560450 (925 m2)	Addition of offices/trailers/buildings at the 800p Camp. Total footprint is 925 m2, including approximately 500 m2 for a new fire hall and emergency response building.	No effect, will occur on developed laydown within Potential Development Area	2019	Security	Layout drawing(s)
18	Mine Site	Impact Area	N7912328 E561111 (9,000 m2)	Construction of a landfarm at the Mine Site landfill facility, with an estimated footprint of 9,000 m2. Disturbed area included in 2018 Addendum, new lined area requires security allocation.	Leveling and grading within Potential Development Area. Area already allocated as disturbed.	2019	Water Licence Modification No. 10 (Approved) Security in place Notification to NWB	IFCs
19	Mine Site	Impact Area	N7913123 E0561560 (2000 m2)	Expansion of the crusher maintenance shop laydown area for seacan and rebuilt equipment storage.	Leveling and grading within Potential Development Area. Area already allocated as disturbed.	2019	None - existing disturbed area	Layout drawing(s)

Item No.	Property Section	Land Use Area	Approximate Location	Description	Description of Effect on Feature(s)	Anticipated Completion Year	Required Permit or QIA Applications	Other Information
	e.g. Milne Inlet/Tote Road/Mine Site	*e.g. Impact Area /Exploration Area*	*Approximate UTM (if known) (Zone 17W)*	*Provide a detailed description of the activity.*	*A description of how the feature(s) (topographical and/or manmade) will be affected*	*N/A*	*List any associated permit applications if applicable.*	*e.g. Issued for construction documentation*
20	Mine Site	Impact Area	N7913410 E561092	Installation of second 15 ML tank at Mine Site bulk fuel storage facility.	No effect, will occur on developed area within Potential Development Area	2019	Security Notification to NWB	IFCs
21	Mine Site	Impact Area	N7912819 E561635 (12,000 m2)	Upgrades to the mine site crusher facility, including expansion of the crusher pad (12,000 m2), new water diversion structures, and increase to sedimentation pond (MS-06) capacity (2,000 m2). Installation of one (1) culvert in northern perimeter ditching to allow for vehicle access to maintenance shop.	Leveling and grading within Potential Development Area	2019	Security Water Licence Modification	IFCs
22	Mine Site	Impact Area	N7916848 E563153 (3,500 m2)	Waste Rock Facility Water Treatment Plant parking and laydown. Expansion of the pad to allow for light vehicle parking, material laydown and better fuel tank access.	Expansion of existing pad in tundra.	2019	Security	Layout drawing(s)
Works Carried forward from 2018 - Security Not In Place								
23	Mine Site	Impact Area	N7913600 E564236 (133,400 m2)	Construction of a Run of Mine (ROM) Stockpile at KM 107 (90,000 m2) including an access road (31,900 m2) and sedimentation pond (11,500 m2 disturbed, 7,400 m2 lined)	Minor leveling and grading within Potential Development Area	2019	Notification to NWB Security	IFCs
24	Mine Site	Impact Area	N7913410 E561092 (21,620 m2)	Construction of the Mine Site fuel storage facility and one arctic diesel fuel tank with 15 ML capacity. The fuel storage facility will comprise a fuel containment berm with a welded geomembrane liner, perimeter access road and fuelling module. Lined footprint is approximately 12,000 m2.	No effect, will occur on developed laydown within Potential Development Area	2018/2019	Notification to NWB Security	IFCs
25	Milne Port	Impact Area	N7976389 E503422 (4,400 m2)	Installation of East Sedimentation Pond Expansion (2a) approved with Modification No. 9, but for which security has not been allocated.	Minor leveling and grading within Potential Development Area.	2019	Water Licence Modification No. 9 (Approved) Security	IFCs
Works Carried over from Prior Years - Security in Place								
2017-1	Milne Port	Impact Area	N7975200 E503350	Installation of 380-person temporary camp inclusive of potable water treatment, sewage treatment, incinerator, kitchen, dining, locker, recreational and washroom facilities.	No effect, will occur on developed laydown within Potential Development Area	2018/2019	Water Licence Modification No. 3b (Pending Approval)	IFCs
2018-1	Milne Port	Impact Area	LP1 N7976200 E504100 (13,000 m2) LP2 N7975900 E503775 (32,000 m2) LP3 N7975200 E503200 (131,000 m2) LP4 N7975175 E503500 (13,000 m2) LP5 N7974900 E503400 (65,000 m2) LP6 N7974700 E503500 (7,000 m2) LP7 N7974600 E503700 (21,000 m2)	Laydown LP7 completed in 2018, remainder carried over to 2019. Development of seven (7) laydowns in the Port area totaling 282,000 m2 to improve the efficiency of material storage and management. The laydowns will be constructed by filling directly over undisturbed ground including filling in low lying areas that collect water. The lay down will be constructed utilizing blasted rock with granular topping to a total minimum thickness of 1 m, free draining to appropriate ditches and water courses.	Minor leveling and grading within Potential Development Area	2019	None - Security in Place	Layout drawing(s)
2018-2	Milne Port	Impact Area	N976800 E504110	Upgrade existing barge offload area to improve safety and operational efficiencies by installing a floating freight dock, improving vessel turnaround time.	Spudding of barge in marine foreshore	2018	DFO Authorization	IFCs

Item No.	Property Section	Land Use Area	Approximate Location	Description	Description of Effect on Feature(s)	Anticipated Completion Year	Required Permit or QIA Applications	Other Information
	e.g. Milne Inlet/Tote Road/Mine Site	*e.g. Impact Area /Exploration Area*	*Approximate UTM (if known) (Zone 17W)*	*Provide a detailed description of the activity.*	*A description of how the feature(s) (topographical and/or manmade) will be affected*	*N/A*	*List any associated permit applications if applicable.*	*e.g. Issued for construction documentation*
2018-3	Milne Port	Impact Area	N7976100 E503500	Relocate existing facilities located in the general area of the fuel tank farm to improve the traffic management of the overall port area.	No effect, will be placed on developed laydown within Potential Development Area	2018	None - Security in Place	Layout drawing(s)
2018-4	Milne Port	Impact Area	N7975800 E503200	Realignment of existing shipload conveyor to improve stockpile laydown area management, including realignment of the stockpile laydown area resulting in additional 26,000 m^2 disturbed land. Installation of West Sedimentation Pond Expansion (1a)	Minor leveling and grading within Potential Development Area.	2018	Water Licence Modification No. 9 (Approved)	Layout drawing(s)
2018-6	Milne Port	Impact Area	N7972669 E504899	Installation of garages, site offices and equipment storage containers on laydown R3 (laydown identified in 2017 work plan).	No effect, will occur on developed laydown within Potential Development Area	2018	None - Security in Place	Layout drawing(s)
2017-2	Milne Port	Impact Area	R1 N7974015 E504036 R2 N7973631 E504478 R3 N7972669 E504899	Laydowns R1 and R2 completed in 2018. R3 construction pending regulatory approval from DFO. Development of three laydown areas (R1, R2 and R3) for construction material laydown, equipment maintenance and welding workshops, site offices and containerized spares. The additional laydown space will optimize storage of materials and supplies and reduce traffic. The laydowns will be constructed by filling directly over undisturbed ground including filling in low lying areas that collect water. The lay down will be constructed utilizing blasted rock with granular topping to a total minimum thickness of 1 m, free draining to appropriate ditches and water courses.	Minor leveling and grading within Potential Development Area.	2018	DFO Authorization	Layout drawing(s)
2018-25	Milne Port	Impact Area	Various locations	Construction of up to 3 km of Port site access roads to improve port traffic management. Locations to be determined.	Leveling and grading within Potential Development Area	2018	Water License Modification	N/A
2018-26	Milne Port	Impact Area	Various locations	Implementation of the Port Site Water Management plan, including berms, ditches and culverts to manage surface water around Milne Port infrastructure.	Positive environmental effect, focus on improving water management by keeping water away from coming in contact with the port area.	2018	Water Licence Modification No. 7 (Approved)	IFCs
2018-27	Milne Port	Impact Area	N7976518 E504044	Relocation of effluent discharge point to barge offload area	Positive effect. Reduced environmental spill risk.	2018	Water Licence Modification No. 7 (Approved)	IFCs
2018-28	Milne Port	Impact Area	N7976800 E504110	Marine manifold building relocation - moving from current location north of fuel tank farm to upgraded freight dock location	Minor leveling and grading within Potential Development Area	2018	Water Licence Modification No. 7 (Approved)	Layout drawing(s)

Item No.	Property Section	Land Use Area	Approximate Location	Description	Description of Effect on Feature(s)	Anticipated Completion Year	Required Permit or QIA Applications	Other Information
	e.g. Milne Inlet/Tote Road/Mine Site	*e.g. Impact Area /Exploration Area*	*Approximate UTM (if known) (Zone 17W)*	*Provide a detailed description of the activity.*	*A description of how the feature(s) (topographical and/or manmade) will be affected*	*N/A*	*List any associated permit applications if applicable.*	*e.g. Issued for construction documentation*
2018-8	Milne Port Mine Site	Impact Area	N7913206 E561603	Continued construction of Mine Site truck shop and initiation of Milne Port truck shop	Minor leveling and grading within Potential Development Area	2019	Water Licence Modification No. 7 (Approved)	IFCs
2018-5	Mine Site	Impact Area	N917115 E562565	Continued upgrades and environmental improvements at the Waste Rock Facility, including the repair and expansion of the Waste Rock Facility pond and on-going operation of the water treatment system in 2019.	Positive effect. Reduced environmental spill risk.	2018	Water Licence Modification No. 7 (Approved) Water Licence Modification No. 8 (Approved)	IFCs
2018-9	Mine Site	Impact Area	N7913733 E560057	Contractor office, garage and workshop installation on existing laydown pad.	No effect, will be placed on developed laydown within Potential Development Area	2018	None - Security in Place	Layout drawing(s)
2018-10	Mine Site	Impact Area	N7911960 E561780	Additional garage at explosives plant facility	No effect, will be placed on developed laydown within Potential Development Area	2018	None - Security in Place	Layout drawing(s)
2017-3	Mine Site	Impact Area	N7914181 E560035	Continued installation of 800-person permanent camp inclusive of: potable water treatment, sewage treatment, incinerator, kitchen, dining, locker, recreational and washroom facilities.	No effect, will be placed on developed laydown within Potential Development Area	2018	Water Licence Modification No. 4 (Approved)	IFCs
2018A-1	Mine Site	Impact Area	N7913855 E563904	Construction of the Mine Haul Road Cross Cut, and widening of the existing Mine Haul Road for safety purposes and to permit larger truck traffic	Minor leveling and grading within Potential Development Area	2019	Water Licence Modification No. 7 (Approved) Submission of IFC Drawings	IFCs
2018A-3	Mine Site	Impact Area	N7912607 E560898	Expansion of the Mine Site Landfill beyond the initial cell. The expansion involves leveling, grading and placing non-hazardous waste and cover material within the ultimate landfill boundary. Cell 2 planned for construction in 2019.	Minor leveling and grading within Potential Development Area	2019	Water Licence Modification No. 10 (Approved)	IFCs
2018A-4	Mine Site	Impact Area	N7913236 E560891	Installation of an effluent discharge line from the sewage treatment plant servicing the 800-person camp to the existing effluent discharge line, to allow for direct discharge of treated sewage effluent to the approved discharge location near the Mary River. This activity involves laying sections of 3” insulated, HDPE pipe and installing four (4) utilities culverts along its alignment.	No effect, will be placed on developed area within Potential Development Area	2018 / 2019	Water Licence Modification No. 10 (Approved) Security for Culverts	IFCs
2015-1	Mine Site	General Area	N7915564 E557216 N7916885 E555697	Improvements to the aerodrome flight path (2015 Work Plan item); includes the leveling of knolls that are within the airstrip approach and the construction of temporary access roads to those areas for the purpose of completing this work and associated environmental monitoring.	Minor leveling and grading outside of Potential Development Area	2019	OEN (Approved by QIA) Security	Layout drawing(s)

Item No.	Property Section	Land Use Area	Approximate Location	Description	Description of Effect on Feature(s)	Anticipated Completion Year	Required Permit or QIA Applications	Other Information
	e.g. Milne Inlet/Tote Road/Mine Site	*e.g. Impact Area /Exploration Area*	*Approximate UTM (if known) (Zone 17W)*	*Provide a detailed description of the activity.*	*A description of how the feature(s) (topographical and/or manmade) will be affected*	*N/A*	*List any associated permit applications if applicable.*	*e.g. Issued for construction documentation*
Progressive Reclamation								
-	Milne Port	-	N7975568 E503745	Management of hydrocarbon impacted soils within the existing landfarm facility.	N/A	Ongoing	N/A	N/A
-	Milne Port	-	N/A	Demobilization of equipment and supplies not required for near term activities as well as current inventory of hazardous waste and other materials by means of sealift from Milne Port	N/A	2018	N/A	N/A
-	Milne Port and Mine Site	-	N/A	Discharge and treatment of residual treated sewage effluent stored in PWSP at Mary River Exploration Camp and Milne Port Site.	N/A	Ongoing	N/A	N/A
-	Tote Road	-	N/A	Continue the development and implementation of a long term multi-year plan to address localized areas of permafrost degradation associated with the current borrow areas including KM97, and the area	N/A	Ongoing	N/A	N/A
-	Tote Road	-	N/A	Reclamation of sections of the exploration phase Tote Road no longer in use by means of scarifying and culvert removals.	N/A	Ongoing	N/A	N/A
-	Mine Site	-	N7912845 E560922	Continued development of the Mine Site landfill and deposition of non-hazardous waste in accordance with the Landfill Maintenance and Operations Manual	N/A	Ongoing	N/A	N/A
-	Site Wide	-	N/A	Ongoing removal from site, or safe disposal on-site of infrastructure, equipment and supplies no longer required for ongoing construction and operations.	N/A	Ongoing	N/A	N/A
-	Site Wide	-	N/A	Unless otherwise identified within the approved interim Closure and Reclamation Plan, where roads are no longer in use - removal of culvert and open/restore the natural drainage channel. Measures will be taken to minimize erosion and sedimentation	N/A	Ongoing	N/A	N/A
-	Site Wide	-	N/A	Areas that have been contaminated by hydrocarbons from normal fuel transfer, handling and storage activities will be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation 2010. Use of reclamation soils for purpose of back fill or general site grading may be carried out with approval of applicable inspectors and agencies.	N/A	Ongoing	N/A	N/A

NOTES:

1. Two (2) of the seven (7) laydowns for the Milne Port area will require a Water Licence Modification. Based on direction from NWB, these have been included as Category 1 activities such that securities can be assessed. Work on these two (2) laydowns will not commence until the applicable regulatory approval is granted.
2. Modification of the Waste Rock Sedimentation Pond (MS-08) is required to address uncontrolled discharge of non-compliant water. An action plan and revised mitigation design has not been finalized at this time, however this work item has been included such that a security estimate for reclamation can be prepared, and will be revised and reconciled following implementation of any revised structures or mitigation measures.
3. An Options Exercise Notice is required to revise the boundaries of the lease area. Work on the select locations requiring an OEN will not commence until approval from QIA is granted.

3.1 INFRASTRUCTURE LAYOUT AT END OF 2019

Site layouts for Milne Port, Tote Road, and Mary River Mine Site can be found in Appendix A of this document.

The survey drawings and calculated areas as defined in the 2015 Montieth and Sutherland Survey Plans remain valid for 2019, however may need to be updated following approval of the Tote Road OEN (Appendix F) and any subsequent OENs submitted in 2019 in relation to the current project or the Phase 2 expansion.

SECTION 4.0 - MINING AND EXPLORATION ACTIVITES

4.1 EXPLORATION ACTIVITIES AND DRILLING PLANS

The scope of Baffinland's Type 'B' Licence (2BE-MRY1421) and Commercial Lease with QIA allows for Baffinland to continue/undertake the exploration activities and drilling programs on its mineral leases in the Qikiqtani Region of Nunavut. This includes the exploration land use areas as defined in Section 2.2 of Commercial Lease. The types of exploration activities planned for 2019 are included within the scope of the Type 'B' Water Licence, with the exception of the proposed Eqe Bay exploration program which will be seeking a new and separate Type 'B' Water Licence for the operation of the exploration camp and activities.

At this time when the Work Plan is required to be submitted, the exploration and drilling programs for 2019 have not yet been finalized. However, as a minimum, activities will include:

- Drilling
- Mapping
- Sampling
- Geophysical and geochemical surveys.

Operation of the Steensby Inlet Camp and Mid Rail Camp are not at this time anticipated to be required during 2019. A new exploration camp at the Eqe Bay location is being evaluated, and Baffinland has engaged QIA in a new land lease for this camp.

It is anticipated that exploration activities will continue in 2019 with a drilling program on Deposits 1, 2, and 3. Once proposed drilling locations are finalized, this information will be provided to QIA, NWB, CIRNAC, and others.

4.2 AMOUNT AND TYPE OF ORE AND WASTE TO BE MINED

An estimate of the breakdown of ore vs. waste mined from Deposit No. 1 by month during 2018 is provided in Table 4-1 below:

Table 4-1: Mine Forecast 2019

Month	Ore Mined (wmt)	Waste Mined (wmt)	Total Mined (wmt)
January	771,123	139,490	910,614
February	772,713	150,034	922,747
March	604,491	501,769	1,106,259
April	730,699	451,726	1,182,425
May	610,065	696,718	1,306,783
June	950,675	253,886	1,204,560
July	587,515	870,835	1,458,349
August	523,383	723,345	1,246,728
September	550,226	742,396	1,292,622
October	819,837	348,347	1,168,184
November	889,212	132,430	1,021,641

Month	Ore Mined (wmt)	Waste Mined (wmt)	Total Mined (wmt)
December	599,097	454,952	1,054,049
Total	8,409,034	5,465,927	13,874,961

4.3 AMOUNT AND TYPE OF ORE TO BE SHIPPED EACH MONTH

Ore shipping during 2019 will occur during the open water season from end of July to approximately mid-October. The expected total shipping quantities for 2019 are shown in Table 4-2 below.

Table 4-2: Ore Shipping Forecast 2019

	Lump Ore Shipped (wmt)		Fines Shipped (wmt)		Total Shipped (wmt)	
Month	**Milne Inlet**	**Steensby Inlet**	**Milne Inlet**	**Steensby Inlet**	**Milne Inlet**	**Steensby Inlet**
January	-	-	-	-	-	-
February	-	-	-	-	-	-
March	-	-	-	-	-	-
April	-	-	-	-	-	-
May	-	-	-	-	-	-
June	-	-	-	-	-	-
July	572,530	-	294,940	-	867,470	-
August	1,335,903	-	688,193	-	2,024,096	-
September	1,288,193	-	663,614	-	1,951,807	-
October	763,373	-	393,253	-	1,156,626	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
TOTAL	**3,959,999**	**-**	**2,040,000**	**-**	**5,999,999**	**-**

4.4 SPECIFIED SUBSTANCES TO BE QUARRIED AND EXPECTED USES

A summary of the expected quantities of quarried and borrow materials to be extracted during 2019 are provided in Table 4-3, below. The expected quarterly quantities of each specified substance per quarry site and borrow location is provided also in Table 4-3, below.

Table 4-3: 2018 Quarry and Borrow Pit Quantities

Quarry Summary	Km Location	Permitted	Q1	Q2	Q3	Q4	Total	Estimated Surface Area Increase	Estimated Breakdown Of Specified Substances
UNITS			m^3	m^3	m^3	m^3	m^3	m^2	
Q1	1	Permitted	0	45,000	20,000	20,000	**85,000**	226 000	Rock
Q5	4	*Proposed*[2]	0	188,333	188,333	188,333	**564,999**	1,225,600	Rock
Q7	7	Permitted	0	0	0	0	**0**	0	Rock
Q11	21	Permitted	0	0	0	0	**0**	0	Rock
PQ2a	28.9	*Proposed*[2]	0	0	30,000	0	**30,000**	345,500	Rock
PQ4a	41.6	*Proposed*[2]	0	0	30,000	0	**30,000**	105,000	Rock
PQ6a	56.4	*Proposed*[2]	0	0	0	30,000	**30,000**	194,000	Rock
PQ12a	76	*Proposed*[2]	0	0	0	30,000	**30,000**	235,500	Rock
Q19	93.5	Permitted	0	0	0	0	**0**	0	Rock
QMR2	102	Permitted	0	10,000	45,000	15,000	**70,000**	32,670	Rock
Km 2	2	Permitted	0	0	0	0	**0**	0	Granular
Km 97	97	Permitted	750	750	750	750	**3,000**	1,500	Granular
Total			**750**	**244,083**	**314,083**	**284,083**	**842,999**	**1,564,170**	

Notes:

1. The quantities from each source are approximate values and may vary based on minor changes to the schedule and scope, however, the aggregate volume to be extracted is expected to remain constant.
2. The final schedule for the issuance of Quarry and Borrow Source Management Plans for proposed new quarry and borrow areas is not finalized at the time the Work Plan was prepared.
3. It is noted D1Q1 and D1Q2 will also be used as a source of aggregate in 2018 to support Mine Haul Road maintenance but is not considered a formal quarry as it is located in the Mining Lease and is anticipated to be within the LOM pit extent.

SECTION 5.0 - ANNUAL QUANTITIES OF SOLID WASTE

5.1 SOLID WASTE DISPOSAL

The expected annual quantity of solid wastes to be deposited during 2019 is established from survey volumes measured in 2015 through 2018, as well as an analysis of proposed activities. Estimated quantities of solid waste to be deposited in approved waste storage areas are shown in the Table 5-1 below.

Table 5-1: Annual Volume of Solid Waste to be Deposited in Waste Storage Areas in 2019

Property Section	Waste Storage Area	Volume of Solid Waste to be disposed of (m^3)
e.g. Milne Port/Tote Road/Mine Site	-	
Mine Site	Landfill	5,000
TOTAL		5,000

SECTION 6.0 - EXPECTED USES OF WATER

6.1 WATER USE

The Amended No.1 Type 'A' Water Licence 2AM-MRY1325, and the construction Type 'B' Water Licence, 8BC-MRY1416, permits the maximum water use for domestic and industrial purposes during construction phase of the Project as shown in Table 6-1 below. As per Clause 22 of the QIA-Baffinland Water Compensation Agreement, Baffinland will pay a Consumptive Payment for Water Use, in connection with the Project for the maximum water volume permitted to be used or withdrawn annually as defined in the water licences issued to Baffinland by NWB.

Table 6-1: Approved Water Use for Domestic and Industrial Purposes during Construction Phase

Property Section	Water Source Name	Water Source Location	Annual Volume to be used (m^3)
Milne Port (Milne Inlet)	Phillips Creek (Summer)	71° 52' 53.3" N 80° 56' 04.0" W	134,130 m^3/year
	Km 32 (Winter)	71° 30' 39.5" N80° 14' 54.4" W	
Mine Site (Mary River)	Camp Lake	71° 19' 38.6" N 79° 22' 57" W	240,000 m^3/year
Steensby Port (Steensby Inlet)	ST 347 km Lake	N/A	0 m^3/year
	3 km Lake	N/A	
TOTAL			**371,130 m^3/year**

Source: Amendment No.1 Type 'A' Water Licence (2AM-MRY1325)

The Amendment No.1 of the Type 'A' Water Licence authorizes Baffinland to withdraw up to 1,500 m^3/day to a maximum of 547,500 m^3 annually of water specifically for use in dust suppression or control along the Tote Road of the Project. Water for dust suppression or control shall be obtained from the sources in accordance with thresholds established and shown in Table 6-2 below:

Table 6-2: Water Use for Dust Suppression

Property Section	Water Source Name	Water Source Location		Daily Water Take Proposed for Dust Suppression(m^3/day)	Restrictions
		Latitude	Longitude		
Milne Port	Phillip's Creek	71° 52' 53.3" N	80° 56' 04.0" W	212	None
Milne Port	Km 32 Lake	71° 30' 39.5" N	80° 14' 54.4" W	364	
Tote Road	CV128	71° 47' 35.1" N	80° 36' 41.7" W	579.5	None
Tote Road	CV099	71° 38' 21.7" N	80° 22' 46.6" W	110	June-July only during low flow (<mean flow) years
Tote Road	CV087	71° 34' 10.0" N	80° 19' 41.6" W	90	June-July only during low flow

Property Section	Water Source Name	Water Source Location		Daily Water Take Proposed for Dust Suppression(m^3/day)	Restrictions
		Latitude	Longitude		
					(<mean flow) years
Tote Road	CV078	71° 31’ 51.9” N	80° 16’ 07.8” W	75	June-July only during low flow (<mean flow) years
Tote Road	Katiktok Lake	71° 23’ 45.7” N	79° 48’ 22.0” W	318	None
Tote Road	BG50	71° 26’ 29.6” N	80° 10’ 27.1” W	150	None
Tote Road	BG32	71° 23’ 35.1” N	79° 51’ 24.9” W	120	June-July only during low flow (<mean flow) years
Tote Road	CV217	71° 23’ 51.4” N	79° 48’ 50.9” W	130	None
Tote Road	Muriel Lake	71° 22’ 18.5” N	79° 39’ 24.3” W	212	None
Tote Road	David Lake	71° 19’ 38.6” N	79° 22’ 57.0” W	132	June-July only during low flow (<mean flow) years
Tote Road	BG17	71° 21’ 19.8” N	79° 34’ 44.0” W	75	June-July only during low flow (<mean flow) years
Tote Road	CV223 (Tom River)	71° 19’ 40.5” N	79° 26’ 15.8” W	135	None
Mine Site	Camp Lake	71° 19’ 38.6” N	79° 22’ 57” W	86	None

Source: Amendment No.1 Type ‘A’ Water Licence (2AM-MRY1325)

SECTION 7.0 - MATERIALS TO BE SHIPPED OFF THE PROPERTY

7.1 MATERIALS SHIPPED OUT

As required by the Lease, the expected quantities of materials planned to be shipped off site in 2019 are detailed in Table 7-1 below.

Table 7-1: Materials to be shipped out in 2019

Property Section	Equipment/ Material Item	Owner	Estimated Annual Amount of Equipment and Material (tonne)	Estimated Annual Revenue Tonnes
e.g. Milne Port/Mine Site	Description of the equipment or the material*	e.g. BIM/Third Party	Estimated total annual amount of equipment and material (tonne)	Estimated amount of revenue tonnes assigned to the shipping of equipment or material
Milne Port	Batteries	BIMC	89	-
Milne Port	Hydro Carbon Contaminated Material	BIMC	205	-
Milne Port	Waste Oil	BIMC	1,238	-
Milne Port	Waste Fuels	BIMC	91	-
Milne Port	Waste Grease	BIMC	32	-
Milne Port	Waste Hazardous Liquids	BIMC	401	-
Milne Port	Waste Aerosol Canisters	BIMC	2.5	-
Milne Port	Contaminated Containers/Solids	BIMC	319	-
Milne Port	Misc Hazardous Materials	BIMC	250	-

Note: For hazardous waste assumptions used in the calculation of the quantity of generated hazardous waste for the Project, please refer to the Waste Management Plan (BAF-PH1-830-P16-0028).

SECTION 8.0 - MATERIALS TO BE SHIPPED TO THE PROPERTY

8.1 DELIVERY OF FUEL

At least two bulk fuel deliveries will occur during the 2019 sealift. At the onset of the shipping season, arctic diesel and Jet A fuel will be delivered to fill the tanks at the Milne Port tank farm. The anticipated fuel delivery provided in the below Table 8-1.

Table 8-1: Anticipated Fuel Delivery During 2019

	Diesel	Jet A
Total Bulk Fuel Delivery	78 ML	3 ML

8.2 MATERIALS SHIPPED TO THE PROPERTY

Materials, equipment, supplies, buildings and machinery to support construction and operations through 2019 will arrive on the 2019 sea lift include:

Table 8-2: Mobile and Mechanical Equipment to be received during 2019

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	793 Trucks	Baffinland	3	375
Mine Site	854 Wheel Dozer	Baffinland	1	30
Mine Site	D10 Dozer	Baffinland	1	70
Mine Site	374 Excavator	Baffinland	1	80
Mine Site	Ejector Box for 740	Baffinland	1	2
Mine Site	4 x 4 hotseating bus	Baffinland	1	20
Mine Site	F350 truck	Baffinland	11	10
Mine Site	Light Plants	Baffinland	21	5
Mine Site	Pumps	Baffinland	2	2
Mine Site	Washcar	Baffinland	1	36
Mine Site	Lunch Trailer	Baffinland	1	36
Milne Port	pumper fire truck	Baffinland	1	20
Mine Site	off road tracked rescue vehicle	Baffinland	1	10
Mine Site	Light ERT utility vehicle	Baffinland	1	8
Milne Port	office trailers	Baffinland	2	72
Mine Site	washroom facility for tote road	Baffinland	2	72
Milne Port	generator	Baffinland	1	1

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	office trailers	Baffinland	2	72
Milne Port	conveyor feeder	Baffinland	1	8
Milne Port	jump conveyor	Baffinland	2	15
Milne Port	heavy duty shunt truck	Baffinland	1	14
Milne Port	950 loader	Baffinland	1	240
Milne Port	feeder dolly	Baffinland	1	6
Tote Road	740 B water truck body	Baffinland	1	15
Mine Site	2 Spare Jaw Feeder Assemblies	Baffinland	1	4
Mine Site	New or Used 349 excavator	Baffinland	1	80
Mine Site	2 FS353 Screen Decks	Baffinland	2	80
Mine Site	Boom truck	Baffinland	1	20
Mine Site	Pressure washing truck	Baffinland	1	15
Mine Site	Telehandler	Baffinland	1	20
Mine Site	247B or 257D skid steer	Baffinland	1	6
Mine Site	Frost Fighters	Baffinland	7	2
Mine Site	Generators/compressors	Baffinland	2	4
Mine Site	Jet A truck	Baffinland	1	10
Mine Site	Fuel Tanker & Tractor	Baffinland	1	15
Milne Port	Desalination Plant for Fresh Water	Baffinland	1	70
Milne Port	Bucket Wheel Stacker Reclaimer	Baffinland	2	210
Milne Port	Fines Mobile Stacker	Baffinland	1	170
Milne Port	Genset modules	Baffinland	4	180
Milne Port	E-house	Baffinland	1	50
Mine Site	Mobile Primary Crusher Unit	Baffinland	1	231
Mine Site	Passenger bus	Baffinland	2	15
Mine Site	Telehandler	Baffinland	1	20
Mine Site	Front End Loader	Baffinland	1	15
Mine Site	Fuel/Lube Truck	Baffinland	1	15
Mine Site	Mobile Fleet- 745C Rock Truck - TFK00727	Baffinland	2	40
Milne Port	Crusher Services office	Baffinland	1	36
Milne Port	Site Construction Office	Baffinland	1	36
Milne Port	Manlift Z-60	Baffinland	2	16
Milne Port	Manlift S135X	Baffinland	3	16

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Milne Port	Zoom Boom 12,000lb	Baffinland	4	20
Milne Port	150T Crane	Baffinland	2	40
Milne Port	Freight Liner Highway Truck	Baffinland	1	20
Milne Port	Tri- Trombone Flat Trailer - 53' to 90'	Baffinland	1	18
Milne Port	Diesel F250 or F350 Pick-up Truck	Baffinland	4	10
Milne Port	Diesel F250 15 passenger Van	Baffinland	1	12
Milne Port	12’ x 60’ c/w 2 offices, open area in middle, and office furniture,	Baffinland	2	36
Milne Port	12’ x 60’ lunch room complete 8’ tables, chairs and equipment	Baffinland	3	36
Milne Port	12’ x 34’ Self-contained washcar on skids	Baffinland	4	36
Milne Port	30,000 L Fuel Tanker Trucks	Baffinland	12	180
Mine Site	Winch Tractor	Nuna	1	13.2
Mine Site	Scissor Deck Trailer	Nuna	1	6.37
Mine Site	Skid steer	Nuna	1	7.633
Mine Site	Manlift	Nuna	1	7.5
Mine Site	Light Plants	Nuna	2	1.92
Mine Site	Frost Fighters	Nuna	4	0.8
Mine Site	Hot Box	Nuna	1	1.55
Mine Site	Cat 988 Loader	Nuna	1	51.4
Mine Site	Mech Truck	Nuna	1	16.4
Mine Site	RO/RO Truck	Nuna	1	16.4
Mine Site	Bins for RO/RO	Nuna	3	21
Mine Site	Vac Trailer or Vac Truck	Nuna	1	16.4
Mine Site	Skid steer	Nuna	1	7.633
Mine Site	Light Plants	Nuna	2	1.92
Mine Site	Frost Fighters	Nuna	4	0.8
Mine Site	Hot Box	Nuna	1	1.55
Mine Site	Cat 930 Loader	Nuna	1	17
Mine Site	Bus	Nuna	2	16.4
Mine Site	Crewcab	Nuna	1	3.8
Mine Site	Flat Deck	Nuna	2	9.98
Mine Site	Fuel Truck	Nuna	1	16.4
Mine Site	Raw Water Truck	Nuna	1	16.4

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	Effluent Water Truck	Nuna	1	16.4
Mine Site	RO/RO Truck	Nuna	1	16.4
Mine Site	Bins for RO/RO	Nuna	3	21
Mine Site	Grocery Truck	Nuna	1	16.4
Mine Site	Skid steer	Nuna	2	15.266
Mine Site	Light Plants	Nuna	2	1.92
Mine Site	Frost Fighters	Nuna	2	0.4
Mine Site	Bear Proof Garbage Bins	Nuna	2	2
Mine Site	RO/RO Truck + VAC for RO/RO - UNIT 1374	Nuna	1	15.876
Mine Site	Bins for RO/RO (2 x GARBAGE BINS)	Nuna	2	4.5
Mine Site	Bins for RO/RO (2 x GARBAGE BINS)	Nuna	2	4.5
Mine Site	Busses 42 passenger	Nuna	3	24.6
Mine Site	Lighting plants	Nuna	10	11.3
Mine Site	D6 Dozer - Caterpillar D6 R II	Besix Vanpile JV	1	24.3
Mine Site	966G Wheel loader - Caterpillar 966G - 4m"	Besix Vanpile JV	1	22.75
Mine Site	Trucks - Articulated dumper 38T/23 m3 - Type Terex TA40	Besix Vanpile JV	5	153.8
Mine Site	Compactor - 9.2T Articulated tandem roller w/ 2 vibratory drums - Type Hamm HD 90	Besix Vanpile JV	1	8.3
Mine Site	85T Track excavator w/ long stick	Besix Vanpile JV	2	172.6
Mine Site	20T 6x4 Tipper Truck	Besix Vanpile JV	1	26
Mine Site	Conveyor belt	Besix Vanpile JV	1	25
Mine Site	Ripper	Besix Vanpile JV	2	5
Mine Site	Diesel Hammer D180	Besix Vanpile JV	3	112.41
Mine Site	Vibrohammer - Type 5.9T, 50KNm, Hydraulic hammer IHC S50/90	Besix Vanpile JV	3	28.95
Mine Site	71KW Power pack for EMV300 vibro hammer	Besix Vanpile JV	2	4
Mine Site	Crawler crane 350 ton - Type Liebherr LR1400-2	Besix Vanpile JV	2	622
Mine Site	Clamshell	Besix Vanpile JV	1	15
Mine Site	250T Lifting crawler crane	Besix Vanpile JV	1	210

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	Mobile crane 32T	Besix Vanpile JV	1	24
Mine Site	Mixer Truck 6/9 m3	Besix Vanpile JV	1	12.2
Mine Site	Bucket 0.5/1 m3	Besix Vanpile JV	1	0.4
Mine Site	80T extensible semi-trailer	Besix Vanpile JV	2	45.4
Mine Site	125 KW/170 HP tractor for 80T semi-trailer	Besix Vanpile JV	2	19
Mine Site	20T Flatbed truck w/ truck mounted crane	Besix Vanpile JV	1	11.6
Mine Site	20' x CONTAINER - Oxy fuel cutting systems, induction heating system, 400A welding generators, welding sets, 7m3/min / 250cft/min mobile compressors	Besix Vanpile JV	1	22
Mine Site	20' x CONTAINER - Mobile Compressor + 50mm PVC Perforated tubes	Besix Vanpile JV	5	110
Mine Site	40' x CONTAINER - Generator 150 kVA, Generator 250 kVA, Generator 30 kVA, Generator 100 Kva	Besix Vanpile JV	3	66
Mine Site	Maintenance truck (water/fuel/maintenance)	Besix Vanpile JV	1	4.8
Mine Site	Piling Frame	Besix Vanpile JV	2	12
Mine Site	Sheetpiles AZ26 - 700	Besix Vanpile JV	72	459.36
Mine Site	Sheetpiles AZ26 - 700	Besix Vanpile JV	14	47.6
Mine Site	Tie-rod dia 800 mm	Besix Vanpile JV	55	386.1
Mine Site	Tie-rod dia 800 mm	Besix Vanpile JV	14	91.84
Mine Site	40' x OPEN TOP - Temporary structural steel access platform	Besix Vanpile JV	1	22
Mine Site	40' x OPEN TOP - Temporary structural steel quay	Besix Vanpile JV	1	22
Mine Site	40' x OPEN TOP - Steel trolley	Besix Vanpile JV	1	22
Mine Site	40' x OPEN TOP - Engine system for mobile trolley movement	Besix Vanpile JV	1	22
Mine Site	40' x OPEN TOP - Walkway	Besix Vanpile JV	1	22
Mine Site	Concrete mattresses scour protection	Besix Vanpile JV	337	674
Mine Site	40' x CONTAINER - workshop materials and spare parts	Besix Vanpile JV	10	220

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	40' x CONTAINER - material for offices, site small facility tools	Besix Vanpile JV	10	220
Mine Site	Container office	Besix Vanpile JV	4	12
Mine Site	Container with lunch room	Besix Vanpile JV	2	6
Mine Site	Precast pile caps	Besix Vanpile JV	1	25
Mine Site	40' x CONTAINER - Fenders SCN 2000, bollards, handrail, guardrail	Besix Vanpile JV	4	88
Mine Site	10'x44' wheeled lunchtrailer	Contractor	1	14
Mine Site	Herman Nelson 6700	Contractor	6	7.2
Mine Site	Bear Proof Garbage Bin	Contractor	4	2.4
Mine Site	20` Container	Contractor	6	130.02
Mine Site	55KW Generator	Contractor	4	4.4
Mine Site	Generator enclosure	Contractor	3	0.66
Mine Site	40` Container	Contractor	6	158.88
Mine Site	Mark IV Tamper	Contractor	2	63.525
Mine Site	Knox Kershaw KBR 940 Regulator	Contractor	2	29.4
Mine Site	Pettibone 445F w/ high rail	Contractor	2	32.77785
Mine Site	Rail car mover	Contractor	2	48.52
Mine Site	Ballast Car	Contractor	15	379.5
Mine Site	CAT 950 loader	Contractor	2	31
Mine Site	CAT 988 loader	Contractor	1	60
Mine Site	Telehandler	Contractor	3	42
Mine Site	Skidsteer	Contractor	1	7
Mine Site	Clipping Machine	Contractor	4	1
Mine Site	Diesel Rail Heater Drapeau 2	Contractor	1	16
Mine Site	Herman Nelson 6700 all in one	Contractor	2	2.4
Mine Site	Herman Nelson extreme cold BT400NEX-D4A	Contractor	6	2.0475
Mine Site	Herman Nelson Flagro-1000 trailer mount	Contractor	1	2.1
Mine Site	light plants	Contractor	15	16.95
Mine Site	light system for office (in C-Can)	Contractor	1	4
Mine Site	F-350 crew cab 4x4 Diesel	Contractor	6	28.68
Mine Site	F-350 crew cab w/ fuel tank	Contractor	6	25.5
Mine Site	Crew Van 4x4 15 passenger	Contractor	5	21

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	F-550 Mechanic Truck	Contractor	2	18
Mine Site	F-450 CSV trucks	Contractor	3	25
Mine Site	power pack 5/10 gallon per minute	Contractor	6	1
Mine Site	Kennworth 880 w/ winch	Contractor	1	24
Mine Site	Kennworth 880 w/ grapple	Contractor	1	17
Mine Site	highway trailer 48 foot	Contractor	1	11
Mine Site	highway trailer 40 foot lowbed	Contractor	1	10.5
Mine Site	trailer w/ rail	Contractor	1	14
Mine Site	Kennworth 880 w/hirail & crane	Contractor	1	32
Mine Site	Kennwoth 370 fuel & lube truck (filled)	Contractor	1	54
Mine Site	Kennworth 880 Dump Truck w/ hirail	Contractor	1	23
Mine Site	Geismar Power Jack Model RV100	Contractor	2	3
Mine Site	Air Compressor	Contractor	1	3
Mine Site	Excavator	Contractor	2	74
Mine Site	20`Container w/ 3 Rail Puller, Threader,misc. small tools	Contractor	1	22
Mine Site	Track Welding Truck	Contractor	2	81.9
Mine Site	12'x60' Office Trailer w/ furniture	Contractor	1	12
Mine Site	trailers for 24'x60'office w/ furniture	Contractor	1	12
Mine Site	trailers for 60'x60'office w/ furniture	Contractor	3	36
Mine Site	Rail Operations Concrete	Contractor	158	316
Mine Site	Crane Mats	Contractor	74	111
Mine Site	Quonset Hut	Contractor	1	5
Mine Site	Portable Washroom	Contractor	2	3
Mine Site	10,000 gallon fuel tank (diesel empty)	Contractor	1	5
Mine Site	10,000 gallon fuel tank (gasoline full)	Contractor	1	45
Mine Site	Outdoor vehicle plug station	Contractor	1	1
Mine Site	20` Container Hose Crimping	Contractor	1	21.67
Mine Site	Rolling Stock Workshop	Nahanni	1	340
Mine Site	Rolling Stock Workshop Crane	Nahanni	1	12
Mine Site	Rail Operations Offices	Nahanni	1	35
Mine Site	Rail Operations Concrete	Nahanni	1	50
Mine Site	Pick up trucks	Allnorth	2	6.488
Mine Site	Screener power screen	Contractor	1	40

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	Inclined screen	Contractor	1	46
Mine Site	Screener	Contractor	1	40
Mine Site	Conveyors	Contractor	4	47
Mine Site	Gen-set trailers	Contractor	1	28
Mine Site	Electrical sub-station	Contractor	3	8
Mine Site	Fuel truck 10,000 liters	Contractor	1	14
Mine Site	Crane 80T	Contractor	1	43
Mine Site	Crane 200T crawler	Contractor	2	100
Mine Site	Mobile concrete plant	Contractor	1	15
Mine Site	Concrete truck	Contractor	2	52
Mine Site	Drill Rig T40R driller	Contractor	1	35
Mine Site	Loader C-988	Contractor	1	50
Mine Site	Dynamite truck	Contractor	2	20
Mine Site	Dynamite truck	Contractor	1	10
Mine Site	Drilling Rig LB 36-410 (rented)	Contractor	1	82
Mine Site	Piling and drilling Rig LRB 355 (rented)	Contractor	1	76
Mine Site	Oscillator VRM KL (rented)	Contractor	1	17
Mine Site	Loader C-980	Contractor	1	50
Mine Site	Loader C-980	Contractor	1	50
Mine Site	Dynamite truck	Contractor	1	10
Mine Site	Semi-trailer	Contractor	1	15
Mine Site	Crane 130T	Contractor	1	50
Mine Site	Basket crane	Contractor	1	2
Mine Site	Generator 35 kW	Contractor	2	6
Mine Site	Air compressor	Contractor	1	22
Mine Site	Air compressor	Contractor	1	22
Mine Site	Tower light 4 000 W	Contractor	6	4
Mine Site	Pick-up 4x4 diesel	Contractor	12	38
Mine Site	Dynamite pick up	Contractor	2	9
Mine Site	Skid Steer CAT 236B	Contractor	1	3
Mine Site	Bucket Lift	Contractor	1	15
Mine Site	Pick-up 4x4 diesel	Contractor	2	6
Mine Site	Dynamite pick up	Contractor	2	9

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	Tower light 4 000 W	Contractor	4	3
Mine Site	Scissors lift	Contractor	2	6
Mine Site	Bucket Lift	Contractor	1	15
Mine Site	Tower light	Contractor	3	3
Mine Site	Tower light	Contractor	1	1
Mine Site	Pick-up 4x4 diesel	Contractor	2	6
Mine Site	Light tower	Contractor	6	5
Mine Site	Pick-up 4x4 diesel	Contractor	6	19
Mine Site	Scissor lift	Contractor	1	4
Mine Site	Generator 35 kW	Contractor	3	5
Mine Site	Welding machine	Contractor	3	3
Mine Site	Generator 114 kW	Contractor	1	3
Mine Site	Diesel tank 22 500 li	Contractor	1	3
Mine Site	Diesel tank 10 000 li	Contractor	2	2
Mine Site	Gaz tank 50 000 li	Contractor	2	2
Mine Site	Diesel tank 10 000 li	Contractor	2	2
Mine Site	Gaz tank 50 000 li	Contractor	1	1
Mine Site	Gaz tank 50 000 li	Contractor	1	1
Mine Site	Gaz tank 10 000 li	Contractor	1	1
Mine Site	Low boy 100T	Contractor	1	13
Mine Site	Tool truck	Contractor	1	14
Mine Site	Bus ford transit	Contractor	1	3
Mine Site	Bucket Lift 100'	Contractor	1	15
Mine Site	Platform truck	Contractor	1	15
Mine Site	Boom truck	Contractor	1	14
Mine Site	Bus 48 passengers	Contractor	1	8
Mine Site	Water tank 50 000 li	Contractor	1	3
Mine Site	Water tank 15 000 li	Contractor	1	3
Mine Site	Water tank 1 000 li	Contractor	2	2
Mine Site	Water tank 50 000 li	Contractor	1	3
Mine Site	Water tank 10 000 li	Contractor	1	3
Mine Site	Office room	Contractor	1	5
Mine Site	Lunch room	Contractor	1	5

Property Section	Material Item	Owner	Quantity	Revenue Tonne
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*
Mine Site	Spare parts trailers	Contractor	1	28
Mine Site	Explosive matts	Contractor	50	175
Mine Site	Methanol	Contractor	110	110
Mine Site	Calcium	Contractor	877	877
Mine Site	Concrete bags	Contractor	67	101
Mine Site	20' Various Containers	Contractor	20	440
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	15	20
Mine Site	Safety barrier (New Jersey)	Contractor	100	204
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	5	7
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	5	7
Mine Site	Board insulation 50mm (Styrofoam)	Contractor	600	192
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	3	4
Mine Site	Geomembrane Liner (5 500 m^2)	Contractor	1	2
Mine Site	Retaining wall concrete bloc 600 x 600 x 1200	Contractor	50	54
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	137	178
Mine Site	Unloader board insulation	Contractor	2000	11
Mine Site	Unloader non-woven geotextile	Contractor	68	15
Mine Site	Parts (for generators)	Contractor	3	2
Mine Site	20' Container Miscellaneous accesories for workers	Contractor	1	20
Mine Site	20' Container -Office equipment	Contractor	1	5

In addition to the above noted equipment to be brought to the Project in 2019, there are materials and equipment that will arrive on the 2019 sealift in support of the Phase 2 expansion, currently in the permitting process. These materials consist of large modules, and were previously referred to in the 2018 Work Plan and 2018 Work Plan Addendum as the Expansion Project Equipment and Materials (the 'Modules). In addition to the Crushing, Screening, Car Dumper, Bulk Material Handling (BMH) Conveyors, and Rail Materials, a Shiploader Module has been added to the 2019 sealift. While these materials will be constructed following approval of the Phase 2 expansion, they are being mobilized to Site with the understanding that they would need to be backhauled in the event Phase 2 is not approved. To assist with the calculation of reclamation securities, the detailed breakdown of the Modules is provided in Table 8-3.

Table 8-3: Expansion Project Equipment and Materials

Module Package	Description	Total Volume (m3)
Shiploader	Shiploader	77,938
	Jetty Travel Gear for Shiploader	2,268
	Landside Travelgear for shiploader (Pivot Point)	1,174
	Lower Part Pivot point for shiploader (to be casted in grouting)	20
Subtotal Shiploader		**81,400**
Car Dumper	Steel Tub, Car Dumper, Car Dumper Hall including E-Houses	12,579
	Positioner Hall (Indexer Building) One piece with shipping braces	8,401
	Hopper Support Structure	2,099
	Positioner	487
	Apron Feeder	496
	Hopper	296
	Positioner Track Dwg# 4933706	97
	Hydraulic Power Unit Car Dumper	45
	40' DC or OT (Drive units, small geared motor for the spillage scraper)	77
	Transformer house	179
Subtotal Car Dumper		**24,756**
Crushing	Crusher building Inculding 4.2 to 4.5	21,111
	Main Shaft Kubria M210	63
	Spider Complete Kubria M210	70
	Crusher feeding chute S6	31
	Various disassembled small parts stowed in 20' Containers	154
	Various disassembled small parts stowed in 20' Containers	387
Subtotal Crushing		**21,815**
Screening building	Screening building	33,278
Subtotal Screening		**33,278**
BMH Conveyors (Transfer Conveyor)	Detail 1 Tower (Lower section)	1,476
	Detail 1 Tower (top section)	996
	Detail 1 Tower (diagonal brace)	167
	Detail 1 Tower (horizontal brace)	0
	Detail 2 Tubular Gallery type 2	691
	Detail 3 Tubular Gallery type 1	3,488
	Detail 4 Transfer Truss PT. 1 Head End (Platform)	1,332
	Detail 4 Transfer Truss PT. 2 - Head End (Truss)	349
	Detail 5 Bent TC-B3	184
	Detail 6 Bent TC-B4	129
	Detail 7 Bent TC-B5	97
	Detail 8 Bent TC-B6	73
	Detail 9 Bent TC-B7	38
	Detail 10 Bent TC-B8	21
	Detail 11 Bent TC-B9	0
	Detail 1 - Gravity Takeup Counterweight (4122)	10
	Transfer Conveyor tables, tail and take up pulley supports	232
	Transition walkway	8

Module Package	Description	Total Volume (m3)
	Corrugated wall panels for tower base	0
BMH Conveyors (Screen Feed Conveyor)	Detail 4 - Tubular gallery (Type 2)	578
	Detail 24 - Tubular gallery (Type 4)	1,744
	Detail 24 - Tubular gallery (Type 5)	581
	Detail 5 - Tubular gallery (Type 3)	527
	Detail 6 - Truss section	596
	Detail 8 - Bent SF-B3	76
	Detail 9 - Bent SF-B4	38
	Detail 10 - Bent SF-B5	17
	Detail 11 - Bent SF-B6	8
	Detail 12 - Bent SF-B8	2
	Detail 12 - Bent SF-B9	0
	Detail 15 - Gravity Take up Tower Bent SF-B2	329
	Detail 15 - Gravity Take up Tower Platform	110
	Detail 16 - Gravity Take up Tower Bent SF-B1	121
	Detail 13 - Caged Ladders	77
	Detail 14 - Caged Ladders	77
	Detail 2 - Counter Weight (CV-001)	8
	Bracing, Guarding, Bolts, Monorail and Monorail Supports in Containers	155
	Detail 4 - Transition walkway	10
BMH Conveyors (Stockpile #1 Conveyor)	Apron Feeder Modular Structure Dribble and head chute	1,011
	Apron Feeder Modular Structure and Dribble and head chute	1,045
	Detail 25 - Apron Feeder Modular Structure stairs	0
	Detail 21 - Feeding Hopper (Top Half)	201
	Detail 18 Arches	573
	Detail 18 Arch cross beam connectors	0
	Reclaim tunnel concrete foundations	1,152
	Reclaim tunnel corrugated steel segments and Exit tunnel segments	189
BMH Conveyors (Oversize Conveyor)	Detail 13 - Gravity Takeup Counterweight (CV-002)	8
	Detail 2 - Truss	726
	Detail 3 - Tubular Gallery (Type 1)	493
	Detail 3 - Tubular Gallery (Type 2)	493
	Detail 3 - Tubular Gallery (Type 3)	1,480
	Detail 4 - Tubular gallery (Type 4)	406
	Detail 5 - Bent OSC-B1	113
	Detail 6 - Bent OSC-B2	61
	Detail 7 - Bent OSC-B3	30
	Detail 8 - Bent OSC-B4	14
	Detail 9 - Bent OSC-B5	6
	Detail 10 - Caged Ladder	77
	Detail 11 - Caged Ladder	77
	Detail 12 - Bent OSC-B6	363
	Detail 13 - Gravity Take up Tower Bent OSC-B7	131
	Detail 13 - Gravity Take up Tower Platform	110
	Containers	155
BMH Conveyors	Detail 1 Head Platform for Fines Collection Conveyor	182

Module Package	Description	Total Volume (m3)
(Fines Conveyor)	Detail 2 Head Platform Stairs and legs for Fines Collection Conveyor	77
	Fines collection conveyor stick built section and Head Chute	0
BMH Conveyors (Lump Conveyor)	Detail 1 - Tubular Gallery Section (Type 1)	405
	Detail 1 - Tubular Gallery Section (Type 2)	405
	Detail 2 - Tubular Gallery Section (Type 3)	366
	Detail 3 - Bent LC-B3	3
	Detail 4 - Bent LC-B2	10
	Detail 5 - Bent LC-B1	17
	Detail 6 - Platform	237
	Detail 6 - Platform Columns	36
	Detail 8 - Platform Stairs	33
	40' Container	155
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	19
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	7
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	6
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	1
BMH Conveyors (Stockpile #2 Conveyor)	Detail 1 - Truss Sections T1	508
	Detail 1 - Truss Sections T2	1,016
	Detail 1 - Truss Sections T3	508
	Drive Station	9,023
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor	67
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor	183
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor	23
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor bypass chute	23
	Stockpile Conveyor Chute Platform - shipped in container	0
	Detail 11 - Tail Section	0
	Conveyor table parts in 40 ft containers or pallets	1,084
	Detail 2 Bent STYC-B1	6
	Detail 2 Bent STYC-B2	3
	Detail 2 Bent STYC-B3	1
	Detail 2 Bent STYC-B4	0
	Detail 10 Loading Area Holding assembly	0
BMH Conveyors (Shiploader Feed Conveyor)	Containers	387
	Tail End Assembly and Conveyor Loading module	0
	Conveyr Stick Built parts for conveyor tables / modules	0
	Conveyor table modules	0
	Drive Station	3,844
	Detail X Bent SFC-B1	7
	Detail X Bent SFC-B2	24
	Detail X Bent SFC-B3	22
	Detail X Bent SFC-B4	39
	Detail X Bent SFC-B5	78
	Detail X Bent SFC-B6	139
	Detail X Bent SFC-B7	250
	Detail X Bent SFC-B8	612
	Detail X Truss T1-1	529

Module Package	Description	Total Volume (m3)
	Detail X Truss T1-2	529
	Detail X Truss T1-3	529
	Detail X Truss T1-4	529
	Detail X Truss T1-5	529
	Detail X Truss T1-6	529
	Detail X Truss T2	534
	Detail X Truss T3	487
	Head Bridge support	163
	Head Bridge support column	125
	Head Bridge support column	125
	Head Truss 1st section	1,201
	Head Truss Final section	845
	Head Platform	96
	Head Chute Removable Portion Section 1	14
	Head Chute Removable Portion Section 2	22
	Head Chute Stationary portion	15
Subtotal BMH Conveyors		**49,868**
Rail Materials	Pandrol Victor Tie Plates (preplated on ties)	764
	Screw Spikes Bags (30/bag)	1,447
	E-Clip Fastener Bags (25kg - 40 bags/pallet)	126
	11" Tie Plates Pallet (300/pallet)	2
	Rail Ties Bundle of 30 ties	11,213
	weld kits (25/ pallet)	171
	Keg track spikes (48/pallet)	3
	joint bar (100/pallet) 136#	3
	Keg bolts & washers (48/pallet)	3
	turnout rail 136# AHH RE	17
	joint bar 115#	10
	HW turnout package ties	150
	TO frog	8
	Sliding Derail	1
	Bumping Post	12
	136# RE RAIL guardrail	3
	Crossing Panel	19
	Timber Screws (1 Pallet)	142
	Rails 25 per bundle	4,059
	115# RE Rail	17
Subtotal Rail		**18,172**

Additional supplies to support construction and operations through 2019 and 2020 will arrive on the 2019 sea lift include:

- Delivery of ammonium nitrate (AN), up to 12,142 m^3 (9,714 tonnes) to be stored on-site in 2019
- Delivery of pre-packaged explosives, up to 176,000 kg to be stored on-site in 2019
- Delivery of maintenance parts.
- Delivery of consumables (lubricants, grease, detergents, boosters, EZ Dets, dry goods, food, household supplies, etc.).

SECTION 9.0 - UPDATES TO ITEMS CONTAINED IN THE SCHEDULES OF THE LEASE

9.1 UPDATES TO THE EMERGENCY RESPONSE PLAN

In accordance with Clause 5.1 item H of the existing Commercial Lease Q13C031, the applicable Emergency Response Plan BAF-PH1-830-P16-0007 and Spill Contingency Plan BAF-PH1-830-P16-0036 have been provided in Appendices of this Work Plan. Note that these documents were updated in September 2018 in support of the approved production increase to 6 Mtpa. Please refer to Section 11 for location and details.

9.2 UPDATES TO ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

All updated Environmental Management and Monitoring Plans were submitted in March 2018 with the Annual Reports, with the exception of the Milne Port Oil Pollution Emergency Plan (OPEP), Spill Contingency Plan, and Emergency Response Plan which were updated in September 2018 in support of the approved 6Mtpa production increase. It is noted that Baffinland and QIA have been working to update the Roads Management Plan for 2018, as well as implement a Tote Road Quarry and Borrow Source Management Plan, however these revised and new documents remain in draft at the time of this Work Plan submission. An extensive list of the current plans for the project is presented in Table 9-1 below.

Table 9-1: Environmental Monitoring and Management Plans

Document Number	Plan Name	Version
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan	March 2016
BAF-PH1-830-P16-0006	Cultural Heritage Resource Protection Plan	March 2016
SD-STD-002	Hazard Identification and Risk Assessment Procedure	December 2010
N/A	EHS Framework Standard	December 2010
H337697-0000-01-126-0002	Health and Safety Management Plan	January 2012
SD-SEMP-003	Human Resources Management Plan	December 2010
BAF-PH1-830-P16-0027	Terrestrial Environmental Management and Monitoring Plan	March 2016
BAF-PH1-830-P16-0025	Stakeholder Engagement Plan	March 2016
BAF-PH1-830-P16-0023	Roads Management Plan	March 2016
BAF-PH1-830-P16-0024	Shipping and Marine Wildlife Management Plan	March 2016
N/A	Blasting Management Plan	April 2013
BAF-PH1-830-P16-0004	Borrow Pits and Quarry Management Plan	March 2014
N/A	Borrow Source Management Plan (See Note 1)	October 2013
BAF-PH1-830-P16-0030	Borrow Source Management Plan - Kilometer 2	October 2014
BAF-PH1-830-P16-0032	Borrow Source Management Plan - Kilometer 97	October 2014
BAF-PH1-830-P16-0035	Borrow Source Management Plan - Kilometer 104	March 2014
H349000-4200-07-245-0001	Quarry Management Plan D1Q1	October 2013
H349000-4200-07-245-0002	Quarry Management Plan D1Q2	October 2013

Document Number	Plan Name	Version
BAF-PH1-830-P16-0017	Quarry Management Plan Q1	July 2017
H349000-3000-07-245-0002	Quarry Management Plan Q11	October 2013
H349000-3000-07-245-0003	Quarry Management Plan Q19	October 2013
H349000-3000-07-245-0001	Quarry Management Plan Q7	October 2013
BAF-PH1-830-P16-0040	Quarry Management Plan QMR2	July 2017
BAF-PH1-840-P16-0002	Emergency Response Plan	September 2018
BAF-PH1-830-P16-0036	Spill Contingency Plan	September 2018
BAF-PH1-830-P16-0008	Environmental Protection Plan	August 2016
BAF-PH1-830-P16-0010	Fresh Water Supply, Sewage and Wastewater Management Plan	March 2018
BAF-PH1-830-P16-0011	Hazardous Materials and Hazardous Waste Management Plan	March 2017
BAF-PH1-830-P16-0012	Interim Closure and Reclamation Plan	October 2018
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystems Management Plan	March 2016
BAF-PHI-830-P16-0001	Surface Water Sampling Program - Quality Assurance and Quality Control Plan	March 2017
BAF-PH1-830-P16-0039	Aquatic Effects Monitoring Plan	October 2015
BAF-PH1-830-P16-0028	Waste Management Plan	September 2018
BAF-PH1-830-P16-0029	Phase 1 Waste Rock Management Plan	November 2017
N/A	Interim Waste Rock Management Plan	March 2018
BAF-PH1-830-P16-0031	Life of Mine Waste Rock Management Plan	April 2014
N/A	Explosives Management Plan (see Note 2)	August 2013
BAF-PH1-830-P16-0013	Milne Port Oil Pollution Emergency Plan (OPEP)	September 2018
BAF-PH1-830-P16-0041	Polar Bear Safety Plan	March 2016
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan	June 2014
BAF-PH1-830-P16-0038	Exploration Closure and Reclamation Plan	July 2014
BAF-PH1-830-P16-0042	Spill at Sea Response Plan	August 2015

NOTES:

[1] Discontinued and incorporated into the March 2014 Borrow Pits and Quarry Management Plan.
[2] The Explosives Management Plan is a contractor document.

9.3 PROPOSED UPDATES TO THE INTERIM CLOSURE AND RECLAMATION PLAN

The Interim Closure and Reclamation Plan (ICRP) was updated in 2018 (Revision 5, 30 October 2018) and approved by QIA, and has been provided as an appendix to this Work Plan. Significant updates to the ICRP have been completed relative to Revision 4 (2016), notably the updates to the Closure Objectives and Criteria, and Closure and Post Closure Monitoring. This update to the ICRP reflects engagement with QIA since 2016 on these and other key topics, however it is recognized that uncertainty remains with respect to topics such as closure criteria and final closure conditions (aesthetics). Future iterations of the ICRP will aim to reduce this uncertainty, both as a result of reclamation research and community engagement. The

ICRP is intended to be an iterative document that will evolve over the life of the mine, and it is recognized that QIA as the land owner will provide valuable input and approval of future versions of the ICRP.

The provision of additional securities for the 2019 Work Plan is allocated as summarized in Table 9-2 below. Further detail can be found in Appendix B.

Table 9-2: Mary River Project Total Closure and Reclamation Security Summary[1] – 2019 Work Plan

	A	B	C	D	E	F	G	H
	Authorization	Liability	Global Estimate from 2018 Addendum Estimate ($)	2018 Unit Rate Adjustment ($)	2019 Estimate, Including 2018 Reconciliation ($)	Total 'Global' Estimated Security for 2018 ($)	Total Posted as of July 2018 ($)	Marginal Adjustment to be Posted ($)
						C + D + E		F - G
1	Type A 2AM-MRY1325	IOL[2]	68,835,000	-7,754,000	34,399,000	95,480,000	73,829,771	21,650,229
2		Crown	1,196,000	-147,000	730,000	1,779,000	1,298,555	480,445
3		Water	1,714,000	-338,000	18,313,000	19,689,000	-	-
4		Land	68,316,878	-7,563,000	16,815,000	77,568,878	-	-
5	*Subtotal Type A*		*70,031,000*	*-7,901,000*	*35,128,000*	*97,258,000*	75,128,326	22,130,674
6	Type B Exploration2BE-MRY1421 [3]	IOL	165,000	-	-	165,000	-	165,000
7		Crown	1,082,000	-	-	1,082,000	1,250,000	-168,000
8		Water	18,000	-	-	18,000	-	-
9		Land	1,229,000	-	-	1,229,000	-	-
10	*Subtotal Type B Exploration*		*1,247,000*	-		*1,247,000*	*1,250,000*	*-3,000*
11	DFO Security Associated with Ore Dock	IOL[2]	-	-	-	-	-	-
12		Crown	563,000	-	-	563,000	563,000	-
13		Water	563,000	-	-	563,000	563,000	-
14		Land	-	-	-	-	-	-
15	*Subtotal DFO*		*563,000*	-		*563,000*	*563,000*	-
16	AANDC Land Lease 47H/16-1-2 [4]	IOL[2]	-	-	-	-	-	-
17		Crown	4,975,000	-	-	4,975,000	4,975,000	-
18		Water	-	-	-	-	-	-
19		Land	4,975,000	-	-	4,975,000	4,975,000	-
20	*Subtotal AANDC Land Lease*		*4,975,000*	-	-	*4,975,000*	*4,975,000*	-
21	**GRAND TOTAL**		**76,816,000**			**104,043,000**	**81,916,326**	

NOTES:

1) Totals rounded to nearest '000 in CAD
2) Security relating to IOL held by Qikiqtani Inuit Association (QIA) under Commercial Lease No. Q13C301
3) As per Mary River Exploration Project Closure and Reclamation Plan (BAF-PH1-830-P16-0038, Rev 1)
4) Posting process for security relating to AANDC Land Lease 47H/16-1-2 phased into a 2-step approach. Phase 1 to be posted November 2016.
5) As per Closure and Reclamation Strategy and Financial Security Estimate for Nunavut Lease #47H/16-1-2 (H349001-2000-07-126-0001, Rev.0)

SECTION 10.0 - REQUESTED AMENDMENTS TO THE PROVISIONS OF THE LEASE

Tote Road Adjustment Notices (TRANs) and Options Exercise Notices (OENs) will be submitted as per Table 3-1, throughout 2019. It is noted that per the Commercial Lease, review of OENs and TRANs outside of the Work Plan will require an associated fee for review.

Included as an appendix of this Work Plan is an OEN for the Tote Road. The intent of this OEN is to reconcile historic adjustments to the Tote Road completed between 2013 and 2016 with the Commercial Lease boundaries, and to incorporate the proposed quarries and laydowns included in the 2019 Work Plan (Item No. 1 and 2).

SECTION 11.0 - ADDITIONAL REPORTS, INFORMATION OR DATA

Additional reports, information or data required to support the 2019 Work Plan are summarized in Table 11-1 below.

Table 11-1: Additional Reports, Information or Data

Title	Organization	Date	Annex
Identify the title of the additional report, information or data to be included with the Annual Work Plan.	*Disclose the name of the organization that produced the addition report, information or data.*	*Include the publish date or reference year to the additional report, information or data.*	*Identify the Annex letter/number corresponding to the additional report, information or data.*
Work Plan Figures - Milne Port - Mine Site - Tote Road	Knight Piésold on behalf of Baffinland	1 November 2018	Appendix A
2019 Marginal Closure and Reclamation Financial Security Estimate	Baffinland	-	Appendix B
Interim Closure and Reclamation Plan	Baffinland	BAF-PH1-830-P16-0012	Appendix C
Emergency Response Plan	Baffinland	BAF-PH1-830-P16-0007	Appendix D
Spill Contingency Plan	Baffinland	BAF-PH1-830-P16-0036	Appendix E
OEN – Tote Road	Baffinland	1 November 2018	Appendix F

Appendix A:

2019 Work Plan Site Layouts

2019 Work Plan – Milne Port Site Layout

2019 Work Plan – Mine Site Layout

2019 Work Plan – Tote Road

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502 200 E | 502 800 E | 503 400 E | 504 000 E | 504 600 E | 505 200 E

7 976 300 N | 7 975 700 N | 7 975 100 N | 7 974 500 N | 7 973 900 N | 7 973 300 N | 7 972 700 N

MILNE INLET

PHILLIPS CREEK

FORESHORE LEASE BOUNDARY

ORE DOCK

PROPOSED FREIGHT DOCK

EFFLUENT DISCHARGE POINT

MARINE FUEL MANIFOLD BUILDING

HTO CABIN

(2019-25) EAST SEDIMENTATION POND EXPANSION (2a)

(2019-10) DESALINATION WATER TREATMENT PLANT

(2019-11) NEW HAZARDOUS WASTE BERM

CULVERT

P-SWD-7

FUEL TANK FARM

SERVICE AREA

EFFLUENT AND FUEL PIPELINES

ORE STOCKPILES

WATER MANAGEMENT BERM

CAMP SITE INFRASTRUCTURE

(2019-8) NEW POLISHING WASTE STABILIZATION POND (PWSP)

LP2

(2019-2) LAYDOWN LP2 EXPANSION

RELOCATED FACILITIES

P-SWD-3

(2019-6) MILNE PORT STOCKPILE FACILITY EXPANSION AND POND

CULVERT

CULVERTS

LAND FARM

SNOW DUMP

(2019-9) NEW CONTAMINATED WATER / SNOW CONTAINMENT POND

RIDGE

MAINTENANCE BUILDING

EXISTING Q1

CULVERT

RIDGE

CAMP PAD

W10A

P-SWD-5

IMPERMEABLE GEOMEMBRANE

W10B

CULVERT

CULVERTS BLOCKED OFF

(2019-7) STACKER / RECLAIMER STORAGE STRUCTURE

LP3

LP5

LP7

P-SWD-6

CULVERT

TOTE ROAD (OLD ALIGNMENT)

TOTE ROAD (NEW ALIGNMENT)

(2019-1) NEW AREA FOR Q1 (22,095 m²)

COMMERCIAL LEASE BOUNDARY

COMMERCIAL LEASE BOUNDARY

TOTE ROAD

SCALE A 120 60 0 200 400 600 m

LEGEND:

- WATER
- BORROW AREAS
- QUARRY AREA
- ROAD
- RIVER/STREAM/DRAINAGE
- QIA SURFACE COMMERCIAL LEASE IMPACT BOUNDARY
- POTENTIAL DEVELOPMENT AREA BOUNDARY
- FORESHORE LEASE BOUNDARY

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. CONTOUR INTERVAL IS 10 METRES.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30OCT'18	ISSUED WITH TRANSMITTAL	AV	AS	AV

Baffinland

MARY RIVER PROJECT

MILNE PORT SITE PLAN
2019 WORK PLAN

Knight Piésold CONSULTING

P/A NO. NB102-181/48 | REF NO. NB18-00740

FIGURE 1 | REV 0

557 000 E
558 500 E
560 000 E
561 500 E
563 000 E
564 500 E
7 917 500 N
7 916 000 N
7 914 500 N
7 913 000 N
7 911 500 N

LEGEND:

- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
- WATER
- BORROW AREAS
- QUARRY AREA
- RIVER/STREAM/DRAINAGE
- ROAD
- QIA SURFACE COMMERCIAL LEASE BOUNDARY
- POTENTIAL DEVELOPMENT AREA BOUNDARY

NOTES:

1. COORDINATE GRID IS UTM NAD 83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. CONTOUR INTERVAL IS 10 METRES.

(2019-22) PAD EXPANSION
WASTE ROCK STOCKPILE WATER TREATMENT FACILITY
EXISTING WPT
WASTE ROCK STOCKPILE
(2019-13) KM 110 LAYDOWN AREA
(2019-14) MAINTENANCE SHOP
(2019-2) LAYDOWN 13
(2019-11) NEW HAZARDOUS WASTE BERM AND DECOMMISSIONING OF EXISTING MINE
(2019-15) DECOMMISSIONING OF WEATHERHAVEN FACILITIES
AIRSTRIP
CAMP LAKE
EXPLORATION CAMP FACILITIES
800 BED MINE SITE PERMANENT CAMP
(2019-20,24) NEW TANK FARM (3 x 15 ml TANKS, ONLY 2 CONSTRUCTED)
ACCOMMODATION CAMP (TO BE REMOVED)
(2019-16) EXPANSION OF LAYDOWN PAD AT 800 PERSON CAMP
MINING AREA
(2019-12) KM 107.5 PARKING LAYDOWN
(2019-23) KM 107 RUN-OF-MINE ORE STOCKPILE
(2019-19) EXPANSION OF CRUSHER MAINTENANCE SHOP LAYDOWN
SHEARDOWN LAKE
(2019-16) NEW OFFICES / TRAILERS / SUPPORT BUILDINGS AT 800 PERSON CAMP
(2019-21) CRUSHER FACILITY EXPANSION AND UPGRADES
(2019-18) NEW MINE SITE LANDFARM

SCALE A: 300 150 0 500 1000 1500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30OCT'18	ISSUED WITH TRANSMITTAL	AV	AS	AV

Baffinland

MARY RIVER PROJECT

MINE SITE LAYOUT
2019 WORK PLAN

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/48	NB18-00740

FIGURE 2 REV 0

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7,990,000
7,980,000
7,970,000
7,960,000
7,950,000
7,940,000
7,930,000
7,920,000
7,910,000
7,900,000
510,000
520,000
530,000
540,000
550,000
560,000
N
MILNE PORT
KM 5
(2019-3) GRADE ADJUSTMENT
KM 10
KM 15
KM 20
KM 25
KM 30
KM 35
KM 40
KM 45
KM 50
KM 55
KM 60
KM 65
KM 70
KM 75
KM 80
KM 85
KM 90
KM 95
KM 100
MINE SITE
(2019-3) GRADE ADJUSTMENT
(14,967 m²)
Q5
(1,225,590 m²)
L2
(56,430 m²)
L4
(67,571 m²)
PQ2 A
(486,031 m²)
(143,036 m²)
L7
(28,977 m²)
(14,800 m²)
PQ4 A
(141,649 m²)
L9
(91,273 m²)
PQ6A
(277,295 m²)
(13,848 m²)
PQ12A
(279,890 m²)
L10
(34,491 m²)
(6,891 m²)
2 1 0 2 4 6 8 10 km
SCALE

LEGEND:

- MILNE PORT / MINE SITE
- MILNE INLET TOTE ROAD
- LAYDOWN AREA
- QUARRY
- CURRENT COMMERCIAL LEASE BOUNDARY
- IOL SURFACE AND SUBSURFACE
- IOL SURFACE ONLY
- REFERENCE SHEET EXTENT
- POTENTIAL DEVELOPMENT AREA
- WATER

NOTES:

1. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP: HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004).
3. COMMERCIAL LEASE BOUNDARY COORDINATES OBTAINED FROM BAFFINLAND IRON MINES CORPORATION, JANUARY, 2018. BOUNDARY EXTENTS HAVE BEEN DIGITIZED BASED ON THESE POINT LOCATIONS ARE ARE APPROXIMATE ONLY.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
1	31OCT18	ISSUED WITH TRANSMITTAL	AV	AS	AV

Baffinland

MARY RIVER PROJECT

TOTE ROAD
2019 WORK PLAN

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/48	NB18-00740

FIGURE 3 REV 1

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Appendix B:

2019 Marginal Closure and Reclamation Financial Security Estimate

2019 Marginal Closure and Reclamation

Financial Security Estimate

1 November 2018

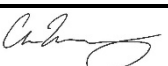
2018-11-01	0	Issued for Use			Via Email 1 Nov. 2018	Via Email 1 Nov. 2018	
			C. Murray	G. Goddard	S. Proulx	P. Du Toit	B. Penney
Date	**Rev.**	**Status**	**Prepared By**	**Checked By**			**Approved By**

Table of Contents

1. Introduction 1
1.1 Purpose 1
1.2 Regulatory Context 1
1.3 Applied Rates 2
1.3.1 2018 Direct Unit Rate Updates 2
1.3.2 Direct Cost Unit Rate – Culverts 4
1.4 Document Structure 4
2. 2018 Reconciliation 5
2.1 2018 Direct Unit Rate Updates 5
2.2 Disturbed Areas Reconciliation 6
2.2.1 Grade and Re-Contour 6
2.3 2018 Sea Lift Materials 6
2.3.1 Buildings and Foundations 6
2.3.2 Mechanical and Mobile Equipment 6
3. 2019 Work Plan 8
3.1 Introduction 8
3.1.1 Closure Scenario 8
3.2 2019 Planned Activities 8
3.3 2019 Work Plan Security Estimate Assumptions 9
3.3.1 Direct Cost Assumptions 9
3.3.1.1 Buildings and Foundations 10
3.3.1.2 Mechanical and Mobile Equipment 10
3.3.1.3 Site Works 12
3.3.1.4 Storage Tanks 13
3.3.1.5 Culverts 14
3.3.1.6 Desalination Plant 14
3.3.1.7 Fill Application 14
3.3.2 Indirect Cost Assumptions 15
3.3.2.1 On-Site Fuel Demobilization and Reclamation Fuel Mobilization 15
3.3.2.2 Off-Site Disposal of Hazardous and Non-Hazardous Waste 15
3.3.2.3 Mobilization of Workers Required for Reclamation 16
3.3.2.4 Worker Accommodation & Camp Operation 16
3.3.2.5 Mobilization and Demobilization of Equipment and Materials 16
3.3.2.6 Post Closure Monitoring 17
3.3.2.7 Supervision, Project Management and Contract Administration 19
3.3.2.8 Engineering Fees 19
3.3.2.9 Contingency 19
3.3.3 Exclusions 19
4. 2019 Estimate Summary 20
5. Supporting Documents 22

List of Appendices

Appendix A – 2019 Estimate Breakdown Structure (EBS)

Appendix B – 2019 Work Plan Layouts

Appendix C – Unit Rate Documentation

Appendix D – Supporting Documentation

1. Introduction

1.1 Purpose

The purpose of this 2019 Marginal Closure and Reclamation Financial Security Estimate ('2019 Estimate') is to provide a summary of the closure and reclamation security estimated to be required for the Mary River Project (the Project) to meet reclamation objectives as outlined in the Interim Mine Closure and Reclamation Plan (BAF-PH1-830-P16-0012). The total 'global' closure and reclamation security estimated to be required takes into consideration planned work in 2019 being conducted under Type "A" Water Licence 2AM-MRY1325, Amendment No. 1 and the Qikiqtani Inuit Association's (QIA) Commercial Lease No. Q13C301 in addition to previous Project closure and reclamation security.

The 2019 Estimate is intended to be inclusive of all closure and reclamation costs estimated to be required for a 3rd Party Contractor to perform the work in a 'worst-case' scenario for all disturbed areas, project components and project activities existing on the Mary River Project site upon conclusion of the 2019 Work Plan. For the purpose of this document, the material changes associated to security from the 2019 Work Plan are termed, '2019 Work Plan Security Estimate'.

In order for the 2019 Estimate Addendum to accurately reflect the total 'global' closure and reclamation security estimated to be required for the Project in 2019, this document also provides a summary of the identified Project components and activities that have materially changed from the position presented by Baffinland Iron Mines Corporation (Baffinland) during the 2018 Annual Security Review (ASR)[1] and subsequent adjustments based on the volume of material that arrived on the 2018 sealift. Based on these identified material changes, the resulting associated security impacts (+/- $) are also presented for incorporation into the 2019 Estimate to ensure accurate representation of the Project based on current planning.

1.2 Regulatory Context

An annual adjustment to reclamation security is required under Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the QIA, as well as a requirement under the Type 'A' Water Licence 2AM-MRY1325, Amendment No. 1 (Part J, Item 3), and in consideration of the QIA Abandonment and Reclamation (A&R) Policy (QIA, 2013). Additionally, Part C, Item 3 of the Type 'A' Water Licence 2 AM-MRY1325 and Section 9.2, Part i) of the Commercial Lease, No. Q13C301 allows for Baffinland (the Licensee) to request a change to the total amount of security outside of the ASR process. The 2019 Estimate therefore represents Baffinland's proposed adjustment to reclamation security to account for work conducted on site to date and planned work to be completed as described in the 2019

[1] As described in 2017 Marginal Closure and Reclamation Financial Security Estimate (November 2, 2016), 2017 Marginal Closure and Reclamation Security Estimate Memo – Revisions to Reflect Interested Parties Feedback (November 24, 2016) and NWB Letter on January 20, 2017 Re: Licence No. 2AM-MRY1325, Baffinland Iron Mines Corporation Type "A" Water Licence, Mary River Mine Project: Direction from Nunavut Water Board Under the Annual Security Review Process Established Under Part C and Schedule C of the Water Licence.

Work Plan. The amount of security estimated to be required is based on an estimate of the highest reclamation liability in the upcoming year[2] or 'worst case' scenario.

1.3 Applied Rates

The 2019 Estimate Addendum was developed by applying the direct cost unit rates established in the 2014 Complete Project Financial Security Assessment[3] to quantities of functional units of each activity or project component proposed/changed under the 2019 Estimate Addendum, unless indicated otherwise. As a result of ongoing discussions with QIA regarding the High Uncertainty Items for the Mary River Project Financial Security Estimate, an evaluation and update of the unit rates was completed in 2018 and is outlined in Section 1.3.1.

Based on the direct cost estimate, indirect costs required to support direct cost work were accounted for proportional to assumptions and considerations applied in the 2014 Complete Project Financial Security Assessment. Indirect costs are additional costs outside of costs required for direct reclamation activities that are required to ensure reclamation objectives are met. The sum of direct and indirect estimated costs for the 2019 Estimate Addendum was then differentiated based on geographic liability allocation (IOL vs. Crown land) and relation to land or water liability. Appendix A presents the Mary River Project Estimate Breakdown Structure (EBS) which demonstrates the results of this process for all activities or project components proposed under the 2019 Estimate Addendum and all previous project financial security liabilities as described in previous ASR submissions.

All costs are in Canadian Dollars (CAD). All monetary totals are rounded to the nearest '000.

1.3.1 2018 Direct Unit Rate Updates

Though discussions with QIA on the High Uncertainty Items, it was determined that an evaluation of labour and equipment rates should be completed to update the direct cost unit rates to be reflective of current market rates. The 2014 Complete Project Financial Security Estimate outlined the 'First Principles' method for developing direct costs, based on the number of person-days, equipment hours and fuel consumption estimated to complete each activity. Where possible, actual cost data was utilized, including labour and equipment rates.

The labour rate derived in the 2014 Complete Project Financial Security Estimate was $100/hour, based on an average blended rate from three (3) different 3rd Party Contractors for personnel skilled in a number of occupations required to carry out the reclamation activities identified. In 2018 Baffinland completed an assessment of five (5) different 3rd Party Contractors, including both contractors from outside Nunavut and those registered in Nunavut. The unit rates were determined to be significantly different from those in used in 2014 and warranted updating. The revised labour rate based on blended updated 2018 contractor rates is $75/hour. Updated labour rates are provided in Appendix C for reference.

[2] As per Type 'A' Water Licence 2AM-MRY1325, Amendment No. 1, Schedule C, Part 6, Item c.
[3] As described in 2014 Complete Project Financial Security Assessment, H349000-1000-07-126-0018, Rev.1. Hatch. Submitted to parties October 31, 2014.

The 2014 Complete Project Financial Security Estimate utilized a blended equipment rate of $150/hour, representative of the variety of equipment required to implement the reclamation activities, and includes the cost to operate and maintain the equipment, but exclusive of labour and mobilization/demobilization. The 2014 blended equipment rate was calculated based on actual equipment rates from three (3) different contractors. In 2018 Baffinland completed an assessment of three (3) different 3rd Party Contractors, including both contractors from outside Nunavut and those registered in Nunavut. The unit rates were determined to be significantly different from those in used in 2014 and warranted updating. The revised equipment rate based on blended updated 2018 contractor rates is $125/hour. Updated labour rates are provided in Appendix C for reference.

Based on the updated labour and equipment rates for the Project, the direct cost unit rates for all reclamation activities have been updated, and are presented in Table 1-1 for reference. As a result of the unit rate update, the overall reclamation estimate for the Project was adjusted to reflect the updated rates, and represents a reduction of the estimate (2014 through 2018) of $7,901,310. This is further detailed in Section 2.0.

Table 1-2. 2018 Unit Rate Update

Description	Unit	2014 Unit Rate ($/unit)	2018 Unit Rate ($/unit)
Fill Application	m^2	44.37	38.83
Grade & Re-Contour	m^2	1.81	1.49
Grade & Re-Contour Significant Disturbed Areas	m^2	5.31	4.99
Culvert Removal	Ea	1,094.48	1,094.48
Liner Removal	m^2	3.50	3.50
Open Pit Stabilization	m^3	6.22	5.49
Light Mechanical Equipment	Ea	1,980.80	1,707.45
Medium Mechanical Equipment	Ea	4,261.34	3,714.64
Heavy Mechanical Equipment	Ea	41,205.45	35,507.45
Light Mobile Equipment	Ea	941.09	876.92
Medium Mobile Equipment	Ea	1,494.13	1,378.63
Heavy Mobile Equipment	Ea	2,618.87	2,310.87
Light Tanks	Ea	2,148.33	1,872.41
Medium Tanks	Ea	7,387.31	6,386.31
Light Diesel Tanks	Ea	3,693.66	3,193.16
Medium Mobile Diesel Tanks	Ea	10,481.05	9,031.52
Medium Diesel Tanks	Ea	16,166.40	13,928.01
Large Diesel Tanks	Ea	106,338.74	91,285.24
Largest Diesel Tanks	Ea	171,468.15	147,297.85
Modular Building Not Contaminated	m^2	59.38	50.75
Modular Building Contaminated	m^2	143.42	123.02
Fold Away Building Not Contaminated	m^2	41.57	35.53
Fold Away Building Contaminated	m^2	142.41	122.25
Soft Walled Building (tent) Not Contaminated	m^2	47.51	40.60
Soft Walled Building (tent) Contaminated	m^2	148.35	127.32
ISO Container	m^2	29.69	25.38
Timber Cribbing	m^2	20.78	17.76
Precast Concrete Foundations	m^2	38.47	32.88
Slab on Grade	m^2	33.11	33.11
Bridge Removal	Lot	201,838.77	172,505.43
Incinerator	Ea	9,975.93	8,743.93

Description	Unit	2014 Unit Rate ($/unit)	2018 Unit Rate ($/unit)
Potable Water	Ea	9,975.93	8,743.93
Sewage Treatment Plant	Ea	11,035.58	9,649.58
Ship Loader	Lot	3,827,468.53	3,271,220.53
Waste Rock Facility Water Treatment Plan	Lot	77,500.00	67,350.00
Reclaim Conveyor	Lot	1,329,441.31	1,136,232.91
Piping	m	66.23	56.60
Cabling	m	26.49	22.64
Miscellaneous Items (Minor)	ea	529.83	452.83
Removal of Airstrip Lighting	m	26.49	22.64

1.3.2 Direct Cost Unit Rate – Culverts

In consultation with QIA, it was determined that the unit rate for culverts utilized for the Project may no longer be representative, as culvert lengths have potentially varied from the assumptions used in the original derivation of unit rates in 2014 by both Baffinland and QIA. It was proposed that a culvert unit rate be developed on a per metre length basis, to better represent the effort required to remove a culvert installation on closure. Baffinland believes this approach is reasonable, however notes that it may be overly conservative for locations where paired or multiple culverts are installed, as the earthworks required to complete the removal would be captured in duplicate using this methodology. The QIA has presented to Baffinland a unit rate of $50/m for culverts, and Baffinland has adopted this rate for consistency. It is noted that, as agreed to with QIA, this unit rate will only apply for the installation of new culverts, and that existing culverts are exempt and will continue to utilize historical unit rates.

1.4 Document Structure

The following outlines the structure of the 2019 Estimate document:

- Section 1 presents the purpose, regulatory context, applied rates used, and document structure applicable to the 2019 Estimate;
- Section 0 describes the '2018 Reconciliation' process, and its resulting impacts to the 2019 Estimate;
- Section 3 provides a summary of the financial security estimated to be required for marginal closure and reclamation liability increase associated with the Mary River Project 2019 Work Plan ('2019 Work Plan Security Estimate');
- Section 4 summarizes net impacts to the 2019 Estimate; and
- Section 5 lists supporting documentation that was available to determine costs and quantities for the purpose of the 2019 Estimate.

2. 2018 Reconciliation

In order for the 2019 Estimate to accurately reflect the total 'global' closure and reclamation security estimated to be required for the Project in 2019, the previous year's project estimates need to reconciled to ensure applicability. Activities previously proposed that require reconciliation fall into the following categories:

a) Activities that have had security allocated to them that are no longer planned to be conducted;

b) Activities that have been conducted but have no security explicitly allocated to them; and

c) Materials and equipment that have arrived at the Project on the 2018 sealift, and were under or over estimated in 2018.

Additionally, as described in Section 1.3.1, the unit rates for labour and equipment were updated to reflect current contractor rates in comparison to the rates used in the 2014 comprehensive estimate. The activities that fall into the above categories and their corresponding reconciliation action are described in the sub sections below.

2.1 2018 Direct Unit Rate Updates

Based on the updated labour and equipment rates for the Project, the direct cost unit rates for all reclamation activities have been updated, and are presented in Table 1-1 with associated reference material presented in Appendix C. The outcome of this assessment was a reduction of the labour rate to $75/hour (formerly $100/hour) and the equipment rate to $125/hour (formerly $150/hour).

The new unit rates were utilized for the 2019 Estimate herein, however the updated unit rates were also applied to the total global estimate of security as calculated by Baffinland between 2014 and 2018. An update to the Estimate Breakdown Structure using the revised rates, exclusive of the 2019 Estimate is provided in Appendix C. The revised global estimate is $62,130,000, which represents an overall reduction in the reclamation security of $7,901,000. This reduction is divided between IOL ($7,754,000) and Crown land ($147,000) liabilities. A breakdown of the global estimate and the reduction is provided in the below Table 2-1. It should be noted that the global estimate provided in Table 2-1 in reference to the 2018 Work Plan Addendum is higher than previously presented. This is the result of a thorough QA/QC check of all inputs into the EBS from 2014 through 2018, and it was determined there were errors in the addition of indirect costs to the EBS. However, these errors were only reflected in the global estimate in 2018, and were not found in the calculation of the marginal increase.

Table 2-1: Summary of Revised Global Estimate

Breakdown	Total ($)	Direct ($)	Indirect ($)
Global Estimate from the 2018 Work Plan Addendum	$ 70,031,000	$ 35,844,000	$ 34,187,000
Adjusted Global Estimate based on revised unit rates (up to 2018 Work Plan Addendum)	$ 62,130,000	$ 29,538,000	$ 32,591,000
Reduction in the Global Estimate	**-$ 7,901,000**	**-$ 6,306,000**	**-$ 1,596,000**

NOTES:
1) Grand total rounded to nearest '000

2.2 Disturbed Areas Reconciliation

2.2.1 Grade and Re-Contour

The position presented by Baffinland during the 2018 ASR allocated a total of $19,000 in direct costs to account for grading and re-contouring of disturbed areas that have not been disturbed and are not anticipated to be disturbed related to the Mary River Project. An itemized list of this reduction is presented in Table 2-2. For the purpose the 2019 Estimate, these areas are no longer envisioned as requiring grading and re-contouring or have been superseded by a more current/accurate allocation.

Table 2-2. Disturbed Areas Removed from the EBS

Description	Unit Rate ($)	Quantity (m^2)	Total Cost ($)[1]
Milne Port			
Laydown LP1	1.49	-13,000	-19,434
	TOTAL	**-13,000**	**-19,000**

NOTES:
1) Grand total rounded to nearest '000

2.3 2018 Sea Lift Materials

The position presented by Baffinland during previous security estimates was based on the forecasted equipment expected to be delivered to site in 2018. As a result of updated planning, contractor scheduling, and operational needs arising following the Work Plan preparation there were additional materials and equipment mobilized to the Project not considered in the previous security estimates, as well as equipment forecasted that did not arrive and equipment that was backhauled and removed from the Project.

2.3.1 Buildings and Foundations

The position presented by Baffinland during the 2018 Estimate included the mobilization and construction of a Rolling Stock Workshop. While this workshop was not mobilized or constructed in 2018, it is planned for mobilization and construction in 2019. There are no changes to the estimate required at this time to account for this.

2.3.2 Mechanical and Mobile Equipment

The position presented by Baffinland during previous security estimates was based on the forecasted equipment expected to be delivered to site in 2018. The actual type and quantity of equipment delivered to site in 2018 varied from the forecasted estimate and therefore during the 2019 Reconciliation process Baffinland adjusted the EBS, as itemized in Table 2-4 below, to ensure the 2018 Estimate reflects the most up to date information. Items marked as '*Backhaul*' were removed from the site in 2018 on the backhaul sealift.

Table 2-2. Mechanical and Mobile Equipment Reconciliation

Description	Unit Rate Type	Unit Rate ($/pcs)	Quantity (pcs)	Cost ($)[1]
Used conveyors	Heavy Equipment	32,950.0	4	131,800
Grizzly unit 11-0702	Heavy Equipment	32,950.0	1	32,950
Concrete Batch Plant	Heavy Equipment	32,950.0	1	32,950

Description	Unit Rate Type	Unit Rate ($/pcs)	Quantity (pcs)	Cost ($)[1]
Hydraulic Rock Crusher - Tramac	Heavy Equipment	32,950.0	1	32,950
Used conveyors	Heavy Equipment	32,950.0	4	131,800
Grizzly unit 11-0702	Heavy Equipment	32,950.0	1	32,950
Jaw Crusher 11-0701	Heavy Equipment	32,950.0	1	32,950
Screener Unit 10-0701	Heavy Equipment	32,950.0	1	32,950
745C Rock Truck	Heavy Mobile Equipment	2,075.0	-5	-10,375
345 D Excavator	Heavy Mobile Equipment	2,075.0	2	4,150
PV-271 Drill	Heavy Mobile Equipment	2,075.0	2	4,150
1 X D65 ATLAS COPCO DRILL S/N TMG185ED00269	Heavy Mobile Equipment	2,075.0	1	2,075
Cat 793 Mining Truck	Heavy Mobile Equipment	2,075.0	2	4,150
Western Star Ore Haul TRuck	Heavy Mobile Equipment	2,075.0	11	22,825
30,000 L Fuel Tanker Trailer	Medium Mobile Equipment	1,162.5	1	1,163
Backhaul deloupe float trailer	Medium Mobile Equipment	1,162.5	-1	-1,163
Backhaul Kenworth Unit	Medium Mobile Equipment	1,162.5	-2	-2,325
Backhaul Western Star Unit	Medium Mobile Equipment	1,162.5	-3	-3,488
1988 MACK Service Truck	Medium Mobile Equipment	1,162.5	1	1,163
Side Dumper Lead or trailer	Medium Mobile Equipment	1,162.5	19	22,088
Kubota RTV-X1100c	Light Mobile Equipment	729.2	2	1,458
Used Light Plant	Light Mobile Equipment	729.2	2	1,458
Backhaul Ford Pickup	Light Mobile Equipment	729.2	-1	-729
Backhaul GMC Sierra	Light Mobile Equipment	729.2	-1	-729
3rd Party Heavy Mobile Equipment (make up for typical fleet)	Heavy Mobile Equipment	2,075.0	16	33,200
3rd Party Medium Mobile Equipment (make up for typical fleet)	Medium Mobile Equipment	1,162.5	-30	-34,875
3rd Party Light Mobile Equipment (make up for typical fleet)	Light Mobile Equipment	729.2	41	29,896
		TOTAL	**65**	**374,000**

NOTES:
1) Grand total rounded to nearest '000

3. 2019 Work Plan

3.1 Introduction

The purpose of this section of the document is to provide a summary of the additional financial security estimated to be required for work items described in the Mary River Project 2019 Work Plan (1 November 2018). The estimated marginal closure and reclamation financial security required to account for 2019 planned work (aka. The '2019 Work Plan Security Estimate') is intended to be aggregated with the changes to the 2018 Work Plan reconciled in the above Section 2 and previous Project closure and reclamation security bonding. The combination of the reconciliation in Section 2 and the estimate presented in this Section 3 will provide a comprehensive update to the 'global' estimate and the marginal increase required for 2019. The result of this approach, the estimated project-wide or 'global' closure and reclamation security bonding totals for the Mary River Project to-date, are presented in Section 4.

A detailed description of the work activities captured in the 2019 Work Plan Security Estimate are described in the Baffinland 2019 Work Plan and are summarized in Section 3.2 below.

3.1.1 Closure Scenario

The 2019 Work Plan Security Estimate is based on a scenario that assumes all planned activities for 2019 Work Plan Addendum have taken place on site and all material/consumables (excluding fuel) that are mobilized to site in 2019 are in full inventory. All other assumptions relating to the estimation of direct and indirect costs, including fuel, associated with the 2019 Work Plan Security Estimate are consistent with the assumptions established in the 2014 Complete Project Financial Security Assessment and previous ASR documentation unless noted otherwise.

3.2 2019 Planned Activities

As described in the 2019 Work Plan, planned work in 2019 is being conducted under the amended Project Certificate No. 005 Amendment No. 2, QIA Commercial Lease No. Q13C301, Type 'A' Water Licence 2AM-MRY1325, Amendment No. 1 and Type 'B' Water Licence 8BC-MRY1416.

The following list represents the activities from the 2019 Work Plan planned for implementation in 2019, but will only proceed following the applicable regulatory approvals where required, and approval from QIA including the posting of any relevant marginal security adjustments or adjustments to the Commercial Lease (e.g. OEN, TRAN). This planned work includes:

1. Development and operation of the mine, ore crushing and land transportation, stockpiling and marine shipment of ore;
2. The continued development and construction of infrastructure required at Milne Port and the Mary River Mine Site (Mine Site) and along the Tote Road for the Mary River Project;
3. Continued operation of Mine Site and Milne Port Camps to support ongoing operations and construction activities which will include the use of water and deposition of waste as authorized under existing permits;

4. On-going operation and expansion of permitted quarry and borrow sources; additionally, four (4) new quarries have been identified along the Tote Road to support ongoing maintenance and construction;
5. At Milne Port, vessels carrying fuel, equipment and supplies for use at the Mine Site and Milne Port will arrive during open water (approximately between mid-July and mid-October 2019). Material, fuel and supplies required for operational and construction activities will be transported to the Mine Site year round via the Tote Road;
6. Ongoing environmental effects studies and baseline data collection will continue to support the construction and operation of the Project as well as for future engineering requirements;
7. Continued environmental monitoring in accordance with the approved Project Certificate, licenses, authorizations, management plans and environmental effects monitoring plans;
8. On-going exploration activities including drilling, mapping, prospecting, sampling, and geophysics. Planning of the details of the summer drilling and/or trenching program is not yet finalized;
9. Tote Road improvements to address safety concerns, freshet runoff issues and poor road conditions during the spring and summer periods;
10. Continued construction of additional fuel storage at the project;
11. Continued construction of the 800-person hardwall camp at the Mine site to address retention issues and safety concerns with continued long-term use of the tent camp at the Mine;
12. Construction of the 380-person hardwall camp at Milne Port following approval of a Water Licence Modification;
13. Site grading and laydown construction for supplies and equipment to support future construction activities and remove ponding and permafrost degradation issues around current infrastructure.
14. Installation of a floating freight dock to improve efficiencies on offloading of sealift as well as provide an opportunity for shore based connection for fuel ships to potentially avoid future use of floating hose for fuel receipt.
15. Erection of additional maintenance facilities to safely service equipment.

A detailed description of these work activities is provided in the Baffinland 2019 Work Plan.

3.3 2019 Work Plan Security Estimate Assumptions

3.3.1 Direct Cost Assumptions

The following sub-sections describe the assumptions used to establish the direct costs allocated in the 2019 Work Plan Estimate based on the 2019 Work Plan. Please refer to Appendix A for details of this cost allocation based on the Estimate Breakdown Structure (EBS), Appendix B for locations of below noted facilities, and Appendix D for supporting documentation relating to estimated unit quantities (where available). Direct cost allocations

were applied to quantities as indicated in the 2019 Work Plan and consistent with the direct cost assumptions described in the 2014 Complete Project Financial Security Assessment.

3.3.1.1 *Buildings and Foundations*

The 2019 Work Plan Security Estimate allocates $254,000 plus proportional cover material application costs, in direct costs to account for a marginal increase of buildings and foundations associated with the 2018 Work Plan Addendum. This marginal increase of buildings and foundations is itemized in the EBS as presented in Appendix A. This additional cost allocation is based on:

- Mobilization of various trailers, offices and washcars; and
- Mobilization and assembly of a heated fold away building (contaminated) at the new KM110 laydown area for maintenance of mine operations equipment.

A summary of security costs associated with the marginal increase of buildings and foundations associated with the 2019 Work Plan is shown in Table 3-1.

Table 3-1: Summary of Marginal Increase of Buildings and Foundation Areas

Description	Unit Rate Type	Unit Rate ($/m^2)	Quantity (m^2)	Cost ($)[1]
Milne Port				
Office trailers (2 x 36 m2)	Modular Building Not Contaminated	47.6	72	3,430
Office trailers (2 x 36 m2)	Modular Building Not Contaminated	47.6	72	3,430
Crusher services trailer (2 x 36 m2)	Modular Building Not Contaminated	47.6	72	3,430
Site Contruction Office (2 x 36 m2)	Modular Building Not Contaminated	47.6	72	3,430
Offices and Lunchrooms (5x36m^2)	Modular Building Not Contaminated	47.6	180	8,574
E-House	Modular Building Not Contaminated	47.6	37	1,771
Mine Site				
Quonset hut	Modular Building Not Contaminated	47.6	100	4,764
Contractor lunchroom	Modular Building Not Contaminated	47.6	36	1,715
Contractor office	Modular Building Not Contaminated	47.6	36	1,715
Rail Operations offices (2 x 36 m2)	Modular Building Not Contaminated	47.6	72	3,430
Office Trailer (60 x 60)	Modular Building Not Contaminated	47.6	334	15,910
Office Trailer (24 x 60)	Modular Building Not Contaminated	47.6	132	6,288
Office Trailer (12 x 60)	Modular Building Not Contaminated	47.6	66	3,144
Lunchtrailer (44 x 10)	Modular Building Not Contaminated	47.6	40	1,905
Container lunchroom (2 x 36 m2)	Modular Building Not Contaminated	47.6	72	3,430
Container Office (4 x 36 m2)	Modular Building Not Contaminated	47.6	144	6,860
Washroom facility for Tote Road	Modular Building Contaminated	114.9	36	4,100
Washcar	Modular Building Contaminated	114.9	36	4,100
Lunchroom	Modular Building Not Contaminated	47.6	36	1,715
Heated Maintenance shop for pit equipment at KM110.5 laydown	Fold Away Building Contaminated	114.0	1,500	171,067
		TOTAL	**3,145**	**254,000**

NOTES:
1) Grand total rounded to nearest '000

3.3.1.2 *Mechanical and Mobile Equipment*

The 2019 Work Plan Security Estimate allocates $593,000, plus cover material application costs, in direct costs to account for a marginal increase of mechanical and mobile equipment as itemized in the 2019 Work Plan. This cost allocation is based on an additional 117 pieces of

Baffinland owned mechanical or mobile equipment top be mobilized to site in 2019. This is in addition to 34 pieces of 3rd Party 'Heavy Mobile Equipment', 49 pieces of 3rd Party 'Medium Mobile Equipment', and 61 pieces of 3rd Party Light Mobile Equipment', to update the 'Typical' 3rd Party equipment fleet adopted in the 2017 ASR Process to 2019 expectations.

A summary of the marginal increase of costs associated with mechanical or mobile equipment and associated unit rates is shown in Table 3-2.

Table 3-2: Summary of Marginal Increase of Mechanical and Mobile Equipment

Description	Unit Rate Type	Unit Rate ($/pcs)	Quantity (pcs)	Cost ($)[1]
Generator Sets	Heavy Equipment	32,950.0	4	131,800
Bucket Wheel Stacker Reclaimer	Heavy Equipment	32,950.0	2	65,900
Screen Metso FS353	Heavy Equipment	32,950.0	2	65,900
30,000 L Fuel Tanker Truck	Heavy Mobile Equipment	2,075.0	12	24,900
745C Rock Truck	Heavy Mobile Equipment	2,075.0	2	4,150
950M Loader	Heavy Mobile Equipment	2,075.0	1	2,075
Heavy Duty Shunt Truck	Heavy Mobile Equipment	2,075.0	1	2,075
Feeder Dolly	Heavy Mobile Equipment	2,075.0	1	2,075
Fines Mobile Stacker	Heavy Mobile Equipment	2,075.0	1	2,075
CONVEYING - Jump Conveyor	Heavy Mobile Equipment	2,075.0	1	2,075
CONVEYING - Conveyor Feeder	Heavy Mobile Equipment	2,075.0	1	2,075
Pumper fire truck	Heavy Mobile Equipment	2,075.0	1	2,075
Mobile Primary Crusher Unit	Heavy Mobile Equipment	2,075.0	1	2,075
Excavator - cat 349	Heavy Mobile Equipment	2,075.0	1	2,075
MOBILE EQUIPMENT - MINE SITE WHEEL DOZER - CAT 824H	Heavy Mobile Equipment	2,075.0	1	2,075
922K Wheel Loader	Heavy Mobile Equipment	2,075.0	1	2,075
374 Excavator	Heavy Mobile Equipment	2,075.0	1	2,075
740B ARTICULATING WATER TRUCK	Heavy Mobile Equipment	2,075.0	1	2,075
Fuel Tanker and tractor	Heavy Mobile Equipment	2,075.0	1	2,075
Jet A Truck	Heavy Mobile Equipment	2,075.0	1	2,075
793 Haul Truck	Heavy Mobile Equipment	2,075.0	3	6,225
D10 Dozer	Heavy Mobile Equipment	2,075.0	1	2,075
Generator/Air Compressor	Light Equipment	1,583.8	2	3,168
Light Plant	Light Equipment	1,583.8	27	42,761
F250 Passenger Van	Light Mobile Equipment	729.2	1	729
Light ERT utility vehicle	Light Mobile Equipment	729.2	1	729
Off Road Tracked Rescue Vehicle	Light Mobile Equipment	729.2	1	729
Skid Steer, Cat 247B or 275D	Light Mobile Equipment	729.2	1	729
Portable water pump	Light Mobile Equipment	729.2	2	1,458
Pickup truck (F350 or similar)	Light Mobile Equipment	729.2	15	10,938
Genie Manlift z60	Light Mobile Equipment	729.2	2	1,458
Genie Manlift s135x	Light Mobile Equipment	729.2	3	2,188
Frost Fighter Heater	Light Mobile Equipment	729.2	7	5,104
Generator (medium)	Medium Equipment	3,392.5	1	3,393
Tri-Trombone flat trailer	Medium Mobile Equipment	1,162.5	1	1,163
Freightliner Highway Truck	Medium Mobile Equipment	1,162.5	1	1,163
Fuel/Lube Truck	Medium Mobile Equipment	1,162.5	1	1,163
Telehandler	Medium Mobile Equipment	1,162.5	1	1,163
Telehandler	Medium Mobile Equipment	1,162.5	1	1,163
Zoom Boom 12,000 lbs	Medium Mobile Equipment	1,162.5	1	1,163
Passenger Bus	Medium Mobile Equipment	1,162.5	4	4,650

Description	Unit Rate Type	Unit Rate ($/pcs)	Quantity (pcs)	Cost ($)[1]
4x4 hotseating bus	Medium Mobile Equipment	1,162.5	1	1,163
Boom Truck	Medium Mobile Equipment	1,162.5	1	1,163
Pressure washing truck	Medium Mobile Equipment	1,162.5	1	1,163
3rd Party Heavy Mobile Equipment (make up for 'typical' fleet)	Heavy Mobile Equipment	2,075.0	34	70,550
3rd Party Medium Mobile Equipment (make up for 'typical' fleet)	Medium Mobile Equipment	1,162.5	49	56,963
3rd Party Light Mobile Equipment (make up for 'typical' fleet)	Light Mobile Equipment	729.2	61	44,479
		TOTAL	**261**	**$593,000**

NOTES:
1) Grand total rounded to nearest '000

3.3.1.3 Site Works

The 2019 Work Plan Addendum Security Estimate allocates $5,076,000 in direct costs to account for a marginal increase of disturbed areas that would have to graded and re-contoured associated with the 2018 Work Plan Addendum. This additional cost allocation is based on:

- Development of four (4) new quarries and expansion of the previously proposed quarry Q5, and the expansion of the existing quarry Q1 with a total footprint of 2,328,287 m^2.
- Construction of the Tote Road laydowns totaling a footprint of 285,000 m^2.
- Expansion of the proposed (2018) laydown LP2 at Milne Port by 30,000 m^2.
- Expansion of the Mine Site Crusher Pad (12,000 m^2) and associated sedimentation pond (2,000 m^2).
- Construction of laydowns at the Mine Site (KM110.5, KM107.5, expansion of the 800 person camp pad, WRF Water Treatment Plant pad) with a total footprint of 286,500 m^2.
- Expansion of the landfill footprint from the existing 13,000 m^2 to a total of 76,000 m^2, representing an increase in disturbed area of 63,000 m^2.
- Construction of the KM107 Run of Mine Stockpile and access road (133,400 m^2) and associated sedimentation pond (7,400 m^2).
- Construction of the Mine Site bulk fuel storage facility at a total footpring of 21,620 m^2 with a lined footprint of 12,000 m^2.
- Expansion of the Milne Port Ore Stockpile pad by 140,000 m^2, and the construction of a new associated sedimentation pond (15,000 m^2).
- Construction of the east sedimentation pond (No. 2a) at the Milne Port Ore Stockpile with a lined footprint of 4,400 m^2.
- Construction of a new contaminated snow dump/oily water containment area at Milne Port with a lined footprint of 2,700 m^2.
- Construction of new hazardous waste berms at the Mine Site and Milne Port with a total area of 360 m^2 per berm.

This marginal increase is based on an additional 3,294,207 m^2 of disturbed areas at a revised unit rate of \$1.49/m^2 for unlined or \$4.12/m^2 for lined, and is itemized in the EBS as presented in Appendix A and outlined in Table 3-2.

Table 3-3: Summary of Marginal Increase of Disturbed Areas Requiring Grade and Re-Contour

Description	Unit Rate Type	Unit Rate ($/$m^2$)	Quantity (m^2)	Cost ($)[1]
Milne Port				
Laydown LP2	Grade and Contour	1.49	30,000	44,847
Ore Stockpile Pad Expansion 2019	Grade and Contour	1.49	140,000	209,287
Ore Stockpile Sedimentation - New 2019	Grade and Re-Contour With Liner	4.12	15,000	62,134
Ore Stockpile Sedimentation Pond 2a	Grade and Re-Contour With Liner	4.12	4,400	18,226
Contaminated Snow dump/oily water containment - new 2019	Grade and Re-Contour With Liner	4.12	2,700	11,116
New Hazardous Waste Berm 2019	Grade and Re-Contour With Liner	4.12	360	1,482
Q1 Quarry (additional marginal increase in 2019)	Grade and Contour	1.49	226,000	337,849
Tote Road				
Laydown 2 - 2019	Grade and Contour	1.49	55,800	83,333
Laydown 4 - 2019	Grade and Contour	1.49	66,300	99,014
Laydown 7 - 2019	Grade and Contour	1.49	28,900	43,160
Laydown 9 - 2019	Grade and Contour	1.49	92,500	138,141
Laydown 10 - 2019	Grade and Contour	1.49	34,500	51,523
Laydown 13 - 2019	Grade and Contour	1.49	7,000	10,454
PQ2a quarry	Grade and Contour	1.49	345,500	516,491
PQ4a quarry	Grade and Contour	1.49	105,000	156,965
PQ6a quarry	Grade and Contour	1.49	194,000	290,012
PQ12a quarry	Grade and Contour	1.49	232,200	347,118
Q5 Quarry Expansion 2019	Grade and Contour	1.49	1,225,587	1,832,140
Mine Site				
Expansion of 800p camp laydown	Grade and Contour	1.49	12,000	17,939
WRF Water Treatment plant laydown 2019	Grade and Contour	1.49	3,500	5,232
KM107.5 Laydown for haul road parking	Grade and Contour	1.49	91,000	136,037
KM110.5 Laydown for Mine Ops	Grade and Contour	1.49	180,000	269,084
Km107 Stockpile and access Road	Grade and Contour	1.49	133,400	199,421
New PWSP 2019	Grade and Re-Contour With Liner	4.12	4,180	17,209
Crusher Pad Expansion 2019	Grade and Re-Contour With Liner	1.49	12,000	17,939
KM107 Sedimentation Pond	Grade and Re-Contour With Liner	4.12	7,400	30,653
Crusher Pad Sedimentation Pond 2019	Grade and Re-Contour With Liner	4.12	2,000	8,285
Landfarm	Grade and Re-Contour With Liner	4.12	9,000	37,280
Hazardous Waste Berm - New 2019	Grade and Re-Contour With Liner	4.12	360	1,482
Mine Site Fuel Tank Farm 2019 Footprint	Grade and Contour	1.49	21,620	32,288
Fuel Tank Containment Area	Grade and Re-Contour With Liner	4.12	12,000	49,707
		TOTAL	**3,294,207**	**5,076,000**

NOTES:
1) Grand total rounded to nearest '000

3.3.1.4 Storage Tanks

The 2019 Work Plan Security Estimate allocates \$358,000 in direct costs to account for the mobilization of additional water and fuel tanks to the Project Site in the 2019 Work Plan, including the construction of two (2) 15 million litre arctic diesel tanks at the Mine Site. A

summary of the marginal increase of costs associated with water and fuel tanks and their associated unit rates is shown in Table 3-4 and is itemized in the EBS as presented in Appendix A.

Table 3-4: Summary of Marginal Increase of Storage Tanks

Description	Unit Rate Type	Unit Rate ($/ea)	Quantity (ea)	Cost ($)[1]
Water Tanks	Light Tank	1,710.4	6	10,263
Fuel Tanks	Light Diesel Tank	2,950.0	5	14,750
	Medium Mobile Diesel Tank	8,381.3	7	58,669
	Largest Diesel Tanks	137,277.5	2	274,555
		TOTAL	**20**	**358,000**

NOTES:
1) Grand total rounded to nearest '000

3.3.1.5 *Culverts*

The 2019 Work Plan Security Estimate allocates $28,500 to account for the installation of 365 m of new culverts at within the Tote Road area and the Mine Site area. As the unit rate was revised in 2018 to account for removal of a culvert on a per metre basis rather than per culvert bases, the cost allocation is based on a total of 365 m of culvert at a unit rate of $50 per metre and is presented in Table 3-5, and itemized in the EBS presented in Appendix A.

Table 3-5: Summary of Marginal Increase for Culvert Removal

Description	Unit Rate Type	Unit Rate ($/m)	Quantity (m)	Cost ($)[1]
Tote Road				
Culverts for Quarry Access Roads	Culvert Removal Per Metre	50	80	4,000
Mine Site				
Culverts for KM107 Stockpile Access Road	Culvert Removal Per Metre	50	225	11,250
Culverts for 800p Camp Discharge Line	Culvert Removal Per Metre	50	60	3,000
		TOTAL	**365**	**18,250**

NOTES:
1) Grand total rounded to nearest '000

3.3.1.6 *Desalination Plant*

The 2019 Work Plan Security Estimate allocates $7,925 plus cover material application costs to account for the closure and reclamation costs of a proposed desalination plant to be mobilized to Milne Port in 2019. This cost allocation is based the unit rate buildup for a potable water plant, established in the 2014 Complete Reclamation Security Estimate.

3.3.1.7 *Fill Application*

The 2019 Estimate allocates an additional $98,000 to account for application of cover material due to the marginal increase of demolition materials to be disposed of on-site. This cost allocation is based on an additional 2,534 m^2 of compacted material requiring fill application at an assumed disposal depth of six (6) meters. A summary of the marginal increase of fill application in the 2019 Security is shown in Table 3-6.

Table 3-6: Marginal Increase of Fill Application

Description	Unit Rate ($/m²)	Quantity (m²)	Cost ($)[1]
Mine Site			
Fill Application for 2018 Estimate Addendum	38.8	2,534	98,378
	TOTAL	**2,534**	**98,000**

NOTES:
1) Grand total rounded to nearest '000

3.3.2 Indirect Cost Assumptions

The following section describes the assumptions used to establish the indirect costs allocated for the purpose of the 2019 Work Plan Security Estimate. Unless noted otherwise, see the 2014 Complete Project Financial Security Assessment (H349000-1000-07-126-0018, Rev. 1) for further supporting information on the specific indirect unit rates and multipliers used below.

3.3.2.1 On-Site Fuel Demobilization and Reclamation Fuel Mobilization

The 2019 Estimate allocates an additional $1,736,000 to account for the demobilization of fuel stored on Site, and the mobilization of fuel required for the marginal increase in reclamation activities captured in the 2019 Estimate Addendum. Based on the increased fuel capacity in 2019 of an additional 30,000,000 L at the Mine Site, it is assumed 50% of this fuel would need to be demobilized at closure. This is based both on the assumption that the tanks would be likely to be entirely full at closure, and that some fuel on Site would be available for reclamation activities. The fuel demobilization rate is assumed to be $0.10/L.

The additional $1,736,000 allocation for fuel mobilization is based on the cost of mobilizing 50% of the fuel required for marginal reclamation and closure activities, including direct activities, power generation, and heat production. Reclamation for the marginal increase in activities in 2019 are estimated to require and additional 564,000 L of Type-1 fuel (see Appendix A). Marginal increases in camp operation during reclamation is estimated to require an additional 5,312 person-days on-site. Each person-day on site is assumed to consume 116L of Type-1 fuel for heat and power generation. This totals 614,000 L of Type-1 fuel required to heat and power the camp. Fuel mobilization rate is assumed to be $0.40/L.

See Appendix A for itemized person-day and fuel consumption quantities per item in the 2019 Estimate.

3.3.2.2 Off-Site Disposal of Hazardous and Non-Hazardous Waste

The 2019 Estimate allocates a marginal increase of $3,508,000 to account for the demobilization of ammonium nitrate planned to be mobilized to Site in 2019. The previous volume of ammonium nitrate accounted for in the estimate was 2,342 m^3. The 2019 Work Plan indicates an estimated total volume of ammonium nitrate required in 2019 at 12,142 m^3, which is an increase of 9,800 m^3, at a backhaul unit rate for dangerous goods of $358/$m^3$.

3.3.2.3 *Mobilization of Workers Required for Reclamation*

The 2019 Estimate allocates an additional $437,000 for worker mobilization. Detailed assumptions for mobilization of workers required for marginal closure and reclamation activities are as follows.

Person-hours required to complete direct cost related on-site marginal reclamation activities is estimated to be 53,120 hrs or 5,312 person-days (based on 10hr/day productivity). See Appendix A for itemized person-day allocations per 2019 Estimate item.

- Assume 70% of hires (3,719 person-days) are from southern communities and 30% (1,594 person-days) are from northern communities.
- Cost per person-day on site for worker mobilization from southern communities is $85.45/person-day on-site.
- Cost per person-day on site for worker mobilization from northern communities is $75.00/person-day on-site

3.3.2.4 *Worker Accommodation & Camp Operation*

The 2019 Estimate allocates an additional $1,198,000 for worker accommodation and camp operation during marginal reclamation activities associated with the 2019 Estimate. Assumptions for worker accommodation and camp operation are:

- Person-hours required to complete direct cost related on-site marginal reclamation activities is estimated to be 53,120 hrs or 5,312 person-days (based on 10hr/day productivity). See Appendix A for itemized person-day allocations.
- Cost for accommodation and camp operation is assumed to be $225.50/person-day and includes camp maintenance, catering, housekeeping, and fuel costs.

3.3.2.5 *Mobilization and Demobilization of Equipment and Materials*

The 2019 Estimate allocates an additional $676,460 to account for mobilization and demobilization of equipment and materials. These are indirect costs for moving equipment and materials to and from the reclamation site. The amount is based the assumption that mobilization and demobilization cost are estimated as 10% of total direct costs.

The 2019 Estimate also allocates an additional $ 15,591,652 to account for the demobilization of the Phase 2 Expansion Project Materials and Equipment (the 'Modules'). Based on discussions with QIA in 2018 regarding the previous estimation of demobilizing the equipment, Baffinland utilized a unit rate of $68/$m^3$ of material that would be required to be backhauled from the Site in the event of unforeseen closure, prior to the approval of the Phase 2 expansion and subsequent construction and installation of this equipment. It is recognized that the costs associated with this equipment are solely related to backhaul, and will need to be re-assessed prior to their installation following approval of the Phase 2 expansion. A full breakdown of the volumes and contents of each module is provided in the 2019 Work Plan, a cost outline per module is provided in the following Table 3-7. It should be noted that this material will not arrive at the Site until the first sealift of 2019, scheduled for the end of July 2019.

Table 3-7: 2019 Phase 2 Expansion Project Materials and Equipment

Description	Unit Rate ($/m³)	Quantity (m³)	Cost ($)[1]
Rail Construction Materials	68	18,172	1,235,696
BMH Conveyors	68	49,868	3,391,024
Car Dumper Module	68	24,756	1,683,408
Screening Module	68	33,278	2,262,904
Shiploader Module	68	81,400	5,535,200
Crushing Module	68	21,815	1,483,420
	TOTAL	**229,289**	**15,592,000**

In addition to the above, the 2019 Estimate allocates an additional $13,300 for the demobilization of hazardous waste materials associated with the Water Treatment Plant at the Waste Rock Facility. This cost was based on the Hatch (2014) cost to demobilize a seacan of hazardous materials ($3,697 + 20% markup), and assumes a total of two (2) seacans of material based on 8,000 kg of lime, 4,086 kg of ferric sulphate, and 75 kg of polymer. In addition, a 50% contingency was applied to account for uncertainty in the packaging of these wastes for disposal.

3.3.2.6 Post Closure Monitoring

This estimate for Post Closure Monitoring has been revised following the update to the Interim Closure and Reclamation Plan (Revision 5, 20 October 2018) and discussions with QIA. The previous value allocated for Post Closure Monitoring was $3,766,000, allocated in the 2016 Marginal Closure and Reclamation Financial Security Estimate.

Based on discussions with QIA with respect to the ICRP and the High Uncertainty Items, the estimate for Post Closure Monitoring was updated in 2018. These updates correspond to the updated Closure and Post Closure Monitoring schedule outlined in the ICRP (Revision 5, 30 October 2018), and reflect specific changes as a result of engagement with the QIA. Of note, Short Term Care and Maintenance has been assumed here to be 2 years duration, as it is unlikely QIA would have sufficient time to execute a Closure plan within 1 year in the event of unplanned closure. The revised total estimate as presented in Table 3-8, is equal to $4,990,000. This represents an increase in Post Closure Monitoring of $1,233,000, which is reflected in this estimate.

Table 4-8: 2019 Updated Post Closure Monitoring Schedule and Costs

	Temporary Care & Maintenance		Closure			Post Closure								
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	16	17	Year 18	Subtotal
Short Term Temporary Care and Maintenance Program	100,000	100,000												200,000
Permitting	200,000	100,000												300,000
Aquatic Monitoring Program (AEMP, DFO)	100,000	100,000	200,000	200,000	200,000	100,000	100,000	100,000	50,000	50,000			50,000	1,250,000
Environmental Effects Monitoring Program	50,000	50,000	50,000	50,000	50,000						25,000	25,000	25,000	325,000
Post-Closure Fauna & Flora Monitoring (Terrestrial Program)	100,000	100,000	200,000	200,000	200,000		100,000		100,000					1,000,000
Marine Monitoring			200,000	200,000	200,000									600,000
Geotechnical/ Engineering Monitoring	30,000	30,000	30,000	30,000	30,000	15,000	15,000	15,000	15,000	15,000			15,000	240,000
Environmental Site Assessment		150,000			150,000									300,000
Safety Compliance Inspection[1]	25,000	25,000	25,000	25,000	25,000	10,000	10,000	10,000	10,000	10,000			10,000	185,000
Socio-economic Reporting	40,000	40,000	40,000	40,000	40,000	20,000	20,000	20,000	20,000	20,000			20,000	320,000
Air Quality Monitoring Program	30,000	30,000	60,000	60,000	60,000	30,000								270,000
Subtotal	675,000	725,000	805,000	805,000	955,000	175,000	245,000	145,000	195,000	95,000			120,000	
													Total	**4,990,000**

3.3.2.7 Supervision, Project Management and Contract Administration

The 2019 Estimate includes a project supervision, management and contract administration indirect cost allowance of $636,000 or 9.4% of total direct costs, contaminated soil treatment costs, care and maintenance costs, and closure monitoring/reporting costs. Project supervision, management and contract administration indirect costs include, but are not limited to:

- Contract strategy, administration and expediting;
- Construction logistics, planning, scheduling, supervision and manpower forecasts;
- Labour relations, safety;
- Field office management, temporary facilities;
- Materials receiving and warehousing;
- Progress monitoring, trending and reporting;
- Cost performance monitoring, trending and claims processing; and
- Quality assurance.

3.3.2.8 Engineering Fees

The 2019 Estimate includes an engineering, design and execution planning indirect cost allowance of $264,000 or 3.9% of the total direct costs.

3.3.2.9 Contingency

The 2019 Estimate includes an additional contingency of $3,083,000 or 12.5% of the total of direct costs, mobilization and demobilization of equipment and materials costs, worker accommodation and camp operation costs, mobilization of workers costs, care and maintenance costs, and closure monitoring/reporting costs.

3.3.3 Exclusions

The listed activities below are recognized by Baffinland as being required to be conducted in an unforeseen closure and reclamation scenario, but additional costs have not been included in the 2019 Work Plan Security Estimate on the basis that it is Baffinland's position that the 2019 Work Plan activities do not warrant additional cost allocations for these activities. Excluded activities from the 2018 Work Plan Addendum Security Estimate are:

- Contaminated Soil Treatment.

4. 2019 Estimate Summary

The 2019 Estimate is inclusive of all closure and reclamation costs estimated to be required for a 3rd Party Contractor to perform the work in a 'worst-case' scenario for all disturbed areas, project components and project activities existing on the Mary River Project site upon conclusion of the 2019 Work Plan, including legacy exploration phase liabilities.

Table 4-1 presents the 'global' closure and reclamation security estimated to be required based on the 2018 ASR Estimate (Column C) compiled with the adjustment based on the updated unit rates (Column D), and the 2019 Work Plan Estimate (Column E) compared to the amount already posted (Column G).

Table 4-1: Mary River Project 'Global' Closure and Reclamation Security Summary[1] – 2019 Work Plan

	A	B	C	D	E	F	G	H
	Authorization	Liability	Global Estimate from 2018 Addendum Estimate ($)	2018 Unit Rate Adjustment ($)	2019 Estimate, Including 2018 Reconciliation ($)	Total 'Global' Estimated Security for 2018 ($)	Total Posted as of July 2018 ($)	Marginal Adjustment to be Posted ($)
						C + D + E		F - G
1	Type A 2AM-MRY1325	IOL[2]	68,835,000	-7,754,000	34,399,000	95,480,000	73,829,771	21,650,229
2		Crown	1,196,000	-147,000	730,000	1,779,000	1,298,555	480,445
3		Water	1,714,000	-338,000	18,313,000	19,689,000	-	-
4		Land	68,316,878	-7,563,000	16,815,000	77,568,878	-	-
5	*Subtotal Type A*		*70,031,000*	*-7,901,000*	*35,128,000*	*97,258,000*	75,128,326	22,130,674
6	Type B Exploration2BE-MRY1421 [3]	IOL	165,000	-	-	165,000	-	165,000
7		Crown	1,082,000	-	-	1,082,000	1,250,000	-168,000
8		Water	18,000	-	-	18,000	-	-
9		Land	1,229,000	-	-	1,229,000	-	-
10	*Subtotal Type B Exploration*		*1,247,000*	-		*1,247,000*	*1,250,000*	*-3,000*
11	DFO Security Associated with Ore Dock	IOL[2]	-	-	-	-	-	-
12		Crown	563,000	-	-	563,000	563,000	-
13		Water	563,000	-	-	563,000	563,000	-
14		Land	-	-	-	-	-	-
15	*Subtotal DFO*		*563,000*	-		*563,000*	*563,000*	-
16	AANDC Land Lease 47H/16-1-2 [4]	IOL[2]	-	-	-	-	-	-
17		Crown	4,975,000	-	-	4,975,000	4,975,000	-
18		Water	-	-	-	-	-	-
19		Land	4,975,000	-	-	4,975,000	4,975,000	-
20	*Subtotal AANDC Land Lease*		*4,975,000*	-	-	*4,975,000*	*4,975,000*	-
21	**GRAND TOTAL**		**76,816,000**			**104,043,000**	**81,916,326**	

NOTES:

1) Totals rounded to nearest '000 in CAD

2) Security relating to IOL held by Qikiqtani Inuit Association (QIA) under Commercial Lease No. Q13C301

3) As per Mary River Exploration Project Closure and Reclamation Plan (BAF-PH1-830-P16-0038, Rev 1)

4) As per Closure and Reclamation Strategy and Financial Security Estimate for Nunavut Lease #47H/16-1-2 (H349001-2000-07-126-0001, Rev.0)

5. Supporting Documents

In addition to information presented within this document, please refer to the following appendices for supporting information:

- Refer to Appendix A for the 2019 Estimate Breakdown Structure (EBS).
- Refer to Appendix B for updated 2019 Work Plan Layouts.
- Refer to Appendix C for the updated Unit Rate documentation
- Refer to Appendix D for Supporting Documentation

Appendix A:

2019 Estimate Breakdown Structure (EBS)

Baffinland

'Mary River Project - Complete Project Security Assessment - Estimate Breakdown Structure'
Updated 31 October 2018

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility/Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M	Closure		Post Closure			C&M	Closure		Post Closure			
																																											Year 0+ %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 + %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0- Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
2000	Project Wide																																																						
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2014		11,768	m2	0.3	2.0	16.6	22.2	38.8	2,968	23,855	195,531	261,420	456,951	0	0	100%	0%	0%	100%	456,951	0	0	456,951	Type A 2AM-MRY1325	Modified	2014	Direct				100%									0	0	456,951	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015		378	m2	0.3	2.0	16.6	22.2	38.8	95	766	6,281	8,397	14,678	0	0	100%	0%	0%	100%	14,678	0	0	14,678	Type A 2AM-MRY1325	Modified	2015	Direct				100%									0	0	14,678	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Additional Laydown Areas		0	m2	0.0	0.1	1.0	0.4	1.5	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015	Direct			33%	33%	33%							0	0	0	0	0	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2016		656	m2	0.3	2.0	16.6	22.2	38.8	166	1,330	10,905	14,580	25,486	0	0	100%	0%	0%	100%	25,486	0	0	25,486	Type A 2AM-MRY1325	Added	2016	Direct				100%									0	0	25,486	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			CON	Consumables	CON		Consumables		Consumables - addition of 49 person camp		49	Bed Space	0.0	700.8	0.0	0.0	700.8	0	34,339	0	0	34,339	0	0	100%	0%	0%	100%	34,339	0	0	34,339	Type A 2AM-MRY1325	Added	2017	Direct				100%									0	0	34,339	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2017		1,192	ea	0.3	2.0	16.6	22.2	38.8	301	2,417	19,809	26,484	46,292	0	0	100%	0%	0%	100%	46,292	0	0	46,292	Type A 2AM-MRY1325	Added	2017	Direct				100%									0	0	46,292	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2019 & 2019-R		2,664	m2	0.3	2.0	16.6	22.2	38.8	672	5,401	44,268	59,185	103,452	0	0	100%	0%	0%	100%	103,452	0	0	103,452	Type A 2AM-MRY1325	Added	2019	Direct				100%									0	0	103,452	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2018-C1 & 2018-R		4,019	m2	0.3	2.0	16.6	22.2	38.8	1,014	8,146	66,772	89,273	156,046	0	0	100%	0%	0%	100%	156,046	0	0	156,046	Type A 2AM-MRY1325	Added	2018-C1	Direct				100%									0	0	156,046	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2018-C2		122	m2	0.3	2.0	16.6	22.2	38.8	31	246	2,020	2,700	4,720	0	0	100%	0%	0%	100%	4,720	0	0	4,720	Type A 2AM-MRY1325	Added	2018-C2	Direct				100%									0	0	4,720	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015 A		8	m2	0.3	2.0	16.6	22.2	38.8	2	16	133	178	312	0	0	100%	0%	0%	100%	312	0	0	312	Type A 2AM-MRY1325	Modified	2015 A	Direct				100%									0	0	312	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			CON	Consumables	CON		Consumables		Consumables		550	Bed Space	0.0	700.8	0.0	0.0	700.8	0	385,441	0	0	385,441	0	0	100%	0%	0%	100%	385,441	0	0	385,441	Type A 2AM-MRY1325	Added	2015 R	Direct				100%									0	0	385,441	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - Shiploader		5,049	m2	0.3	2.0	16.6	22.2	38.8	1,274	10,235	83,892	112,162	196,054	0	0	0%	100%	0%	100%	0	196,054	0	196,054	Type A 2AM-MRY1325	Added	2015 R	Direct				100%									0	0	196,054	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2015 R		4,661	m2	0.3	2.0	16.6	22.2	38.8	1,176	9,448	77,444	103,541	180,984	0	0	100%	0%	0%	100%	180,984	0	0	180,984	Type A 2AM-MRY1325	Added	2015 R	Direct				100%									0	0	180,984	0	0	0	0	0
1000	Project Wide	1100	General (Project Controls Use)	1100	General (Project Controls Use)	1100	General (Project Controls Use)			A2	Fill Application	Fill	Site Works	Fill Application	Fill Application	Fill Application - 2017-A		7,147	m2	0.3	2.0	16.6	22.2	38.8	1,803	14,487	118,750	158,766	277,515	0	0	100%	0%	0%	100%	277,515	0	0	277,515	Type A 2AM-MRY1325	Added	2017-A	Direct				100%									0	0	277,515	0	0	0	0	0
2000	Milne Port																																																					
2000	Milne Port	2100	General																																																			
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure	2110	Communication and IT Infrastructure	001	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed - Demolish Building - ISO Shipping Container	2110-BLD-001	15	m2	0.1	1.4	8.4	14.0	23.8	2	21	125	208	354	1	15	100%	0%	0%	100%	354	0	0	354	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	118	118	118	0	0	0	0	0
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure		BLD									Satellite Dish Sea Can - Demolish and Decontaminate Building - Undefined	2110-BLD-002	0	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	0	0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure	2110	Communication and IT Infrastructure		BLD							Satellite Dish Sea Can - Demolish and foundations - Undefined	2110-BLD-002	0	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	0	0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure	2110	Communication and IT Infrastructure		BLD							Satellite Dish Sea Can - Demolish floor finish - Undefined	2110-BLD-002	0	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	0	0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure	2110	Communication and IT Infrastructure	002	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Communication Shed - Demolish and foundations - Gravel Base - Skidded Building	2110-BLD-001	15	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	0	0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2110	Communication and IT Infrastructure	2110	Communication and IT Infrastructure	003	BLD		#N/A	FW	Flooring / Foundations	Wood Floor		Communication Shed - Demolish floor finish - Raised Steel or Wooden Floor	2110-BLD-001	15	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	0	0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Disturbed Area @ Milne Port (adjacent to Steel Tank Farm)		45,000	m2	0.0	0.1	1.0	0.4	1.5	571	6,581	42,845	17,845	67,271	0	0	100%	0%	0%	100%	67,271	0	0	67,271	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	22,424	22,424	22,424	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Mine Laydown Area		37,375	m2	0.0	0.1	1.0	0.4	1.5	474	5,466	35,585	14,821	55,872	0	0	100%	0%	0%	100%	55,872	0	0	55,872	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	18,624	18,624	18,624	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP3		131,000	m2	0.0	0.1	1.0	0.4	1.5	1,663	19,159	124,727	51,947	195,833	0	0	100%	0%	0%	100%	195,833	0	0	195,833	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%	33%	33%							0	65,278	65,278	65,278	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP5		65,000	m2	0.0	0.1	1.0	0.4	1.5	825	9,506	61,887	25,775	97,169	0	0	100%	0%	0%	100%	97,169	0	0	97,169	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%	33%	33%							0	32,390	32,390	32,390	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP2		32,000	m2	0.0	0.1	1.0	0.4	1.5	406	4,680	30,468	12,689	47,837	0	0	100%	0%	0%	100%	47,837	0	0	47,837	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%	33%	33%							0	15,946	15,946	15,946	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP7		21,000	m2	0.0	0.1	1.0	0.4	1.5	267	3,071	19,994	8,327	31,393	0	0	100%	0%	0%	100%	31,393	0	0	31,393	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%	33%	33%							0	10,464	10,464	10,464	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP1		-13,000	m2	0.0	0.1	1.0	0.4	1.5	-165	-1,901	-12,377	-5,155	-19,434	0	0	100%	0%	0%	100%	-19,434	0	0	-19,434	Type A 2AM-MRY1325	Removed	2019-R	Direct			33%	33%	33%							0	-6,478	-6,478	-6,478	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP2		30,000	m2	0.0	0.1	1.0	0.4	1.5	381	4,388	28,563	11,896	44,847	0	0	100%	0%	0%	100%	44,847	0	0	44,847	Type A 2AM-MRY1325	Added	2019	Direct			33%	33%	33%							0	14,949	14,949	14,949	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP1		13,000	m2	0.0	0.1	1.0	0.4	1.5	165	1,901	12,377	5,155	19,434	0	0	100%	0%	0%	100%	19,434	0	0	19,434	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%	33%	33%							0	6,478	6,478	6,478	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP4		13,000	m2	0.0	0.1	1.0	0.4	1.5	165	1,901	12,377	5,155	19,434	0	0	100%	0%	0%	100%	19,434	0	0	19,434	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%	33%	33%							0	6,478	6,478	6,478	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown LP6		7,000	m2	0.0	0.1	1.0	0.4	1.5	89	1,024	6,665	2,776	10,464	0	0	100%	0%	0%	100%	10,464	0	0	10,464	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%	33%	33%							0	3,488	3,488	3,488	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Milne Port Module Road 2018		13,300	m2	0.0	0.1	1.0	0.4	1.5	169	1,945	12,663	5,274	19,882	0	0	100%	0%	0%	100%	19,882	0	0	19,882	Type A 2AM-MRY1325	Added	2018-C2	Direct			33%	33%	33%							0	6,627	6,627	6,627	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Milne Port Q1 Access Road		1,200	m2	0.0	0.1	1.0	0.4	1.5	15	176	1,143	476	1,794	0	0	100%	0%	0%	100%	1,794	0	0	1,794	Type A 2AM-MRY1325	Added	2018-C2	Direct			33%	33%	33%							0	598	598	598	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2131	Construction Laydown			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Milne Port Surface Water Management Diversion Berms & Ditching		9,500	m2	0.0	0.1	1.0	0.4	1.5	121	1,389	9,045	3,767	14,202	0	0	100%	0%	0%	100%	14,202	0	0	14,202	Type A 2AM-MRY1325	Added	2018-C2	Direct			33%	33%	33%							0	4,734	4,734	4,734	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2133	Materials Handling													0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct													0	0	0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2136	Milne Port			A3	Grade & Re-Contour	A9	Site Works	Grade and Re-Contour Building Footprints		Grade and Re-Contour Building Footprints		14,306	m2	0.0	0.1	1.0	0.4	1.5	182	2,092	13,621	5,673	21,386	0	0	100%	0%	0%	100%	21,386	0	0	21,386	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	7,129	7,129	7,129	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2138	Quarry Development													0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct													0	0	0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Site Roads		12,149	m2	0.0	0.1	1.0	0.4	1.5	154	1,777	11,567	4,817	18,161	0	0	100%	0%	0%	100%	18,161	0	0	18,161	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	6,054	6,054	6,054	0	0	0	0	0
2000	Milne Port	2100	General	2130	Site Development	2134				A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Camp Pad @ Milne Port		66,536	m2	0.0	0.1	1.0	0.4	1.5	845	9,731	63,350	26,385	99,465	0	0	100%	0%	0%	100%	99,465	0	0	99,465	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%							0	33,155	33,155	33,155	0	0	0	0	0
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment	013	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	2140-MO-001		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%					33%	0				0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment	014	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	2140-MO-002		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%					33%	0				0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment	015	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	2140-MO-003		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%					33%	0				0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment	016	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	2140-MO-004		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%					33%	0				0	0	0	0	0	0	0	0
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Mobile Light Plant, Large		5	Ea	13.0	100.0	975.0	1,000.0	2,075.0	65	500	4,875	5,000	10,375	96	480	100%	0%	0%	100%	10,375	0	0	10,375	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%							0	3,458	0	3,458	0	0	0	0	3,458
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Pick-Up Truck		7	Ea	6.7	20.8	500.0	208.3	729.2	47	146	3,500	1,458	5,104	4	28	100%	0%	0%	100%	5,104	0	0	5,104	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%							0	1,701	0	1,701	0	0	0	0	1,701
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	F250 Passenger Van		1	Ea	6.7	20.8	500.0	208.3	729.2	7	21	500	208	729	4	4	100%	0%	0%	100%	729	0	0	729	Type A 2AM-MRY1325	Added	2019	Direct			33%		33%							0	243	0	243	0	0	0	0	243
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd party Equipment	Ford F350 Pickup		6	Ea	6.7	20.8	500.0	208.3	729.2	40	125	3,000	1,250	4,375	4	24	100%	0%	0%	100%	4,375	0	0	4,375	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%							0	1,458	0	1,458	0	0	0	0	1,458
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Jump Conveyor		2	Ea	13.0	100.0	975.0	1,000.0	2,075.0	26	200	1,950	2,000	4,150	96	192	100%	0%	0%	100%	4,150	0	0	4,150	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%							0	1,383	0	1,383	0	0	0	0	1,383
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd party Equipment	Stockpile Reclaim Loader, 988		2	Ea	10.0	37.5	750.0	375.0	1,162.5	20	75	1,500	750	2,325	24	48	100%	0%	0%	100%	2,325	0	0	2,325	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%							0	775	0	775	0	0	0	0	775
2000	Milne Port	2100	General	2140	Mobile Equipment	2140	Mobile Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd party Equipment	Grove 60 Ton Crane		1	Ea	13.0	100.0	975.0	1,000.0	2,075.0	13	100	975	1,000	2,075	96	96	100%	0%	0%	100%	2,075	0	0	2,075	Type A 2AM-MRY1325	Added	2016	Direct			33%		33%							0

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Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'

Updated 31 October 2018

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| Level 0 - Site Location | Level 0 - Description | Level 1 - Area | Level 1 - Description | Level 2 - Facility / System | Level 2 - Description | Level 3 - Sub Facility/ Sub System | Level 3 - Description | ID CODE | Equipment Type | Price Code | Price Code Description | Qty Code | Area - QTY Code | QTY Code Description | Type | Description | Tag Number | QTY | Unit | Manhours Per Unit | Unit Fuel Consumption | Unit Labour | Unit Equipment | Unit Rate | Total Manhours | Total Fuel Consumption | Total Labour | Total Equipment | Total Cost ($) | Unit M3 | Total Vol (m3) | IOL (%) | Crown Land (%) | Water Liability (%) | Land Liability (%) | IOL Cost ($) | Crown Land Cost ($) | Water Liability Cost ($) | Land Liability Cost ($) | License | Adjustment Tag | Associated Work Plan | Type of Costs | C&M | Year 0+ % | Closure | Year 1+ - % | Year 2+ % | Year 3 + % | Post Closure | Year 4 + % | Year 5 + % | Year 6 + % | Year 7 + % | Year 8 + % | C&M | Year 0- Cost ($) | Year 0++ Cost ($) | Closure | Year 1 - Cost ($) | Year 2 - Cost ($) | Year 3 - Cost ($) | Post Closure | Year 4 - Cost ($) | Year 5 - Cost ($) | Year 6 - Cost ($) | Year 7 - Cost ($) | Year 8 - Cost ($) |
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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility/Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Existing Laydown Area		17,367	m2	0.0	0.1	1.0	0.4	1.5	220	2,540	16,535	6,887	25,962	0	0	100%	0%	0%	100%	25,962	0	0	25,962	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Existing Laydown Area		17,367	m2	0.0	0.1	1.0	0.4	1.5	220	2,540	16,535	6,887	25,962	0	0	100%	0%	0%	100%	25,962	0	0	25,962	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown Pad Development (Nuna services)		11,400	m2	0.0	0.1	1.0	0.4	1.5	145	1,667	10,854	4,521	17,025	0	0	100%	0%	0%	100%	17,025	0	0	17,025	Type A 2AM-MRY1325	Added 2018-C1	Direct	
4000	Mine Site	4100	General	4130	Site Development	4131	Construction Laydown Areas			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Mine Truck Shop (2018) laydown area		25,000	m2	0.0	0.1	1.0	0.4	1.5	317	3,656	23,803	9,914	37,336	0	0	100%	0%	0%	100%	37,336	0	0	37,336	Type A 2AM-MRY1325	Added 2018-C2	Direct	
4000	Mine Site	4100	General	4130	Site Development	4135	Explosives Pads													0	0	0	0	0	0	0	0	0	0	0	0	100%	0%			0	0	0	0	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4131	Explosives Pads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Additional laydown next to Halch old office/carpentry shack		11,250	m2	0.0	0.1	1.0	0.4	1.5	143	1,645	10,711	4,461	16,801	0	0	100%	0%	0%	100%	16,801	0	0	16,801	Type A 2AM-MRY1325	Added	2015 R	Direct
4000	Mine Site	4100	General	4130	Site Development	4133	Ore Crushing and Loading			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Crusher Pad Expansion		25,700	m2	0.01	0.1	1.0	0.4	1.5	326	3,759	24,469	10,191	38,381	0	0	100%	0%	0%	100%	38,381	0	0	38,381	Type A 2AM-MRY1325	Added	2017	Direct
4000	Mine Site	4100	General	4130	Site Development	4133	Ore Crushing and Loading			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Crusher extension Pad		36,180	m2	0.01	0.1	1.0	0.4	1.5	459	5,291	34,447	14,347	54,032	0	0	100%	0%	0%	100%	54,032	0	0	54,032	Type A 2AM-MRY1325		2015 A	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry		258,580	m2	0.0	0.1	1.0	0.4	1.5	3,283	37,817	246,197	102,539	386,553	0	0	100%	0%	0%	100%	386,553	0	0	386,553	Type A 2AM-MRY1325	Check	2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	D1Q2 Quarry		109,807	m2	0.0	0.1	1.0	0.4	1.5	1,394	16,059	104,549	43,543	164,151	0	0	100%	0%	0%	100%	164,151	0	0	164,151	Type A 2AM-MRY1325	Check	2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	D1Q1 Quarry		66,978	m2	0.0	0.1	1.0	0.4	1.5	850	9,796	63,771	26,560	100,126	0	0	100%	0%	0%	100%	100,126	0	0	100,126	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry (additional marginal increase in 2017)		6,000	m2	0.0	0.1	1.0	0.4	1.5	76	878	5,713	2,379	8,969	0	0	100%	0%	0%	100%	8,969	0	0	8,969	Type A 2AM-MRY1325	Added	2017	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Laydown Pad development (Mine Site)		45,000	m2	0.0	0.1	1.0	0.4	1.5	571	6,581	42,845	17,845	67,271	0	0	100%	0%	0%	100%	67,271	0	0	67,271	Type A 2AM-MRY1325	Added	2017-A	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry (marginal increase to existing)		50,000	m2	0.0	0.1	1.0	0.4	1.5	635	7,313	47,606	19,827	74,745	0	0	100%	0%	0%	100%	74,745	0	0	74,745	Type A 2AM-MRY1325	Added	2017-A	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry (marginal decrease, area not used in 2017)		-6,000	m2	0.0	0.1	1.0	0.4	1.5	-76	-878	-5,713	-2,379	-8,969	0	0	100%	0%	0%	100%	-8,969	0	0	-8,969	Type A 2AM-MRY1325	Added	2018-R	Direct
4000	Mine Site	4100	General	4130	Site Development	4138	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	QMR2 Quarry (marginal decrease, area not used in 2017)		-50,000	m2	0.0	0.1	1.0	0.4	1.5	-635	-7,313	-47,606	-19,827	-74,745	0	0	100%	0%	0%	100%	-74,745	0	0	-74,745	Type A 2AM-MRY1325	Added	2018-R	Direct
4000	Mine Site	4100	General	4130	Site Development	4131	Quarry Development			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Informal Construction Laydown at Mary River				0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Site Roads		80,899	m2	0.0	0.1	1.0	0.4	1.5	1,027	11,831	77,025	32,080	120,937	0	0	100%	0%	0%	100%	120,937	0	0	120,937	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour		Waste Rock Road		20,000	m2	0.0	0.1	1.0	0.4	1.5	254	2,925	19,042	7,931	29,898	0	0	100%	0%	0%	100%	29,898	0	0	29,898	Type A 2AM-MRY1325		2015	Direct
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Site Roads		1,120	m2	0.0	0.1	1.0	0.4	1.5	14	164	1,066	444	1,673	0	0	100%	0%	0%	100%	1,673	0	0	1,673	Type A 2AM-MRY1325		2015 A	Direct
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			A3	Grade & Re-Contour	A2	Site Works	Grade and Re-Contour	Grade and Contour	Mine Haul Road Widening and Cross Cut		55,900	m2	0.0	0.1	1.0	0.4	1.5	710	8,175	53,223	22,167	83,482	0	0	100%	0%	0%	100%	83,482	0	0	83,482	Type A 2AM-MRY1325		2018-C2	Direct
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			Cu-m	Culvert Removal per metre	cu-m	Site Works	Culvert Removal per metre		Culverts for KM107 Stockpile (3 x 75m)		225	m	0.3	2.2	26.1	21.7	50.0	78	489	5,869	4,891	11,249	0	0	100%	0%	0%	100%	11,249	0	0	11,249	Type A 2AM-MRY1325	added	2019	Direct
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			Cu-m	Culvert Removal per metre	cu-m	Site Works	Culvert Removal per metre		Culverts for 800p camp discharge line (4 x 15m)		60	m	0.3	2.2	26.1	21.7	50.0	21	130	1,565	1,304	3,000	0	0	100%	0%	0%	100%	3,000	0	0	3,000	Type A 2AM-MRY1325	added	2019	Direct
4000	Mine Site	4100	General	4130	Site Development	4139	Site Roads			Cu	Culvert Removal	cu	Site Works	Culvert Removal		Culverts - IOL		14	Ea	6.0	37.5	450.0	375.0	862.5	84	525	6,300	5,250	12,075	0	0	100%	0%	0%	100%	12,075	0	0	12,075	Type A 2AM-MRY1325		2018-C2	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	599	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	CAT 988H	MOBILE EQUIPMENT - MOBILE CRUSHER FRONT-END LOADER - CAT 988H L: 10390, W: 3600, H: 4115, 43400 kg	4141-MO-005		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	600	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	CAT 988H	MOBILE EQUIPMENT - MOBILE CRUSHER FRONT-END LOADER - CAT 988H L: 10390, W: 3600, H: 4115, 43400 kg	4141-MO-006		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	601	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Haul Truck	MOBILE EQUIPMENT - MINE HAUL TRUCK - CAT 777G L: 10445, W: 6706, H: 5840, 75200 kg	4141-MO-007		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	602	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Haul Truck	MOBILE EQUIPMENT - MINE HAUL TRUCK - CAT 777G L: 10445, W: 6706, H: 5840, 75200 kg	4141-MO-008		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	603	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Haul Truck	MOBILE EQUIPMENT - MINE HAUL TRUCK - CAT 777G L: 10445, W: 6706, H: 5840, 75200 kg	4141-MO-009		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	604	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Haul Truck	MOBILE EQUIPMENT - MINE HAUL TRUCK - CAT 777G L: 10445, W: 6706, H: 5840, 75200 kg	4141-MO-010		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	605	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	FEL	MOBILE EQUIPMENT - MINE SITE LARGE EXCAVATOR - CAT 390DL L: 13470, W: 3500, H: 4782, 85000 kg	4141-MO-024		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	606	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	4141-MO-025		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	607	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	4141-MO-026		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	608	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	4141-MO-027		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	609	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	4141-MO-028		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	610	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - PICKUP TRUCK - FORD F350 L: 6274, W: 2665, H: 2032, 6350 kg	4141-MO-029		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	611	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Drill	MOBILE EQUIPMENT - SINGLE PASS PRODUCTION DRILL - CAT MD6290 56800 kg	4141-MO-030		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	612	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Drill	MOBILE EQUIPMENT - SINGLE PASS PRODUCTION DRILL - CAT MD6290 L: 14260, W: 4210, H: 4590, 56800 kg	4141-MO-031		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	613	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	FEL size	MOBILE EQUIPMENT - SECONDARY DRILL - TAMROCK 800	4141-MO-033		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment	614	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Kenworth Truck	MOBILE EQUIPMENT - DRILL DUST SUPPRESSION WATER/METHANOL TRUCK - KENWORTH T800H	4141-MO-035		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Mine Haul Truck, 777		3	Ea	13.0	100.0	975.0	1,000.0	2,075.0	39	300	2,925	3,000	6,225	96	288	100%	0%	0%	100%	6,225	0	0	6,225	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Mobile Light Plant		5	Ea	10.0	37.5	750.0	375.0	1,162.5	50	188	3,750	1,875	5,813	24	120	100%	0%	0%	100%	5,813	0	0	5,813	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Light ERT utility vehicle		1	Ea	6.7	20.8	500.0	208.3	729.2	7	21	500	208	729	4	4	100%	0%	0%	100%	729	0	0	729	Type A 2AM-MRY1325	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Off Road Tracked Rescue Vehicle		1	Ea	6.7	20.8	500.0	208.3	729.2	7	21	500	208	729	4	4	100%	0%	0%	100%	729	0	0	729	Type A 2AM-MRY1325	Added	2019	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Skid Steer, Cat 247B or 275D		1	Ea	6.7	20.8	500.0	208.3	729.2	7	21	500	208	729	4	4	100%	0%	0%	100%	729	0	0	729	Type A 2AM-MRY1325	Added	2019	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Portable water pump		2	Ea	6.7	20.8	500.0	208.3	729.2	13	42	1,000	417	1,458	4	8	100%	0%	0%	100%	1,458	0	0	1,458	Type A 2AM-MRY1325	Added	2019	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Pickup truck (F350 or similar)		15	Ea	6.7	20.8	500.0	208.3	729.2	100	313	7,500	3,125	10,938	4	60	100%	0%	0%	100%	10,938	0	0	10,938	Type A 2AM-MRY1325	Added	2019	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Genie Manlift z60		2	Ea	6.7	20.8	500.0	208.3	729.2	13	42	1,000	417	1,458	4	8	100%	0%	0%	100%	1,458	0	0	1,458	Type A 2AM-MRY1325	Added	2019	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Genie Manlift s135x		3	Ea	6.7	20.8	500.0	208.3	729.2	20	63	1,500	625	2,188	4	12	100%	0%	0%	100%	2,188	0	0	2,188	Type A 2AM-MRY1325	Added	2019	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	3rd Party Equipment	Pick-Up Truck		7	Ea	6.7	20.8	500.0	208.3	729.2	47	146	3,500	1,458	5,104	4	28	100%	0%	0%	100%	5,104	0	0	5,104	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Truck Wash Facility		1	Ea	13.0	100.0	975.0	1,000.0	2,075.0	13	100	975	1,000	2,075	96	96	100%	0%	0%	100%	2,075	0	0	2,075	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Container Handler		1	Ea	13.0	100.0	975.0	1,000.0	2,075.0	13	100	975	1,000	2,075	96	96	100%	0%	0%	100%	2,075	0	0	2,075	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Gantry Crane		1	Ea	13.0	100.0	975.0	1,000.0	2,075.0	13	100	975	1,000	2,075	96	96	100%	0%	0%	100%	2,075	0	0	2,075	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Single Pass Production Drill		1	Ea	13.0	100.0	975.0	1,000.0	2,075.0	13	100	975	1,000	2,075	96	96	100%	0%	0%	100%	2,075	0	0	2,075	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	3rd Party Equipment	Ore Haul Truck Workshop		1	Ea	13.0	100.0	975.0	1,000.0	2,075.0	13	100	975	1,000	2,075	96	96	100%	0%	0%	100%	2,075	0	0	2,075	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Boom Truck		1	Ea	10.0	37.5	750.0	375.0	1,162.5	10	38	750	375	1,163	24	24	100%	0%	0%	100%	1,163	0	0	1,163	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Passenger Bus		1	Ea	10.0	37.5	750.0	375.0	1,162.5	10	38	750	375	1,163	24	24	100%	0%	0%	100%	1,163	0	0	1,163	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Track Dozer, D9		1	Ea	10.0	37.5	750.0	375.0	1,162.5	10	38	750	375	1,163	24	24	100%	0%	0%	100%	1,163	0	0	1,163	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Shovel 6030		1	Ea	10.0	37.5	750.0	375.0	1,162.5	10	38	750	375	1,163	24	24	100%	0%	0%	100%	1,163	0	0	1,163	Type A 2AM-MRY1325	Added	2016	Direct
4000	Mine Site	4100	General	4140	Mobile Equipment	4141	Mine Mobile Equipment			MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	3rd Party Equipment	Integrated Tool Carrier, 938		1	Ea	10.0	37.5	750.0	375.0	1,162.5	10	38	750	375	1,163	24	24	100%

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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility/ Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M	Closure	Post Closure					C&M	Closure	Post Closure					
																																										Year 0+ %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 + %	Year 5 + %	Year 6 - %	Year 7 - %	Year 8 + %	Year 0- Cost ($)	Year 0+1 Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
4000	Mine Site	4100	General	4140	Mobile Equipment	4142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	45 MT	MOBILE EQUIPMENT - SITE MAINTENANCE MID SIZE EXCAVATOR - CAT 345DL L: 11910, W: 3490, H: 3770, 45000 kg			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Grader	MOBILE EQUIPMENT - GRADER - CAT 16M L: 9994, W: 3077, H: 3524, 24400 kg			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	CAT 988H	MOBILE EQUIPMENT - MOBILE CRUSHING FRONT END LOADER - CAT 988H L: 10360, W: 3600, H: 4115, 43400 kg			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	CAT 988H	MOBILE EQUIPMENT - ORE HAUL TRUCK FRONT END LOADER - CAT 988H L: 9277, W: 1678, H: 3810, 3175 kg			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Haul Truck trailer	MOBILE EQUIPMENT - TOTE ROAD ORE HAUL TRUCK - LEAD TRAILER - SMITHCO S4 (75T) L: 10240, W: 3060, H: 4210			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Haul Truck trailer	MOBILE EQUIPMENT - TOTE ROAD ORE HAUL TRUCK - PUP TRAILER - SMITHCO S4 (75T) L: 10240, W: 3060, H: 4210			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	731	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - WATER TRUCK - PETERBILT 348 AUTO S/S 100 BBL	4144-MO-001		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	732	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Container Handler	MOBILE EQUIPMENT - CONTAINER HANDLER - KALMAR DRF 450-6555 L: 11684, W: 3454, H: 2146, 72000 kg	4144-MO-002		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	733	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	school bus	MOBILE EQUIPMENT - PASSENGER TRANSFER BUS - BLUE BIRD BBCV DIESEL 3507A L: 12192, W: 2440, H: 2900, 14000 kg	4144-MO-003		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	734	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	school bus	MOBILE EQUIPMENT - PASSENGER TRANSFER BUS - BLUE BIRD BBCV DIESEL 3507A L: 12192, W: 2440, H: 2900, 14000 kg	4144-MO-004		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	735	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	school bus	MOBILE EQUIPMENT - WORKER TRANSFER MINI BUS - BLUE BIRD BBCV DIESEL 1910 A L: 7470, W: 2440, H: 3930, 7080 kg	4144-MO-005		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	736	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	sewage tank and vacuum	MOBILE EQUIPMENT - SEWAGE HOLDING TANK SKID MOUNTED VACUUM UNIT - TEXLA	4144-MO-006		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	737	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Trailer	MOBILE EQUIPMENT - FREIGHT DELIVERY HIBOY TRAILER L: 14629 W: 2438	4144-MO-007		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	738	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - DIESEL FUEL TRAILER TRACTOR - WESTERN STAR 4900FA	4144-MO-008		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	739	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Dump Truck	MOBILE EQUIPMENT - JET-AT FUEL DELIVERY TRUCK - MACK/INNOCAR GU813 L: 8052, W: 2960, H: 3589	4144-MO-009		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	740	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	trailer (Fuel)	MOBILE EQUIPMENT - DIESEL FUEL DELIVERY TRAILER - TRENCAR TC406 SUPER B-TRAIN L: 24384, W: 2590, H: 4013, 33500 kg	4144-MO-010		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	741	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Large Trailer	MOBILE EQUIPMENT - MOBILE EQUIPMENT COWBOY TRAILER - SHELTEMA L: 7620, W: 4572	4144-MO-011		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	742	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - GARBAGE TRUCK - PETERBILT 365	4144-MO-012		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	743	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	4144-MO-013		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	744	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	4144-MO-014		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	745	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	4144-MO-015		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	746	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	4144-MO-016		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	747	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - GARBAGE BIN - SMALL	4144-MO-017		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	748	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - GARBAGE BIN - SMALL	4144-MO-018		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	749	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Cat 740	MOBILE EQUIPMENT - ARTICULATED WATER/SAND TRUCK - CAT 740	4144-MO-024		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	750	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	trailer (Fuel)	MOBILE EQUIPMENT - DIESEL FUEL DELIVERY TRAILER - ADVANCE	4144-MO-025		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	751	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	sewage tank and vacuum	MOBILE EQUIPMENT - SEWAGE HOLDING TANK SKID MOUNTED VACUUM UNIT - TEXLA	4144-MO-026		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	752	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - HEATED/REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-030		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	753	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - HEATED/REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-031		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	754	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-032		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	755	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-033		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	756	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-034		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	757	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-035		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	758	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-036		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	759	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	4144-MO-037		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	760	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	4144-MO-040		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	761	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	4144-MO-041		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	762	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	4144-MO-042		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	763	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	4144-MO-043		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	764	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	4144-MO-044		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment	765	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	4144-MO-045		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4142	Mobile Site Services Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - TOTE ROAD ORE HAUL TRUCK - TRACTOR - WESTERN STAR 6900XD			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment		MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	school bus	MOBILE EQUIPMENT - COACH PASSENGER TRANSFER BUS			Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
4000	Mine Site	4100	General	4140	Mobile Equipment	4144	Mobile Site Services Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Container Handler	MOBILE EQUIPMENT - CONTAINER HANDLER - KALMAR DRF 450-6555 L: 11684, W: 3454, H: 2146, 72000 kg			Ea	13.0	100.0	975.0	1,000.0	2

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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility/ Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Quonset hut		100	m2	0.22	2.8	16.8	28.0	47.6	22	280	1,681	2,802	4,764	1	100	100%	0%	0%	100%	4,764	0	0	4,764	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	EBC lunch		36	m2	0.22	2.8	16.8	28.0	47.6	8	101	605	1,009	1,715	1	36	100%	0%	0%	100%	1,715	0	0	1,715	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	EBC office		36	m2	0.22	2.8	16.8	28.0	47.6	8	101	605	1,009	1,715	1	36	100%	0%	0%	100%	1,715	0	0	1,715	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Rail Operations offices		72	m2	0.22	2.8	16.8	28.0	47.6	16	202	1,211	2,018	3,430	1	72	100%	0%	0%	100%	3,430	0	0	3,430	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Office Trailer (60 x 60)		334	m2	0.22	2.8	16.8	28.0	47.6	75	936	5,615	9,359	15,910	1	334	100%	0%	0%	100%	15,910	0	0	15,910	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Office Trailer (24 x 60)		132	m2	0.22	2.8	16.8	28.0	47.6	30	370	2,219	3,699	6,288	1	132	100%	0%	0%	100%	6,288	0	0	6,288	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Office Trailer (12 x 60)		66	m2	0.22	2.8	16.8	28.0	47.6	15	185	1,110	1,849	3,144	1	66	100%	0%	0%	100%	3,144	0	0	3,144	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Lunchtrailer (44 x 10)		40	m2	0.22	2.8	16.8	28.0	47.6	9	112	673	1,121	1,905	1	40	100%	0%	0%	100%	1,905	0	0	1,905	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Container w lunchroom		72	m2	0.22	2.8	16.8	28.0	47.6	16	202	1,211	2,018	3,430	1	72	100%	0%	0%	100%	3,430	0	0	3,430	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Single Trailers (modular)	3rd Party Contractor	Container Office		144	m2	0.22	2.8	16.8	28.0	47.6	32	404	2,421	4,035	6,860	1	144	100%	0%	0%	100%	6,860	0	0	6,860	Type B Construction 2BC-MRY1416	Added	2019	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1-c	Modular Building Contaminated (480 ft2)	FTR1-c	Buildings (Contaminated)	Single Trailers (modular)		Construction offices, lunchrooms, washcars (assume 50 units @ 36 m2 per wash car)		1,218	m2	0.56	2.8	42.0	70.1	114.9	683	3,413	51,194	85,323	139,930	1	1,218	100%	0%	0%	100%	139,930	0	0	139,930	Type B Construction 2BC-MRY1416	Added	2018-C1	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Construction offices, lunchrooms, washcars (assume 6 units @ 36 m2 per wash car)		216	m2	0.22	2.8	16.8	28.0	47.6	48	605	3,632	6,053	10,289	1	216	100%	0%	0%	100%	10,289	0	0	10,289	Type B Construction 2BC-MRY1416	Added	2017-A	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings			CON	Consumables	CON	Consumables			Addition of 50 person camp at Mine Site		50	Bed Space	0.00	700.8	0.0	0.0	700.8	0	35,040	0	0	35,040	0	0	100%	0%	0%	100%	35,040	0	0	35,040	Type A 2AM-MRY1325	Added	2017-A	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		50- Person Rapid Deploy Camp (assume same footprint as former Shanco Trailer Camp)		950	m2	0.18	2.2	13.5	22.4	38.1	170	2,130	12,778	21,296	36,203	1	475	100%	0%	0%	100%	36,203	0	0	36,203	Type A 2AM-MRY1325	Added	2017-A	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings		BLD	FF3	Modular Building Not Contaminated (480 ft2)	FF3	Buildings (Not Contaminated)	Soft walled Building (tent)		35- Person 'Norse-man Style' Camp (assume same footprint as former Shanco Trailer Camp)		950	m2	0.18	2.2	13.5	22.4	38.1	170	2,130	12,778	21,296	36,203	1	475	100%	0%	0%	100%	36,203	0	0	36,203	Type A 2AM-MRY1325	Added	2017-A	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4512	Accommodation Wings			CON	Consumables	CON	Consumables			Addition of 800 person camp at Mine Site		800	Bed Space	0.00	700.8	0.0	0.0	700.8	0	560,641	0	0	560,641	0	0	100%	0%	0%	100%	560,641	0	0	560,641	Type A 2AM-MRY1325	Added	2017-A	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4510	Accommodations Area	857	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - RAW SEWAGE LIFT STATION	4510-PP-001	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	924	BLD	FF2	Fold Away Building Not Contaminated (480 ft2)	FFL	Buildings (Not Contaminated)	Fold Away Building		Emergency Response Garage - Demolish and Decontaminate Building - Fold-away Building (Steel)	4513-BLD-002	279	m2	0.2	2.0	11.8	19.6	33.3	44	547	3,281	5,469	9,297	1	279	100%	0%	0%	100%	9,297	0	0	9,297	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	925	BLD	CP	Precast Concrete Foundations - (480 ft2)	CP	Flooring / Foundations	Precast Foundations		Emergency Response Garage - Demolish and foundations - Precast Footing (Perimeter Beam)	4513-BLD-002	279	m2	0.1	1.8	10.9	18.2	30.9	40	506	3,036	5,061	8,603	1	209	100%	0%	0%	100%	8,603	0	0	8,603	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	926	BLD	CS	Slab on Grade - ASSUME 300mm thick	CS	Flooring / Foundations	Slab on Grade		Emergency Response Garage - Demolish floor finish - Slab on grade C/W Drainage	4513-BLD-002	279	m2	0.1	1.9	9.4	18.8	30.0	35	523	2,614	5,228	8,364	0	0	100%	0%	0%	100%	8,364	0	0	8,364	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	937	TK-	MT2	Medium Tanks	MT2	Mechanical Equipment	Medium Tanks		TANK - EMERGENCY RESPONSE OFFICE SEWAGE COLLECTION TANK - LAGRANGE MECHANICAL SERVICES L: 3791 W: 1829 H: 813	4513-TK-004	1	Ea	31.0	325.0	2,325.0	3,250.0	5,900.0	31	325	2,325	3,250	5,900	2	2	100%	0%	0%	100%	5,900	0	0	5,900	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	921	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FTR2	Buildings (Not Contaminated)	Double Trailer (2 or more)		Emergency Response Office - Demolish and Decontaminate Building - Trailer - Modular (2 or more modules)	4513-BLD-001	89	m2	0.2	2.8	16.8	28.0	47.6	20	250	1,500	2,500	4,250	1	89	100%	0%	0%	100%	4,250	0	0	4,250	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	939	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 20,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MINE EMERGENCY RESPONSE GARAGE DIESEL FUEL TANK - DTE ULC601-07	4513-TK-023	1	Ea	15.5	162.5	1,162.5	1,625.0	2,950.0	16	163	1,163	1,625	2,950	20	20	100%	0%	0%	100%	2,950	0	0	2,950	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	938	TK-	MT1	Light Tanks	MT1	Mechanical Equipment	Light Tanks		TANK - EMERGENCY RESPONSE OFFICE RAW WATER TANK - NORWESCO L: 1613 W: 737 H: 1676	4513-TK-005	1	Ea	9.7	89.6	725.0	895.8	1,710.4	10	90	725	896	1,710	1	1	100%	0%	0%	100%	1,710	0	0	1,710	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	922	BLD	FW	Timber Cribbing (480 ft2)	FT	Flooring / Foundations	Timber Cribbing		Emergency Response Office - Demolish and foundations - Timber Cribbing to Elevate Building	4513-BLD-001	89	m2	0.1	1.0	5.9	9.8	16.7	11	88	525	875	1,488	0	27	100%	0%	0%	100%	1,488	0	0	1,488	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	930	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - EMERGENCY RESPONSE OFFICE RAW WATER PUMP - SIMER JET PUMPS 2205C L: 483 W: 275 H: 267	4513-PP-006	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	931	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	RAW WATER TANK PUMP	4513-MT-006	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	932	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - MINE EMERGENCY RESPONSE GARAGE FUEL OIL PUMP (PUMP) - VIKING DUPLEX OIL SYSTEMS	4513-PP-021	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	933	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	FUEL OIL PUMP	4513-MT-021	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	934	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - MINE EMERGENCY RESPONSE GARAGE FUEL OIL PUMP (STANDBY) - VIKING DUPLEX OIL SYSTEMS	4513-PP-022	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	935	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	FUEL OIL PUMP	4513-MT-022	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	936	SQ-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Shop Equipment	SHOP / MAINTENANCE EQUIPMENT - DRY CHEMICAL REFILL STATION - TYCO FIRE PROTECTION	4513-SQ-010	0	Ea	19.2	177.5	1,440.0	1,775.0	3,392.5	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	923	BLD		#N/A	FW	Flooring / Foundations	Wood Floor		Emergency Response Office - Demolish floor finish - Raised Steel or Wooden Floor	4513-BLD-001	89	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	927	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Pick up	MOBILE EQUIPMENT - AMBULANCE - FORD F450 L: 6680, W: 2438, H: 2924, 6350 kg	4513-MO-001		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	928	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	large fire truck	MOBILE EQUIPMENT - FIRE TRUCK - OSHKOSH T3000 L: 10922 W: 2921, H: 3607, 39000 kg	4513-MO-002		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4513	Emergency Services Building	929	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	small tank	MOBILE EQUIPMENT - SNOW RESCUE VEHICLE - HAGGLUND BV206 L: 6900, W: 1870, H: 2400, 6580 kg	4513-MO-003		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	859	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Service Core - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-001	1,857	m2	0.2	2.8	16.8	28.0	47.6	416	5,203	31,219	52,031	88,453	1	1,857	100%	0%	0%	100%	88,453	0	0	88,453	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	862	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Office - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-002	608	m2	0.2	2.8	16.8	28.0	47.6	136	1,703	10,219	17,031	28,953	1	608	100%	0%	0%	100%	28,953	0	0	28,953	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	865	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laundry - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-003	424	m2	0.2	2.8	16.8	28.0	47.6	95	1,188	7,125	11,875	20,188	1	424	100%	0%	0%	100%	20,188	0	0	20,188	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	868	BLD	FF1	Modular Building Not Contaminated (480 ft2)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Laboratory - Demolish and Decontaminate Building - Special Modular / Prefabricated	4511-BLD-004	312	m2	0.2	2.8	16.8	28.0	47.6	70	875	5,250	8,750	14,875	1	312	100%	0%	0%	100%	14,875	0	0	14,875	Type A 2AM-MRY1325		2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	871	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - AIR COMPRESSOR	4511-LE-001	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	872	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - AIR COMPRESSOR	4511-LE-002	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	873	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - AIR DRYER	4511-LE-003	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	874	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - BALANCE SCALE	4511-LE-004	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	875	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - BALANCE SCALE	4511-LE-005	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	876	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - BALANCE SCALE	4511-LE-006	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	877	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - CARBON/SULFUR ANALYSER	4511-LE-007	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	878	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - CHILLER	4511-LE-008	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	879	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - CRUSHER	4511-LE-016	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	880	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - CRUSHER DUST HOOD	4511-LE-017	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	881	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - DRYING OVEN	4511-LE-018	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	882	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - DRYING OVEN	4511-LE-019	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	883	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - DUST COLLECTOR	4511-LE-020	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	884	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - FUMEHOOD	4511-LE-021	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	885	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - FUSION SYSTEM	4511-LE-022	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Direct
4000	Mine Site	4500	Non Process Facilities	4510	Accommodations Area	4511	Service Core	886	LE-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Lab Equip.	LABORATORY EQUIPMENT - HOT PLATE	4511-LE-023	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0

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Baffinland

'Mary River Project - Complete Project Security Assesment - Estimate Breakdown Structure'
Updated 31 October 2018

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| Level 0 - Site Location | Level 0 - Description | Level 1 - Area | Level 1 - Description | Level 2 - Facility / System | Level 2 - Description | Level 3 - Sub Facility/ Sub System | Level 3 - Description | ID CODE | Equipment Type | Price Code | Price Code Description | Qty Code | Area - QTY Code | QTY Code Description | Type | Description | Tag Number | QTY | Unit | Manhours Per Unit | Unit Fuel Consumption | Unit Labour | Unit Equipment | Unit Rate | Total Manhours | Total Fuel Consumption | Total Labour | Total Equipment | Total Cost ($) | Unit M3 | Total Vol (m3) | IOL (%) | Crown Land (%) | Water Liability (%) | Land Liability (%) | IOL Cost ($) | Crown Land Cost ($) | Water Liability Cost ($) | Land Liability Cost ($) | License | Adjustment Tag | Abandoned Work Plan | Type of Costs | C&M | Year 0+% | Closure | Year 1+ -% | Year 2+ % | Year 3+ % | Post Closure | Year 4+ % | Year 5+ % | Year 6+ % | Year 7+ % | Year 8+ % | C&M | Year 0- Cost ($) | Year 0+1- Cost ($) | Closure | Year 1 - Cost ($) | Year 2 - Cost ($) | Year 3 - Cost ($) | Post Closure | Year 4 - Cost ($) | Year 5 - Cost ($) | Year 6 - Cost ($) | Year 7 - Cost ($) | Year 8 - Cost ($) |
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| Level 0 - Site Location | Level 0 - Description | Level 1 - Area | Level 1 - Description | Level 2 - Facility / System | Level 2 - Description | Level 3 - Sub Facility/ Sub System | Level 3 - Description | ID CODE | Equipment Type | Price Code | Price Code Description | Qty Code | Area - QTY Code | QTY Code Description | Type | Description | Tag Number | QTY | Unit | Manhours Per Unit | Unit Fuel Consumption | Unit Labour | Unit Equipment | Unit Rate | Total Manhours | Total Fuel Consumption | Total Labour | Total Equipment | Total Cost ($) | Unit M3 | Total Vol (m3) | IOL (%) | Crown Land (%) | Water Liability (%) | Land Liability (%) | IOL Cost ($) | Crown Land Cost ($) | Water Liability Cost ($) | Land Liability Cost ($) | License | Adjustment Tag | Abandoned Work Plan | Type of Costs | C&M Year 0+ % | C&M Year 0+1 - % | Closure Year 1 - % | Closure Year 2 - % | Closure Year 3 - % | Post Closure Year 4 + % | Post Closure Year 5 - % | Post Closure Year 6 - % | Post Closure Year 7 - % | Post Closure Year 8 + % | C&M Year 0- Cost ($) | C&M Year 0+1- Cost ($) | Closure Year 1 - Cost ($) | Closure Year 2 - Cost ($) | Closure Year 3 - Cost ($) | Post Closure Year 4 - Cost ($) | Post Closure Year 5 - Cost ($) | Post Closure Year 6 - Cost ($) | Post Closure Year 7 - Cost ($) | Post Closure Year 8 - Cost ($) |
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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility / Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Abandoned Work Plan	Type of Costs	C&M	Closure			Post Closure					C&M	Closure			Post Closure				
																																										Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
8000	Other Indirects	8100	Other Indirects	8120	Third Party Services	8121	Project Management, Engineering and Procurement					Indirect	Indirect			Geotechnical Inspections													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015	Indirect						20%	20%	20%	20%	20%	0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8120	Third Party Services	8121	Project Management, Engineering and Procurement					Indirect	Indirect		Indirect	Geotechnical Inspections													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Indirect						20%	20%	20%	20%	20%	0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	8120	Third Party Services	8121	Project Management, Engineering and Procurement				Indirect	Indirect	Indirect		Indirect	Geotechnical Inspections													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2017-A	Indirect						20%	20%	20%	20%	20%	0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)				Indirect	Indirect	Indirect	Indirect		Ammonium Nitrate (explosive material)													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2014	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)				Indirect	Indirect	Indirect	Indirect		Ammonium Nitrate (explosive material)													3,508,000	0	0	100%	0%	0%	100%	3,508,000	0	0	3,508,000	Type A 2AM-MRY1325	Added	2019	Indirect			33%	33%	33%						0		1,169,333	1,169,333	1,169,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)				Indirect	Indirect	Indirect	Indirect		Ammonium Nitrate (explosive material)													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive material)													2,537,000	0	0	100%	0%	0%	100%	2,537,000	0	0	2,537,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		845,667	845,667	845,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive Material)													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive Material)													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 R	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)				Indirect	Indirect	Indirect	Indirect		Ammonium Nitrate (explosive material)													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2017-A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment				Indirect	Indirect	Indirect	Indirect		Contaminated Soil Treatment													234,000	0	0	100%	0%	0%	100%	234,000	0	0	234,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		78,000	78,000	78,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2015	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													63,000	0	0	100%	0%	0%	100%	63,000	0	0	63,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		21,000	21,000	21,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2015 A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment													5,000	0	0	100%	0%	0%	100%	5,000	0	0	5,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		1,667	1,667	1,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment				Indirect	Indirect	Indirect	Indirect		Contaminated Soil Treatment													0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2017-A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													2,873,000	0	0	100%	0%	0%	100%	2,873,000	0	0	2,873,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		957,667	957,667	957,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													29,000	0	0	100%	0%	0%	100%	29,000	0	0	29,000	Type A 2AM-MRY1325		2015	Indirect			33%	33%	33%						0		9,667	9,667	9,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													14,000	0	0	100%	0%	0%	100%	14,000	0	0	14,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		4,667	4,667	4,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													28,000	0	0	100%	0%	0%	100%	28,000	0	0	28,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		9,333	9,333	9,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													-15,000	0	0	100%	0%	0%	100%	-15,000	0	0	-15,000	Type A 2AM-MRY1325	removed	2018-MAY	Indirect			33%	33%	33%						0		-5,000	-5,000	-5,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													136,000	0	0	100%	0%	0%	100%	136,000	0	0	136,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			33%	33%	33%						0		45,333	45,333	45,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													1,736,000	0	0	100%	0%	0%	100%	1,736,000	0	0	1,736,000	Type A 2AM-MRY1325	Added	2019	Indirect			33%	33%	33%						0		578,667	578,667	578,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													76,000	0	0	100%	0%	0%	100%	76,000	0	0	76,000	Type A 2AM-MRY1325	Added	2018-C2	Indirect			33%	33%	33%						0		25,333	25,333	25,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													9,000	0	0	100%	0%	0%	100%	9,000	0	0	9,000	Type A 2AM-MRY1325		2015 A	Indirect			33%	33%	33%						0		3,000	3,000	3,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													219,000	0	0	100%	0%	0%	100%	219,000	0	0	219,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		73,000	73,000	73,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel													1,211,000	0	0	100%	0%	0%	100%	1,211,000	0	0	1,211,000	Type A 2AM-MRY1325	Added	2017-A	Indirect			33%	33%	33%						0		403,667	403,667	403,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													1,245,000	0	0	98%	2%	0%	100%	1,216,526	28,474	0	1,245,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		249,000	249,000	249,000	124,500	124,500	124,500	62,250	62,250
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													652,000	0	0	98%	2%	0%	100%	637,088	14,912	0	652,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		130,400	130,400	130,400	65,200	65,200	65,200	32,600	32,600
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													66,000	0	0	100%	0%	0%	100%	66,000	0	0	66,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		13,200	13,200	13,200	6,600	6,600	6,600	3,300	3,300
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													46,000	0	0	100%	0%	0%	100%	46,000	0	0	46,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,200	9,200	9,200	4,600	4,600	4,600	2,300	2,300
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													47,000	0	0	79%	21%	0%	100%	37,060	9,940	0	47,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,400	9,400	9,400	4,700	4,700	4,700	2,350	2,350
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													29,000	0	0	79%	21%	0%	100%	22,867	6,133	0	29,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		5,800	5,800	5,800	2,900	2,900	2,900	1,450	1,450
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													-61,637	0	0	100%	0%	0%	100%	-61,637	0	0	-61,637	Type A 2AM-MRY1325	Removed	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-12,327	-12,327	-12,327	-6,164	-6,164	-6,164	-3,082	-3,082
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													102,000	0	0	100%	0%	0%	100%	102,000	0	0	102,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		20,400	20,400	20,400	10,200	10,200	10,200	5,100	5,100
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													437,000	0	0	100%	0%	0%	100%	437,000	0	0	437,000	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		87,400	87,400	87,400	43,700	43,700	43,700	21,850	21,850
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													55,000	0	0	100%	0%	0%	100%	55,000	0	0	55,000	Type A 2AM-MRY1325	Added	2018-C2	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		11,000	11,000	11,000	5,500	5,500	5,500	2,750	2,750
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation													43,000	0	0	100%	0%	0%	100%	43,000	0	0	43,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		8,600	8,600	8,600	4,300	4,300	4,300	2,150	2,150
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													676,460	0	0	79%	21%	0%	100%	676,460	0	0	676,460	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		135,292	135,292	135,292	67,646	67,646	67,646	33,823	33,823
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													92,000	0	0	100%	0%	0%	100%	92,000	0	0	92,000	Type A 2AM-MRY1325	Added	2018-C2	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		18,400	18,400	18,400	9,200	9,200	9,200	4,600	4,600
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift													481,541	0	0	100%	0%	0%	100%	481,541	0	0	481,541	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		96,308	96,308	96,308	48,154	48,154	48,154	24,077	24,077
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Rail Construction Materials (mobilized in 2019)		18,172	m3		68								1,235,696	0	0	100%	0%	0%	100%	1,235,696	0	0	1,235,696	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		247,139	247,139	247,139	123,570	123,570	123,570	61,785	61,785
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	SMH Conveyors (mobilized in 2019)		49,868	m3		68								3,391,024	0	0	100%	0%	0%	100%	3,391,024	0	0	3,391,024	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		678,205	678,205	678,205	339,102	339,102	339,102	169,551	169,551
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Car Dumper Module (mobilized in 2019)		24,756	m3		68								1,683,408	0	0	100%	0%	0%	100%	1,683,408	0	0	1,683,408	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		336,682	336,682	336,682	168,341	168,341	168,341	84,170	84,170
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Screening Module (mobilized in 2019)		33,278	m3		68								2,262,904	0	0	100%	0%	0%	100%	2,262,904	0	0	2,262,904	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		452,581	452,581	452,581	226,290	226,290	226,290	113,145	113,145
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Shiploading Module (mobilized in 2019)		81,400	m3		68								5,535,200	0	0	100%	0%	0%	100%	5,535,200	0	0	5,535,200	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		1,107,040	1,107,040	1,107,040	553,520	553,520	553,520	276,760	276,760
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Crushing Module (mobilized in 2019)		21,815	m3		68								1,483,420	0	0	100%	0%	0%	100%	1,483,420	0	0	1,483,420	Type A 2AM-MRY1325	Added	2019	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		296,684	296,684	296,684	148,342	148,342	148,342	74,171	74,171
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Crushing Module (mobilized in 2018, installed following expansion approval)		30,500	m3		68								2,074,000	0	0	100%	0%	0%	100%	2,074,000	0	0	2,074,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		414,800	414,800	414,800	207,400	207,400	207,400	103,700	103,700
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Crushing Module (mobilized in 2018, installed following expansion approval)		-30,500	m3		68								-2,074,000	0	0	100%	0%	0%	100%	-2,074,000	0	0	-2,074,000	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-414,800	-414,800	-414,800	-207,400	-207,400	-207,400	-103,700	-103,700
8002	Other Indirects	8102	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	SMH Conveyors (mobilized in 2018, installed following expansion approval)		40,500	m3		68								2,754,000	0	0	100%	0%	0%	100%	2,754,000	0	0	2,754,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		550,800	550,800	550,800	275,400	275,400	275,400	137,700	137,700
8002	Other Indirects	8102	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	SMH Conveyors (mobilized in 2018, installed following expansion approval)		-40,500	m3		68								-2,754,000	0	0	100%	0%	0%	100%	-2,754,000	0	0	-2,754,000	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-550,800	-550,800	-550,800	-275,400	-275,400	-275,400	-137,700	-137,700
8003	Other Indirects	8103	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Screening Module (mobilized in 2018, installed following expansion approval)		24,100	m3		68								1,638,800	0	0	100%	0%	0%	100%	1,638,800	0	0	1,638,800	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		327,760	327,760	327,760	163,880	163,880	163,880	81,940	81,940
8003	Other Indirects	8103	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Screening Module (mobilized in 2018, installed following expansion approval)		-24,100	m3		68								-1,638,800	0	0	100%	0%	0%	100%	-1,638,800	0	0	-1,638,800	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-327,760	-327,760	-327,760	-163,880	-163,880	-163,880	-81,940	-81,940
8004	Other Indirects	8104	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Car Dumper Module (mobilized in 2018, installed following expansion approval)		41,500	m3		68								2,822,000	0	0	100%	0%	0%	100%	2,822,000	0	0	2,822,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		564,400	564,400	564,400	282,200	282,200	282,200	141,100	141,100
8004	Other Indirects	8104	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Car Dumper Module (mobilized in 2018, installed following expansion approval)		-41,500	m3		68								-2,822,000	0	0	100%	0%	0%	100%	-2,822,000	0	0	-2,822,000	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-564,400	-564,400	-564,400	-282,200	-282,200	-282,200	-141,100	-141,100
8005	Other Indirects	8105	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Rail Construction Materials (mobilized in 2018, installed following expansion approval)		25,100	m3		68								1,706,800	0	0	100%	0%	0%	100%	1,706,800	0	0	1,706,800	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		341,360	341,360	341,360	170,680	170,680	170,680	85,340	85,340
8005	Other Indirects	8105	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Rail Construction Materials (mobilized in 2018, installed following expansion approval)		-9,926	m3		68								-674,968	0	0	100%	0%	0%	100%	-674,968	0	0	-674,968	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%

| | | |

Appendix B

Updated Site Layouts

2019 Work Plan - Mine Site Layout

2019 Work Plan – Milne Port Layout

2019 Work Plan – Tote Road Layout

SAVED: I:\1\02\00181\48\A\Acad\FIGS\B12 R0, 10/30/2018 10:30:33 AM , ASIMPSON PRINTED: 10/30/2018 10:31:17 AM, Layout1, ASIMPSON
XREF FILE(S): X-C-TOPO-MILN-INDEX; X-C-TOPO-MILN-SITE-LAY; X-C-TOPO-MINE-MILN-FROM-OTHRS-FEB21-18; x-c-topo-mine-miln-from-othrs-jun28-18; C-TOPO-2019-WORK-PLAN-QUAR-LAYD-OTHR IMAGE FILE(S): 170929 - Tote Rd KM 2 to 5 Laydowns_reduced Rev C GIS Baffinland Logo H353004-40000-221-271-0004-0001-H353004-40000-221-271-0004-0001B Milne Overview Sketch milne port changes - feb 21-2018

502 200 E | 502 800 E | 503 400 E | 504 000 E | 504 600 E | 505 200 E

7 976 300 N | 7 975 700 N | 7 975 100 N | 7 974 500 N | 7 973 900 N | 7 973 300 N | 7 972 700 N

MILNE INLET

PHILLIPS CREEK

FORESHORE LEASE BOUNDARY

ORE DOCK

PROPOSED FREIGHT DOCK

EFFLUENT DISCHARGE POINT

MARINE FUEL MANIFOLD BUILDING

HTO CABIN

(2019-25) EAST SEDIMENTATION POND EXPANSION (2a)

(2019-10) DESALINATION WATER TREATMENT PLANT

(2019-11) NEW HAZARDOUS WASTE BERM

CULVERT

P-SWD-7

FUEL TANK FARM

SERVICE AREA

EFFLUENT AND FUEL PIPELINES

ORE STOCKPILES

WATER MANAGEMENT BERM

CAMP SITE INFRASTRUCTURE

(2019-8) NEW POLISHING WASTE STABILIZATION POND (PWSP)

LP2

(2019-2) LAYDOWN LP2 EXPANSION

RELOCATED FACILITIES

P-SWD-3

(2019-6) MILNE PORT STOCKPILE FACILITY EXPANSION AND POND

CULVERT

CULVERTS

LAND FARM

SNOW DUMP

(2019-9) NEW CONTAMINATED WATER / SNOW CONTAINMENT POND

RIDGE

MAINTENANCE BUILDING

EXISTING Q1

CULVERT

RIDGE

CAMP PAD

W10A

P-SWD-5

IMPERMEABLE GEOMEMBRANE

W10B

CULVERT

CULVERTS BLOCKED OFF

(2019-7) STACKER / RECLAIMER STORAGE STRUCTURE

LP3

LP5

LP7

P-SWD-6

CULVERT

TOTE ROAD (OLD ALIGNMENT)

TOTE ROAD (NEW ALIGNMENT)

(2019-1) NEW AREA FOR Q1 (22,095 m²)

COMMERCIAL LEASE BOUNDARY

COMMERCIAL LEASE BOUNDARY

TOTE ROAD

SCALE A 120 60 0 200 400 600 m

LEGEND:

- WATER
- BORROW AREAS
- QUARRY AREA
- ROAD
- RIVER/STREAM/DRAINAGE
- QIA SURFACE COMMERCIAL LEASE IMPACT BOUNDARY
- POTENTIAL DEVELOPMENT AREA BOUNDARY
- FORESHORE LEASE BOUNDARY

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. CONTOUR INTERVAL IS 10 METRES.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30OCT'18	ISSUED WITH TRANSMITTAL	AV	AS	AV

Baffinland

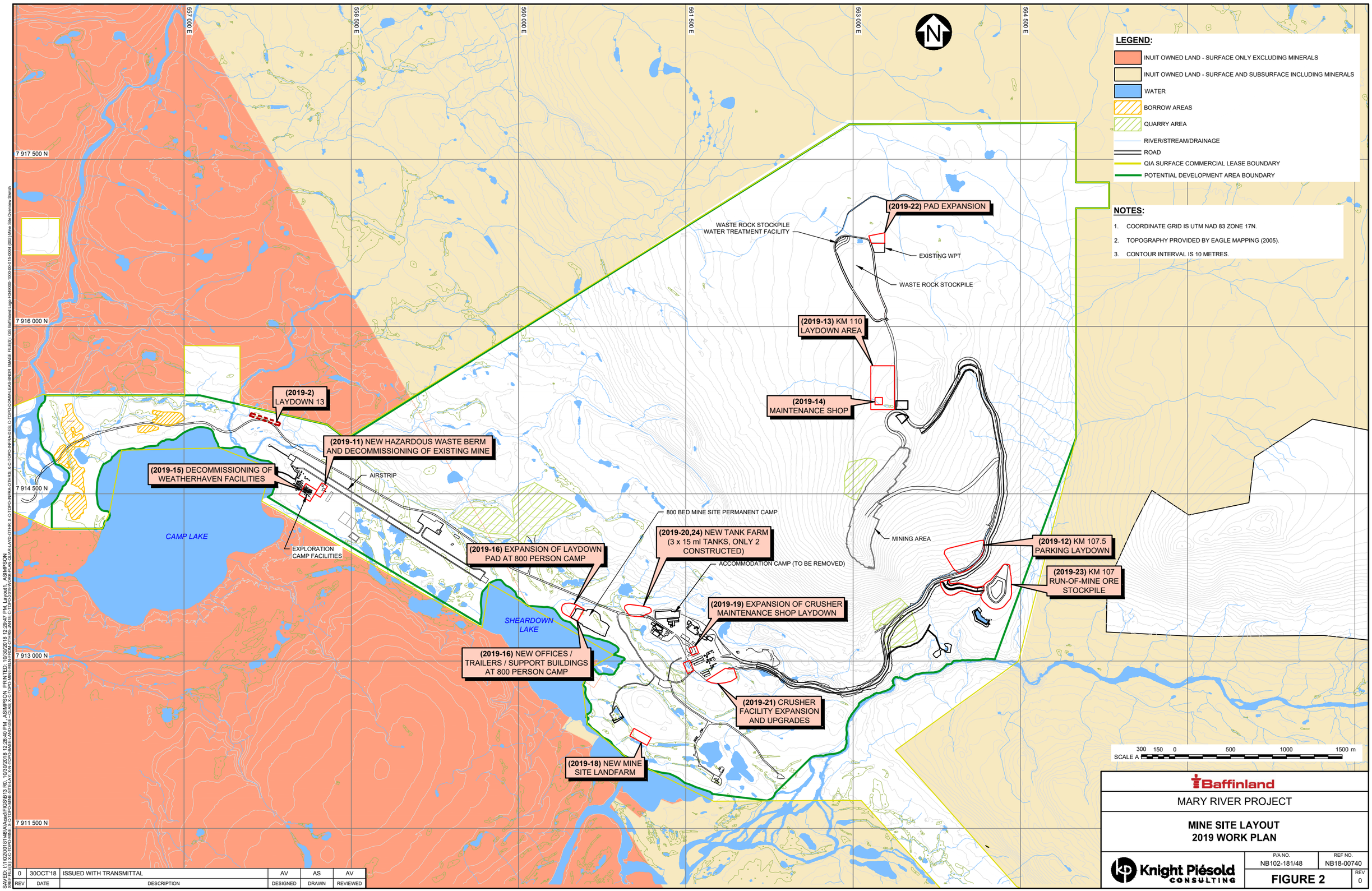
MARY RIVER PROJECT

MILNE PORT SITE PLAN
2019 WORK PLAN

Knight Piésold CONSULTING

P/A NO. NB102-181/48 | REF NO. NB18-00740

FIGURE 1 | REV 0



REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30OCT'18	ISSUED WITH TRANSMITTAL	AV	AS	AV

Baffinland

MARY RIVER PROJECT

MINE SITE LAYOUT
2019 WORK PLAN

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/48	NB18-00740

FIGURE 2 REV 0

SAVED: (\\1026018\VMA\acad\FIGS\813 RD, 10/30/2018 12:28:40 PM, ASIMPSON, PRINTED: 10/30/2018 12:29:47 PM, Layout1, ASIMPSON
XREF FILES): X-C:\TOPO\MINE_X-C:\TOPO\MINE-SITE-LAY~1\X-N-TOPO-BASE_AND_USE~2.DAS; X-C:\TOPO-MINE\MLH-ROAD-TOPHE~1\N16_C:\TOPO\2019-WORK PLAN-GUAR-LAYD-OTHR_X-C:\TOPO-INFRA-OTHRS_X-C:\TOPO-INFRA-DES_C:\TOPO-INFRA-DES

7,990,000
7,980,000
7,970,000
7,960,000
7,950,000
7,940,000
7,930,000
7,920,000
7,910,000
7,900,000
510,000
520,000
530,000
540,000
550,000
560,000
N
MILNE PORT
KM 5
(2019-3) GRADE ADJUSTMENT
KM 10
KM 15
KM 20
KM 25
KM 30
KM 35
KM 40
KM 45
KM 50
KM 55
KM 60
KM 65
KM 70
KM 75
KM 80
KM 85
KM 90
KM 95
KM 100
MINE SITE
(2019-3) GRADE ADJUSTMENT
(14,967 m²)
Q5
(1,225,590 m²)
L2
(56,430 m²)
L4
(67,571 m²)
PQ2 A
(486,031 m²)
(143,036 m²)
L7
(28,977 m²)
(14,800 m²)
PQ4 A
(141,649 m²)
L9
(91,273 m²)
PQ6A
(277,295 m²)
(13,848 m²)
PQ12A
(279,890 m²)
L10
(34,491 m²)
(6,891 m²)
2 1 0 2 4 6 8 10 km
SCALE

LEGEND:

- MILNE PORT / MINE SITE
- MILNE INLET TOTE ROAD
- LAYDOWN AREA
- QUARRY
- CURRENT COMMERCIAL LEASE BOUNDARY
- IOL SURFACE AND SUBSURFACE
- IOL SURFACE ONLY
- REFERENCE SHEET EXTENT
- POTENTIAL DEVELOPMENT AREA
- WATER

NOTES:

1. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP: HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004).
3. COMMERCIAL LEASE BOUNDARY COORDINATES OBTAINED FROM BAFFINLAND IRON MINES CORPORATION, JANUARY, 2018. BOUNDARY EXTENTS HAVE BEEN DIGITIZED BASED ON THESE POINT LOCATIONS ARE ARE APPROXIMATE ONLY.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
1	31OCT18	ISSUED WITH TRANSMITTAL	AV	AS	AV

Baffinland

MARY RIVER PROJECT

TOTE ROAD
2019 WORK PLAN

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/48	NB18-00740

FIGURE 3 REV 1

SAVED: I:\1102\00181\48\A\GIS\Figs\B13 R1.mxd; Nov 01, 2018 8:28 AM; asimpson

Appendix C

Unit Rate Documentation

Baffinland

Summary of Current Contractor Equipment Rates - 2018
Mary River Project

2018-11-01

		Contractor 1			Contractor 2		Contractor 3		
Class	**Description**	**Hourly Reg.**	**Monthly Reg.**	**Hourly Est.**	**Hourly Reg.**	**Monthly Reg.**	**Hourly Reg.**	**Monthly Reg.**	**Hourly Est.**
HEQ	Loader 988	$ 250.00							
HEQ	930 Loader		$ 13,700.00	85.6					
HEQ	Excavator	$ 195.00							
HEQ	Excavator	$ 260.00							
HEQ	Nuna 60T Crane	$ 247.43							
HEQ	Wheel Loader				$ 155.00				
HEQ	Wheel Loader				$ 165.00				
HEQ	Excavator				$ 115.00				
LEQ	Tracked Skid Steer		$ 5,900.00	36.9					
LEQ	Frost Fighter		$ 332.00	2.1					
LEQ	Light Tower		$ 1,759.00	11.0					
LTR	Fuel/Lube Truck		$ 19,000.00	118.8					
LTR	Effluent Haul Truck		$ 11,600.00	72.5					
LTR	Raw Water Truck		$ 16,600.00	103.8					
LTR	Sterling RO/RO		$ 15,000.00	93.8					
LTR	Tractor				$ 140.00				
LTR	Trailer				$ 140.00				
TR	Crew Bus		$ 8,400.00	52.5					
TR	Crewcab		$ 4,000.00	25.0					
TR	F550 Flat Deck		$ 5,000.00	31.3					
TR	Grocery Truck		$ 8,100.00	50.6					
TR	Mechanic Truck		$ 9,500.00	59.4					
TR	Large bus				$ 40.00				
TR	Utility Truck				$ 75.50				
TR	Tractor							$ 10,000.00	62.5
TR	Trailer							$ 3,500.00	21.9
TR	Pickup Truck							$ 3,500.00	21.9

Hourly Estimates based on conservative assumption

8 hour days
20 days per month
160 hours per month

Baffinland

Summary of Current Contractor Labour Rates - 2018
Mary River Project

2018-11-01

		Contractor 1			Contractor 2			Contractor 3			Contractor 4			Contractor 5		
Heavy Operator		**Straight**	**Overtime**	**Standby**	**Straight**	**Overtime**	**Standby**	**Straight**	**Overtime**	**Standby**	**Straight**	**Overtime**	**Standby**	**Straight**	**Overtime**	**Standby**
OPR	Operator – CAT 992/988 Loaders, CAT 777/740 Trucks, Dozer, Grader, Excavator	$ 67.26	$ 77.43	$ 57.93				$ 59.00	$ 77.00	$ 29.50	$ 61.50	$ 74.00	$ 32.00			
OPR	Operator – Multi Operator (Excavator, Loader, Skid Steers, Dozer, Grader)	$ 69.47	$ 80.30	$ 60.08				$ 59.00	$ 77.00	$ 29.50	$ 61.50	$ 74.00	$ 32.00			
OPR	Crane Operator – 50 ton to 200 ton	$ 78.29	$ 91.76	$ 68.66				$ 59.00	$ 77.00	$ 29.50						
OPR	Crane Operator – 200 ton and above	$ 80.06	$ 94.06	$ 70.37				$ 64.00	$ 82.00	$ 32.00						
OPR	Crusher Operator	$ 69.47	$ 80.30	$ 60.08				$ 59.00	$ 77.00	$ 29.50	$ 61.50	$ 74.00	$ 32.00			
OPR	Operators - B Train; CAT - 992/988/777/740; Multi Operators							$ 59.00	$ 77.00	$ 29.50						
OPR	Crane Operator(direct hire, if available)													$ 105.50		$ 94.70
OPR	Multi-Purpose Operator (incl 988 Loader)													$ 73.44		$ 65.93
OPR	Loader Operator (< 988)													$ 69.56		$ 62.53
OPR	Rigger (direct hire, if available)													$ 88.25		$ 80.46
OPR	Multi-Purpose Operator													$ 72.00		$ 64.63
OPR	Loader Operator (988 + >)													$ 71.50		$ 64.31
opr	Dozer Operator													$ 68.19		$ 61.31
opr	Excavator Operator													$ 69.00		$ 61.97
OPR	Crusher Operator													$ 78.51		$ 70.68
Light Operator																
OPR	Truck Driver (Conventional)													$ 63.75		$ 57.19
OPR	Operator – Skid Steer	$ 64.17	$ 73.42	$ 54.93				$ 59.00	$ 77.00	$ 29.50	$ 61.50	$ 74.00	$ 32.00			
OPR	Truck Driver (Other)													$ 62.50		$ 56.07
OPR	Bobcat Operator													$ 60.00		$ 53.91
OPR	Packer Operator													$ 60.00		$ 53.91
Supervisor/PM/Safety																
SAFE	Safety Support	$ 73.09	$ 85.82	$ 63.51												
SUP	Supervisor										$ 76.00	$ 91.00	$ 32.00			
SUP	Maintenance Supervisors							$ 83.00	$ 105.41	$ 41.50						
SUP	Site Superintendent													$ 148.00		$ 131.84
SUP	Site Foreman													$ 102.00		$ 92.71
SUP	Project Manager													$ 145.00		$ 129.43
SUP	Construction Engineer													$ 99.00		$ 88.13
SUP	Site Administrator													$ 70.01		$ 62.88
SAFE	Safety Coordinator													$ 105.00		$ 94.27
Mechanic																
Mech	Technician / Mechanic – HD/HT/Truck & Coach/Automotive/Crusher/Drills/Heavy Equip	$ 81.83	$ 96.35	$ 72.09	$ 83.00	$ 94.00	$ 63.00	$ 70.00	$ 89.50	$ 34.50	$ 69.00	$ 83.00	$ 32.00			
Mech	Millwrights	$ 81.83	$ 96.35	$ 72.09	$ 83.00	$ 94.00	$ 63.00	$ 70.00	$ 89.50	$ 33.50						
Mech	Welders	$ 76.53	$ 89.47	$ 66.94	$ 83.00	$ 94.00	$ 63.00	$ 70.00	$ 89.50	$ 33.50						
Mech	Electricians	$ 81.83	$ 96.35	$ 72.09	$ 83.00	$ 94.00	$ 63.00	$ 70.00	$ 89.50	$ 33.50						
Mech	Housing Maintainer	$ 65.93	$ 75.71	$ 56.64				$ 55.00	$ 73.00	$ 27.50						
Mech	Carpenter	$ 71.23	$ 82.59	$ 61.79				$ 70.00	$ 89.50	$ 33.50						
Mech	Machinist															
Mech	Truck & Coach Mechanic															
Mech	Heavy Equipment Mechanic															
Mech	Red Seal Technicians/Mechanics															
Mech	Plumber															
Mech	Journeyman Tradesman Heavy Duty Mechanics (HD/HT)				$ 78.00	$ 105.00										
Mech	Heavy Duty Mechanics							$ 67.00	$ 86.50	$ 33.50						
Mech	Truck and Coach Mechanics							$ 67.00	$ 86.50	$ 33.50						
Mech	Automotive Mechanics							$ 67.00	$ 86.50	$ 33.50						
Mech	Mechanic													$ 96.90		$ 87.74
Labourer																
LAB	Skilled Labour	$ 60.64	$ 68.83	$ 51.49				$ 55.00	$ 73.00	$ 27.50	$ 56.00	$ 67.00	$ 32.00			
LAB	Grease Bay Attendants	$ 60.64	$ 68.83	$ 51.49				$ 55.00	$ 73.00	$ 27.50						
LAB	Wash Bay Attendants	$ 60.64	$ 68.83	$ 51.49				$ 55.00	$ 73.00	$ 27.50						

Baffinland

Summary of Current Contractor Labour Rates - 2018
Mary River Project

2018-11-01

		Contractor 1			Contractor 2			Contractor 3			Contractor 4			Contractor 5		
LAB	Janitor	$ 57.10	$ 64.25	$ 48.06												
LAB	Labour / Grease Bay Attendants							$ 55.00	$ 67.00	$ 27.50						
LAB	Skilled Labourer													$ 61.20		$ 54.99
LAB	Labourer													$ 60.00		$ 53.91
LAB	Welder													$ 88.00		$ 80.23
LAB	Serviceman													$ 71.49		$ 64.38
Electricians																
ELE	Journeyman Tradesman Electricians				$ 78.00	$ 105.00										
ELE	Electricians							$ 67.00	$ 86.50	$ 33.50						

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'Mary River Project - Complete Project Security Assement - Estimate Breakdown Structure'
Updated 30 October 2018, Revised Unit Rates for 2018

| Level 0 - Site Location | Level 0 - Description | Level 1 - Area | Level 1 - Description | Level 2 - Facility System | Level 2 - Description | Level 3 - Sub Facility Sub | Level 3 - Description | ID CODE | Equipment Type | Price Code | Price Code Description | Qty Code | Area - QTY Code | QTY Code Description | Type | Description | Tag Number | QTY | Unit | Manhours Per Unit | Unit Fuel Consumption | Unit Labour | Unit Equipment | Unit Rate | Total Manhours | Total Fuel Consumption | Total Labour | Total Equipment | Total Cost ($) | Unit M3 | Total Vol (m3) | IOL (%) | Crown Land (%) | Water Liability (%) | Land Liability (%) | IOL Cost ($) | Crown Land Cost ($) | Water Liability Cost ($) | Land Liability Cost ($) | License | Adjustment Tag | Abandoned Work Plan | Type of Costs | C&M Year 0- % | Closure Year 0+1 - % | Closure Year 1 - % | Closure Year 2 - % | Closure Year 3 - % | Post Closure Year 4 - % | Post Closure Year 5 - % | Post Closure Year 6 - % | Post Closure Year 7 - % | Post Closure Year 8 - % | C&M Year 0- Cost ($) | Closure Year 0+1 - Cost ($) | Closure Year 1 - Cost ($) | Closure Year 2 - Cost ($) | Closure Year 3 - Cost ($) | Post Closure Year 4 - Cost ($) | Post Closure Year 5 - Cost ($) | Post Closure Year 6 - Cost ($) | Post Closure Year 7 - Cost ($) | Post Closure Year 8 - Cost ($) |
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'Mary River Project - Complete Project Security Assement - Estimate Breakdown Structure'
Updated 30 October 2018, Revised Unit Rates for 2018

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'Mary River Project - Complete Project Security Assement - Estimate Breakdown Structure'
Updated 30 October 2018, Revised Unit Rates for 2018

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility Sub	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M	Closure		Post Closure						C&M	Closure			Post Closure					
																																											Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0 - Cost ($)	Year 0+1 - Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	023	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	CAT 988H	MOBILE EQUIPMENT - STOCKPILE FRONT END LOADER - CAT 988H L: 10390, W: 3600, H: 4115, 43400 kg	2142-MO-006		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	024	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-009		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	025	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-010		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	026	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-011		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	027	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-012		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	028	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-013		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	029	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-014		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	030	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-015		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	031	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-016		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	032	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-017		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	033	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Lights	MOBILE EQUIPMENT - NIGHT WORK AREA LIGHT PLANTS - TEREX AL4 L: 4623, W: 2007, H: 9000, 925 kg	2142-MO-018		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	034	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	bobcat size	MOBILE EQUIPMENT - CONVEYOR CLEANUP/SNOW REMOVAL ALL TERRAIN LOADER - CAT 247B L: 3277, W: 1676, H: 3810, 3175 kg	2142-MO-019		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment	035	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	bobcat size	MOBILE EQUIPMENT - CONVEYOR CLEANUP/SNOW REMOVAL ALL TERRAIN LOADER - CAT 247B L: 3277, W: 1676, H: 3810, 3175 kg	2142-MO-020		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment		Front End Loader		1	Ea	13.0	100.0	975.0	1,000.0	2,075.0	13	100	975	1,000	2,075	96	96	100%	0%	0%	100%	2,075	0	0	2,075	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%		33%					33%	0		692	0	692	0	0	0	0	692
2000	Mine Port	2100	General	2140	Mobile Equipment	2142	Mobile Materials Handling Equipment		MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	CAT 988H	MOBILE EQUIPMENT - STOCKPILE RECLAIM FRONT END LOADER - CAT 988H L: 10390, W: 3600, H: 4115, 43400 kg			Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	064	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - WATER TRUCK - PETERBILT 348 AUTO 10,000 BBL	2144-MO-001		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	065	MO-	O3	Heavy Mobile Equipment	O3	Mobile Equipment	Heavy Mobile Equipment	Container Handler	MOBILE EQUIPMENT - CONTAINER HANDLER - KALMAR DRF 450-6555 L: 11684, W: 3454, H: 2146, 72000 kg	2144-MO-002		Ea	13.0	100.0	975.0	1,000.0	2,075.0	0	0	0	0	0	96	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	066	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	school bus	MOBILE EQUIPMENT - TRANSPORT TRANSFER BUS - BLUE BIRD BBCV DIESEL 3507A L: 12192, W: 2440, H: 2900, 14000 kg	2144-MO-003		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	067	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	school bus	MOBILE EQUIPMENT - WORKER TRANSFER MINI BUS - BLUE BIRD BBCV DIESEL 1910 A L: 7470, W: 2440, H: 1930, 7080 kg	2144-MO-004		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	068	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - WATER DELIVERY TRUCK - PETERBILT 367 TRI-DRIVE	2144-MO-005		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	069	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - MILNE/MR FREIGHT HAUL TRACTOR - PETERBILT 367	2144-MO-006		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	070	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - MILNE/MR FREIGHT HAUL TRACTOR - PETERBILT 367	2144-MO-007		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	071	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - MILNE/MR FREIGHT HAUL TRACTOR - PETERBILT 367	2144-MO-008		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	072	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Trailer	MOBILE EQUIPMENT - MILNE/MR FREIGHT HAUL HIBOY TRAILER L: 12192, W: 2438	2144-MO-009		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	073	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Trailer	MOBILE EQUIPMENT - MILNE/MR FREIGHT HAUL HIBOY TRAILER L: 12192, W: 2438	2144-MO-010		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	074	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Trailer	MOBILE EQUIPMENT - MILNE/MR FREIGHT HAUL HIBOY TRAILER L: 12192, W: 2438	2144-MO-011		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	075	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	sewage tank and vacuum	MOBILE EQUIPMENT - SEWAGE HOLDING TANK SKID MOUNTED VACUUM UNIT - TEXLA	2144-MO-012		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	076	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Hwy Truck	MOBILE EQUIPMENT - GARBAGE TRUCK - PETERBILT 365	2144-MO-013		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	077	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	2144-MO-014		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	078	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	2144-MO-015		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	079	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	2144-MO-016		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	080	MO-	O2	Medium Mobile Equipment	O2	Mobile Equipment	Medium Mobile Equipment	Garbage Bin (Large)	MOBILE EQUIPMENT - GARBAGE BIN - LARGE	2144-MO-017		Ea	10.0	37.5	750.0	375.0	1,162.5	0	0	0	0	0	24	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	081	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - GARBAGE BIN - SMALL	2144-MO-018		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	082	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - GARBAGE BIN - SMALL	2144-MO-019		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	083	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	2144-MO-025		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	084	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	2144-MO-026		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	085	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Small Garbage bin	MOBILE EQUIPMENT - WILDLIFE DETERGENT GARBAGE BIN	2144-MO-027		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	086	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - HEATED/REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	2144-MO-030		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	087	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - HEATED/REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	2144-MO-031		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	088	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	2144-MO-032		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	089	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	2144-MO-033		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	090	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	2144-MO-034		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0	0	0	0	0	0
2000	Mine Port	2100	General	2140	Mobile Equipment	2144	Mobile Site Services Equipment	091	MO-	O1	Light Mobile Equipment	O1	Mobile Equipment	Light Mobile Equipment	Sea Container	MOBILE EQUIPMENT - REFRIGERATED SEA CONTAINER L: 6096, W: 2440, H: 2440	2144-MO-035		Ea	6.7	20.8	500.0	208.3	729.2	0	0	0	0	0	4	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%					33%	0		0	0	0

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Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IOL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IOL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Associated Work Plan	Type of Costs	C&M	Closure	Post Closure							C&M	Closure	Post Closure						
																																											Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0- Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 - Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	468	In Meters	piping	Piping	Piping	Bulks	Piping		Sewage Treatment Piping - Piping Installation - Sewage truck bldg to STP	2731.2-P	258	m	0.3	3.1	18.8	31.3	53.1	65	806	4,838	8,063	13,706	0	3	100%	0%	100%	0%	13,706	0	13,706	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		6,853	6,853	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	466	VP-	VP3	VENDOR PKG - Sewage Treatment Plant	VP3	Packaged Facilities	Sewage Treatment Plant Package		SEWAGE TREATMENT PLANT VENDOR PACKAGE	2731-VP-005	1	Ea	51.0	450.0	3,825.0	4,500.0	8,775.0	51	450	3,825	4,500	8,775	329	329	100%	0%	100%	0%	8,775	0	8,775	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		4,388	4,388	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	456	BLD	FF1-c	Modular Building Contaminated (480 sq)	FC-c	Buildings (Contaminated)	ISO Shipping Containers		Sewage Chemical Storage Container - Demolish and Decontaminate Building - ISO Shipping Container	2731-BLD-001	30	m2	0.6	2.8	42.0	70.1	114.9	17	83	1,250	2,083	3,417	1	30	100%	0%	0%	100%	3,417	0	0	3,417	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,708	1,708	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	465	TK-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Tank	TANK - TREATED EFFLUENT TANK	2731-TK-002	1	Ea	19.2	177.5	1,440.0	1,775.0	3,392.5	19	178	1,440	1,775	3,393	1	1	100%	0%	0%	100%	3,393	0	0	3,393	Type B Construction 2BC-MRY1416	Added	2014	Direct			33%		33%				33%		0		1,131	0	1,131	0	0	0	0	1,131
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	462	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - TREATED EFFLUENT DISCHARGE PUMP NO.1	2731-PP-003	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%				33%		0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	463	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - TREATED EFFLUENT DISCHARGE PUMP NO.2	2731-PP-004	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%				33%		0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	464	SC-	MM2	Medium Equipment	MM2	Mechanical Equipment	Medium Equipment	Screen	SCREEN - SCREEN	2731-SC-001	0	Ea	19.2	177.5	1,440.0	1,775.0	3,392.5	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			33%		33%				33%		0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	457	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Sewage Chemical Storage Container - Demolish and foundations - Gravel Base - Skidded Building	2731-BLD-001	30	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	458	BLD		#N/A	FW	Flooring / Foundations	Wood Floor		Sewage Chemical Storage Container - Demolish floor finish - Raised Steel or Wooden Floor	2731-BLD-001	30	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	467	In Meters		Inlcuded with Piping	Piping - Heat Tracing	Bulks	Piping - Heat Tracing		Sewage Treatment Piping - Heat Trace Installation - Sewage truck bldg to STP	2731.2-E	128	m	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	460	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Sewage Treatment Plant - Demolish and foundations - Gravel Base - Skidded Building	2731-VP-005	178	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	461	VP-		#N/A	FW	Flooring / Foundations	Wood Floor		Sewage Treatment Plant - Demolish floor finish - Raised Steel or Wooden Floor	2731-VP-005	178	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2731	Sewage Treatment Systems	466	VP-	VP3	VENDOR PKG - Sewage Treatment Plant	VP3	Packaged Facilities	Sewage Treatment Plant		Sewage Treatment Plant for 380-person temporary soft-walled camp at Milne Port		1	Ea	51.0	450.0	3,825.0	4,500.0	8,775.0	51	450	3,825	4,500	8,775	329	329	100%	0%	100%	0%	8,775	0	8,775	0	Type B Construction 2BC-MRY1416	Added	2017-A	Direct			50%	50%							0		4,388	4,388	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	470	BLD	FF2-c	Fold Away Building Contaminated (480 sq)	FFL-c	Buildings (Contaminated)	Fold Away Building		Sewage Truck Building - Demolish and Decontaminate Building - Fold-away Building (Steel)	2732-BLD-001	56	m2	0.6	2.0	42.0	70.1	114.0	31	109	2,344	3,906	6,359	1	56	100%	0%	0%	100%	6,359	0	0	6,359	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		3,180	3,180	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	477	TK-	MT1-d	Light Diesel (Day tanks 10,000L to 50,000L)	MT1-d	Mechanical Equipment	Light Diesel Tanks		TANK - MILNE SEWAGE TRUCK BUILDING DIESEL FUEL TANK - DTE ULC601-07	2732-TK-003	1	Ea	15.5	162.5	1,162.5	1,625.0	2,950.0	16	163	1,163	1,625	2,950	20	20	100%	0%	0%	100%	2,950	0	0	2,950	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		1,475	1,475	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	471	BLD	CP	Precast Concrete Foundations - (480 sq)	CP	Flooring / Foundations	Precast Foundations		Sewage Truck Building - Demolish and foundations - Precast Footing (Perimeter Beam)	2732-BLD-001	56	m2	0.1	1.8	10.9	18.2	30.9	8	101	607	1,012	1,721	1	42	100%	0%	0%	100%	1,721	0	0	1,721	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		860	860	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	473	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - MILNE SEWAGE TRUCK BUILDING FUEL OIL PUMP (DUTY) - VIKING DUPLEX OIL SYSTEMS	2732-PP-001	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	474	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	FUEL OIL PUMP	2732-MT-001	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	475	PP-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	PUMP - MILNE SEWAGE TRUCK BUILDING FUEL OIL PUMP (STANDBY) - VIKING DUPLEX OIL SYSTEMS	2732-PP-002	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	476	MT-	MM1	Light Equipment	MM1	Mechanical Equipment	Light Equipment	Pump	FUEL OIL PUMP	2732-MT-002	0	Ea	8.1	88.8	607.5	887.5	1,583.8	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416	Removed	2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2730	Sewage System	2732	Sewage Truck Building	472	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Sewage Truck Building - Demolish floor finish - Gravel	2732-BLD-001	56	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2734	Treated Effluent Discharge	480	In Meters	piping	Piping	Piping	Bulks	Piping		Treated Effluent Piping - Piping Installation - STP to effluent pond and ocean discharge		2,595	m	0.3	3.1	18.8	31.3	53.1	649	8,109	48,656	81,094	137,859	0	26	100%	0%	100%	0%	137,859	0	137,859	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		45,953	45,953	45,953	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	0	Sewage System		Treated Effluent Discharge		In Meters	piping	Piping	Piping	Bulks	Piping		Realignment of the Milne Port treated effluent line		750	m	0.3	3.1	18.8	31.3	53.1	188	2,344	14,063	23,438	39,844	0	8	100%	0%	0%	100%	39,844	0	39,844	0	Type A 2AM-MRY1325		2018-C2	Direct			33%	33%	33%						0		13,281	13,281	13,281	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	0	Sewage System		Treated Effluent Discharge		In Meters	piping	Piping	Piping	Bulks	Piping		Realignment of the fuel manifold and piping line		750	m	0.3	3.1	18.8	31.3	53.1	188	2,344	14,063	23,438	39,844	0	8	100%	0%	0%	100%	39,844	0	39,844	0	Type A 2AM-MRY1325		2018-C2	Direct			33%	33%	33%						0		13,281	13,281	13,281	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2734	Treated Effluent Discharge	479	In Meters		Inlcuded with Piping	Piping - Heat Tracing	Bulks	Piping - Heat Tracing		Treated Effluent Piping - Heat Trace Installation - STP to effluent pond and ocean discharge		1,330	m	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	498	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 5kV - Electrical distribution system from power gen to e-house	2750.2-E	6,100	m	0.1	1.3	7.5	12.5	21.3	610	7,625	45,750	76,250	129,625	0	61	100%	0%	0%	100%	129,625	0	0	129,625	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		43,208	43,208	43,208	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	499	In Meters	cable	Cable	Cable	Bulks	Cable		Power Distribution System - Electrical Cable Installation 600V - Connections from e-house to facilities	2750.3-E	5,000	m	0.1	1.3	7.5	12.5	21.3	500	6,250	37,500	62,500	106,250	0	50	100%	0%	0%	100%	106,250	0	0	106,250	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		35,417	35,417	35,417	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	483	BLD	FF1	Modular Building Not Contaminated (480 82)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-001	59	m2	0.2	2.8	16.8	28.0	47.6	13	167	1,000	1,667	2,833	1	59	100%	0%	0%	100%	2,833	0	0	2,833	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		944	944	944	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	486	BLD	FF1	Modular Building Not Contaminated (480 82)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-002	37	m2	0.2	2.8	16.8	28.0	47.6	8	104	625	1,042	1,771	1	37	100%	0%	0%	100%	1,771	0	0	1,771	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		590	590	590	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	489	BLD	FF1	Modular Building Not Contaminated (480 82)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #1 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-003	37	m2	0.2	2.8	16.8	28.0	47.6	8	104	625	1,042	1,771	1	37	100%	0%	0%	100%	1,771	0	0	1,771	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		590	590	590	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	487	BLD	FF1	Modular Building Not Contaminated (480 82)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #2 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-004	37	m2	0.2	2.8	16.8	28.0	47.6	8	104	625	1,042	1,771	1	37	100%	0%	0%	100%	1,771	0	0	1,771	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		590	590	590	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	495	BLD	FF1	Modular Building Not Contaminated (480 82)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Fuel Tank Farm E-House - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-005	2	m2	0.2	2.8	16.8	28.0	47.6	1	7	39	65	111	1	2	100%	0%	0%	100%	111	0	0	111	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		55	55	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	496	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Fuel Tank Farm E-House - Demolish and foundations - Gravel Base - Skidded Building	2750-BLD-005	2	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	497	BLD		#N/A	FW	Flooring / Foundations	Wood Floor		Fuel Tank Farm E-House - Demolish floor finish - Raised Steel or Wooden Floor	2750-BLD-005	2	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			50%	50%							0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	484	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Accommodation Area E-House #1 - Demolish and foundations - Gravel Base - Skidded Building	2750-BLD-001	59	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	485	BLD		#N/A	FW	Flooring / Foundations	Wood Floor		Accommodation Area E-House #1 - Demolish floor finish - Raised Steel or Wooden Floor	2750-BLD-001	59	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type B Construction 2BC-MRY1416		2014	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System		GE-	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Power plant generators	Genset modules		4	Ea	168.0	1,850.0	12,600.0	18,500.0	32,950.0	672	7,400	50,400	74,000	131,800	56	224	100%	0%	0%	100%	131,800	0	0	131,800	Type A 2AM-MRY1325	Added	2018-C1	Direct			33%		33%				33%		0		43,933	0	43,933	0	0	0	0	43,933
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System		GE-	MM3	Heavy Equipment	MM3	Mechanical Equipment	Heavy Equipment	Power plant generators	Genset modules		-4	Ea	168.0	1,850.0	12,600.0	18,500.0	32,950.0	-672	-7,400	-50,400	-74,000	-131,800	56	-224	100%	0%	0%	100%	-131,800	0	0	-131,800	Type A 2AM-MRY1325	Added	2018-MAY	Direct			33%		33%				33%		0		-43,933	0	-43,933	0	0	0	0	-43,933
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	008	BLD	FF1	Modular Building Not Contaminated (480 82)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Accommodation Area E-House #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-008	0	m2	0.2	2.8	16.8	28.0	47.6	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	008	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Accommodation Area E-House #3 - Demolish and foundations - Gravel Base - Skidded Building	2750-BLD-008	0	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	008	BLD		#N/A	FW	Flooring / Foundations	Wood Floor		Accommodation Area E-House #3 - Demolish floor finish - Raised Steel or Wooden Floor	2750-BLD-008	0	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	009	BLD	FF1	Modular Building Not Contaminated (480 82)	FS	Buildings (Not Contaminated)	Prefabricated Special Modular		Services Area E-House #3 - Demolish and Decontaminate Building - Special Modular / Prefabricated	2750-BLD-009	0	m2	0.2	2.8	16.8	28.0	47.6	0	0	0	0	0	1	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	009	BLD	EG	Gravel Base Removal	EG	Flooring / Foundations	Gravel Base		Services Area E-House #3 - Demolish and foundations - Gravel Base - Skidded Building	2750-BLD-009	0	m2	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
2000	Mine Port	2700	Site Utilities	2750	Power Distribution System	2750	Power Distribution System	009	BLD		#N/A	FW	Flooring / Foundations	Wood Floor		Services Area E-House #3 - Demolish floor finish - Raised Steel or Wooden Floor	2750-BLD-009	0	m2	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Direct			33%	33%	33%						0		0	0	0	0	0	0	0	0
3000	Tote Road	3100	General																																																													
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	504	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 1 - Demolish Building ISO Shipping Container	3111-BLD-001	15	m2	0.1	1.4	8.4	14.0	23.8	2	21	125	208	354	1	15	100%	0%	0%	100%	354	0	0	354	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		118	118	118	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3111	Communications Facility No. 1	507	BLD	FF4	ISO Container	FC	Buildings (Not Contaminated)	ISO Shipping Containers		Communication Shed No. 2 - Demolish Building ISO Shipping Container	3111-BLD-002	15	m2	0.1	1.4	8.4	14.0	23.8	2	21	125	208	354	1	15	100%	0%	0%	100%	354	0	0	354	Type A 2AM-MRY1325		2014	Direct			33%	33%	33%						0		118	118	118	0	0	0	0	0
3000	Tote Road	3100	General	3110	Communication and IT Infrastructure	3

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| Level 0 - Site Location | Level 0 - Description | Level 1 - Area | Level 1 - Description | Level 2 - Facility / System | Level 2 - Description | Level 3 - Sub Facility Sub | Level 3 - Description | ID CODE | Equipment Type | Price Code | Price Code Description | Qty Code | Area - QTY Code | QTY Code Description | Type | Description | Tag Number | QTY | Unit | Manhours Per Unit | Unit Fuel Consumption | Unit Labour | Unit Equipment | Unit Rate | Total Manhours | Total Fuel Consumption | Total Labour | Total Equipment | Total Cost ($) | Unit M3 | Total Vol (m3) | IDL (%) | Crown Land (%) | Water Liability (%) | Land Liability (%) | IDL Cost ($) | Crown Land Cost ($) | Water Liability Cost ($) | Land Liability Cost ($) | License | Adjustment Tag | Abandoned Work Plan | Type of Costs | C&M | Closure | Post Closure | | | | | | | C&M | Closure | Post Closure | | | | | | | |
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Updated 30 October 2018, Revised Unit Rates for 2018

Level 0 - Site Location	Level 0 - Description	Level 1 - Area	Level 1 - Description	Level 2 - Facility / System	Level 2 - Description	Level 3 - Sub Facility/ Sub System	Level 3 - Description	ID CODE	Equipment Type	Price Code	Price Code Description	Qty Code	Area - QTY Code	QTY Code Description	Type	Description	Tag Number	QTY	Unit	Manhours Per Unit	Unit Fuel Consumption	Unit Labour	Unit Equipment	Unit Rate	Total Manhours	Total Fuel Consumption	Total Labour	Total Equipment	Total Cost ($)	Unit M3	Total Vol (m3)	IDL (%)	Crown Land (%)	Water Liability (%)	Land Liability (%)	IDL Cost ($)	Crown Land Cost ($)	Water Liability Cost ($)	Land Liability Cost ($)	License	Adjustment Tag	Abandoned Work Plan	Type of Costs	C&M	Closure			Post Closure				C&M	Closure			Post Closure				
																																										Year 0 - %	Year 0+1 - %	Year 1 - %	Year 2 - %	Year 3 - %	Year 4 - %	Year 5 - %	Year 6 - %	Year 7 - %	Year 8 - %	Year 0- Cost ($)	Year 0+1- Cost ($)	Year 1 - Cost ($)	Year 2 - Cost ($)	Year 3 - Cost ($)	Year 4 - Cost ($)	Year 5 -Cost ($)	Year 6 - Cost ($)	Year 7 - Cost ($)	Year 8 - Cost ($)
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)				Indirect	Indirect	Indirect	Indirect		Ammonium Nitrate (explosive material)														0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive material)		2,537,000												2,537,000	0	0	100%	0%	0%	100%	2,537,000	0	0	2,537,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		845,667	845,667	845,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive Material)		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)					Indirect	Indirect			Ammonium Nitrate (explosive Material)		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Removed	2015 R	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Ammonium Nitrate (explosive Material)				Indirect	Indirect	Indirect	Indirect		Ammonium Nitrate (explosive material)		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2017-A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment				Indirect	Indirect	Indirect	Indirect		Contaminated Soil Treatment		234,000												234,000	0	0	100%	0%	0%	100%	234,000	0	0	234,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		78,000	78,000	78,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2015	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment		63,000												63,000	0	0	100%	0%	0%	100%	63,000	0	0	63,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		21,000	21,000	21,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2015 A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment					Indirect	Indirect			Contaminated Soil Treatment		5,000												5,000	0	0	100%	0%	0%	100%	5,000	0	0	5,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		1,667	1,667	1,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Contaminated Soil Treatment				Indirect	Indirect	Indirect	Indirect		Contaminated Soil Treatment		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2017-A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		2,873,000												2,873,000	0	0	100%	0%	0%	100%	2,873,000	0	0	2,873,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		957,667	957,667	957,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		29,000												29,000	0	0	100%	0%	0%	100%	29,000	0	0	29,000	Type A 2AM-MRY1325		2015	Indirect			33%	33%	33%						0		9,667	9,667	9,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		14,000												14,000	0	0	100%	0%	0%	100%	14,000	0	0	14,000	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		4,667	4,667	4,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		28,000												28,000	0	0	100%	0%	0%	100%	28,000	0	0	28,000	Type A 2AM-MRY1325	Added	2017	Indirect			33%	33%	33%						0		9,333	9,333	9,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		-15,000												-15,000	0	0	100%	0%	0%	100%	-15,000	0	0	-15,000	Type A 2AM-MRY1325	removed	2018-MAY	Indirect			33%	33%	33%						0		-5,000	-5,000	-5,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		136,000												136,000	0	0	100%	0%	0%	100%	136,000	0	0	136,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			33%	33%	33%						0		45,333	45,333	45,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		76,000												76,000	0	0	100%	0%	0%	100%	76,000	0	0	76,000	Type A 2AM-MRY1325	Added	2018-C2	Indirect			33%	33%	33%						0		25,333	25,333	25,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		9,000												9,000	0	0	100%	0%	0%	100%	9,000	0	0	9,000	Type A 2AM-MRY1325		2015 A	Indirect			33%	33%	33%						0		3,000	3,000	3,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		219,000												219,000	0	0	100%	0%	0%	100%	219,000	0	0	219,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		73,000	73,000	73,000	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Fuel				Indirect	Indirect	Indirect	Indirect		Fuel		1,211,000												1,211,000	0	0	100%	0%	0%	100%	1,211,000	0	0	1,211,000	Type A 2AM-MRY1325	Added	2017-A	Indirect			33%	33%	33%						0		403,667	403,667	403,667	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		1,245,000												1,245,000	0	0	98%	2%	0%	100%	1,216,526	28,474	0	1,245,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		249,000	249,000	249,000	124,500	124,500	124,500	62,250	62,250
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		652,000												652,000	0	0	98%	2%	0%	100%	637,088	14,912	0	652,000	Type A 2AM-MRY1325		2014	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		130,400	130,400	130,400	65,200	65,200	65,200	32,600	32,600
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		66,000												66,000	0	0	100%	0%	0%	100%	66,000	0	0	66,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		13,200	13,200	13,200	6,600	6,600	6,600	3,300	3,300
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		46,000												46,000	0	0	100%	0%	0%	100%	46,000	0	0	46,000	Type A 2AM-MRY1325		2015	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,200	9,200	9,200	4,600	4,600	4,600	2,300	2,300
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		47,000												47,000	0	0	79%	21%	0%	100%	37,060	9,940	0	47,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		9,400	9,400	9,400	4,700	4,700	4,700	2,350	2,350
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		29,000												29,000	0	0	79%	21%	0%	100%	22,867	6,133	0	29,000	Type A 2AM-MRY1325	Added	2016	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		5,800	5,800	5,800	2,900	2,900	2,900	1,450	1,450
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		-61,637												-61,637	0	0	100%	0%	0%	100%	-61,637	0	0	-61,637	Type A 2AM-MRY1325	Removed	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-12,327	-12,327	-12,327	-6,164	-6,164	-6,164	-3,082	-3,082
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		102,000												102,000	0	0	100%	0%	0%	100%	102,000	0	0	102,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		20,400	20,400	20,400	10,200	10,200	10,200	5,100	5,100
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		55,000												55,000	0	0	100%	0%	0%	100%	55,000	0	0	55,000	Type A 2AM-MRY1325	Added	2018-C2	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		11,000	11,000	11,000	5,500	5,500	5,500	2,750	2,750
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		43,000												43,000	0	0	100%	0%	0%	100%	43,000	0	0	43,000	Type A 2AM-MRY1325	Added	2017	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		8,600	8,600	8,600	4,300	4,300	4,300	2,150	2,150
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		92,000												92,000	0	0	100%	0%	0%	100%	92,000	0	0	92,000	Type A 2AM-MRY1325	Added	2018-C2	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		18,400	18,400	18,400	9,200	9,200	9,200	4,600	4,600
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		481,541												481,541	0	0	100%	0%	0%	100%	481,541	0	0	481,541	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		96,308	96,308	96,308	48,154	48,154	48,154	24,077	24,077
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Crushing Module (mobilized in 2018, installed following expansion approval)		30,500	m3					68						2,074,000	0	0	100%	0%	0%	100%	2,074,000	0	0	2,074,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		414,800	414,800	414,800	207,400	207,400	207,400	103,700	103,700
8001	Other Indirects	8101	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Crushing Module (mobilized in 2018, installed following expansion approval)		-30,500	m3					68						-2,074,000	0	0	100%	0%	0%	100%	-2,074,000	0	0	-2,074,000	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-414,800	-414,800	-414,800	-207,400	-207,400	-207,400	-103,700	-103,700
8002	Other Indirects	8102	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	BMH Conveyors (mobilized in 2018, installed following expansion approval)		40,500	m3					68						2,754,000	0	0	100%	0%	0%	100%	2,754,000	0	0	2,754,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		550,800	550,800	550,800	275,400	275,400	275,400	137,700	137,700
8002	Other Indirects	8102	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	BMH Conveyors (mobilized in 2018, installed following expansion approval)		-40,500	m3					68						-2,754,000	0	0	100%	0%	0%	100%	-2,754,000	0	0	-2,754,000	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-550,800	-550,800	-550,800	-275,400	-275,400	-275,400	-137,700	-137,700
8003	Other Indirects	8103	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Screening Module (mobilized in 2018, installed following expansion approval)		24,100	m3					68						1,638,800	0	0	100%	0%	0%	100%	1,638,800	0	0	1,638,800	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		327,760	327,760	327,760	163,880	163,880	163,880	81,940	81,940
8003	Other Indirects	8103	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Screening Module (mobilized in 2018, installed following expansion approval)		-24,100	m3					68						-1,638,800	0	0	100%	0%	0%	100%	-1,638,800	0	0	-1,638,800	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-327,760	-327,760	-327,760	-163,880	-163,880	-163,880	-81,940	-81,940
8004	Other Indirects	8104	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Car Dumper Module (mobilized in 2018, installed following expansion approval)		41,500	m3					68						2,822,000	0	0	100%	0%	0%	100%	2,822,000	0	0	2,822,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		564,400	564,400	564,400	282,200	282,200	282,200	141,100	141,100
8004	Other Indirects	8104	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Car Dumper Module (mobilized in 2018, installed following expansion approval)		-41,500	m3					68						-2,822,000	0	0	100%	0%	0%	100%	-2,822,000	0	0	-2,822,000	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-564,400	-564,400	-564,400	-282,200	-282,200	-282,200	-141,100	-141,100
8005	Other Indirects	8105	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Rail Construction Materials (mobilized in 2018, installed following expansion approval)		25,100	m3					68						1,706,800	0	0	100%	0%	0%	100%	1,706,800	0	0	1,706,800	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		341,360	341,360	341,360	170,680	170,680	170,680	85,340	85,340
8005	Other Indirects	8105	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect	Lot	Rail Construction Materials (mobilized in 2018, installed following expansion approval)		-9,926	m3					68						-674,968	0	0	100%	0%	0%	100%	-674,968	0	0	-674,968	Type A 2AM-MRY1325	Added	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-134,994	-134,994	-134,994	-67,497	-67,497	-67,497	-33,748	-33,748
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		270,000												270,000	0	0	100%	0%	0%	100%	270,000	0	0	270,000	Type A 2AM-MRY1325	Added	2018-C1	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		54,000	54,000	54,000	27,000	27,000	27,000	13,500	13,500
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		30,000												30,000	0	0	100%	0%	0%	100%	30,000	0	0	30,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		6,000	6,000	6,000	3,000	3,000	3,000	1,500	1,500
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		18,000												18,000	0	0	100%	0%	0%	100%	18,000	0	0	18,000	Type A 2AM-MRY1325		2015 A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		3,600	3,600	3,600	1,800	1,800	1,800	900	900
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		477,000												477,000	0	0	96%	4%	0%	100%	457,394	19,606	0	477,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		95,400	95,400	95,400	47,700	47,700	47,700	23,850	23,850
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		266,000												266,000	0	0	96%	4%	0%	100%	255,066	10,934	0	266,000	Type A 2AM-MRY1325	Added	2015 R	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		53,200	53,200	53,200	26,600	26,600	26,600	13,300	13,300
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization and Demobilization of Equipment and Materials by Sealift		474,000												474,000	0	0	100%	0%	0%	100%	474,000	0	0	474,000	Type A 2AM-MRY1325	Added	2017-A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		94,800	94,800	94,800	47,400	47,400	47,400	23,700	23,700
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		-33,000												-33,000	0	0	100%	0%	0%	100%	-33,000	0	0	-33,000	Type A 2AM-MRY1325	removed	2018-MAY	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		-6,600	-6,600	-6,600	-3,300	-3,300	-3,300	-1,650	-1,650
8000	Other Indirects	8100	Other Indirects	TBD	Mobilization	TBD	Mobilization and Demobilization				Indirect	Indirect	Indirect	Indirect		Mobilization of Workers Required for Reclamation		177,000												177,000	0	0	100%	0%	0%	100%	177,000	0	0	177,000	Type A 2AM-MRY1325	Added	2017-A	Indirect			20%	20%	20%	10%	10%	10%	5%	5%	0		35,400	35,400	35,400	17,700	17,700	17,700	8,850	8,850
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste & Material				Indirect	Indirect	Indirect	Indirect		Off-Site Disposal of Waste & Material		1,969,000												1,969,000	0	0	100%	0%	0%	100%	1,969,000	0	0	1,969,000	Type A 2AM-MRY1325		2014	Indirect			33%	33%	33%						0		656,333	656,333	656,333	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste & Material					Indirect	Indirect			Off-Site Disposal of Waste & Material		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2015	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste & Material					Indirect	Indirect			Off-Site Disposal of Waste & Material		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2016	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste & Material					Indirect	Indirect			Off-Site Disposal of Waste & Material		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325		2015 A	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste & Material					Indirect	Indirect			Off-Site Disposal of Waste & Material		0												0	0	0	100%	0%	0%	100%	0	0	0	0	Type A 2AM-MRY1325	Added	2015 R	Indirect			33%	33%	33%						0		0	0	0	0	0	0	0	0
8000	Other Indirects	8100	Other Indirects	TBD	Material Disposal	TBD	Off-Site Disposal of Waste &

| | | |

Appendix D

Supporting Documentation

Baffinland

2018 Sealift Manifest
Summary of Equipment

2018-11-01

D/R#	PKG #	Description	Securities Classification	Vol (m³)	Wgt (Kgs)	Shipper	Date loade	Vessel / Voyage #	Port of Dis	RDate
7364	140669	HP-400 CONE CRUSHER *REFURBISHED (TWO BROKEN LIFTING EYES)	Heavy	27	23140	TOROMONT	7-8-18	M/V Miena Voy: 1	Mary River	6-18-18
8742	145827	VERY USED CONVEYOR #7009	Heavy	41.76	1820	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-12-18
8742	145828	VERY USED CONVEYOR #0775	Heavy	64.05	3200	SANA	9-28-18	M/V Zelada Voy: 4	Mary River	9-12-18
8742	145829	VERY USED CONVEYOR #12-0702	Heavy	59.4	3200	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-12-18
8742	145830	VERY USED CONVEYOR #12-0701	Heavy	25.19	1820	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-12-18
8769	145847	CONVEYOR #0788	Heavy	63.01	1820	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-13-18
8769	145848	CONVEYOR #7008	Heavy	32.64	1820	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-13-18
8769	145867	CONVEYOR #17-0703	Heavy	38.74	1820	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-13-18
8769	145868	CONVEYOR #771	Heavy	30.83	1820	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-13-18
8770	145869	CONE CRUSHER UNIT #18-0704	Heavy	289.8	32800	SANA	9-28-18	M/V Zelada Voy: 4	Mary River	9-13-18
8814	145182	SKID & CONVEYOR #144-8598	Heavy	3.5	3947	TOROMONT	9-26-18	M/V Zelada Voy: 4	Mary River	9-7-18
8814	145183	CONVEYOR #144-8598	Heavy	3.5	3850	TOROMONT	9-26-18	M/V Zelada Voy: 4	Mary River	9-7-18
8833	145928	TWIN SCREENER #797	Heavy	316.91	35830	SANA	9-28-18	M/V Zelada Voy: 4	Mary River	9-17-18
8833	145929	GRIZZLY UNIT 11-0702	Heavy	123.22	25100	SANA	9-25-18	M/V Zelada Voy: 4	Mary River	9-17-18
8833	145930	SCREENER UNIT 14-0701	Heavy	177.07	19320	SANA	9-25-18	M/V Zelada Voy: 4	Mary River	9-17-18
8865	145992	JAW CRUSHER # 11-0701	Heavy	246.52	56300	SANA	9-28-18	M/V Zelada Voy: 4	Mary River	9-20-18
7416	141332	CAT 320 EXCAVATOR + BUCKET SN-WBK008821	Heavy Mobile	76.54	22494	CONTRAC EQUIP	7-9-18	M/V Miena Voy: 1	Mary River	6-26-18
8757	145831	PV-271 DRILL S/N #4893	Heavy Mobile	289.8	57142	EPIROC	9-23-18	M/V Zelada Voy: 4	Mary River	9-12-18
8757	145832	PV-271 DRILL S/N #4894	Heavy Mobile	289.8	57143	EPIROC	9-23-18	M/V Zelada Voy: 4	Mary River	9-12-18
8505	145019	1 X D65 ATLAS COPCO DRILL S/N TMG185ED00269	Heavy Mobile	116.92	24945	EPIROC	9-30-18	M/V Qamutik Voy: 5	Mary River	8-23-18
7448	141378	938K CAT FRONT END LOADER	Heavy Mobile	75.13	19955	NAHANI	7-10-18	M/V Miena Voy: 1	Mary River	6-26-18
7502	141501	TADANO RT 90100 CRANE -GR1000XL 100TN	Heavy Mobile	170.19	42184	NAHANI	7-9-18	M/V Miena Voy: 1	Mary River	6-29-18
7547	141498	USED KENWORTH TANDEM TRACTOR	Heavy Mobile	83.23	11000	NAHANNI	7-9-18	M/V Miena Voy: 1	Mary River	6-29-18
8397	144848	USED FIRE TRUCK PUMPER 2004	Heavy Mobile	90.45	14050	ROCKY MOUNTA	9-29-18	M/V Qamutik Voy: 5	Mary River	8-17-18
7306	140535	345 D EXCAVATOR UNIT #15-0305	Heavy Mobile	136.43	45375	SANA	7-9-18	M/V Miena Voy: 1	Mary River	6-14-18
8833	145931	WESTERN STAR TRUCK #18-0103	Heavy Mobile	99.22	12590	SANA	9-26-18	M/V Zelada Voy: 4	Mary River	9-17-18
8810	145143	ORE HAUL TRUCK WESTERN STAR	Heavy Mobile	127.3	20300	TEAM TRUCK	9-25-18	M/V Zelada Voy: 4	Mary River	9-5-18
8883	145935	WESTERN STAR TRUCK KN5343	Heavy Mobile	103.41	19048	TEAM TRUCK	9-26-18	M/V Zelada Voy: 4	Mary River	9-18-18
7646	142398	CONCRETE BATCH PLANT	Heavy	183.42	20000	RELIABLE MIX CO	7-10-18	M/V Miena Voy: 1	Mary River	7-3-18
8883	145937	WESTERN STAR TRUCK KN5339	Heavy Mobile	103.41	19048	TEAM TRUCK	9-25-18	M/V Zelada Voy: 4	Mary River	9-18-18
8811	145281	WESTERN STAR ORE HAUL TRUCK #5337	Heavy Mobile	117.31	20300	TEAM TRUCK	9-29-18	M/V Qamutik Voy: 5	Mary River	9-12-18
8883	145936	WESTERN STAR TRUCK KN5340	Heavy Mobile	103.41	19048	TEAM TRUCK	9-29-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8883	145938	WESTERN STAR TRUCK KN5342	Heavy Mobile	103.41	19048	TEAM TRUCK	9-30-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8761	145188	ORE HAUL TRUCK WESTERN STAR	Heavy Mobile	127.3	20300	TEAM TRUCK CE	9-25-18	M/V Zelada Voy: 4	Mary River	9-6-18
8854	145958	WESTERN STAR ORE HAUL TRUCK #5341	Heavy Mobile	117.65	20300	TEAM TRUCK CE	9-25-18	M/V Zelada Voy: 4	Mary River	9-19-18
8761	145180	ORE HAUL TRUCK WESTERN STAR	Heavy Mobile	127.3	20300	TEAM TRUCK CE	9-30-18	M/V Qamutik Voy: 5	Mary River	9-6-18
8827	145894	WESTERN STAR VIN#KN5338	Heavy Mobile	117.65	20300	TEAM TRUCK CE	9-25-18	M/V Zelada Voy: 4	Mary River	9-14-18
7664	142319	150 TON CRANE GROVE RT9150E	Heavy Mobile	313.51	90800	TESSIER	7-9-18	M/V Miena Voy: 1	Mary River	7-4-18
8394	144849	D10 TL DOZER S/N IIW00294	Heavy Mobile	200.77	68300	TORMONT	8-17-18	M/V Miena Voy: 3	Mary River	8-17-18
7542	140712	745C ARTICULATED TRUCK #TFK01668	Heavy Mobile	145.11	357000	TOROMONT	7-11-18	M/V Miena Voy: 1	Mary River	6-21-18
7647	140717	988K LOADER S/N: TWX01274	Heavy Mobile	145.53	47900	TOROMONT	7-9-18	M/V Miena Voy: 1	Mary River	7-8-18
7527	138718	992 K LOADER WITH BUCKET S/N: KK400117	Heavy Mobile	515.42	107000	TOROMONT	7-11-18	M/V Miena Voy: 1	Mary River	7-3-18
7665	142435	988H LOADER	Heavy Mobile	148.67	59000	TOROMONT	7-9-18	M/V Miena Voy: 1	Mary River	7-6-18
7541	141321	745C ARTICULATED TRUCK #TFK01306	Heavy Mobile	145.11	35700	TOROMONT	7-22-18	M/V Zelada Voy: 2	Mary River	6-21-18
8844	145810	992 LOADER S/N- KK-400126	Heavy Mobile	451.98	107000	TOROMONT	9-23-18	M/V Zelada Voy: 4	Mary River	9-19-18
8844	145811	CAT 793 MINING TRUCK	Heavy Mobile	494.9	141521	TOROMONT	9-23-18	M/V Zelada Voy: 4	Mary River	9-19-18
8844	145812	CAT 793 MINING TRUCK	Heavy Mobile	494.9	141521	TOROMONT	9-23-18	M/V Zelada Voy: 4	Mary River	9-19-18
7540	141512	PETERBUILT TRI-DRIVE TRACTOR UNIT #570	Heavy Mobile	88.39	13608	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	7-3-18
7291	140522	WESTERN STAR TRI DRIVE TRACTO #567 VIN # 5KJRALAVX7PY08585 U	Heavy Mobile	98.1	11340	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	6-13-18
7374	140599	PETERBILT TRI DRIVE TRACTOR #569 VIN#1X9F000X810556001	Heavy Mobile	124.9	13608	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	6-15-18
7394	140763	WESTERN STAR TRI DRIVE TRACTOR #559 WHITE VIN#5KKPALAV27PY	Heavy Mobile	122.76	13608	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	6-21-18
7641	142411	KOMATSU LOADER WA500 -USED	Heavy Mobile	146.78	32899	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	7-6-18

Baffinland

2018 Sealift Manifest
Summary of Equipment

2018-11-01

D/R#	PKG #	Description	Securities Classification	Vol (m³)	Wgt (Kgs)	Shipper	Date loade	Vessel / Voyage #	Port of Dis	RDate
7642	142424	250 KOMATSU LOADER VIN #150QCHKWA2506V670 -USED	Heavy Mobile	28.14	12340	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	7-6-18
7714	142472	WESTERN STAR TRI DRIVE BOOM TRUCK VIN#5KKPALCK57PY50037 BL	Heavy Mobile	124.6	29435	TRETAN	7-10-18	M/V Miena Voy: 1	Mary River	7-10-18
7212	140431	USED WESTERN STAR WINCH TRUCK #568 (SOME SCRATCHES)	Heavy Mobile	105.18	15876	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	6-6-18
7928	142554	PETERBUILT TRACTOR TRI DRIVE UNIT #572	Heavy Mobile	126.47	13407	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-17-18
7973	142650	WESTERN STAR TANDEM TRACTOR	Heavy Mobile	100.82	11423	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-20-18
7984	142651	CAT 988 LOADER	Heavy Mobile	116.53	47619	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-20-18
8351	142764	PETERBILT TRI DRIVE TRACTOR UNIT #573	Heavy Mobile	112.09	13608	TRETAN	9-26-18	M/V Zelada Voy: 4	Mary River	8-14-18
8425	144895	PETERBUILT TRI-DRIVE TRACTOR #571	Heavy Mobile	117.42	13608	TRETAN	9-26-18	M/V Zelada Voy: 4	Mary River	8-21-18
7237	140442	WESTERN STAR TRUCK #561 SERIAL #5KKRALAV57PX63437	Heavy Mobile	103.41	16000	TRETAN INC	7-9-18	M/V Miena Voy: 1	Mary River	6-8-18
7290	140523	PUMP STATION # PP-50001 F	Light	1.18	850	ALMIQ	7-7-18	M/V Miena Voy: 1	Mary River	6-13-18
7290	140524	PUMP STATION # PP-50001 G	Light	1.18	850	ALMIQ	7-7-18	M/V Miena Voy: 1	Mary River	6-13-18
7290	140525	PUMP STATION # PP-50001 H	Light	1.18	850	ALMIQ	7-7-18	M/V Miena Voy: 1	Mary River	6-13-18
7290	140526	PUMP STATION # PP-50001 I	Light	1.18	850	ALMIQ	7-7-18	M/V Miena Voy: 1	Mary River	6-13-18
7415	141331	185 AIR COMPRESSOR UNIT #10028248	Light	9.62	970	UNITED RENTALS	7-10-18	M/V Miena Voy: 1	Mary River	6-26-18
7466	141447	C185 COMPRESSOR #10058734	Light	8.61	942	VANCOUVER PIL	7-10-18	M/V Miena Voy: 1	Mary River	6-28-18
7516	131331	AIR COMPRESSOR	Light	5.64	749	BATTLEFIELD	7-10-18	M/V Miena Voy: 1	Mary River	6-29-18
7998	132811	OPEN CRATE STC: BIG PUMP	Light	7.09	1502	MCCUE	7-23-18	M/V Zelada Voy: 2	Mary River	7-21-18
8029	142674	TIOGA DIESEL HEATER UNIT #402	Light	31.5	4517	TRETAN	8-17-18	M/V Miena Voy: 3	Mary River	7-24-18
8029	142675	TIOGA DIESEL HEATER UNIT #400	Light	32.56	2951	TRETAN	8-17-18	M/V Miena Voy: 3	Mary River	7-24-18
8076	142698	CEMENT PUMP	Light	23.26	5442	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-25-18
8013	133145	OPEN PUMP	Light	12.36	2974	TOROMONT	8-17-18	M/V Miena Voy: 3	Mary River	8-10-18
8013	133146	RUPP PUMP	Light	4.23	656	TOROMONT	8-14-18	M/V Miena Voy: 3	Mary River	8-10-18
8642	145208	SULLIVAN AIR COMPRESSOR S/N #2018080-10089	Light	5.4	998	SURETRACK	9-26-18	M/V Zelada Voy: 4	Mary River	9-7-18
8584	145053	TANK, DOUBLE WALL 4220L DCS4500	Light Diesel	10.14	1050	SEI	9-26-18	M/V Zelada Voy: 4	Mary River	8-24-18
7004	138302	USED LIGHT;PLANT,ARCTIC PKG,IR L6,6KW,12V,SV	Light Mobile	14.02	960	AMALGAMATED	7-22-18	M/V Zelada Voy: 2	Mary River	5-14-18
7004	138301	USED LIGHT;PLANT,ARCTIC PKG,IR L6,6KW,12V,SV	Light Mobile	14.02	960	AMALGAMATED	7-22-18	M/V Zelada Voy: 2	Mary River	5-14-18
7395	140378	2018 KUBOTA RTV-X1100C (RUST ON DRIVER DOOR HINGE)	Light Mobile	10.8	1075	DEBOER'S	7-9-18	M/V Miena Voy: 1	Mary River	6-4-18
7822	142520	NEW GREY FORD F350 PICK UP VIN#1FT8W3BT1JEB00977	Light Mobile	37.5	5216	DYNO NOBEL	7-26-18	M/V Zelada Voy: 2	Mary River	7-13-18
7545	141513	R550 CREW TRUCK	Light Mobile	50	3500	MAHANI	7-10-18	M/V Miena Voy: 1	Mary River	7-3-18
7411	141328	FORKLIFT MAN BASKET	Light Mobile	5.39	355	NAHANI	7-9-18	M/V Miena Voy: 1	Mary River	6-26-18
7447	141366	LIGHT TOWERS	Light Mobile	24.2	740	NAHANI	7-10-18	M/V Miena Voy: 1	Mary River	6-27-18
7447	141367	LIGHT TOWERS	Light Mobile	24.2	740	NAHANI	7-10-18	M/V Miena Voy: 1	Mary River	6-27-18
7447	141368	HEATER	Light Mobile	21.99	1750	NAHANI	7-10-18	M/V Miena Voy: 1	Mary River	6-27-18
7447	141369	HEATER	Light Mobile	21.99	1750	NAHANI	7-10-18	M/V Miena Voy: 1	Mary River	6-27-18
7644	142412	FORD F350 PICK UP WHITE VIN#1FT8W3BT9GEA05379	Light Mobile	50	3481	NAHANI	7-10-18	M/V Miena Voy: 1	Mary River	7-6-18
7543	141338	USED 289 CAT SKID STEER S/N: TAW04512	Light Mobile	15.53	4700	NAHANNI	7-10-18	M/V Miena Voy: 1	Mary River	6-26-18
7547	141499	USED SERVICE TRUCK - 5500 VIN: 1HTSLNDL2LH280174	Light Mobile	54.51	10400	NAHANNI	7-9-18	M/V Miena Voy: 1	Mary River	6-29-18
8076	142695	TOWER LIGHT LT-35	Light Mobile	14.4	1043	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-25-18
8076	142696	TOWER LIGHT LT-42	Light Mobile	14.4	1043	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-25-18
8131	142730	DODGE 3500 CREW TRUCK LP1#3 VIN-3C63R3GL4FG535364	Light Mobile	50	3000	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-27-18
8131	142731	DODGE 3500 CREW TRUCK PSE LT110 VIN-3C63R3GLXFG544036	Light Mobile	50	3000	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-27-18
8108	142712	USED 2015FORD F250 VIN#1FT7W2BT4FED01236	Light Mobile	32.93	3303	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-26-18
8206	143915	125MT FOOT GENIE MANLIFT	Light Mobile	93.03	20739	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-10-18
8208	143911	135' MANLIFT GENIE #2-135-70	Light Mobile	97.65	20366	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	8-3-18
8538	145064	NEW FORD F550 FLAT DECK CREW CAB	Light Mobile	62.73	6315	ORO	10-5-18	M/V Qamutik Voy: 5	Mary River	8-28-18
8604	145107	USED FORD F-350 WHITE VIN#1FT7W3BT3HED36472	Light Mobile	33.54	3500	PRESTIGE FORD	9-28-18	M/V Zelada Voy: 4	Mary River	9-4-18
8604	145128	USED FORD F-350 WHITE VIN#1FKT7W3BT9HED95669	Light Mobile	33.54	3500	PRESTIGE FORD	10-1-18	M/V Qamutik Voy: 5	Mary River	9-4-18
8705	145214	NEW FORD SERVICE TRUCK 1FD8W3HT9JEC96431	Light Mobile	36.64	4565	PRESTIGE FORD	10-1-18	M/V Qamutik Voy: 5	Mary River	9-7-18
8704	145215	NEW FORD SERVICE TRUCK 1FD8W3HT9JEC96430	Light Mobile	36.64	4565	PRESTIGE FORD	10-5-18	M/V Qamutik Voy: 5	Mary River	9-7-18
8819	145899	NEW DODGE RAM 2500 PICK UP #18-0029	Light Mobile	32.84	3504	SANA	10-5-18	M/V Qamutik Voy: 5	Mary River	9-17-18
8819	145900	NEW DODGE RAM 2500 PICK UP #18-0030	Light Mobile	32.84	3504	SANA	10-5-18	M/V Qamutik Voy: 5	Mary River	9-17-18
8830	145932	FROSTFIGHTER FLAGRO #18-5917	Light Mobile	21.4	1825	SANA	10-2-18	M/V Qamutik Voy: 5	Mary River	9-17-18

Baffinland

2018 Sealift Manifest
Summary of Equipment

2018-11-01

D/R#	PKG #	Description	Securities Classification	Vol (m³)	Wgt (Kgs)	Shipper	Date loade	Vessel / Voyage #	Port of Dis	RDate
8846	145933	NEW DODGE RAM 2500 #18-0031	Light Mobile	24.84	3504	SANA	10-5-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8846	145934	NEW DODGE RAM 2500 #18-0032	Light Mobile	24.84	3431	SANA	10-1-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8454	144948	2018 DODGE 5500 SERVICE TRUCK #160	Light Mobile	55.23	8850	SANDVIC	10-1-18	M/V Qamutik Voy: 5	Mary River	8-22-18
8642	145209	ALLMAN LIGHT TOWER S/N #39-000302	Light Mobile	9.13	998	SURETRACK	9-26-18	M/V Zelada Voy: 4	Mary River	9-7-18
8642	145210	ALLMAN LIGHT TOWER S/N #39-000301	Light Mobile	9.13	998	SURETRACK	9-26-18	M/V Zelada Voy: 4	Mary River	9-7-18
7479	141317	USED CAT 259D TRACK LOADER S/N: CAT0259DHFTL10436	Light Mobile	15.44	3856	TOROMONT	7-9-18	M/V Miena Voy: 1	Mary River	6-22-18
7479	141318	USED CAT 289D TRACK LOADER S/N CAT0289DTA9Z00552	Light Mobile	16.7	4989	TOROMONT	7-9-18	M/V Miena Voy: 1	Mary River	6-22-18
7479	141319	USED CAT 289D TRACK LOADER S/N CAT0289DKTAW02023	Light Mobile	16.7	5442	TOROMONT	7-9-18	M/V Miena Voy: 1	Mary River	6-22-18
7871	142568	HEATER #14-000299	Light Mobile	21.97	1769	TOROMONT	7-23-18	M/V Zelada Voy: 2	Mary River	7-17-18
7871	142569	HEATER #14-000300	Light Mobile	21.97	1769	TOROMONT	7-23-18	M/V Zelada Voy: 2	Mary River	7-17-18
8374	144557	USED FORD F350 PICK UP WITH FLATDECK VIN: 1FT8X3DT2HEB71397	Light Mobile	34.32	6350	TOROMONT	8-16-18	M/V Miena Voy: 3	Mary River	8-8-18
8920	146040	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146041	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146042	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146043	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146044	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146045	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146046	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146047	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146048	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146049	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
8920	146050	DIESEL TOWER LIGHT 40W	Light Mobile	9.34	835	TOROMONT	9-30-18	M/V Qamutik Voy: 5	Mary River	9-24-18
7572	141503	HYDRAULIC HAMMER 50131	Light Mobile	2.83	2997	TRAMAC	7-7-18	M/V Miena Voy: 1	Mary River	6-29-18
7700	142442	F350 CREW CAB WHITE SHORT BOX -ID #5473 #111	Light Mobile	32.28	3038	TRETAN	7-10-18	M/V Miena Voy: 1	Mary River	7-9-18
7700	142443	F350 CREW CAB WHITE LONG BOX -ID #5474 #112	Light Mobile	32.28	3038	TRETAN	7-10-18	M/V Miena Voy: 1	Mary River	7-9-18
7734	142466	JLG BOOM LIFT 450AJ	Light Mobile	85.14	7000	TRETAN	7-10-18			
7720	142438	KUBOTA SVL UNIT #410	Light Mobile	19.49	5244	TRETAN	7-10-18			
7720	142439	KUBOTA SVL UNIT #411	Light Mobile	19.49	5244	TRETAN	7-10-18			
7837	142524	TOWER LIGHT	Light Mobile	11.81	865	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-13-18
7837	142525	TOWER LIGHT	Light Mobile	11.81	865	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-13-18
7837	142526	BATTLEFIELD MANLIFT	Light Mobile	42.5	13605	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-13-18
7928	142553	USED F-350 EXTENDED CAB #P-107	Light Mobile	30.73	5171	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-17-18
7973	142664	2018 KUBOTA RTV-X-1100C UNIT P106	Light Mobile	10.76	1060	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-20-18
7985	142666	WHITE FORD F350 PICKUP UNIT P-108	Light Mobile	30.73	5171	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-20-18
8789	145874	MOBILE TOWER LIGHT #70036741	Light Mobile	7.04	650	TRETAN	9-26-18	M/V Zelada Voy: 4	Mary River	9-14-18
8789	145875	MOBILE TOWER LIGHT #700365137	Light Mobile	7.04	650	TRETAN	9-26-18	M/V Zelada Voy: 4	Mary River	9-14-18
8789	145876	MOBILE TOWER LIGHT #T-12553	Light Mobile	9.96	650	TRETAN	9-25-18	M/V Zelada Voy: 4	Mary River	9-14-18
8789	145877	MOBILE TOWER LIGHT #B-16841	Light Mobile	14.38	750	TRETAN	9-25-18	M/V Zelada Voy: 4	Mary River	9-14-18
7415	141329	5-45' GENIE MANLIFT #10074593	Light Mobile	57.64	6709	UNITED RENTALS	7-10-18	M/V Miena Voy: 1	Mary River	6-26-18
7415	141330	5-65' GENIE MANLIFT #10156514	Light Mobile	82.5	9308	UNITED RENTALS	7-10-18	M/V Miena Voy: 1	Mary River	6-26-18
7457	141336	DIESEL HAMMER	Light Mobile	14.69	18141	VANCOUVER PIL	7-8-18	M/V Miena Voy: 1	Mary River	6-26-18
7563	141535	85' MANLIFT	Light Mobile	72.75	17100	VANCOUVER PIL	7-10-18	M/V Miena Voy: 1	Mary River	7-4-18
7574	141539	PLASTIC WATER STORAGE MODEL E2500V 11,365L -#Y026236	Light Tanks	19.24	350	NAHANI	7-7-18	M/V Miena Voy: 1	Mary River	7-4-18
7574	141540	PLASTIC WATER STORAGE MODEL E2500V 11,365L -#Y026237	Light Tanks	19.24	349	NAHANI	7-7-18	M/V Miena Voy: 1	Mary River	7-4-18
7574	141541	PLASTIC WATER STORAGE MODEL E2500V 11,365L -#Y026238	Light Tanks	19.24	350	NAHANI	7-7-18	M/V Miena Voy: 1	Mary River	7-4-18
7369	140657	FRP WATER TANK -SERIAL # C01000296	Light Tanks	199.58	5699	GRANBY COMPO	7-24-18	M/V Zelada Voy: 2	Mary River	6-15-18
7370	140658	FRP WATER TANK - SERIAL # C01000295	Light Tanks	199.58	5699	GRANBY COMPO	7-24-18	M/V Zelada Voy: 2	Mary River	6-15-18
7738	142487	USED WATER TANK ST112-0841 LM-STO612886	Light Tanks	7.09	2200	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-10-18
7738	142488	USED WATER TANK WT109-0035 LM11101036	Light Tanks	8.68	2200	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-10-18
8176	143887	WELDED STEEL TANK	Light Tanks	64.47	3855	NAHANNI	8-17-18	M/V Miena Voy: 3	Mary River	8-1-18
7543	141337	WELDER	Medium	3.38	1000	NAHANNI	7-10-18	M/V Miena Voy: 1	Mary River	6-26-18
7985	142667	WACKER NEUSON G70 MOBILE GENERATOR	Medium	12.01	1973	TRETAN	7-23-18	M/V Zelada Voy: 2	Mary River	7-20-18

Baffinland

2018 Sealift Manifest
Summary of Equipment

2018-11-01

D/R#	PKG #	Description	Securities Classification	Vol (m³)	Wgt (Kgs)	Shipper	Date loade	Vessel / Voyage #	Port of Dis	RDate
8255	144556	1 X BUNDED FUEL TANK 65000L	Medium Diesel Tanks	95.03	9891	WESTEEL	8-17-18	M/V Miena Voy: 3	Mary River	8-8-18
8270	144558	1 X BUNDED FUEL TANK	Medium Diesel Tanks	95.03	9977	WESTEEL	8-17-18	M/V Miena Voy: 3	Mary River	8-9-18
8270	144559	1 X BUNDED FUEL TANK	Medium Diesel Tanks	95.03	9977	WESTEEL	8-17-18	M/V Miena Voy: 3	Mary River	8-9-18
8270	144560	1 X BUNDED FUEL TANK	Medium Diesel Tanks	95.03	9977	WESTEEL	8-17-18	M/V Miena Voy: 3	Mary River	8-9-18
8270	144561	1 X BUNDED FUEL TANK	Medium Diesel Tanks	95.03	9977	WESTEEL	8-17-18	M/V Miena Voy: 3	Mary River	8-9-18
8295	144594	1 X BUNDED FUEL TANK 65000L	Medium Diesel Tanks	95.03	9977	WESTEEL	8-17-18	M/V Miena Voy: 3	Mary River	8-10-18
8861	145993	SKY TRACK CAT TH360 #27986	Medium Mobile	33.58	9440	ALMIQ	9-30-18	M/V Qamutik Voy: 5	Mary River	9-19-18
8587	145106	TRAILER #18-0604	Medium Mobile	36.77	1361	CONCASSAGE	9-29-18	M/V Qamutik Voy: 5	Mary River	8-30-18
8668	145179	30 000L FUEL TANKER TRAILER	Medium Mobile	129.93	9720	FOSSIL	9-30-18	M/V Qamutik Voy: 5	Mary River	9-6-18
8475	144927	NEW SCHOOL BUS	Medium Mobile	110.26	6379	GIRARDIN	9-30-18	M/V Qamutik Voy: 5	Mary River	8-21-18
8582	144928	K-LOADER AIRCRAFT	Medium Mobile	67.13	9744	JIM BAKER	9-30-18	M/V Qamutik Voy: 5	Mary River	8-21-18
7545	141511	MINI BUS -BLUEBIRD 24 PASSENGER	Medium Mobile	78.91	6660	MAHANI	7-10-18	M/V Miena Voy: 1	Mary River	7-3-18
7411	141325	ZOOM BOOM ME-245	Medium Mobile	39.98	15600	NAHANI	7-10-18	M/V Miena Voy: 1	Mary River	6-26-18
7449	141431	KENWORTH T-800 WATER TRUCK	Medium Mobile	106.58	14360	NAHANI	7-9-18	M/V Miena Voy: 1	Mary River	6-27-18
7948	142570	CEMENT MIXER VIN# 1HTXHAHT47J566651	Medium Mobile	81.58	18000	NAHANI	7-22-18	M/V Zelada Voy: 2	Mary River	7-18-18
7948	142571	CEMENT MIXER VIN# 1HTXHAHT17J566655	Medium Mobile	81.58	18000	NAHANI	7-22-18	M/V Zelada Voy: 2	Mary River	7-18-18
7948	142572	CEMENT MIXER VIN# 1HTXHAHT47J566658	Medium Mobile	81.58	18000	NAHANI	7-22-18	M/V Zelada Voy: 2	Mary River	7-18-18
7547	141509	USED TRIDEM SISSOR DECK TRAILER GREY	Medium Mobile	79.77	11400	NAHANNI	7-10-18	M/V Miena Voy: 1	Mary River	6-29-18
7547	141497	USED WESTERN STAR TRACTOR TANDEM S/N: 5KJJAEAV88P465295	Medium Mobile	83.23	9400	NAHANNI	7-9-18	M/V Miena Voy: 1	Mary River	6-29-18
8131	142732	20' FLAT DECK TRAILER	Medium Mobile	18.25	1000	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-27-18
8206	143913	9000LB TELE HANDLER #944-42LULLI	Medium Mobile	39.21	12184	NAHANNI	8-16-18	M/V Miena Voy: 3	Mary River	7-10-18
8857	145944	SKY TRACK CAT TH514 #18-1203	Medium Mobile	60.43	4900	SANA	9-27-18	M/V Zelada Voy: 4	Mary River	9-18-18
8857	145945	WHEEL LOADER CAT908 UNIT #284	Medium Mobile	36.06	6630	SANA	9-25-18	M/V Zelada Voy: 4	Mary River	9-18-18
8864	145957	SANDVIK DRILL DX800	Medium Mobile	125.17	17500	SANA	9-25-18	M/V Zelada Voy: 4	Mary River	9-19-18
8818	145901	53' VAN #18-0601	Medium Mobile	168.7	30000	SANA	9-29-18	M/V Qamutik Voy: 5	Mary River	9-17-18
8833	145903	3 AXELS 48' FLATBED TRAILER + 2 X PRIMARY WALLS #11-0701	Medium Mobile	78.88	8500	SANA	9-30-18	M/V Qamutik Voy: 5	Mary River	9-17-18
8843	145940	WATER TRUCK VIN# 1FVHG3DU900BW2480	Medium Mobile	98.01	11860	SANA	9-30-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8843	145942	2 AXLES 53' TRAILER #11-0603	Medium Mobile	177.51	6803	SANA	9-29-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8843	145943	LOWBED TRAILER #2M5531617K1178948	Medium Mobile	113.75	13585	SANA	9-30-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8845	145948	2 AXELS 48' FLATBED TRAILER #10-0609	Medium Mobile	53.92	6030	SANA	9-30-18	M/V Qamutik Voy: 5	Mary River	9-18-18
8702	145181	SIDE DUMPER #713698	Medium Mobile	124.29	20570	SMITHCO	9-26-18	M/V Zelada Voy: 4	Mary River	9-6-18
8703	145192	SIDE DUMPER #713702	Medium Mobile	124.29	21169	SMITHCO	9-26-18	M/V Zelada Voy: 4	Mary River	9-7-18
8772	145889	SIDE DUMPER #713709	Medium Mobile	145.39	21632	SMITHCO	9-25-18	M/V Zelada Voy: 4	Mary River	9-14-18
8805	145280	SIDE DUMPER #713706	Medium Mobile	124.29	21169	SMITHCO	9-26-18	M/V Zelada Voy: 4	Mary River	9-12-18
8805	145826	LEAD PUMP TRAILER #713710	Medium Mobile	123.09	21169	SMITHCO	9-26-18	M/V Zelada Voy: 4	Mary River	9-12-18
8806	145270	SIDE DUMPER SERIAL #713704	Medium Mobile	124.29	21169	SMITHCO	9-26-18	M/V Zelada Voy: 4	Mary River	9-11-18
8806	145277	SIDE DUMPER SERIAL #713705	Medium Mobile	145.39	21632	SMITHCO	9-25-18	M/V Zelada Voy: 4	Mary River	9-11-18
8808	145833	LEAD DUMPER #713703	Medium Mobile	144.24	21632	SMITHCO	9-25-18	M/V Zelada Voy: 4	Mary River	9-13-18
8808	145834	LEAD DUMPER PUP #713708	Medium Mobile	123.09	21169	SMITHCO	9-26-18	M/V Zelada Voy: 4	Mary River	9-13-18
8825	145902	SIDE DUMPER #713693	Medium Mobile	145.39	21269	SMITHCO	9-25-18	M/V Zelada Voy: 4	Mary River	9-17-18
8634	145090	DUMPER -SIDE DUMPER VIN #713695	Medium Mobile	145.39	21632	SMITHCO	9-29-18	M/V Qamutik Voy: 5	Mary River	8-30-18
8634	145092	SIDE DUMP TRAILER VIN #713692	Medium Mobile	124.29	20570	SMITHCO	9-29-18	M/V Qamutik Voy: 5	Mary River	8-30-18
8634	145093	SIDE DUMP TRAILER VIN #713694	Medium Mobile	124.29	20570	SMITHCO	9-30-18	M/V Qamutik Voy: 5	Mary River	8-30-18
8633	145121	SIDE DUMPER SERIAL #713696	Medium Mobile	124.29	20570	SMITHCO	9-29-18	M/V Qamutik Voy: 5	Mary River	8-31-18
8633	145122	SIDE DUMPER SERIAL #713699	Medium Mobile	124.29	21269	SMITHCO	9-30-18	M/V Qamutik Voy: 5	Mary River	8-31-18
8638	145129	SIDE DUMPER SERIAL #713700	Medium Mobile	124.29	21169	SMITHCO	9-29-18	M/V Qamutik Voy: 5	Mary River	9-5-18
8638	145130	SIDE DUMPER SERIAL #713701	Medium Mobile	124.29	21269	SMITHCO	9-29-18	M/V Qamutik Voy: 5	Mary River	9-5-18
8807	145229	SIDE DUMPER SERIAL #713697	Medium Mobile	145.39	21269	SMITHCO	9-30-18	M/V Qamutik Voy: 5	Mary River	9-10-18
8805	145825	LEAD PUMP TRAILER #713707	Medium Mobile	144.7	21632	SMITHCO	9-29-18	M/V Qamutik Voy: 5	Mary River	9-12-18
8178	143885	TANK TRAILER ON WHEELS VIN# 1T9AA9H30KS588018	Medium Mobile	117.13	6623	TREMCAR	8-16-18	M/V Miena Voy: 3	Mary River	8-1-18
8178	143886	TANK TRAILER ON WHEELS 1 APTEL VIN#IT9AA9823KS588019	Medium Mobile	93.09	4150	TREMCAR	8-17-18	M/V Miena Voy: 3	Mary River	8-1-18
7589	142379	EXTENDABLE FLATBED TRAILER #T106	Medium Mobile	67.26	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-5-18

Baffinland

2018 Sealift Manifest
Summary of Equipment

2018-11-01

D/R#	PKG #	Description	Securities Classification	Vol (m³)	Wgt (Kgs)	Shipper	Date loade	Vessel / Voyage #	Port of Dis	RDate
7589	142380	EXTENDABLE FLATBED TRAILER #T117	Medium Mobile	67.26	12000	TRETAN	7-10-18	M/V Miena Voy: 1	Mary River	7-5-18
7589	142381	EXTENDABLE FLATBED TRAILER #T108	Medium Mobile	67.26	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-5-18
7589	142382	EXTENDABLE FLATBED TRAILER #T107	Medium Mobile	67.26	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-5-18
7650	142407	TRI AXLE FLAT BED UNIT #T115	Medium Mobile	63.47	12000	TRETAN	7-10-18	M/V Miena Voy: 1	Mary River	7-6-18
7650	142408	TRI AXLE FLAT BED UNIT #T109	Medium Mobile	59.64	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-6-18
7650	142409	TRI AXLE FLAT BED UNIT #T118	Medium Mobile	63.34	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-6-18
7650	142410	TRI AXLE FLAT BED UNIT #T119	Medium Mobile	63.06	12000	TRETAN	7-10-18	M/V Miena Voy: 1	Mary River	7-6-18
7650	142405	TRI AXLE FLAT BED UNIT #T116	Medium Mobile	65.42	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-6-18
8845	145949	HYDRAULIC ROCK CRUSHER - TRAMAC	Heavy	24.26	3480	SANA	9-30-18	M/V Qamutik Voy: 5	Mary River	9-18-18
7650	142406	TRI AXLE FLAT BED UNIT #T122	Medium Mobile	67.54	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-6-18
7651	142403	TRI AXLE FLAT DECK UNIT #T112	Medium Mobile	69.14	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-5-18
7651	142404	TRI AXLE FLAT DECK UNIT #T111	Medium Mobile	69.14	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-5-18
7668	141645	TRAILER #T-113	Medium Mobile	58.83	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-8-18
7668	141646	TRAILER #T-110	Medium Mobile	58.83	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-8-18
7721	142444	FLAT BED TRAILER UNIT T-120	Medium Mobile	6.73	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-9-18
7721	142448	FLAT BED TRAILER UNIT T-13647	Medium Mobile	6.73	12000	TRETAN	7-11-18	M/V Miena Voy: 1	Mary River	7-9-18
7643	142423	BLUE BIRD BUS #586 -USED	Medium Mobile	91.48	14663	TRETAN	7-9-18	M/V Miena Voy: 1	Mary River	7-7-18
7721	142445	FLAT BED TRAILER UNIT T-121	Medium Mobile	6.73	12000	TRETAN	7-10-18			
7778	142493	CAT TL1255CB TELEHANDLER	Medium Mobile	53.77	16266	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-12-18
7778	142494	CAT TL1055C TELEHANDLER	Medium Mobile	53.77	15495	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-12-18
7929	142555	1988 MACK SERVICE TRUCK VIN#VG6BA03B9JB051291	Medium Mobile	71.08	14912	TRETAN	7-22-18	M/V Zelada Voy: 2	Mary River	7-18-18

Baffinland

2018 Sealift Backhaul Summary

2018-11-01

Owner	Bakhaul Voyage	DESCRIPTION	L (m)	W (m)	H (m)	m³	WEIGHT (kg)	Unit Rate Classification
Baffinland	Voyage 2	8781241/CONE MAIN FRAME	12.2	2.44	2.59	77.09912	19250	Heavy
Baffinland	Voyage 2	Scott Woods GMC Sierra unit # 917	6.00	2.20	2.30	30.36	5,100.00	Light Mobile
Baffinland	Voyage 2	Scott Woods Kenworth unit # 398	7.00	3.50	4.00	98.00	28,350.00	Medium Mobile
Baffinland	Voyage 2	Scott Woods Kenworth unit # 397	7.00	3.50	4.00	98.00	28,350.00	Medium Mobile
Baffinland	Voyage 2	Scott Woods Western Star unit # 371	7.00	3.50	4.00	98.00	19,500.00	Medium Mobile
Baffinland	Voyage 2	Scott Woods Western Star unit # 372	7.00	3.50	4.00	98.00	19,500.00	Medium Mobile
Baffinland	Voyage 2	Scott Woods Western Star unit # 373	7.00	3.50	4.00	98.00	19,500.00	Medium Mobile
Baffinland	Voyage 2	Scott Woods Ford pickup unit # 927	6.00	2.20	2.30	30.36	6,100.00	Light Mobile
Baffinland	Voyage 2	Scott Woods Deloupe float trailer	18.00	3.50	1.80	113.40	16,000.00	Medium Mobile
Almiq	Voyage 3	Link - Belt HC 278H W /40' Boom with rigging	24.02	4.25	4.11	419.57	80,300	Heavy Mobile
Almiq	Voyage 3	Sany SCC8300 Crawler crane Base Machine and track frames	12.75	7.92	3.50	353.43	95,000	Heavy Mobile
Almiq	Voyage 3	LOADER 950H - WITH FORKS ~~AND BUCKET~~	8.16	3.00	3.37	82.50	18,838	Heavy Mobile
Almiq	Voyage 3	PANIER NACELLE POUR SKYTRACK	3.59	1.52	1.22	6.66	873	Medium Mobile
Almiq	Voyage 3	FREIGHTLINER TRUCK - 2005 - WHITE - SN: 1fujc5cv75hn66092	7.30	2.60	3.55	67.38	7,184	Medium Mobile
Almiq	Voyage 3	MACK TRUCK 600 - 2005 - WHITE - SN: 1m1ak06y75n004472 - + TRAI	7.30	2.60	3.55	67.38	7,154	Medium Mobile
Almiq	Voyage 3	HYDRAULIC TRAILER extendable - #20072	17.15	2.60	2.70	120.39	10,500	Medium Mobile
Almiq	Voyage 3	10 WHEELS TRUCK - CAMION MACK / 0004-1706	7.31	2.53	3.50	64.73	15,000	Medium Mobile
Almiq	Voyage 3	FUEL TRUCK - KENWORTH - 04-16004	10.60	2.90	3.68	113.12	33,700	Medium Mobile
Almiq	Voyage 3	FUEL TANK	39.00	1.30	1.70	86.19	719	Medium Diesel Tank
Almiq	Voyage 3	20' SEA CONTAINER - #725928-0 - 5-frost fiter 1-géné 30kw,1 géné 4(	6.10	2.44	2.59	38.55	2,500	Light Mobile
Contractor	Voyage 3	Screener				400.00	59	Heavy
Contractor	Voyage 3	Primary Crusher				226.00	55	Heavy
Contractor	Voyage 3	Cone crusher sandvik				362.00	59	Heavy
Contractor	Voyage 3	Belt Conveyor				30.00	5	Heavy
Contractor	Voyage 3	Belt Conveyor				29.00	5	Heavy
Contractor	Voyage 3	Belt Conveyor				33.00	5	Heavy
Contractor	Voyage 3	Belt Conveyor				35.00	6	Heavy

Baffinland

Mobile and Mechanical Equipment
Estimated to Arrive in 2019

2018-11-01

Property Section	Material Item	Owner	Quantity	Revenue Tonne	Classification
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*	
Mine Site	Pick up trucks	Allnorth	2	6.488	Light Mobile
Mine Site	Ejector Box for 740	Baffinland	1	2	-
Milne Port	Desalination Plant for Fresh Water	Baffinland	1	70	-
Mine Site	2 FS353 Screen Decks	Baffinland	2	80	Heavy
Milne Port	Bucket Wheel Stacker Reclaimer	Baffinland	2	210	Heavy
Milne Port	Genset modules	Baffinland	4	180	Heavy
Mine Site	793 Trucks	Baffinland	3	375	Heavy Mobile
Mine Site	854 Wheel Dozer	Baffinland	1	30	Heavy Mobile
Mine Site	D10 Dozer	Baffinland	1	70	Heavy Mobile
Mine Site	374 Excavator	Baffinland	1	80	Heavy Mobile
Milne Port	pumper fire truck	Baffinland	1	20	Heavy Mobile
Milne Port	conveyor feeder	Baffinland	1	8	Heavy Mobile
Milne Port	jump conveyor	Baffinland	2	15	Heavy Mobile
Milne Port	heavy duty shunt truck	Baffinland	1	14	Heavy Mobile
Milne Port	950 loader	Baffinland	1	240	Heavy Mobile
Tote Road	740 B water truck body	Baffinland	1	15	Heavy Mobile
Mine Site	New or Used 349 excavator	Baffinland	1	80	Heavy Mobile
Mine Site	Jet A truck	Baffinland	1	10	Heavy Mobile
Mine Site	Fuel Tanker & Tractor	Baffinland	1	15	Heavy Mobile
Milne Port	Fines Mobile Stacker	Baffinland	1	170	Heavy Mobile
Mine Site	Mobile Primary Crusher Unit	Baffinland	1	231	Heavy Mobile
Mine Site	Front End Loader	Baffinland	1	15	Heavy Mobile
Mine Site	Mobile Fleet- 745C Rock Truck - TFK00727	Baffinland	2	40	Heavy Mobile
Milne Port	150T Crane	Baffinland	2	40	Heavy Mobile
Milne Port	30,000 L Fuel Tanker Trucks	Baffinland	12	180	Heavy Mobile
Mine Site	Generators/compressors	Baffinland	2	4	Light
Mine Site	F350 truck	Baffinland	11	10	Light Mobile
Mine Site	Light Plants	Baffinland	21	5	Light Mobile
Mine Site	Pumps	Baffinland	2	2	Light Mobile
Mine Site	off road tracked rescue vehicle	Baffinland	1	10	Light Mobile
Mine Site	Light ERT utility vehicle	Baffinland	1	8	Light Mobile
Mine Site	247B or 257D skid steer	Baffinland	1	6	Light Mobile
Mine Site	Frost Fighters	Baffinland	7	2	Light Mobile
Milne Port	Manlift Z-60	Baffinland	2	16	Light Mobile
Milne Port	Manlift S135X	Baffinland	3	16	Light Mobile
Milne Port	Diesel F250 or F350 Pick-up Truck	Baffinland	4	10	Light Mobile
Milne Port	Diesel F250 15 passenger Van	Baffinland	1	12	Light Mobile
Milne Port	generator	Baffinland	1	1	Medium
Milne Port	feeder dolly	Baffinland	1	6	Medium
Mine Site	4 x 4 hotseating bus	Baffinland	1	20	Medium Mobile
Mine Site	Boom truck	Baffinland	1	20	Medium Mobile
Mine Site	Pressure washing truck	Baffinland	1	15	Medium Mobile
Mine Site	Telehandler	Baffinland	1	20	Medium Mobile
Mine Site	Passenger bus	Baffinland	2	15	Medium Mobile
Mine Site	Telehandler	Baffinland	1	20	Medium Mobile
Mine Site	Fuel/Lube Truck	Baffinland	1	15	Medium Mobile
Milne Port	Zoom Boom 12,000lb	Baffinland	4	20	Medium Mobile
Milne Port	Freight Liner Highway Truck	Baffinland	1	20	Medium Mobile
Milne Port	Tri- Trombone Flat Trailer - 53' to 90'	Baffinland	1	18	Medium Mobile
Mine Site	Washcar	Baffinland	1	36	Modular Building Contaminated
Mine Site	washroom facility for tote road	Baffinland	2	72	Modular Building Contaminated
Milne Port	12’ x 34’ Self-contained washcar on skids	Baffinland	4	36	Modular Building Contaminated
Mine Site	Lunch Trailer	Baffinland	1	36	Modular Building Not Contaminated
Milne Port	office trailers	Baffinland	2	72	Modular Building Not Contaminated
Mine Site	office trailers	Baffinland	2	72	Modular Building Not Contaminated
Milne Port	E-house	Baffinland	1	50	Modular Building Not Contaminated
Milne Port	Crusher Services office	Baffinland	1	36	Modular Building Not Contaminated
Milne Port	Site Construction Office	Baffinland	1	36	Modular Building Not Contaminated
Milne Port	12’ x 60’ c/w 2 offices, open area in middle, and office furniture,	Baffinland	2	36	Modular Building Not Contaminated
Milne Port	12’ x 60’ lunch room complete 8’ tables, chairs and equipment	Baffinland	3	36	Modular Building Not Contaminated
Mine Site	2 Spare Jaw Feeder Assemblies	Baffinland	1	4	parts
Mine Site	Container office	Besix Vanpile JV	4	12	Building
Mine Site	Container with lunch room	Besix Vanpile JV	2	6	Building
Mine Site	Conveyor belt	Besix Vanpile JV	1	25	Heavy
Mine Site	D6 Dozer - Caterpillar D6 R II	Besix Vanpile JV	1	24.3	Heavy Mobile
Mine Site	966G Wheel loader - Caterpillar 966G - 4m"	Besix Vanpile JV	1	22.75	Heavy Mobile
Mine Site	Crawler crane 350 ton - Type Liebherr LR1400-2	Besix Vanpile JV	2	622	Heavy Mobile
Mine Site	250T Lifting crawler crane	Besix Vanpile JV	1	210	Heavy Mobile
Mine Site	Diesel Hammer D180	Besix Vanpile JV	3	112.41	Light
Mine Site	20' x CONTAINER - Mobile Compressor + 50mm PVC Perforated tubes	Besix Vanpile JV	5	110	Light
Mine Site	40' x CONTAINER - Generator 150 kVA, Generator 250 kVA, Generator 30 kVA, Generator 100 Kva	Besix Vanpile JV	3	66	Light
Mine Site	Maintenance truck (water/fuel/maintenance)	Besix Vanpile JV	1	4.8	Light Mobile
Mine Site	71KW Power pack for EMV300 vibro hammer	Besix Vanpile JV	2	4	Medium
Mine Site	Trucks - Articulated dumper 38T/23 m3 - Type Terex TA40	Besix Vanpile JV	5	153.8	Medium Mobile
Mine Site	Compactor - 9.2T Articulated tandem roller w/ 2 vibratory drums - Type Hamm HD 90	Besix Vanpile JV	1	8.3	Medium Mobile
Mine Site	85T Track excavator w/ long stick	Besix Vanpile JV	2	172.6	Medium Mobile
Mine Site	20T 6x4 Tipper Truck	Besix Vanpile JV	1	26	Medium Mobile
Mine Site	Vibrohammer - Type 5.9T, 50KNm, Hydraulic hammer IHC S50/90	Besix Vanpile JV	3	28.95	Medium Mobile
Mine Site	Mobile crane 32T	Besix Vanpile JV	1	24	Medium Mobile
Mine Site	80T extensible semi-trailer	Besix Vanpile JV	2	45.4	Medium Mobile
Mine Site	125 KW/170 HP tractor for 80T semi-trailer	Besix Vanpile JV	2	19	Medium Mobile
Mine Site	20T Flatbed truck w/ truck mounted crane	Besix Vanpile JV	1	11.6	Medium Mobile

Baffinland

Mobile and Mechanical Equipment
Estimated to Arrive in 2019

2018-11-01

Property Section	Material Item	Owner	Quantity	Revenue Tonne	Classification
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*	
Mine Site	Ripper	Besix Vanpile JV	2	5	parts
Mine Site	Clamshell	Besix Vanpile JV	1	15	parts
Mine Site	Mixer Truck 6/9 m3	Besix Vanpile JV	1	12.2	parts
Mine Site	Bucket 0.5/1 m3	Besix Vanpile JV	1	0.4	parts
Mine Site	20' x CONTAINER - Oxy fuel cutting systems, induction heating system, 400A welding generators, welding sets, 7m3/min / 250cft/min mobile compressors	Besix Vanpile JV	1	22	parts
Mine Site	Piling Frame	Besix Vanpile JV	2	12	parts
Mine Site	Sheetpiles AZ26 - 700	Besix Vanpile JV	72	459.36	parts
Mine Site	Sheetpiles AZ26 - 700	Besix Vanpile JV	14	47.6	parts
Mine Site	Tie-rod dia 800 mm	Besix Vanpile JV	55	386.1	parts
Mine Site	Tie-rod dia 800 mm	Besix Vanpile JV	14	91.84	parts
Mine Site	40' x OPEN TOP - Temporary structural steel access platform	Besix Vanpile JV	1	22	parts
Mine Site	40' x OPEN TOP - Temporary structural steel quay	Besix Vanpile JV	1	22	parts
Mine Site	40' x OPEN TOP - Steel trolley	Besix Vanpile JV	1	22	parts
Mine Site	40' x OPEN TOP - Engine system for mobile trolley movement	Besix Vanpile JV	1	22	parts
Mine Site	40' x OPEN TOP - Walkway	Besix Vanpile JV	1	22	parts
Mine Site	Concrete mattresses scour protection	Besix Vanpile JV	337	674	parts
Mine Site	40' x CONTAINER - workshop materials and spare parts	Besix Vanpile JV	10	220	parts
Mine Site	40' x CONTAINER - material for offices, site small facility tools	Besix Vanpile JV	10	220	parts
Mine Site	Precast pile caps	Besix Vanpile JV	1	25	parts
Mine Site	40' x CONTAINER - Fenders SCN 2000, bollards, handrail, guardrail	Besix Vanpile JV	4	88	parts
Mine Site	Outdoor vehicle plug station	Contractor	1	1	-
Mine Site	10'x44' wheeled lunchtrailer	Contractor	1	14	Building
Mine Site	12'x60' Office Trailer w/ furniture	Contractor	1	12	Building
Mine Site	trailers for 24'x60'office w/ furniture	Contractor	1	12	Building
Mine Site	trailers for 60'x60'office w/ furniture	Contractor	3	36	Building
Mine Site	Quonset Hut	Contractor	1	5	Building
Mine Site	Portable Washroom	Contractor	2	3	Building
Mine Site	CAT 950 loader	Contractor	2	31	Heavy Mobile
Mine Site	CAT 988 loader	Contractor	1	60	Heavy Mobile
Mine Site	power pack 5/10 gallon per minute	Contractor	6	1	Light
Mine Site	Air Compressor	Contractor	1	3	Light
Mine Site	10,000 gallon fuel tank (diesel empty)	Contractor	1	5	Light Diesel Tank
Mine Site	10,000 gallon fuel tank (gasoline full)	Contractor	1	45	Light Diesel Tank
Mine Site	Herman Nelson 6700	Contractor	6	7.2	Light Mobile
Mine Site	Skidsteer	Contractor	1	7	Light Mobile
Mine Site	Clipping Machine	Contractor	4	1	Light Mobile
Mine Site	Diesel Rail Heater Drapeau 2	Contractor	1	16	Light Mobile
Mine Site	Herman Nelson 6700 all in one	Contractor	2	2.4	Light Mobile
Mine Site	Herman Nelson extreme cold BT400NEX-D4A	Contractor	6	2.0475	Light Mobile
Mine Site	Herman Nelson Flagro-1000 trailer mount	Contractor	1	2.1	Light Mobile
Mine Site	light plants	Contractor	15	16.95	Light Mobile
Mine Site	F-350 crew cab 4x4 Diesel	Contractor	6	28.68	Light Mobile
Mine Site	F-350 crew cab w/ fuel tank	Contractor	6	25.5	Light Mobile
Mine Site	F-550 Mechanic Truck	Contractor	2	18	Light Mobile
Mine Site	F-450 CSV trucks	Contractor	3	25	Light Mobile
Mine Site	Geismar Power Jack Model RV100	Contractor	2	3	Light Mobile
Mine Site	55KW Generator	Contractor	4	4.4	Medium
Mine Site	Mark IV Tamper	Contractor	2	63.525	Medium Mobile
Mine Site	Knox Kershaw KBR 940 Regulator	Contractor	2	29.4	Medium Mobile
Mine Site	Pettibone 445F w/ high rail	Contractor	2	32.77785	Medium Mobile
Mine Site	Rail car mover	Contractor	2	48.52	Medium Mobile
Mine Site	Ballast Car	Contractor	15	379.5	Medium Mobile
Mine Site	Telehandler	Contractor	3	42	Medium Mobile
Mine Site	Crew Van 4x4 15 passenger	Contractor	5	21	Medium Mobile
Mine Site	Kennworth 880 w/ winch	Contractor	1	24	Medium Mobile
Mine Site	Kennworth 880 w/ grapple	Contractor	1	17	Medium Mobile
Mine Site	highway trailer 48 foot	Contractor	1	11	Medium Mobile
Mine Site	highway trailer 40 foot lowbed	Contractor	1	10.5	Medium Mobile
Mine Site	trailer w/ rail	Contractor	1	14	Medium Mobile
Mine Site	Kennworth 880 w/hirail & crane	Contractor	1	32	Medium Mobile
Mine Site	Kennwoth 370 fuel & lube truck (filled)	Contractor	1	54	Medium Mobile
Mine Site	Kennworth 880 Dump Truck w/ hirail	Contractor	1	23	Medium Mobile
Mine Site	Excavator	Contractor	2	74	Medium Mobile
Mine Site	Track Welding Truck	Contractor	2	81.9	Medium Mobile
Mine Site	Bear Proof Garbage Bin	Contractor	4	2.4	parts
Mine Site	20` Container	Contractor	6	130.02	parts
Mine Site	Generator enclosure	Contractor	3	0.66	parts
Mine Site	40` Container	Contractor	6	158.88	parts
Mine Site	light system for office (in C-Can)	Contractor	1	4	parts
Mine Site	20`Container w/ 3 Rail Puller, Threader,misc. small tools	Contractor	1	22	parts
Mine Site	Rail Operations Concrete	Contractor	158	316	parts
Mine Site	Crane Mats	Contractor	74	111	parts
Mine Site	20` Container Hose Crimping	Contractor	1	21.67	parts
Mine Site	Screener power screen	Contractor	1	40	Heavy
Mine Site	Inclined screen	Contractor	1	46	Heavy
Mine Site	Screener	Contractor	1	40	Heavy
Mine Site	Conveyors	Contractor	4	47	Heavy
Mine Site	Gen-set trailers	Contractor	1	28	Heavy
Mine Site	Electrical sub-station	Contractor	3	8	Heavy
Mine Site	Fuel truck 10,000 liters	Contractor	1	14	Heavy Mobile
Mine Site	Crane 80T	Contractor	1	43	Heavy Mobile
Mine Site	Crane 200T crawler	Contractor	2	100	Heavy Mobile

Baffinland

Mobile and Mechanical Equipment
Estimated to Arrive in 2019

2018-11-01

Property Section	Material Item	Owner	Quantity	Revenue Tonne	Classification
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*	
Mine Site	Mobile concrete plant	Contractor	1	15	Heavy Mobile
Mine Site	Concrete truck	Contractor	2	52	Heavy Mobile
Mine Site	Drill Rig T40R driller	Contractor	1	35	Heavy Mobile
Mine Site	Loader C-988	Contractor	1	50	Heavy Mobile
Mine Site	Dynamite truck	Contractor	2	20	Heavy Mobile
Mine Site	Dynamite truck	Contractor	1	10	Heavy Mobile
Mine Site	Drilling Rig LB 36-410 (rented)	Contractor	1	82	Heavy Mobile
Mine Site	Piling and drilling Rig LRB 355 (rented)	Contractor	1	76	Heavy Mobile
Mine Site	Oscillator VRM KL (rented)	Contractor	1	17	Heavy Mobile
Mine Site	Loader C-980	Contractor	1	50	Heavy Mobile
Mine Site	Loader C-980	Contractor	1	50	Heavy Mobile
Mine Site	Dynamite truck	Contractor	1	10	Heavy Mobile
Mine Site	Semi-trailer	Contractor	1	15	Heavy Mobile
Mine Site	Crane 130T	Contractor	1	50	Heavy Mobile
Mine Site	Basket crane	Contractor	1	2	Heavy Mobile
Mine Site	Generator 35 kW	Contractor	2	6	Light
Mine Site	Air compressor	Contractor	1	22	Light
Mine Site	Air compressor	Contractor	1	22	Light
Mine Site	Tower light 4 000 W	Contractor	6	4	Light Mobile
Mine Site	Pick-up 4x4 diesel	Contractor	12	38	Light Mobile
Mine Site	Dynamite pick up	Contractor	2	9	Light Mobile
Mine Site	Skid Steer CAT 236B	Contractor	1	3	Light Mobile
Mine Site	Bucket Lift	Contractor	1	15	Light Mobile
Mine Site	Pick-up 4x4 diesel	Contractor	2	6	Light Mobile
Mine Site	Dynamite pick up	Contractor	2	9	Light Mobile
Mine Site	Tower light 4 000 W	Contractor	4	3	Light Mobile
Mine Site	Scissors lift	Contractor	2	6	Light Mobile
Mine Site	Bucket Lift	Contractor	1	15	Light Mobile
Mine Site	Tower light	Contractor	3	3	Light Mobile
Mine Site	Tower light	Contractor	1	1	Light Mobile
Mine Site	Pick-up 4x4 diesel	Contractor	2	6	Light Mobile
Mine Site	Light tower	Contractor	6	5	Light Mobile
Mine Site	Pick-up 4x4 diesel	Contractor	6	19	Light Mobile
Mine Site	Scissor lift	Contractor	1	4	Light Mobile
Mine Site	Generator 35 kW	Contractor	3	5	Medium
Mine Site	Welding machine	Contractor	3	3	Medium
Mine Site	Generator 114 kW	Contractor	1	3	Medium
Mine Site	Diesel tank 22 500 li	Contractor	1	3	Medium Diesel Tank
Mine Site	Diesel tank 10 000 li	Contractor	2	2	Medium Diesel Tank
Mine Site	Gaz tank 50 000 li	Contractor	2	2	Medium Diesel Tank
Mine Site	Diesel tank 10 000 li	Contractor	2	2	Medium Diesel Tank
Mine Site	Gaz tank 50 000 li	Contractor	1	1	Medium Diesel Tank
Mine Site	Gaz tank 50 000 li	Contractor	1	1	Medium Diesel Tank
Mine Site	Gaz tank 10 000 li	Contractor	1	1	Medium Diesel Tank
Mine Site	Low boy 100T	Contractor	1	13	Medium Mobile
Mine Site	Tool truck	Contractor	1	14	Medium Mobile
Mine Site	Bus ford transit	Contractor	1	3	Medium Mobile
Mine Site	Bucket Lift 100'	Contractor	1	15	Medium Mobile
Mine Site	Platform truck	Contractor	1	15	Medium Mobile
Mine Site	Boom truck	Contractor	1	14	Medium Mobile
Mine Site	Bus 48 passengers	Contractor	1	8	Medium Mobile
Mine Site	Water tank 50 000 li	Contractor	1	3	Medium Tank
Mine Site	Water tank 15 000 li	Contractor	1	3	Medium Tank
Mine Site	Water tank 1 000 li	Contractor	2	2	Medium Tank
Mine Site	Water tank 50 000 li	Contractor	1	3	Medium Tank
Mine Site	Water tank 10 000 li	Contractor	1	3	Medium Tank
Mine Site	Office room	Contractor	1	5	Modular Building Not Contaminated
Mine Site	Lunch room	Contractor	1	5	Modular Building Not Contaminated
Mine Site	Spare parts trailers	Contractor	1	28	parts
Mine Site	Explosive matts	Contractor	50	175	parts
Mine Site	Methanol	Contractor	110	110	parts
Mine Site	Calcium	Contractor	877	877	parts
Mine Site	Concrete bags	Contractor	67	101	parts
Mine Site	20' Various Containers	Contractor	20	440	parts
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	15	20	parts
Mine Site	Safety barrier (New Jersey)	Contractor	100	204	parts
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	5	7	parts
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	5	7	parts
Mine Site	Board insulation 50mm (Styrofoam)	Contractor	600	192	parts
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	3	4	parts
Mine Site	Geomembrane Liner (5 500 m²)	Contractor	1	2	parts
Mine Site	Retaining wall concrete bloc 600 x 600 x 1200	Contractor	50	54	parts
Mine Site	Non-woven Geotextile (bundle of 3 rolls)	Contractor	137	178	parts
Mine Site	Unloader board insulation	Contractor	2000	11	parts
Mine Site	Unloader non-woven geotextile	Contractor	68	15	parts
Mine Site	Parts (for generators)	Contractor	3	2	parts
Mine Site	20' Container Miscellaneous accesories for workers	Contractor	1	20	parts
Mine Site	20' Container -Office equipment	Contractor	1	5	parts
Mine Site	Rolling Stock Workshop	Nahanni	1	340	Building
Mine Site	Rolling Stock Workshop Crane	Nahanni	1	12	Building
Mine Site	Rail Operations Offices	Nahanni	1	35	Building
Mine Site	Rail Operations Concrete	Nahanni	1	50	parts
Mine Site	Lighting plants	Nuna	10	11.3	Light Mobile
Mine Site	Cat 988 Loader	Nuna	1	51.4	Heavy Mobile
Mine Site	Cat 930 Loader	Nuna	1	17	Heavy Mobile

Baffinland

Mobile and Mechanical Equipment
Estimated to Arrive in 2019

2018-11-01

Property Section	Material Item	Owner	Quantity	Revenue Tonne	Classification
e.g. Milne Port or Mine Site	*Description of the material**		*Quantity of the material to be shipped to and stored on the Property (including unit of measurement)*	*Estimated amount of revenue tonnes (mt) assigned to the shipping of material*	
Mine Site	Bins for RO/RO	Nuna	3	21	Light
Mine Site	Bins for RO/RO	Nuna	3	21	Light
Mine Site	Bear Proof Garbage Bins	Nuna	2	2	Light
Mine Site	Bins for RO/RO (2 x GARBAGE BINS)	Nuna	2	4.5	Light
Mine Site	Bins for RO/RO (2 x GARBAGE BINS)	Nuna	2	4.5	Light
Mine Site	Winch Tractor	Nuna	1	13.2	Light Mobile
Mine Site	Scissor Deck Trailer	Nuna	1	6.37	Light Mobile
Mine Site	Skid steer	Nuna	1	7.633	Light Mobile
Mine Site	Manlift	Nuna	1	7.5	Light Mobile
Mine Site	Light Plants	Nuna	2	1.92	Light Mobile
Mine Site	Frost Fighters	Nuna	4	0.8	Light Mobile
Mine Site	Hot Box	Nuna	1	1.55	Light Mobile
Mine Site	Mech Truck	Nuna	1	16.4	Light Mobile
Mine Site	Skid steer	Nuna	1	7.633	Light Mobile
Mine Site	Light Plants	Nuna	2	1.92	Light Mobile
Mine Site	Frost Fighters	Nuna	4	0.8	Light Mobile
Mine Site	Hot Box	Nuna	1	1.55	Light Mobile
Mine Site	Crewcab	Nuna	1	3.8	Light Mobile
Mine Site	Skid steer	Nuna	2	15.266	Light Mobile
Mine Site	Light Plants	Nuna	2	1.92	Light Mobile
Mine Site	Frost Fighters	Nuna	2	0.4	Light Mobile
Mine Site	RO/RO Truck	Nuna	1	16.4	Medium Mobile
Mine Site	Vac Trailer or Vac Truck	Nuna	1	16.4	Medium Mobile
Mine Site	Bus	Nuna	2	16.4	Medium Mobile
Mine Site	Flat Deck	Nuna	2	9.98	Medium Mobile
Mine Site	Fuel Truck	Nuna	1	16.4	Medium Mobile
Mine Site	Raw Water Truck	Nuna	1	16.4	Medium Mobile
Mine Site	Effluent Water Truck	Nuna	1	16.4	Medium Mobile
Mine Site	RO/RO Truck	Nuna	1	16.4	Medium Mobile
Mine Site	Grocery Truck	Nuna	1	16.4	Medium Mobile
Mine Site	RO/RO Truck + VAC for RO/RO - UNIT 1374	Nuna	1	15.876	Medium Mobile
Mine Site	Busses 42 passenger	Nuna	3	24.6	Medium Mobile

Baffinland

Phase 2 Expansion Equipment and Materials

2018-11-01

Module Package	Description	Total Volume (m3)	Subtotal ($)
Shiploader	Shiploader	77,938	
	Jetty Travel Gear for Shiploader	2,268	
	Landside Travelgear for shiploader (Pivot Point)	1,174	
	Lower Part Pivot point for shiploader (to be casted in grouting)	20	
	Subtotal	81,400	$ 5,535,000.00
Car Dumper	Steel Tub, Car Dumper, Car Dumper Hall including E-Houses	12,579	
	Positioner Hall (Indexer Building) One piece with shipping braces	8,401	
	Hopper Support Structure	2,099	
	Positioner	487	
	Apron Feeder	496	
	Hopper	296	
	Positioner Track Dwg# 4933706	97	
	Hydraulic Power Unit Car Dumper	45	
	40' DC or OT (Drive units, small geared motor for the spillage scraper)	77	
	Transformer house	179	
	Subtotal	24,756	$ 1,683,000.00
Crushing	Crusher building Inculding 4.2 to 4.5	21,111	
	Main Shaft Kubria M210	63	
	Spider Complete Kubria M210	70	
	Crusher feeding chute S6	31	
	Various disassembled small parts stowed in 20' Containers	154	
	Various disassembled small parts stowed in 20' Containers	387	
	Subtotal	21,815	$ 1,483,000.00
Screening building	Screening building	33,278	$ 2,263,000.00
Transfer Conveyor	Detail 1 Tower (Lower section)	1,476	
	Detail 1 Tower (top section)	996	
	Detail 1 Tower (diagonal brace)	167	
	Detail 1 Tower (horizontal brace)	0	
	Detail 2 Tubular Gallery type 2	691	
	Detail 3 Tubular Gallery type 1	3,488	
	Detail 4 Transfer Truss PT. 1 Head End (Platform)	1,332	
	Detail 4 Transfer Truss PT. 2 - Head End (Truss)	349	
	Detail 5 Bent TC-B3	184	
	Detail 6 Bent TC-B4	129	
	Detail 7 Bent TC-B5	97	
	Detail 8 Bent TC-B6	73	
	Detail 9 Bent TC-B7	38	
	Detail 10 Bent TC-B8	21	
	Detail 11 Bent TC-B9	0	
	Detail 1 - Gravity Takeup Counterweight (4122)	10	
	Transfer Conveyor tables, tail and take up pulley supports	232	
	Transition walkway	8	
	Corrugated wall panels for tower base	0	
Screen Feed Conveyor	Detail 4 - Tubular gallery (Type 2)	578	
	Detail 24 - Tubular gallery (Type 4)	1,744	
	Detail 24 - Tubular gallery (Type 5)	581	
	Detail 5 - Tubular gallery (Type 3)	527	
	Detail 6 - Truss section	596	
	Detail 8 - Bent SF-B3	76	
	Detail 9 - Bent SF-B4	38	
	Detail 10 - Bent SF-B5	17	
	Detail 11 - Bent SF-B6	8	
	Detail 12 - Bent SF-B8	2	
	Detail 12 - Bent SF-B9	0	
	Detail 15 - Gravity Take up Tower Bent SF-B2	329	
	Detail 15 - Gravity Take up Tower Platform	110	
	Detail 16 - Gravity Take up Tower Bent SF-B1	121	
	Detail 13 - Caged Ladders	77	
	Detail 14 - Caged Ladders	77	
	Detail 2 - Counter Weight (CV-001)	8	
	Bracing, Guarding, Bolts, Monorail and Monorail Supports in Containers	155	
	Detail 4 - Transition walkway	10	
	Apron Feeder Modular Structure Dribble and head chute	1,011	

Bulk Material Handling Conveyors

Module Package	Description	Total Volume (m3)	Subtotal ($)
Stockpile #1 Conveyor	Apron Feeder Modular Structure and Dribble and head chute	1,045	
	Detail 25 - Apron Feeder Modular Structure stairs	0	
	Detail 21 - Feeding Hopper (Top Half)	201	
	Detail 18 Arches	573	
	Detail 18 Arch cross beam connectors	0	
	Reclaim tunnel concrete foundations	1,152	
	Reclaim tunnel corrugated steel segments and Exit tunnel segments	189	
Oversize Conveyor	Detail 13 - Gravity Takeup Counterweight (CV-002)	8	
	Detail 2 - Truss	726	
	Detail 3 - Tubular Gallery (Type 1)	493	
	Detail 3 - Tubular Gallery (Type 2)	493	
	Detail 3 - Tubular Gallery (Type 3)	1,480	
	Detail 4 - Tubular gallery (Type 4)	406	
	Detail 5 - Bent OSC-B1	113	
	Detail 6 - Bent OSC-B2	61	
	Detail 7 - Bent OSC-B3	30	
	Detail 8 - Bent OSC-B4	14	
	Detail 9 - Bent OSC-B5	6	
	Detail 10 - Caged Ladder	77	
	Detail 11 - Caged Ladder	77	
	Detail 12 - Bent OSC-B6	363	
	Detail 13 - Gravity Take up Tower Bent OSC-B7	131	
	Detail 13 - Gravity Take up Tower Platform	110	
	Containers	155	
Fines Conveyor	Detail 1 Head Platform for Fines Collection Conveyor	182	
	Detail 2 Head Platform Stairs and legs for Fines Collection Conveyor	77	
	Fines collection conveyor stick built section and Head Chute	0	
Lump Conveyor	Detail 1 - Tubular Gallery Section (Type 1)	405	
	Detail 1 - Tubular Gallery Section (Type 2)	405	
	Detail 2 - Tubular Gallery Section (Type 3)	366	
	Detail 3 - Bent LC-B3	3	
	Detail 4 - Bent LC-B2	10	
	Detail 5 - Bent LC-B1	17	
	Detail 6 - Platform	237	
	Detail 6 - Platform Columns	36	
	Detail 8 - Platform Stairs	33	
	40' Container	155	
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	19	
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	7	
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	6	
	Detail 7 - Chute - 2336-CV-001 Head Lump conveyor	1	
Stockpile #2 Conveyor	Detail 1 - Truss Sections T1	508	
	Detail 1 - Truss Sections T2	1,016	
	Detail 1 - Truss Sections T3	508	
	Drive Station	9,023	
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor	67	
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor	183	
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor	23	
	Chute - 4211-CV-001 Head Yard Stockpile #2 conveyor bypass chute	23	
	Stockpile Conveyor Chute Platform - shipped in container	0	
	Detail 11 - Tail Section	0	
	Conveyor table parts in 40 ft containers or pallets	1,084	
	Detail 2 Bent STYC-B1	6	
	Detail 2 Bent STYC-B2	3	
	Detail 2 Bent STYC-B3	1	
	Detail 2 Bent STYC-B4	0	
	Detail 10 Loading Area Holding assembly	0	
	Containers	387	
	Tail End Assembly and Conveyor Loading module	0	
	Conveyr Stick Built parts for conveyor tables / modules	0	
	Conveyor table modules	0	
	Drive Station	3,844	
	Detail X Bent SFC-B1	7	
	Detail X Bent SFC-B2	24	

Baffinland

Phase 2 Expansion Equipment and Materials

2018-11-01

Module Package	Description	Total Volume (m3)	Subtotal ($)
Shiploader Feed Conveyor	Detail X Bent SFC-B3	22	
	Detail X Bent SFC-B4	39	
	Detail X Bent SFC-B5	78	
	Detail X Bent SFC-B6	139	
	Detail X Bent SFC-B7	250	
	Detail X Bent SFC-B8	612	
	Detail X Truss T1-1	529	
	Detail X Truss T1-2	529	
	Detail X Truss T1-3	529	
	Detail X Truss T1-4	529	
	Detail X Truss T1-5	529	
	Detail X Truss T1-6	529	
	Detail X Truss T2	534	
	Detail X Truss T3	487	
	Head Bridge support	163	
	Head Bridge support column	125	
	Head Bridge support column	125	
	Head Truss 1st section	1,201	
	Head Truss Final section	845	
	Head Platform	96	
	Head Chute Removable Portion Section 1	14	
	Head Chute Removable Portion Section 2	22	
	Head Chute Stationary portion	15	
Subtotal		49,868	$ 3,391,000.00
Rail Materials	Pandrol Victor Tie Plates (preplated on ties)	764	
	Screw Spikes Bags (30/bag)	1,447	
	E-Clip Fastener Bags (25kg - 40 bags/pallet)	126	
	11" Tie Plates Pallet (300/pallet)	2	
	Rail Ties Bundle of 30 ties	11,213	
	weld kits (25/ pallet)	171	
	Keg track spikes (48/pallet)	3	
	joint bar (100/pallet) 136#	3	
	Keg bolts & washers (48/pallet)	3	
	turnout rail 136# AHH RE	17	
	joint bar 115#	10	
	HW turnout package ties	150	
	TO frog	8	
	Sliding Derail	1	
	Bumping Post	12	
	136# RE RAIL guardrail	3	
	Crossing Panel	19	
	Timber Screws (1 Pallet)	142	
	Rails 25 per bundle	4,059	
	115# RE Rail	17	
Subtotal		18,172	$ 1,236,000.00
	Total for All Modules	**229,288**	**$ 15,591,000.00**

Appendix C:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012)

Baffinland Iron Mines Corporation

INTERIM CLOSURE AND RECLAMATION PLAN

BAF-PH1-830-P16-0012

Revised Draft - Rev 5

Prepared By: Christopher Murray
Department: Sustainable Development
Title: Environmental & Regulatory Compliance Manager
Date: October 30, 2018
Signature:

Reviewed By: Megan Lord-Hoyle
Department: Sustainable Development
Title: Director, Sustainable Development
Date: October 30, 2018
Signature: Megan Lord-Hoyle

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DOCUMENT REVISION RECORD

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TABLE OF CONTENTS

1 PLAIN LANGUAGE SUMMARY 9

2 INTRODUCTION 17

2.1 Purpose and Scope of ICRP 17

2.2 ICRP Goal and Principles 18

2.2.1 Policies and Guidelines for Final Closure 18

2.2.2 Site Abandonment Goal 19

2.2.3 Closure Principles to Achieve Site Abandonment Goal 19

2.3 Closure and Reclamation Planning Team 20

2.3.1 Closure Plan Progression 20

2.4 Engagement 22

2.5 Regulatory Instruments for Closure and Reclamation 24

2.5.1 Annual Security Review 25

2.5.2 Project Updates and Reporting 25

3 PROJECT ENVIRONMENT 26

3.1 Atmospheric Environment 26

3.1.1 Climate 26

3.1.2 Air Quality 28

3.1.3 Noise and Vibration 30

3.2 Physical (Terrestrial) Environment 30

3.2.1 Topography 30

3.2.2 Permafrost 31

3.2.3 Surficial and Bedrock Geology 31

3.2.4 Hydrology and Drainage 33

3.3 Chemical Environment 34

3.3.1 Surficial Soil Chemistry 34

3.3.2 Surface Water and Sediment Quality 35

3.3.3 Geochemistry 36

3.4 Biological Environment 38

3.4.1 Vegetation 38

3.4.2 Aquatic Wildlife 39

3.4.3 Terrestrial Wildlife 40

3.4.4 Marine Wildlife 42

3.5 Socio-Economic Environment 50

3.5.1 Nearby Communities 51

3.5.2 Traditional Land Use 52

3.5.3 Protected Areas 54

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4 PROJECT INFORMATION 55
4.1 Location and Access 55
4.1.1 Proponent Name and Address 55
4.2 Project History 55
4.3 Site Geology 58
4.3.1 Regional Geology 58
4.3.2 Iron Ore Deposit Geology 58
4.3.3 Geotechnical Overview 59
4.4 Project Summary 60
4.4.1 Site Plans 69
4.4.2 Inuit Owned Lands 70
5 PERMANENT CLOSURE AND RECLAMATION 71
5.1 Definition of Permanent Closure and Reclamation 71
5.1.1 Closure Objectives and Criteria 72
5.2 Permanent Closure and Reclamation Requirements 77
5.2.1 Open Pit Mine Workings 78
5.2.2 Waste Rock and Overburden Piles 86
5.2.3 Quarries and Ore/Aggregate Stockpiles 96
5.2.4 Buildings and Equipment 100
5.2.5 Mining Infrastructure 102
5.2.6 Transportation Routes 106
5.2.7 Waste, Landfills and other Disposal Areas 110
5.2.8 Water Management Systems 120
6 PROGRESSIVE RECLAMATION 127
6.1 Definition of Progressive Reclamation 127
6.2 Opportunities for Progressive Reclamation 127
6.2.1 Proposed Progressive Rehabilitation Measures 128
6.3 Completed Progressive Reclamation 129
7 TEMPORARY CLOSURE 131
7.1 Short-Term Temporary Mine Closure – Care and Maintenance 131
7.1.1 Health and Safety of Workers and the Public During Temporary Closure 131
7.1.2 Restriction of Access and Site Security 132
7.1.3 Security of Mine Openings 132
7.1.4 Security of Mechanical, Hydraulic Systems and Electrical Systems 132
7.1.5 Hazardous Materials & Waste Management Sites 133
7.1.6 Docks and Airstrip 133
7.1.7 Control of Effluents 133

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7.1.8 Stabilization of Stockpiles 134
7.1.9 Site Inspection Program 134
7.1.10 Notification of Temporary Closure 134
7.2 Short-Term Temporary Closure Monitoring, Maintenance, and Reporting 134
7.2.1 Health and Safety of Workers and the Public During Long-term Temporary Closure 136
7.2.2 Restriction of Access and Site Security 136
7.2.3 Security of Open Pit 136
7.2.4 Security of Mechanical, Hydraulic, and Electrical Systems 137
7.2.5 Hazardous Materials and Waste Management Sites 137
7.2.6 Stabilization of Stockpiles 137
7.2.7 Docks and Airstrip 138
7.2.8 Control of Effluents 138
7.2.9 Site Inspection Program 138
7.3 Long-Term Temporary Closure Monitoring, Maintenance, and Reporting 139
8 INTEGRATED SCHEDULE OF ACTIVITIES 140
8.1 Duration of Closure Activites 140
8.2 Summary of Activities during Final Closure by Year 142
9 POST-CLOSURE SITE ASSESSMENT 145
9.1 Short-Term Temporary Care and Maintenance Program 148
9.2 Long-Term Maintenance 148
9.3 Regulatory Reporting 149
9.4 Geotechnical Engineering Monitoring 149
9.4.1 Geotechnical Engineering Analyses 151
9.4.2 Geotechnical Monitoring Inspections 153
9.4.3 Additional site observations 154
9.5 Closure and Post-Closure Aquatic Monitoring and Reporting 154
9.5.1 Environmental Effects Monitoring Program (EEM) 159
9.5.2 Core Receiving Environment Monitoring Program (CREMP) 159
9.5.3 Lake Sedimentation Monitoring Program 160
9.6 Environmental Site Assessment 160
9.7 Terrestrial Environment Monitoring and Reporting 161
9.8 Marine Environment Monitoring and Reporting 162
9.9 Safety Compliance Inspection 162
9.10 Socio-economic Reporting 163
9.11 Air Quality Monitoring and Reporting 163
10 FINANCIAL SECURITY 165

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10.1 Preliminary Mine Closure and Reclamation Plan Costs 165
10.1.1 Addendum to PCRP Closure and Reclamation Cost Estimate 165
10.1.2 Summary of PCRP Closure and Reclamation Cost Estimate 166
10.2 Total Financial Security Posted 167
11 CONCORDANCE TABLES 168
12 GLOSSARY OF TERMS, ACRONYMS, OR ABBREVIATIONS 208
12.1 Glossary of Terms 208
12.2 Acronyms and Abbreviations 217
13 REFERENCES 221

Appendix A Preliminary Mine Closure and Reclamation Plan Drawings
Appendix B Mine Closure and Reclamation Planning Guidelines, Regulations and Lease Requirements
Appendix C Site Photos of Current Site Condition (2017)
Appendix D Reclamation Research Plans
Appendix E Record of Engagement
Appendix F Lessons Learned from Other Projects
Appendix G Residual Effects
Appendix H FEIS Freshwater Quality Predictions (Based on FEIS and its Addendum, Volume 7, Section 3.4)

List of Figures

Figure 4.1 Site Location Map 56
Figure 4.2 Relative Location of Project Areas 63
Figure 4.3 Mine Site Layout 64
Figure 5.1 General Layout and Development Of Deposit 1 Pit 79
Figure 5.2 Placement of Waste Rock and Overburden 88
Figure 5.3 Evolution of the Waste Rock Stockpile Over the Life-Of-Mine 89
Figure 5.4 Water Management Structures for the Waste Rock Storage Area 90
Figure 5.5 Waste Rock Deposition Plan – Summer 2018 – Plan View 91
Figure 5.6 Major Waste Streams and Methods of Transportation 117
Figure 8.1 Schedule of Final Closure Activities 143
Figure 9.1 Anticipated Closure and Post Closure Monitoring & Reporting Program Schedule for Major Mine Areas 147
Figure 9.2 Milne Port Site Plan 156
Figure 9.3 Mary River Mine Site Plan 157

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Figure 9.4 Dust Fall Sample Locations for the Project Area 158

List of Tables

Table 1.1: Outline Of Major Reclamation Activities at Each Mine Area 14
Table 2.1: Applicable Mine Closure Planning Policies, Guidelines, And Lease Requirements 24
Table 3.1: Measured Baseline Concentrations 29
Table 3.2: Baseline Dustfull Deposition Rates 29
Table 3.3: Baseline Metal Deposition Rates for Select Metals 29
Table 3.4: Baseline Noise Monitoring Results 30
Table 3.5: Total Amounts of Organic Matter And Primary Nutrients In Soils in the Project Area 35
Table 4.1: Major Project Components 65
Table 4.2: Drawings for Mine Closure and Reclamation 69
Table 5.1: Closure Objectives, Criteria and Actions by Major Project Components (Based on ERP – 4.2 Mtpa Nominal) 73
Table 5.2: Potential Water Source Pit Fill Data (Conceptual Level) 81
Table 6.1: Summary of Conceptual Current and Proposed Progressive Rehabilitation Schedule 127
Table 9.1: Proposed Post-Closure Geotechnical Assessment and Monitoring Requirements 150
Table 10.1: Total Cost and Breakdown for Mary River Project Closure and Reclamation 167
Table 11.1: Conformity Assessment of the CIRNAC Guidelines to the ICRP 168
Table 11.2: QIA Abandonmenta and Reclamation Policy for Inuit Owned Lands Concordance Table 171
Table 11.3: NIRB Project Certificate Term and Conditions Concordance Table 173
Table 11.4: Type ‘A’ Water Licence 2AM-MRY1325 Amendment No.1, Part J, Item 2 206

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FOREWORD

The Interim Closure and Reclamation Plan (ICRP) builds on the Preliminary Closure and Reclamation Plan (PCRP) which was reviewed and approved by the Nunavut Impact Review Board (NIRB) under Project Certificate 005 and its amendment, and, by the Nunavut Water Board (NWB) with the issuance of Type 'A' Water Licence 2AM-MRY1325 and Amendment No. 1. The ICRP reflects the requirements of Qikiqtani Inuit Association (QIA) Commercial Lease No. Q13C301 and requirements of Part J, Item 2 of the Type 'A' Water Licence, 2AM-MRY1325 - Amendment No. 1 which requires the March 2015 ICRP to be updated 60 days after the issuance of the amended Type A Licence, taking into consideration the items listed in Part J, Item 2. The revised plan is to address the relevant comments and recommendations provided by intervening parties during the review period for the Type A Licence amendment application.

The development of the PCRP and subsequent development of the ICRP is based on Crown Indigenous Relations and Northern Affairs Canada (CIRNAC, formerly AANDC) guidelines[1] which envisage three primary stages in the development of a Mine Closure and Reclamation Plan (or A&R Plan):

- A Preliminary Closure and Reclamation Plan
- An Interim Closure and Reclamation Plan
- A Final Closure and Reclamation Plan

The ICRP considers the complete development of the Project and describes expected closure activities at the end of the Project Life (21 year mine life). The ICRP is thus a conceptual benchmark for the intended reclamation and closure activities associated with all components of the Mary River project approved under Project Certificate No. 005 and its Amendment No 1. The ICRP will be updated as required throughout the life of the Project.

As per Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and QIA Commercial Lease No. Q13C301, the Final CRP will be developed and submitted no later than one (1) year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days) to provide greater detailed descriptions of the proposed reclamation activities in such a manner that they can be subsequently implemented. If future revisions of referenced Project authorizations were to require this to change, this timeframe will be adjusted accordingly.

[1] MVLWB/AANDC, Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, November 2013

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1 PLAIN LANGUAGE SUMMARY

BACKGROUND AND INTRODUCTION

The Mary River Project (the Project) is located on north Baffin Island, in the Qikiqtani Region of Nunavut. The Project is wholly owned by Canadian mining company Baffinland Iron Mines Corporation (Baffinland). The scope of the Project is defined by Project Certificate No 005 (and its Amendment No 1) and Type A Water Licence 2AM-MRY1325 - Amendment No. 1. The Project's Interim Mine Closure and Reclamation Plan (ICRP) is considered to be a "living" document, which is refined regularly throughout the life of mine until a Final Closure and Reclamation Plan is achieved. Ongoing iterations to the ICRP will address issues such as notable changes to the Project and refinements to the closure design based on findings from operational data collection (e.g. community engagement, environmental monitoring, research studies, etc.). This version of the ICRP builds on the initial Preliminary Mine Closure and Reclamation Plan (PMCRP) (H337697-0000-07-126-0014) presented in Volume 3, Appendix 3B, Attachment 10 of the Mary River Project Final Environmental Impact Statement (FEIS) and approved by Nunavut Impact Review Board (NIRB).

This ICRP document has been developed in accordance with applicable requirements from numerous regulatory instruments and guidelines, including the following primary sources:

- Conditions applying to security and abandonment, closure and reclamation or temporary closure in Type "B" Water Licence 8BC-MRY1416, Type "A" Water Licence 2AM-MRY1325 - Amendment No. 1.
- Conditions applying to closure and reclamation set forth in Commercial Lease No. Q13C301.
- The Project Certificate No. 005 (December 28, 2012) and its associated Amendment (May 28, 2014) terms and conditions.
- The Qikiqtani Inuit Association (QIA) Abandonment and Reclamation Policy for Inuit Owned Lands (Version 3.0, 2013).
- Mackenzie Valley Land and Water Board (MVLWB)/Aboriginal Affairs and Northern Development Canada (AANDC) Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the NWT (2013).

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Document Organization

Following development of the PMCRP in 2011, Baffinland agreed to reorganize the ICRP document at QIA's request to follow the recommended template provided in the MVLWB/AANDC Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories. These Guidelines were released in 2013. This ICRP follows the suggested template with some minor exceptions, and includes the following major topics of discussion:

Section 2 Provides the purpose, scope, and goal of the ICRP, outlines the closure and reclamation planning team, details the approach for engagement, and summarizes regulatory instruments (permits, authorizations, and agreements) for closure and reclamation;

Section 3 Provides a description of pre-disturbance (baseline) conditions for the atmospheric, physical (terrestrial), biological and socio-economic environment;

Section 4 Provides a detailed description of the Mine, including the location and access, project history, site geology, and high-level project summary;

Section 5 Provides a detailed description for the permanent closure of the Mine for each of the mine components, including the expected final conditions. This Section contains the bulk of available detail for how the Mine will be closed, the reclamation targets Baffinland seeks to achieve (closure objectives and criteria) and the other key components of the closure design (e.g. performance monitoring, uncertainties, contingency planning).;

Section 6 Provides a description of planned and completed progressive reclamation at the Mine site;

Section 7 Discusses planning for short-term temporary mine closure and long-term mine closure and suspension of activities.

Section 8 Provides a schedule for the planned closure activities;

Section 9 Provides a post-closure site assessment that summarizes how the residual environmental impacts of the Mine as a whole will be assessed once the selected closure activities have been completed;

Section 10 Discusses the estimated costs associated with closure and reclamation activities

Section 11 Provides a tabulated summary of the ICRP's concordance with the primary regulatory instruments

Section 12 Glossary of terms, acronyms, and abbreviations

Section 13 References

Appendix A Provides the closure drawings

Appendix B Provides a tabulated summary of mine closure and reclamation planning guidelines, regulations, and lease requirements

Appendix C Presents recent photos of major work areas

Appendix D Discusses the Reclamation Research Plans developed to address such as pit water quality, waste rock seepage quality and natural revegetation efforts

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Appendix E Provides a record of engagement on closure issues

Appendix F Discusses lessons learned from other sites applicable to the closure and reclamation of this Project

Appendix G Summarizes residual effects predictions from the FEIS and Addendum

Appendix H Summarizes FEIS Freshwater Quality Predictions (Based on FEIS and its Addendum, Volume 7, Section 3.4)

Updates to the Closure Plan

This interim closure and reclamation plan will be updated as the project progresses taking into account lessons learned, the results of research and monitoring data, input from stakeholders, and changes to how the site is operated.

To account for interim closure and reclamation security adjustments to reflect project development phases until such a time planned closure commences, an updated determination of Project closure and reclamation security is currently captured on an annual basis in Annual Security Review (ASR) process to account for any planned constriction activities. This is done incrementally and reflects closure requirements if Baffinland is not able to reach its planned closure phase. The ASR process is conducted in accordance with Part C and Schedule C of Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the QIA and includes consultation with Land-owners and other key stakeholders. The results of this ASR process should be considered on the interim basis to assess Project closure and reclamation liability for the end of the upcoming year until such time planned closure commences. In all cases, closure and reclamation liability estimates adhere to required closure and reclamation guidelines including, but not limited to, the QIA Abandonment and Reclamation policy guiding principles and stated assumptions.

As per Type "A" Water License 2AM-MRY1325 and QIA Commercial Lease No. Q13C301, the Final Mine Closure and Reclamation Plan will be developed and submitted at least one year before a scheduled permanent closure or within 120 days of the notification of an unplanned closure. The Final Mine Closure and Reclamation Plan will provide more detailed descriptions of the proposed reclamation activities in such a manner that they can be subsequently implemented. If future revisions of referenced Project authorizations were to change, this timeframe will be adjusted accordingly.

The Final Mine Closure and Reclamation Plan will be issued to relevant stakeholders including the Land Use Engineer of CIRNAC (Territorial Land Use Regulations, Sections 33 and 35), to the Lands Director at QIA, and to the Nunavut Water Board.

Prior to closing out the Project, Baffinland will consult with the Landlord and surrounding communities regarding transfer of ownership of structures that may be utilized by the surrounding communities during harvests, camping, and other recreational uses or relocated to local hamlets.

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PROJECT AND CLOSURE SUMMARY

Project related facilities were designed and constructed to minimize the footprint. These design and construction considerations have facilitated reclamation plans and minimized the engineering required to support the complete decommissioning and reclamation of the site.

Three closure scenarios and their associated closure and reclamation activities are described in this ICRP: Short-Term Temporary Care and Maintenance, Long-Term Temporary Mine Closure and Final Mine Closure. In addition to these scenarios, progressive reclamation measures have been proposed to facilitate temporary and final mine closures measures.

Temporary closure, Short-Term Temporary Care and Maintenance or Long-Term Temporary Mine Closure, occurs when the Project ceases Operation with the intent of resuming activities in the future. During temporary closure, Baffinland will maintain all operating facilities and programs necessary to protect humans, wildlife, and the environment, including necessary environmental monitoring. Short-Term Temporary Care and Maintenance activities will occur if the Project ceases operation for a period of less than one (1) year with the intent of resuming activities in the future. Long-Term Temporary Mine Closure will occur if the Project ceases operation for a period of greater than (1) year with the intent of resuming activities in the future.

In Short-Term Temporary Care and Maintenance, all facilities and equipment would be secured and de-energized. An inventory of all hydrocarbon products, chemicals, hazardous wastes and explosives would be carried out and all effluents would be monitored. Personnel necessary, including environmental personnel, to maintain site security and project monitoring requirements would remain on site.

During Long-term Temporary Mine Closure the Project sites will be maintained in a secure condition, all facilities and equipment would de-energized and winterized. Hazardous waste and explosives would be removed from the site. Personnel necessary, including environmental personnel, to maintain site security and project monitoring requirements would remain on site.

Final Mine Closure and Reclamation will occur when there is no foreseeable intent by Baffinland to return to active mining. Final Mine Closure and Reclamation will include removing all infrastructure, equipment and materials into an on-site landfill, the Mine Pit, quarries and/or other approved disposal location(s) for disposal of inert, non-hazardous, non-combustible materials. All other infrastructure, equipment and materials will be sent off-site to an approved disposal location. Arrangements will be made with a sealift contractor to collect materials and equipment at Milne Port to ship material destined for off-site transport. The airstrips will be closed and reclaimed unless otherwise directed by regulatory agencies or the Land Owner in order to provide emergency/rescue landing spots for regional aircraft and access for post closure monitoring. Permanent dock structures will be left in place at Milne Port and Steensby Port but all surface equipment and materials will be removed. Disturbed areas would undergo contouring of ground or granular surfaces as required to maintain stability and natural drainage patterns will be re-established, if required, as reasonably possible. At Final Mine Closure and Reclamation, project components will be inspected to ensure specific closure objectives of project components are achieved

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and closure principles of long-term safety of the site, no long term active care requirements, physical stability and chemical stability have been met.

Following the closure activities, there will be several long-term landform changes, including: the creation of waste rock pile, the creation of a mine pit lake where previously there had been a hilltop, and several small quarries will be visible landforms.

The final closure and reclamation activities are expected to last a period of three (3) years based on estimated duration and level of effort required for identified closure activities[2]. Post closure monitoring will continue until closure principles of long-term safety of the site, no long term active care requirements, physical stability and chemical stability have been shown to be met by monitoring results. These activities may be periodic. It is currently estimated post closure monitoring and follow-up inspections will be conducted for a period of fifteen (15) years based on impacts assessment determinations described in the Mary River Project Final Environmental Impact Statement.

An outline of major reclamation activities for each mine area, and the envisioned post-closure landscape is presented on the following page.

[2] Estimated duration and level of effort required for identified closure activities is described in 'Annual Security Review (ASR)' documentation required under Section 9.2 of the Commercial Lease, No. Q13C301, and under Part C and Schedule C of the NWB Type "A" Water Licence No. 2AMMRY1325.

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Table 1.1: Outline Of Major Reclamation Activities at Each Mine Area

Area	Project Operations	Major Reclamation Activities	Post Closure Landscape
Milne Port	Deep water port operation, with ore dock, ship loading facilities, ore stockpiles and stormwater ponds. Other primary infrastructure includes an accommodation complex with sewage treatment plant, power plant, warehouse/garages, fuel storage, landfarm and hazardous waste storage area, polishing ponds, and quarry/borrow areas.	Decommissioning of all infrastructure, removal of building materials and hazardous waste from site. Ore stockpiles removed. All equipment and supplies will be removed. Assessment and potential removal of contaminated soils. Grading of earthen structures and disturbed areas to re-establish natural drainage pathways where acceptable.	No visible foreign building materials will remain. Deep water dock will remain in place. Disturbed areas will be graded to establish stable drainage pathways that do not require maintenance. Natural recovery of vegetation will occur over many years. Surface materials will be scarified to accelerate recovery in priority areas. Ship traffic associated with the mine will stop. Travel to site for post-closure monitoring will be via aircraft only.
Tote Road	Ore hauling road from the Mine site to Milne Port. Approximately 100 km long, all-season gravel road. The road includes over a hundred water crossings consisting of culverts and four bridges. Ore is hauled by truck and trailer assembly, with payload of roughly 150 tonnes. Water intake infrastructure from permitted sources for dust suppression. Quarries and borrow areas exist along the road.	Removal of all water crossing structures, water intakes, and equipment associated with quarries and borrow areas. Assessment of bridge abutments for long-term physical stability, and potential removal of fill. Streambed and banks will be assessed for physical stability and alterations will be made as necessary. Grading at quarries and borrow areas to re-establish natural drainage pathways where possible.	Remaining sections of the road adjacent to former water crossings will be shaped to maintain long-term stability. Tote road traffic associated with mining will stop. No further maintenance of the road will be completed by BIM. Remaining sections of the road may be used by land users. At former water crossings, banks will be graded to provide access for ATVs. Natural recovery of vegetation will occur over many years. Surface materials will be scarified to accelerate recovery in priority areas.

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Table 1.1: Outline Of Major Reclamation Activities at Each Mine Area

Area	Project Operations	Major Reclamation Activities	Post Closure Landscape
Mine Site	Mining operations commencing on a hill crest outcrop, progressing to open pit mining following 10-12 years of mining at full production rates. A haul road exists from the orebody to the Ore crushing/loading facilities and Waste Rock Stockpile. Supporting infrastructure includes the airstrip and helipad, utilities (power, water, sewage), warehouses/garages, offices, accommodations camp, landfill, explosives storage and emulsion plant, sedimentation and polishing ponds, quarries and borrow areas.	The final Open Pit will be flooded by natural inflows and active pumping. An engineered spillway will be constructed to discharge overflowing water to a tributary of the Mary River. The Waste Rock Stockpile will be progressively reclaimed during mining by placement of a 25 m thick cover of non-PAG rock over PAG rock. Decommissioning of all infrastructure, removal of building materials and hazardous waste from site. Ore at crushing/loading facilities removed. All mobile equipment and supplies will be removed. Assessment and potential removal of contaminated soils. Grading of earthen structures and disturbed areas to re-establish natural drainage pathways where acceptable.	Current estimates for the final Open Pit include a footprint of approximately 1 km by 1.75 km wide with roughly 200 m average depth. The Waste Rock Pile will be approximately 250 m high at its highest point. Actual dimensions of these areas are irregular and may change based on the orebody and market conditions. Water treatment is not expected to be required at the Open Pit and Waste Rock Stockpile. No visible foreign building materials will remain. Disturbed areas will be graded to establish stable drainage pathways that do not require maintenance. Natural recovery of vegetation will occur over many years. Surface materials will be scarified to accelerate recovery in priority areas.

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Predictions for Post-closure Conditions

Following reclamation, all Project areas are expected to be physically and chemically stable. Excluding the Open Pit and Waste Rock Stockpile areas, water quality is predicted to return to pre-disturbance levels, and the wildlife may begin to safely access the area again. Changes to water quality and fish and fish habitat in Mary River and Camp Lake (including tributaries) downgradient from the Open Pit and Waste Rock Stockpile have been identified as a research priority of Baffinland. Baseline studies indicated natural fluctuations in concentrations of several metals (reflecting the nature of the regional geology) exceeded water quality (CCME) and safe fish consumption (Health Canada) guidelines. This is unlikely to improve following mining.

Disturbed areas will be graded to re-establish natural drainage pathways where practical, and natural revegetation will be promoted in priority areas by scarifying the surface materials to assist recovery. The revegetation process is expected to take many years, and may never return to baseline conditions in certain locations. Communities have indicated a preference to leave select infrastructure in place (e.g. Ore Dock, Tote Road, Airstrip), but the majority of non-native materials will be removed or no longer visible.

Baffinland has committed to a rigorous monitoring program which is laid out in Project permits (i.e. NIRB Project Certificate, NWB Type A Water Licence), and will adaptively manage operations and mitigation strategies to effectively minimize post-closure residual effects where practical. Monitoring results will be reported to government agencies and the QIA for review and comment on an ongoing basis, and working groups have been established specifically to monitor Terrestrial and Marine effects during mining, to avoid unforeseen impacts post-closure. Ongoing mine closure planning will also be informed by community engagement feedback, and focus studies which may address priority areas.

Focus of this Revision

The main objectives of an ICRP are to set out the objectives and criteria for the successful closure and reclamation of the site, develop options for the reclamation of various areas on site, and to plan research efforts to address uncertainties with respect to closure. The aim of this revision is to update and streamline the presented information, to simplify Table 5.1 to support its discussion and further refinement in collaboration with QIA, and to provide a more accessible document for upcoming QIA engagement efforts for future development of the ICRP.

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2 INTRODUCTION

2.1 PURPOSE AND SCOPE OF ICRP

This Interim Mine Closure and Reclamation Plan (ICRP) outlines the closure goal, principles, objectives, criteria and activities associated with the final closure and reclamation of the Project as approved under Project Certificate No 005 and its Amendment No.1 issued by the Nunavut Impact Review Board (NIRB) on May 28, 2014.

Mine closure and reclamation for the Project will be regulated under Baffinland's Commercial Lease No. Q13C301, Type 'A' Water Licence 2AM-MRY1325 - Amendment No. 1 (Type 'A' Water Licence), Type 'B' Water Licence 8BC-MRY1314 and CIRNAC (formerly INAC) Land Lease 47H/16-1-2. In cases, if any, where there was conflict between Type 'B' Water Licence 8BC-MRY1314 and the amended Type 'A' Water Licence, Baffinland will adhere with the terms and conditions of the Type 'A' Water Licence. In cases where the term 'Abandonment and Reclamation (A&R)' is used in authorizations, regulations and other forms of communication, Mine Closure and Reclamation (MCR) is synonymous for the purpose of the Mary River Project.

The ICRP considers the complete development of the Mary River Project (the Project) and describes expected closure activities at the end of the Project Life. Based on current planning, temporal boundaries of the projected Project lifecycle are as follows:

- Construction (Early Revenue Phase (ERP); 2014 to 2015)
- Operation (2016 to 2039)
- Closure and Post-Closure (2040 to 2047)

As planned final closure is decades away, the ICRP is thus a conceptual benchmark for the intended reclamation and closure activities associated with all components of the Mary River project approved under Project Certificate No. 005. The ICRP will be updated as required throughout the life of the Project.

As per Type "A" Water License 2AM-MRY1325 and QIA Commercial Lease No. Q13C301, the Final Closure and Reclamation Plan (Final CRP) will be developed and submitted no later than one (1) year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within 120 days) to provide greater detailed descriptions of the proposed reclamation activities such a manner that they can be subsequently implemented. If future revisions of referenced Project authorizations were to change, this timeframe will be adjusted accordingly.

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2.2 ICRP Goal and Principles

Over the life of the Project it is expected that closure and reclamation techniques and methodologies for site reclamation will continue to evolve with changes to the understanding of the Project site, stakeholder's views, and technologies for cost effective and practical reclamation in northern conditions. Planning for mine site reclamation will be based on the protection of human health and the environment, and remain dynamic to take into account the results of ongoing and future studies and identified best practices.

2.2.1 Policies and Guidelines for Final Closure

The Project is being designed with closure and reclamation considerations in mind in compliance with the Baffinland Sustainable Development Policy (Baffinland, 2015). General closure and reclamation objectives of this ICRP correspond with the QIA A&R Policy (QIA, 2013). The main goals of this Policy and the above guidelines and regulations are to:

- Apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts and facilitate biodiversity conservation.
- Use energy resources, raw materials and natural resources efficiently and effectively.
- Engage with governments, employees, local communities and the public to create a shared understanding of closure and reclamation issues and take their views into consideration in making decisions.
- Return the Project affected and viable sites (Milne Port, Mine Site, and Quarries) to "wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and human activities" (NRCan, 1994).
- Where practicable, undertake reclamation of affected areas in an ongoing and progressive manner to reduce the environmental risk once the mine ceases operation (INAC, 2002. INAC, 2002a. Northwest Territories Water Board, 1990 and QIA, 2013).
- Provide for the reclamation of affected sites and areas to a stable and safe condition and restore altered water courses to near their original alignment and cross-section. Where practical, affected areas will be returned to a state compatible with the original undisturbed area (Territorial Land Use Regulations).
- Restore altered water courses to their original alignment and cross-section (Territorial Land Use Regulations).
- Reduce the need for Long-term monitoring and maintenance by designing for closure and instituting progressive reclamation, when possible.
- Provide for mine closure using the current available proven technologies in a manner consistent with sustainable development.

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- Provide sufficient detail such that adequate scopes of work can be developed for the execution of reclamation work. Where insufficient details exist, monetary allowances should be included in the reclamation security cost estimate to account for additional engineering and planning. Identification of the specific aspects of closure planning requiring refinement to reach a Final CRP and the corresponding reclamation security amounts are determined as part of the ASR process.

2.2.2 Site Abandonment Goal

In accordance with the above Policy, regulations, and guidelines, the site abandonment goal of the final closure activities is to return project sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities[3].

2.2.3 Closure Principles to Achieve Site Abandonment Goal

In order to achieve the Site Abandonment Goal, closure objectives and criteria have been selected for Project components (Section 4.4.2) based on the following Closure Principles:

- Ensure the safety of the abandoned sites for wildlife and human users.
- Ensure physical stability of abandoned Project sites and remaining physical features (open pit, waste rock stockpile, quarries, road and railway embankments, stream crossings).
- Ensure chemical stability of the mine open pit, waste rock stockpile, quarries, and, other Project disturbed areas.
- Incorporate considerations for future land use of Project sites in final closure planning (to be informed over time by the Mine Closure Working Group).
- Achieve the "Recognized Closed Mine" status in as minimal duration as reasonably practical, as defined by Part (4) of the Metal and Diamond Mining Effluent Regulations (MDMER, formerly the Metal Mining Effluent Regulations) SOR/2002-222 dated 1 June 2018 and ensure no requirements for long-term active care.
- Implement reclamation in a progressive, ongoing manner during the life of the Project and restore sites as soon as an area is no longer required for operations to limit the need for long term maintenance and monitoring.
- Reclaim disturbed Project areas such that no long-term active care is required.
- The objectives and criteria proposed for implementing Final Closure and achieving the stated goal and principles are discussed in Section 5.1.1 of this ICRP.

[3] Based on alignment with Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/AANDC, 2013)

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2.3 Closure and Reclamation Planning Team

The Mary River Project ICRP contains and describes the plans related to closure and reclamation of the Project. The ICRP addresses the activities expected to be required to ensure the Project closure goal, principles, objectives, and criteria are met. Participation of local communities and other stakeholders in the consideration of alternative reclamation activities to safeguard community values is encouraged as the Project proceeds. Currently, closure planning related to the Project is the responsibility of the Sustainable Development Department at Baffinland with support consultants. Stantec Consulting ltd. has provided input on this latest revision of the ICRP.

2.3.1 Closure Plan Progression

2.3.1.1 Preliminary Mine Closure and Reclamation Plan

A Preliminary Mine Closure and Reclamation Plan (PCRP) (H337697-0000-07-126-0014) was prepared for Baffinland in support of the regulatory approval process, including the Final Environmental Impact Statement (FEIS) for the Project, and was based on available Project design information which was at a conceptual level. The PCRP assumes that the reader has access to and is familiar with the FEIS content.

The purpose of the PCRP was to provide an initial closure and reclamation plan for the Mary River Project, at a conceptual level, in accordance with the regulatory framework established by the Inuit, Federal and Territorial governments.

2.3.1.2 Interim Mine Closure and Reclamation Plan

The ICRP builds on the PCRP which was reviewed and approved by NIRB under Project Certificate 005 and its amendment, and, by the Nunavut Water Board (NWB) with the issuance of Type A Water Licence 2AM-MRY1325. The ICRP reflects the requirements of Commercial Lease No. Q13C301, AANDC Land Lease 47H/16-1-2, and Part J, Item 2 of the Type A Water Licence, 2AM-MRY1325 - Amendment No. 1 which required the PCRP to be updated to an ICRP 60 days prior to the commencement of the mining operations.

The Mary River ICRP was developed to increase the detail of the closure criteria and planning presented in the PCRP. It addresses progressive rehabilitation undertaken to date and addresses temporary care and maintenance and long-term closure as well as final cessation of operations. Public health and safety is considered throughout all stages of progressive rehabilitation, closure, and post-closure.

The ICRP does not constitute a Final Mine Closure and Reclamation Plan. The ICRP reflects the level of advancement of development on site and what is expect in future development.

2.3.1.3 Updates to the Interim Mine Closure and Reclamation Plan

It is anticipated the ICRP will be reviewed annually and updated regularly throughout the life of the Project, as per the terms and conditions of the Commercial Lease No. Q13C301 and the Type “A” Water License 2AM-MRY1325 - Amendment No. 1, and AANDC Land Lease 47H/16-1-2. Once the Project reaches full planned operation, and site activities and infrastructure have stabilized, less frequent updates may be

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discussed with QIA. Parties reserve the right to request an update, if warranted, and any changes to the existing ICRP update schedule would require QIA approval. Updates to the ICRP are primarily expected to focus on the refinement and elaboration of the specific performance indicators and commitments and incorporating any reclamation strategy changes based on reclamation research.

Baffinland expects ICRP updates to mainly coincide with the development of the Annual Work Plans as ICRP updates will primarily be required when an Annual Work Plan calls for the construction and operation, or reclamation, of components of the Project that have not been adequately addressed previously or further information has become available or the Annual Work Plans notes material changes to project activities which would require consideration to closure and reclamation strategies. The update would also include any outcomes of the previous year's reclamation research, if successful or positive[4]. If a previously not considered activity or project component is proposed in an Annual Work Plan, the closure strategy will be detailed in the respective Work Plan and/or its supporting documentation.

- When updates to the ICRP are required, Baffinland proposes the following timetable[5]:
- By October 15 of a given year, Baffinland will provide a draft of the upcoming Annual Work Plan to the Landlord for discussion.
- By October 31 of a given year, Baffinland will submit the upcoming Annual Work Plan to all other relevant stakeholders.
- By November 30 of a given year, Baffinland expects review and comments on the upcoming Annual Work Plan from relevant stakeholders including the Landlord.
- By December 31 of a given year, Baffinland will provide an updated ICRP, if required, to the Landlord for review.
- By February 28 of the subsequent year, Baffinland expects discussions with the Landlord to be complete regarding the upcoming Annual Work Plan and ICRP revisions and Landlord approval of the ICRP, if required.
- By March 31 of the subsequent year, Baffinland will distribute the current version of the ICRP to all relevant stakeholders.

2.3.1.4 Final Closure and Reclamation Plan

As per Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and QIA Commercial Lease No. Q13C301, the Final CRP will be developed and submitted no later than one (1) year, or earlier if possible, before scheduled permanent closure or immediately after notification of an unplanned closure (within

[4] The results of any reclamation research that occur during a given year will first be reported to relevant stakeholders in that year's NWB and QIA Annual Report.

[5] Proposed schedule of ICRP updates will be revisited if the frequency of the ASR process changes.

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120 days) to provide greater detailed descriptions of the proposed reclamation activities such a manner that they can be subsequently implemented. If future revisions of referenced Project authorizations were to change, this timeframe will be adjusted accordingly. The Final CRP will include a schedule for the implementation of work; any additional appropriate closure criteria based on completed reclamation research and site monitoring; and fully describe the level of detail and certainty surrounding post-closure monitoring and contingency planning.

2.3.1.5 Final Monitoring Agreement

As per Section 12.3 and 12.4 of the QIA Commercial Lease No. Q13C301, Baffinland will submit a Final Monitoring Agreement within twelve (12) months prior to the completion of Operations. The Final Monitoring Agreement shall include, but not be limited to, provisions detailing the implementation of the contents of the Final CRP in respect of monitoring subsequent to the completion of the Operations and closure activities. The Final Monitoring Agreement will be entered into and determined with Baffinland and the Landlord before Baffinland submits the Final CRP or any other Monitoring Plans in respect thereof to other Governmental Authorities.

2.3.1.6 Exploration Abandonment and Reclamation Plan

The Exploration Abandonment and Reclamation Plan (BAF-PH1-830-P16-0038) is a distinct separate plan from the ICRP that describes the closure and reclamation activities and costs for the Mary River Exploration Project regulated under Baffinland's Type "B" Water Licence No. 2BE-MRY142. In the event Mary River Exploration Project activities occur on Inuit Owned Lands, Baffinland's IOL Commercial Lease (No. Q13C301) conditions will also then apply and the Exploration Abandonment and Reclamation Plan would be required to be reviewed and approved by the QIA. If exploration liability did occur on IOL, it is expected closure goal, principles, objectives, and criteria would apply for similar components.

2.4 Engagement

Baffinland's approach to stakeholder and Inuit community engagement emphasizes the importance of informing stakeholders, establishing effective communication strategies, and collecting feedback from them on potential issues and concerns.

Since 2014, the engagement program has included considerable consultation related to the Phase 2 Proposal, including the identification and discussion of topics of interest and concern regarding the proposal and potential effects. For detailed consultation information, refer to the Public Consultation Report (TSD-4), prepared in support of the Approved Project for the Phase 2 Proposal.

In support of achieving the engagement objectives defined for the Project, Baffinland implements a variety of engagement mechanisms that are intended to ensure that a broad and comprehensive approach to the identification of stakeholders and that the creation of enhanced opportunities for dialogue and input are executed. During engagement with the North Baffin communities, the QIA and other stakeholders related to the ERP and ongoing operations, a few questions were raised about Project

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closure and reclamation. These were mainly concerned with who would be cleaning potential Project-related spills as proponents of past projects created fuel spills, which may have affected marine mammals. Some community members wondered what would happen to Project infrastructure and equipment post-closure and others asked about the status of the ICRP.

Baffinland has proposed to establish a Mine Closure Working Group to best incorporate considerations for post-closure land use of the Project site. The role of this Mine Closure Working Group will be to facilitate the integration of community representation and technical expertise by drawing on Inuit knowledge, arctic experience for similar mining operations, and discussion of alternative uses for decommissioned facilities into the reclamation options for various Project components.

A mandate or terms of reference for the Mine Closure Working Group is currently being developed in consultation with the QIA prior to the initial first meeting of the Mine Closure Working Group. Baffinland is aiming to establish this group following the Phase 2 Project regulatory process in order to incorporate community engagement in the planning for the working group. As a prerequisite, Baffinland will review a summary of community feedback received on mine closure to date, as well as available QIA engagement records relevant to closure. This review will help align the terms of reference, group membership, and topic identification with stakeholder priorities. While the Mine Closure Working Group is anticipated to be developed following community engagement during the Phase 2 regulatory process, the approval of the Phase 2 expansion is not a prerequisite for the formation of the working group, and it is anticipated that this working group will be in place by the end of 2019.

Baffinland expects an early priority for the Mine Closure Working Group will be to determine additional or modified reclamation research activities (Appendix D) applicable to the Project to help address identified uncertainties and determine the appropriateness of existing action levels (Section 5.2).

As the Project advances, Baffinland is committed to engagement with stakeholders regarding closure and reclamation issues. These issues include, but are not limited to:

- Appropriate closure and reclamation objectives and criteria based on desired future land use (aesthetics and values) of Project areas.
- Additional or modified reclamation research activities (Appendix D).
- Requirements to address identified uncertainties and determine the appropriateness of existing action levels (Section 5.2).
- Whether there will be any interest in maintaining the bulk fuel storage facilities and/or sealift landing areas for use by the local community assuming responsibility for the operation and maintenance of the facilities would be transferred to the local interested party.
- Transfer of responsibility of the Tote Road water crossings to the local community and if the Tote Road will be left completely intact assuming road operation and maintenance responsibility would

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then be transferred to another party. Implications for liability will need to be discussed with QIA in advance of this transfer.

- Transfer of responsibility of airstrip (including airstrip lighting) to the local community assuming the airstrip is left intact and operation and maintenance responsibility would then be transferred to another party. Implications for liability will need to be discussed with QIA in advance of this transfer.
- Whether there will be any interest in transfer of salvageable materials and buildings for local community use assuming responsibility would be transferred to another party.

Baffinland anticipates relying on the Mine Closure Working Group to best facilitate stakeholder engagement related to the Mary River Project and incorporate considerations for post-closure land use of the Project site. Stakeholder comments and Baffinland responses related to closure and reclamation are found in Appendix E.

2.5 Regulatory Instruments for Closure and Reclamation

Baffinland is committed to, and will be responsible for, carrying out the closure and rehabilitation measures in a phased, ongoing (progressive) manner as reviewed and agreed with the Landlord, regulatory agencies and impacted communities.

This current revision of the ICRP has been developed as per the Type "A" Water License 2AM-MRY1325 - Amendment No. 1 Part J, Item 2, in accordance with the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/AANDC, 2013)*; and the *Abandonment and Reclamation Policy for Inuit Owned Lands* (the Qikiqtani Inuit Association-Version 3.0).

Relevant policies, guidelines, and associated regulations that Baffinland will adhere to in the development of this and future revisions to the ICRP are outlined in Table 2.1, below.

Table 2.1: Applicable Mine Closure Planning Policies, Guidelines, And Lease Requirements

Title/Year/Agency
Project Certificate No.005 (with associated amendment), 2014, NIRB
Type A Water Licence 2AM-MRY1325 (2013) and Amendment No. 1 (2015), NWB
Commercial Lease No.: Q13C301, 2013, QIA
AANDC Land Lease 47H/16-1-2, 2014, AANDC
Guidelines for the Preparation of an Environmental Impact Statement for Baffinland Iron Mines Corporation's Mary River Project (NIRB File No. 08MN053), 2009, NIRB
Abandonment and Reclamation Policy for Inuit Owned Lands, Qikiqtani Inuit Association, Version 3.0. 2013, 2013, QIA
Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, 2013, MVWLB/AANDC
Mine Site Reclamation Policy for Nunavut, 2002, AANDC

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Title/Year/Agency
Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories, 1990, Northwest Territories Water Board
NWT/Nunavut Mines Health and Safety Act and Regulations, 2005, Government of Nunavut

A Glossary of Terms, Acronyms and Abbreviations used throughout this document and the applicable guidelines and regulations can be found in Section 12. Refer to Section 11 for a concordance review of applicable requirements.

2.5.1 Annual Security Review

On an annual basis, in order to account for interim closure and reclamation security adjustments to reflect project development phases until such a time planned closure commences, an updated determination of Project closure and reclamation security is captured through the Annual Security Review (ASR) process should Baffinland not be able to reach its planned closure phase. The ASR process is conducted in accordance with Schedule C of Type "A" Water License 2AM-MRY1325 and Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the Landlord and includes consultation with landowners and other key stakeholders.

2.5.2 Project Updates and Reporting

Since 2007, Baffinland has provided annual reports to the Nunavut Impact Review Board (NIRB) summarizing the site work completed, and the work planned for the following year for the activities previously screened and approved by NIRB. These reports also provide a synopsis of compliance performance with explorations licences, permits, approvals and commitments, and include the results of monitoring activities. An update on the existing environmental conditions and progressive reclamation activities are also contained in these reports. The reports are publicly available through NIRB (http://www.nirb.ca/) and results of the monitoring activities described in these annual reports which have an impact or influence on the goals, objectives, criteria, or strategy of the ICRP will be considered in future revisions of the ICRP.

Appendix C provides site photographs of current conditions onsite.

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3 PROJECT ENVIRONMENT

A summary description of the atmospheric, bio-physical terrestrial and socio-economic environments at the Project site locations are outlined in the following sections. A comprehensive description of the baseline social, physical, biological and chemical conditions at the Project Location and impact area, with supporting documentation, are presented in Volumes 4 to 8 of the Mary River Project Final Environmental Impact statement (FEIS), and the ERP (Baffinland, 2013), available through the NIRB website (http://www.nirb.ca/), as follows:

- Volume 4: Human Environment
- Volume 5: Atmospheric Environment
- Volume 6: Terrestrial Environment
- Volume 7: Freshwater Environment
- Volume 8: Marine Environment

3.1 ATMOSPHERIC ENVIRONMENT

3.1.1 CLIMATE

The Project is situated in the Northern Arctic Ecozone. The climate is semi-arid and permafrost coverage is continuous to a depth of 500 metres, with an active layer of up to two (2) metres. Extremely cold temperatures, combined with the permafrost, result in a short period of runoff that typically occurs from June to September. All rivers and creeks, except for the very largest systems, freeze during winter. Due to the combination of low temperatures and low infiltration, vegetative cover is minimal and surface water is abundant. The region is dotted with thousands of small lakes and streams.

The region experiences near 24-hour darkness with less than two hours of twilight from November to January. During the winter months the treeless topography and fine powdery snow produce blowing snow conditions, resulting in restricted visibility. Frost-free conditions occur from late June to late August. There is continuous daylight from May to August. The months of July and August usually experience the greatest precipitation. From September to November, temperature and the number of daylight hours decrease, and by mid-October the mean daily temperature is generally well below 0°C. The highest snowfall typically occurs during this period.

For additional details on the Project climate conditions refer to Mary River Project FEIS, February 2012, Volume 5, Section 1.

A meteorological baseline report is included in the Mary River FEIS, Appendix 5A, Section 1.1 summarizes the collection of baseline meteorological data at each Project site and incorporates long-term meteorological data from regional Environment Canada (EC) stations. Figure 1 in Appendix 5A Meteorological Report and Meteorological Instrument Report, Volume 5 of the Mary River Project FEIS

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shows the regional and project specific meteorological station locations used to complete the climatic assessment to support the development of the Mary River Project.

At present meteorological data at the Project sites is continuously being collected internally. Baffinland are required under their Project Certificate to report on Climate change and provide weather information publicly on Baffinland website.

3.1.1.1 Air Temperature

The baseline meteorological report and meteorological instrument report provided in the Mary River FEIS, Volume 5, Appendix 5A, specifically Section 1.3 provides an overview of the mean monthly, annual, and expected project air temperature conditions. Figure 4 in Appendix 5A - Meteorological Report and Meteorological Instrument Report, Volume 5 of the Mary River Project FEIS shows the monthly mean average temperatures for the years 2005 to 2008 for both Environment Canada (EC) and Baffinland meteorological stations. EC climate stations range from approximately -34°C in February at Pond Port to about 7°C in July at Igloolik. The monthly average temperatures at Nanisivik are 0.7 -7.3°C colder than at other stations during summer and fall. Temperatures at Pond Port are 1-5.6°C colder than other stations during winter months.

Data from Pond Port are most representative of temperatures at all three Baffinland stations compared to the other long-term EC stations, although there is a tendency for warmer temperatures at the Baffinland stations during summer. The Pond Port data, corrected upward by 2.4°C during summer, are assumed to be reasonably representative of baseline conditions at Mary River Project site and to provide the best source of long-term temperature information for the Project sites

3.1.1.2 Precipitation

In the Canadian Arctic, precipitation comes in the form of rain, sleet, snow, and ice crystals. The climatic assessment found in Appendix 5A of the Mary River Project FEIS provides a mean monthly and long term annual precipitation data for meteorological stations. Data indicates that precipitation has increased slightly over the entire measurement period (about 0.24 mm/year). Mean monthly precipitation at long-term ECCC climate stations range from 4 mm in February at Pond Port, Hall Beach and Nanisivik, to about 64 mm in August at Dewar Lakes. Variability in precipitation at the long-term ECCC stations ranges from about 5 mm in January to about 30 mm in August.

Total rainfall was measured at the Project site meteorological stations for months where the mean temperature was typically above 0°C which includes May to October. These months were used to compare the Project-measured precipitation data with measurements from the EC meteorological stations. Mary River had more rainfall in summer than all other Project stations, whereas rainfall in Milne Port and Steensby was mid-low range except for autumn months, when they were higher than at all other stations. Based on a comparison of the monthly trends, it appears that the data from Hall Beach are most representative of rainfall in Mary River, and data from Pond Port and Igloolik are most representative of rainfall from Milne Port and Steensby, respectively.

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Data from the EC Hall Beach meteorological station was assumed to be reasonably representative of baseline rainfall conditions at the Mary River Project site and to provide the best source of long-term precipitation information. Likewise, an average of precipitation data from Pond Port and Igloolik meteorological stations were assumed to be reasonably representative of baseline conditions at both Milne Port and Steensby Port. Additional details are provided in Section 1.4, Appendix 5A, Volume 5 of the Mary River Project FEIS.

3.1.2 Air Quality

The Project is in a remote location with no existing local sources of air pollutants other than the Project which introduces new, local sources of air contaminants such as particulate matter (TSP, PM_{10}, and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), and carbon monoxide (CO) to the Project area.

In order to identify air quality baseline conditions, Baffinland did some ambient monitoring to assess the background air quality in the areas where project activities would occur. The monitoring results were supplemented with long term ambient air quality data that exists for other monitoring stations in the north. Parameters monitored for include:

- Total suspended particulate (TSP)
- Inhalable particulate matter (PM_{10})
- Total particulate deposition (dustfall)
- Sulphur dioxide (SO_2)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Dust deposition
- Metals deposition

Baffinland's 2007 baseline ambient air quality monitoring program had two components: an active and a passive monitoring program:

Active Monitoring Program: Measured ambient concentrations of TSP. Samples were collected simultaneously from two locations near the Mine Site over 72 hours using battery-powered Airmetrics "MiniVol" samplers. Sampling time was increased from 24 hours to ensure adequate capture of particulate and to increase the accuracy of the measurements, as low particulate levels were anticipated. A Dust Track monitored particulate matter with aerodynamic diameters less than 10 µm (i.e., PM_{10}).

Passive Sampling Program: Collection of SO_2, NO_2, and O_3 samples simultaneously at two different locations near the Mine Site. Passive monitors (duplicate monitors for each contaminant) were installed at each location for 49 days. This program also involved collection of particulate deposition (dustfall), including metals at the same locations also over the same period. Section 2, Volume 5 of the Mary River

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Project FEIS, February 2012, identifies existing air quality conditions in the project area and describes potential effects of the Project on air quality.

Summary tables below were extracted from Tables 5-2.1, 5-2.2 and 5-3.3, Section 2.2, Volume 5 of the Mary River Project FEIS provide the baseline air quality conditions for the Project. Additional details on the air quality monitoring program and baseline conditions refer to the Baseline Air Quality Report Appendix 5C-1 of the Mary River Project FEIS.

Table 3.1: Measured Baseline Concentrations

Parameter	Baseline Concentration ($\mu g/m^3$)
24-hour TSP	7.0
24-hour PM_{10}	3.8
30-day SO_2	0.262
30-day NO_2	0.188
30-day O_3	52.8

Table 3.2: Baseline Dustfull Deposition Rates

Parameter	Baseline Deposition Rate ($mg/100cm^2/30$-day)
Total Dustfall	0.398

Table 3.3: Baseline Metal Deposition Rates for Select Metals

Parameter	Baseline Deposition Rate ($\mu g/100cm^2/30$-day)
Al	26.9
Co	0.5
Cr	0.3
Fe	30.6
Mg	23.9
Mn	1.7

Source: Tables 5-2.1, 5-2.2 and 5-2.3, Section 2.2, Mary River FEIS Volume 5

Air quality monitoring conducted since project operation in 2014 has included ambient air quality monitoring of gaseous emissions at the Mine Site and Milne Port, and dust fall monitoring along the Tote Road, at Mine Site and Milne Port. Ambient air quality results to date have indicated that NO_2 and SO_2 continue to meet ambient air quality standards. Dust fall at the Mine Site has generally been within predicted levels; however, at Milne Port dust fall has exceeded predictions near the ore stock piles and near the camp where dust is generated by both traffic and the nearby ore piles. Along the Tote Road, within 30 m and one kilometre on either side of the road, dust fall has shown an increase over predictions. However, outside the one kilometre range the dust fall deposition rates decreased to just at or below laboratory detection limits, which is within predicted levels.

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3.1.3 Noise and Vibration

A detailed noise baseline assessment was conducted in 2007 and provided as Appendix 5D-1 of the Mary River Project FEIS, February 2012. The basic procedure to establish baseline noise levels consisted of:

- Conducting measurements and recording sound levels at Milne Port, the Mine Site, and Steensby Port.
- Validating the data based on the recordings and weather information.
- Calculating the resulting validated sound level data.

Background atmospheric noise levels in remote areas are typically low, ranging from about 25 to 40 dBA, similar to those measured for the Mine Site, Steensby Inlet and Milne Inlet. Table 3.4 below which is a replica of Table 5-3.1 from Volume 5 of the Mary River Project FEIS shows the measured ambient noise values for each site. At these levels, noise would be described as faint.

Table 3.4: Baseline Noise Monitoring Results

Site	L_{eq} (24 h) (dBA)	L_{eq} (Day, 15h) (dBA)	L_{eq} (Night, 9h) (dBA)	Minimum L_{eq} (1 h) (dBA)	Maximum L_{eq} (1 h) (dBA)
Mary River	25	25	26	20	34
Steensby Inlet	29	31	26	23	35
Milne Inlet	30	31	29	21	35

Source: Mary River FEIS, Appendix 5, Table 5-3.1

3.2 Physical (Terrestrial) Environment

Superficial landforms and deposits in the Mary River Project area are associated with widespread glaciation on Baffin Island. Surface geology consists of locally abundant sediment deposits from glaciers and rivers. Occasional outcrops of granitic and sedimentary rock formations occur. The North Baffin region containing the Mary River area lies within the Committee Belt, a granite-greenstone terrain mixed with sedimentary and volcanic rock. The mountains to the east are older than 540 million years old, and the lowland plateaus to the west are about 250 to 540 million years old.

3.2.1 Topography

Topography varies considerably across the Project area. The shoreline of Milne Inlet in the northern part of the Project area is situated on a relatively broad, deep and flat sand beach. Milne Inlet itself is enclosed by steep fiord walls measuring 60–600 m above sea level (asl). Moving inland, the Milne Inlet Tote Road follows the Phillip's Creek valley that starts near sea level at Milne Inlet and rises to 188 m asl at the Mine Site. The Phillip's Creek valley is confined by hills or mountains on both sides. West of the Phillip's Creek Valley is mountainous terrain with some occurrence of glaciers.

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At the Mine Site, Nulujaak (Deposit No. 1) rises quickly to 679 m asl from the fairly flat and sandy outwash plain where the exploration camp is currently located. Nulujaak is a landmark for Inuit travelling on the land and is part of a ridge trending approximately north–south. The land to the west is equally mountainous with some minor coverage of glaciers. East of Deposit No. 1 the land is somewhat rolling with several elevated plateaus formed by horizontal sedimentary deposits. South of Mary River the undulating outwash plains end near the Ravn River. South of the Ravn River the land is quite flat and poorly drained and begins to drop steeply toward the Cockburn Lake valley, which is bounded by steep cliffs that range from 360–380 m asl. The land south of Cockburn Lake to Steensby Inlet becomes flatter with mainly undulating bedrock and boulder landforms. Figure 6-2.1 - Relief Map of the Northern Baffin Region, found in Section 2.1.1.1. Volume 6 of the Mary River Project FEIS shows the relief across North Baffin Island, and the topography as it relates to Project features starting in the north at Milne Inlet and extending towards Steensby Port in the south.

Additional details on topography can be found in Section 2.1.1.1, Volume 6 of the Mary River FEIS, February 2012.

3.2.2 Permafrost

The Project is located in a zone of continuous permafrost which can extend to depths of several hundred metres. Cryosolic soils (i.e., those affected by permafrost-related processes) predominate. The active layer through the Project area typically ranges from approximately 1 to 2 m but may be greater in areas where there is loose, sandy soil at the edges of lakes or ponds and less in areas with a substantial surface layer of wet organics. Unfrozen taliks can exist within areas of continuous permafrost below lakes, under large rivers or near the coast.

Permafrost thickness in and around the RSA is considered to be deep, typically in the 400–700 m depth range. In 2007, a 400 m thermistor installed into Deposit No. 1 showed that the depth to permafrost is predicted to extend to 610 m at this location which is well below the planned depth of mining.

Between 2006 and 2008 more than fifty ground temperature monitoring instruments (thermistor cables) were installed and sporadically monitored to determine typical ground temperatures in the overburden soils and bedrock across the RSA. Many were installed to depths sufficient to define the typical stable temperatures in the permafrost soils below the depth of zero annual amplitude. The depth of zero annual amplitude in temperature fluctuation appears to exist at depths of between 10 and 15 m in the valleys. At that depth, the “typical” permafrost temperature is roughly -10°C. Details on permafrost are described in Section 2.1.1.4, Volume 6, of the Mary River Project FEIS.

3.2.3 Surficial and Bedrock Geology

The surficial geology of the area generally consists of locally abundant Holocene glacio-lacustrine sediments, alluvial sediments (alluvial deposits), marine and glacio-marine deltaic sediments and end moraine till, with occasional outcrops of pre-Quaternary bedrock and sedimentary rock formations. Figure

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6-2-2 - Surficial Geology in the Regional Study Area (RSA) in Volume 6 of the Mary River FEIS shows the surficial geology of the Project area.

The following sections provide some more specific observations associated with the surficial geology at some of the proposed and existing project infrastructure locations/sites.

Mine Site - The Project is located in a glaciofluvial outwash deposit in what appears to be a classic U-shaped valley. There are some direct glacial deposits consisting of kames, moraines and eskers in and around the southeastern portion of Sheardown Lake. The outwash valley is essentially a relatively flat plane with very little local relief, the primary exceptions being along water bodies, esker deposits and adjacent to valley edges. Valley walls are generally steep and abrupt, often with distinct terraces.

Northern Transportation Corridor - The Northern Transportation Corridor alignment (along the Tote Road) generally follows a glacial valley-oriented northwest-southeast to the Mine Site. The surficial deposits along this alignment include till veneer or blankets on the higher elevations with some drumlins and moraines. Glaciofluvial outwash sediments (gravel and sand) forming braided floodplains, terraces and fans or stratified glacial drift (gravel and sand) are typically found in the valley floors. Limited bedrock exposure is present along the Tote Road.

Milne Port - The dominant landforms in the Milne Inlet area are typically a result of glacial activity, marine and mechanical forms in various degrees. Glacial activity is not overly apparent on the immediate Port site but is more pronounced in the higher elevations south of the site. Marine and mechanical features are most predominant with terraces and strand (beach) lines formed by marine action which have been cut by mechanical features, some of which may be attributed to permafrost. Wind appears to have been responsible for some drifting on the finer grained soils on the lower part of the site. Recently deposited colluvium is present on many of the slopes and side hills in the area. The action of surface water has produced numerous sharp gullies along water-ways. Marine clays were also noted at some locations at the site.

Southern Transportation Corridor - The topography of the Southern Transportation Corridor from the mine site to the Steensby Port is generally quite hilly, with the exception of the Ravn River area which is relatively flat. Glaciated valleys are evident along a significant portion of the alignment. The surficial geology of the corridor is also characterized by the relatively recent glacial activity of Baffin Island. Surficial geology consists of several types of deposits including glacio-lacustrine sediments, alluvial sediments (alluvial deposits), end moraine till, and till veneers and blankets. Occasional outcrops of pre-Quaternary bedrock and sedimentary rock formations are also common along the southern section of the RSA.

Steensby Port - Near surface bedrock is dominant in the Steensby Port area. Limited overburden is in the form of marine sediments and localized deposits of till. The majority of the overburden is located in depressions bet

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For additional details on site specific baseline conditions refer to Section 2.1.1.2 Surficial Geology, Volume 6 of the Mary River Project FEIS.

3.2.3.1 Surficial Soils Composition

A soils evaluation was carried out in 2007 and 2008 by an Arctic soils specialist (Veldhuis, 2010). Regionally, soil formation is controlled and limited by year-round low soil temperatures, low precipitation rates and near-surface permafrost. Soil formation occurs in the thin layer overlying the permafrost that is subject to seasonal thawing, known as the active layer. The thickness of the active layer varies substantially across the region with topography, depth to bedrock, and vegetative or water cover but is typically between 1 to 2 m thick in the Project area depending on the local soil cover. In locations where well drained, dry sand and gravels are present, thaw depth can extend to 2 to 4 m depth.

3.2.3.2 Bedrock Geology

The baseline information available on bedrock geology in the Project area is based on field geological exploration programs conducted by Baffinland geologists from 2004 to 2008 and summarized by Aker Kvaerner (2008).

The North Baffin Island region and Mary River area lie within the Committee Belt, a granite-greenstone terrane mixed with rift basin sediments and volcanic rocks. The belt lies within the Churchill Province, extending from Baker Lake to Greenland, and is divided into five main assemblages: the Archean, the Mary River Group, the Piling Group, the Bylot Supergroup, and the Turner Cliffs-Ship Formation.

The Mary River iron deposits are located within the Mary River Group, an assemblage of Late-Archean (2.76 to 2.72 Ga) metasedimentary to metavolcanic rocks that have been folded and preserved in greenstone belts. The Mary River Group greenstone belts are present as fragmented remnants stretching from Bylot Island south to Eqe Bay. Refer to Figure 6-2.5 – Bedrock Geology in the RSA shown in Volume 6 of the Mary River Project FEIS, Primary sequences within the Group consist of a lower series of metavolcanic rocks and an upper series of turbidite pelitic-greywacke; the stratigraphic position of iron formation, quartzite, conglomerate, minor marble, and volcanic breccia units within the belts, which varies across the region. The Mary River Group is part of the regional Committee Belt, an Archean-aged (2.9 to 2.5 Ga) assemblage of granite-greenstone terranes, granitic migmatites gneissic granitic intrusions, and clastic and carbonate sedimentary units reworked during the Paleo-Proterozoic (2.5 to 1.6 Ga). For additional details on site specific baseline conditions refer to Section 2.1.2, Volume 6 of the Mary River Project FEIS.

3.2.4 Hydrology and Drainage

Groundwater flow in the Local Study Area (LSA) consists of seepage through unconsolidated materials within the active layer, which typically ranges from 1 to 2 m (up to 3 m) below surface. This groundwater reports to local surface drainages and lakes. The long period of sub-zero temperatures results in a very short runoff season, typically occurring from June through September. Runoff may extend to late October

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in systems with large lake components. A Baseline Hydrology Report for the Project is found in Appendix 7A, Volume 7 of the Mary River FEIS.

The key findings within the Baseline Hydrology Report pertain to four main hydrometric parameters: timing of runoff, magnitude of runoff, spatial variability of timing and magnitude of runoff, and long-term runoff estimates. Runoff in the vicinity of the Mary River Project are characterised as follows:

- Streamflow typically commences in early to mid-June as temperatures climb above 0°C, and ends in late September to late October, depending upon watershed characteristics.
- The annual hydrograph is dominated by a nival (snowmelt) freshet, which occurs between late June and the end of July, followed by a period of low baseflows driven by permafrost melt and shallow subsurface flow. Baseflows are punctuated by precipitation events through July to early September.
- Precipitation runoff events are usually quite large and flows increase rapidly as interception, infiltration, and evapotranspiration are minimal due to shallow permafrost, cool temperatures and lack of vegetative cover.

The drainage pathways for the Mary River Project are defined by catchments as shown in the following figures in from Volume 7 of the Mary River Project FEIS. Additional details on drainage can be found in Section 2.0 of Volume 7 of the Mary River Project FEIS.

- Figure 7-1.1 – Freshwater Regional Study Area
- Figure 7-1.2 – Milne Port Local Study Area and Milne Tote Road Local Study Area
- Figure 7-1.3 – Mine Site Local Study Area
- Figure 7-1.4 – Railway Corridor Local Study Area and Steensby Port Local Study Area

3.3 Chemical Environment

3.3.1 Surficial Soil Chemistry

Project area soils were classified based on the Canadian System of Soil Classification (National Research Council, 1998), and included primarily Cryosols (permanently frozen soils or soils with permafrost within 100–200 cm of soil surface) and Brunisols (soils with weak B horizon development). In general, Project-area soils all showed weakly developed horizons, with a general lack of organic material accumulation. Fine to medium-textured soil materials were generally cryoturbated, and patterned ground phenomena related to permafrost and freeze-thaw cycling were also commonly observed throughout the RSA. Soils throughout the RSA were generally poor in nutrients (Table 3.5). This factor, in combination with the depressed level of pedogenic development in the area and thinness of soils where present, generally make local soils unsuitable for stockpiling for revegetation purposes (Veldhuis 2010). For further information regarding surficial soils composition, see Section 2.1.1.3, Volume 6, of the Mary River Project FEIS.

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Table 3.5: Total Amounts of Organic Matter And Primary Nutrients In Soils in the Project Area

Parameter	Concentration Range per Horizon, %			
	B Horizon (sandy)	C Horizon (sandy)	B and C Horizons (loamy)	A Horizon
Organic Matter	0.83 (0.17 - 2.21)	0.34 (0.17 - 0.51)	2.81 (0.17 - 5.44)	13.72 (2.38 - 26.00)
Nitrogen	0.04 (0.02 - 0.08)	0.03 (0.02 - 0.04)	0.15 (0.012 - 0.36)	0.93 (0.09 - 1.14)
Phosphorous	0.03 (0.01 - 0.09)	0.07 (0.04 - 0.11)	0.04 (0.02 - 0.10)	0.06 (0.06 - 0.11)
Potassium	0.13 (0.05 - 0.36)	0.15 (0.09 - 0.25)	0.47 (0.16 - 0.69)	0.08 (0.06 - 0.11)
Sulphur	< 0.01	< 0.01	0.02 (0.01 - 0.05)	0.06 (0.01 - 0.10)

NOTE(S):
1. FROM VELDHUIS 2010.

3.3.2 Surface Water and Sediment Quality

Freshwater quality measurements in the Mary River area indicate naturally elevated concentrations of dissolved oxygen, turbidity, aluminium, and iron. Some average values for pH, as well as cadmium and mercury in fresh water are greater than levels recommended by the guidelines of Canadian Council of Ministers of the Environment.

A baseline water quality program was carried out over the period of 2005 through 2008 which included up to 74 surface water sampling sites distributed throughout the study area. Three lakes in the vicinity of the Mine Site with the potential to be affected by Project-related components and activities were sampled in 2006 through 2007: Camp Lake, Sheardown Lake and Mary Lake. In 2008, lake water sampling extended to the Steensby Inlet area, the Rail Camp area, and the current railway alignment. A follow-up water and sediment quality monitoring program was carried out in summer 2011 to update the dataset and to obtain water and sediment quality data from candidate long-term water monitoring locations. Sediment samples were collected from various lake, stream, and river locations. The complete water and sediment quality baseline data are provided in the Surface Water and Sediment Baseline Report found in Appendix 7B-1, Volume 7 of the Mary River FEIS.

Volume 7 of the Mary River FEIS, February 2012 discusses impacts to the Freshwater Environment, including impacts on water quantity, quality and fish habitat. Sections 1 and 2 of Volume 7 describe the baseline hydrologic conditions, potential impacts and mitigation measures and residual effects of activities on the hydrologic system in the Project area. Sections 3 and 4 of Volume 7 include similar content related to water quality and aquatic biota and habitat, respectively.

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Water quality monitoring of the mine has demonstrated general compliance with required discharge limits and have not identified project-related effects on water quality in potentially affected waterbodies. Baffinland has generally been in compliance with the discharge limits specified in its Type A Water Licence, with two exceptions, where immediate corrective action was undertaken. Aquatic Effects Monitoring Program monitoring to date has not identified a significant mine-related effect to the nearby aquatic environment. To date, monitoring under the Environmental Effects Monitoring (EEM) Program under Metal and Mining Effluent Regulations (MDMER, formerly the Metal Mining Effluent Regulations) has demonstrated compliance with MDMER requirements (Baffinland, 2017c).

3.3.3 GEOCHEMISTRY

Deposit No.1 occurs at the nose of a syncline plunging steeply to the north-east (Aker Kvaerner, 2008). The iron formation occupies the nose and two limbs of this feature with a -1,300 m long northern portion and a – 700 m long southern portion. For the LOM characterization, waste rock was subdivided based on broad geo-structural categories about the iron ore zone, mainly by hanging wall and footwall zones.

- The iron ore deposits at the Mary River project represent high-grade examples of Algoma-type iron formation and are composed of hematite, magnetite and mixed hematite-magnetite-specular hematite varieties of ore (Aker Kvaerner 2008). The iron deposits consist of a number of lensoidal bodies that vary in their proportions of the main iron oxide minerals and impurity content of sulphur and silica in the ore. The massive hematite ore is the highest grade ore and also has the fewest impurities, which may indicate it was derived from relatively pure magnetite orthat chert, quartzite and sulphides were leached and oxidized during alteration of the iron formation.
- The footwall to the iron formation mainly consists of gneiss with minor schist, psammitic gneiss (psammite) and amphibolite. The footwall mainly consists of quartz-feldspar-mica gneiss with lesser meta-sediment (greywacke) and quartz-mica schist. Microcline and albite are the predominant feldspars within the gneiss and biotite is generally more abundant than muscovite.
- The hanging wall is primarily composed of schist and volcanic tuft with lesser amphibolite and metasediment. The hanging wall primarily encompasses chlorite--actinolite schist and garnetiferous amphibolites. Metavolcanic tuftis also a significant lithology identified in the hanging wall.

Metal leaching and acid rock drainage (ML/ARD) characterization studies in support of the LOM pit waste rock are provided in the report entitled "Mine Rock ML/ARD Characterization Report Deposit 1, Mary River Project", March 2014 as appended to the LOM Waste Rock Management Plan. Additional investigations have been completed specifically for the 5-year open pit and in response to observed acidic conditions within the current waste rock pile (AMEC, 2014 and AMEC, 2017).

A total of 776 Acid-base Accounting (ABA) samples and 376 minerology samples were selected to provide representative samples of the waste rock categories and broad spatial coverage of non-ore mine rock in the vicinity of the LOM open pit development. All 776 ABA samples were analyzed for modified Sobek acid base accounting (ABA), NAG, pH, and elemental content. Subsets of drill core samples were also analyzed

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for downhole variability, NAG leachate, short-term metal leaching, whole rock elemental content, detailed mineralogical analysis, and long-term kinetic testing.

Results of ABA testing from the Life of Mine (LOM) characterization determined that waste rock is generally characterized as having low neutralization potentials (NP) and low acid potentials (AP). Data suggests that the waste rock is dominated by noncarbonate sources of NP (e.g. silicates) with lesser NP derived from carbonate sources. Sulphide was the primary form of sulphur; however, further review of the geochemical database notes that sulphates may also contribute to total sulphur contents.

- Approximately 85% of waste rock samples had neutralization potential ratios (NPR) greater than 2 and are classified as non-potentially acid generating (Non-PAG) and are unlikely to generate acidic drainage.
- Approximately 10% of the samples had NPR values of less than 1.
- Approximately 5% of the samples were classified as having uncertain acid generating potential ($1 < NPR < 2$).

Extrapolating these results to the project waste rock model, indicates that approximately 11% of the LOM in-pit waste rock is expected to have NPR <2 and is considered potentially acid generating (PAG). Proximity to ore appears to correlate to increased PAG quantities (defined as NPR <2) with the hanging wall schist (HWS) and footwall schist (FWS) zones identified with the greatest proportion of PAG of the major waste units. The proportion of LOM PAG waste rock was estimated to be 14% as part of the baseline studies and FEIS, representing a larger proportion than current projections.

Ten (10) waste rock samples were run in humidity cells for 53 weeks in 2008 and 2009. A further 17 waste rock samples were initiated in humidity cell tests in May 2011 for between 109 and 120 weeks of reported data. Nine (9) of these samples were standard humidity cells and eight (8) were NP depleted humidity cells designed to assess drainage quality in the absence of carbonate NP.

The pH of most cells was in the range of 5.5 to 7 throughout testing. Of the 17 cells in operation since 2011, three cells exhibited slowly declining pH throughout testing reaching a minimum measured weakly acidic pH of between 4.5 and 5 after approximately two (2) years of operation (under laboratory conditions). Selected humidity cell tests are planned to continue. Kinetic testing results and cold climate conditions at site suggest the lag time to acid on-set in PAG rock would be on the order of five (5) years or longer.

Total sulphide content of samples is weakly correlated with sulphate release rates; however, through the current periods of testing metal release rates and trends vary among the cells. Though metal release rates are generally low in most cells, release rates are the highest in the lower pH humidity cells with notable release rates for cadmium, cobalt, copper, nickel, lead and zinc in two (2) cells which also contain near worst case solid concentrations for these metals in Deposit 1 mine rock.

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Water quality of the Waste Rock Stockpile runoff and discharge from the Waste Rock Stockpile pond(s) will be used as key environmental performance indicators. Conductivity, pH and sulphate will be used as early-warning indicators to identify potential acid generation in the pile. Ammonia and nitrate will be monitored to inform the effects of remaining explosive residue on the water quality of WRF runoff.

Water quality of effluent discharges from the waste rock surface water management pond(s) will be compared to the water quality criteria outlined in the Type A Water Licence and MDMER and used to inform and implement adaptive management actions as required.

3.4 Biological Environment

3.4.1 Vegetation

Existing knowledge of the North Baffin region with respect to vegetation describes the area as having a harsh climate, high winds and shallow soils result in sparse and dwarfed plant life. Herb- and lichen-dominated communities constitute the main vegetative cover. The latter is closely associated with the rock fields and hilly upland areas. Common herbs are purple saxifrage, mountain avens, and arctic poppy, often mixed with shrubs such as arctic willow. The size of shrubs decreases rapidly as one moves north. Vegetative cover tends to be greater on wetter sites confined to coastal lowlands, sheltered valleys and moist nutrient-rich corridors along streams and rivers. Baseline studies of the Mary River Project area were conducted during each of the summers of 2005 through 2008. A total of 833 plots were surveyed across the terrestrial RSA, focusing mainly on the Potential Development Areas (PDA). A total of 155 vascular plant species were recorded, a vegetation classification system was developed, and a species list was compiled. In addition to vegetation surveys, there was particular emphasis on establishing baseline levels of different metals and elements of the area prior to project development. Results for of the Vegetation Baseline Report for the project, including selected metals in plant species foliage are summarized and detailed in the Vegetation Baseline Report, Appendix 6C, Volume 6 of the Mary River Project FEIS, February 2012. Figure 2 –Terrestrial Regional Study Area showing Vegetation plot locations found in Appendix 6C of the Mary River FEIS shows the vegetation plot locations in the regional study area.

The vegetation abundance monitoring program to date has indicated no evidence of changes in vegetation abundance in the Project area from 2014 to 2017 as a result of the Project. There is annual variation in the cover of some plant groups in the Project area; however, these differences were found across all plots; therefore, the variation is attributed to natural variation in plant group cover and there is no evidence to support a Project-related effect in the first three (3) years of monitoring. Metals analysis of soil and vegetation was conducted from 2012 to 2016; all results have been within the expected range and below Project-specific thresholds, following the resampling of two stations in 2017 that were confirmed to be outliers.

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3.4.2 AQUATIC WILDLIFE

A freshwater aquatic baseline study was completed for the Project from 2005 and 2011. The results of this report are presented in Appendix 7C, Volume 7 of the Mary River FEIS, February 2012 and summarized at a high level in the sections below.

There are two key fish species in the freshwater environment: Arctic char (*Salvelinus alpinus*) and a minnow species named nine-spine stickleback (*Pungitius pungitius*). While both are generally abundant and widespread in distribution, ninespine stickleback are absent from the freshwater lakes and streams that were surveyed near the Milne Inlet coast. As all streams with the possible exception of large rivers freeze solid in winter, lakes provide the only overwintering habitat for both species and spawning habitat for Arctic char across the study areas. Many streams provide rearing and foraging habitat and potential protection from predators for juvenile Arctic char. Most of the drainage basins that support Arctic char either contain barriers preventing anadromous migrations and/or are distant from the coast and most populations in the five study areas are land-locked. Nearshore zones of larger lakes also provide rearing and foraging habitat and potential protection from predators for juvenile Arctic char, foraging and, in some cases, spawning habitat for adult Arctic char, and overwintering habitat for all life stages. Arctic char feed primarily on benthic invertebrates, although cannibalism occurs in a small proportion of at least some populations.

Mercury concentrations in Arctic char muscle exceeded guidelines for human consumption in some fish captured in the Mine Area, although concentrations were similar to those reported for other landlocked Arctic char populations. In general, the lower trophic level communities are similar to other areas of the Canadian Arctic. As is typical of Arctic ecosystems, the freshwater environment is relatively nutrient-poor and primary productivity is relatively low. In general, Arctic freshwater ecosystems are characterized by relatively low diversity of zooplankton communities due to low temperatures and nutrients; results of the baseline studies for Mine Area lakes are consistent with this generalization. The benthic invertebrate communities in the Mine Area are generally moderately diverse, although higher diversity is found in some small tributaries, and are dominated by chironomids.

Figures 7-4.2, 7-4.4, and 7-4.8 (FEIS Section 4.5) show the distribution of Arctic char in fresh water at the project sites.

Monitoring results to 2017 has identified impacts within the FEIS predictions, where FEIS predictions are exceeded, adaptive management is being applied to mitigate observed effects. At the Mine Site, while lake sedimentation rates in Sheardown Lake NW in 2016 and 2017 were greater than baseline, they remained within the range predicted in the FEIS, and monitoring of the biological communities (i.e., phytoplankton, benthic macroinvertebrates, and Arctic Char) conducted during the first three years of operation (2015-2017) indicated that there were no adverse mine-related influences on the biota of the Mine Site waterbodies and watercourses (Minnow Environmental Inc. 2016, 2017). Some issues regarding fish passage and condition of stream crossings along the Tote Road have been noted in the annual surveys conducted since 2009; as a result, Baffinland has implemented various mitigation measures to correct

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issues identified and will apply experience gained and lessons learned to the planning and design of the proposed North Railway watercourse crossings.

3.4.3 Terrestrial Wildlife

Terrestrial wildlife on north Baffin Island (described in the Mary River Project FEIS, Volume 6, Appendix 6F - Terrestrial Wildlife Baseline Report) includes caribou, wolves, foxes, Arctic hares, ermine, and small mammals. Terrestrial wildlife, caribou in particular, are an important part of the Inuit culture and are an important component of a subsistence lifestyle. Occurrence of most wildlife species on north Baffin Island is relatively sparse.

3.4.3.1 Caribou

A key terrestrial wildlife species (to both humans and within the broader ecology) is the North Baffin Island caribou. They currently occur in low densities and their abundance seems to be cyclical – harvest data and Inuit Qaujimajatuqangit (IQ – Inuit Knowledge) suggests a roughly 60- to 70-year cycle of abundance. The cyclical pattern of caribou abundance is similar to patterns described on Greenland and south Baffin Island. The cause of these changes in abundance is currently unknown. The last period of caribou abundance in the regional study area (RSA) was 1980 to 2000. According to IQ, and trail orientation and abundance, movement will predominantly be east-west and will occur within the southern half of the RSA Caribou numbers are expected to gradually increase in the Mary River Region, but might not recover to historical highs until the 2050s. There is evidence that caribou occur, and have historically occurred, throughout the entire region and, therefore, use most of the RSA as some form of habitat. The most-used habitat is in the southern and central portion of the RSA, as indicated by caribou sign (bones, antlers, tracks, and trails) and IQ. Trails observed along the proposed railway alignment suggest that some areas are better for movement. Analyses of habitat use show a greater probability of caribou occurrence for some habitats during the calving, growing, and winter seasons, but the probability of occurrence of caribou is relatively equal in many locations throughout the Project area. The caribou that currently occupy the RSA are not migratory. The local caribou on average move less than 4 km per day during all seasons with very few focused directional movements and all movements were at the scale of tens of kilometres — most caribou remained within the areas they were collared. Additional details on Caribou populations are summarized in Section 5 and Appendix 6F- Terrestrial Baseline Report of the Mary River FEIS.

The Terrestrial baseline report found in Appendix 6F of the Mary River FEIS is the most extensive and thorough summary of north Baffin Island caribou currently in existence. It summarizes and synthesizes the history of government surveys, local harvest, IQ, habitat use, and terrestrial wildlife surveys funded by Baffinland, and is one of the most in-depth analyses of caribou habitat selection completed in Nunavut.

In June 2013, a group of five caribou was observed in the PDA during height of land surveys; however, caribou have not been observed during surveys conducted between 2014 and 2017. Lack of caribou observations on site follows the trends of low numbers recorded in regional observations. Low numbers

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of incidental observations of caribou between the mine site and Milne Inlet between 2013 and 2017 also coincide with the lack of caribou observations during the height of land surveys.

3.4.3.2 MARINE AND TERRESTIAL BIRD COMMUNITES

The marine and terrestrial bird communities of north Baffin Island are described in the Bird Baseline Report found in Appendix 6E, Volume 6 of the Mary River FEIS.

Field surveys in the Project Area documented 54 bird species within the marine and terrestrial RSAs, five of them Species at Risk listed by COSEWIC (2010) or SARA (Environment Canada, SARA 2010) as identified during the time of baseline programs, including Peregrine Falcon, Short-eared Owl (documented within the terrestrial RSA but showing no signs of nesting there), and Ivory Gull, Ross's Gull and Harlequin Duck (all detected within the marine RSA, but no nesting sites were located). One additional Species at Risk, the Red Knot, has the potential to be found within the Project Area, but was not detected during baseline surveys.

Staging and breeding areas are found in the Project Area for numerous species of birds including Snow Geese, Common and King Eiders, Brant, and Long-tailed Ducks, and include a known moulting area for Snow Geese prior to fall migration. Twenty-five species were confirmed to breed throughout the marine and terrestrial study area. No large, conspicuous seabird nesting colonies were recorded during Project surveys; however, several are known to exist within and adjacent to the marine RSA, particularly on Bylot Island, in Foxe Basin, and along Hudson Strait. Marine surveys did locate a large breeding colony of Snow Geese (>5,000 individuals) on the southwestern shores of Steensby Inlet**.**

IQ surveys conducted in the surrounding communities indicated that the marine and terrestrial habitat contains several areas that are used seasonally by large numbers of various bird species. Community Elders indicated that most bird species in the area are migratory and typically arrive in late-April, May, and June, and start leaving in August. Breeding occurs throughout the area: most of the islands within the RSA are used as nesting grounds by various species of seabirds, gulls, terns and waterfowl, and some large colonies of seabirds and gulls are known along cliff habitats. Species such as geese, eiders, loons and ducks can be found nesting along coastlines or inland along freshwater lakes. Fall migration occurs between early August to late October depending on the species and the sex. Some birds, such as Common Raven, ptarmigan, and sometimes Snowy Owl, winter in the area, and some seabirds, such as Black Guillemot, also remain in the area year-round using the open shore leads in the winter.

Pre-clearing nest surveys in 2017 prior to development in expanded project footprint areas were conducted; no nests were identified within the new disturbance area. The addition of the 2017 results of the cliff-nesting raptor survey has indicated no evidence of a relationship between distance from the road/PDA and the number of birds observed. There has been no effect on cliff-nesting raptor nest occupancy rates since 2011, and distance to disturbance analysis suggests there is no negative effect on monitored raptor nesting productivity. Although annual variation in productivity for peregrine falcons and

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rough-legged hawks is apparent, it is most likely representative of natural variability associated with variation in prey availability and weather rather than due to any influence of disturbance.

3.4.3.3 Wolves and Foxes

Wolves and foxes are the dominant carnivores in the RSA and exist at low densities throughout the RSA. Very little information was collected on these midsize carnivores because they were so rarely observed. Fewer than 100 wolf and fox observations were recorded during extensive baseline surveys from 2006–2010. Information in published journal articles was supplemented with anecdotal and IQ information specific to the Project area for this baseline. Carnivore populations are tied to fluctuating prey densities (e.g., caribou and lemmings). Occurrence of carnivores might increase in the area if caribou populations return in large numbers. Additional details on midsize carnivores in the Project area can be found in Section 2.3, Appendix 6F-Terrestial Wildlife Baseline Report of the Mary River Project FEIS.

Lemming and Arctic Hare, Lemmings are a key prey species in Arctic ecosystems. Their abundance affects the behaviour, habitat use, and population dynamics of carnivores such as Arctic fox, red fox, wolf, Snowy Owls, and falcons. Lemming populations are considered Secure in Nunavut. Populations typically undergo large regular fluctuations in population size (every three to four years). Refer to Section 2.3, Appendix 6 F of the Mary River Project FEIS, February 2012 Arctic hare are a lagomorph found in treeless regions across North America and Greenland. They are restricted to mountains, tundra, and coastal barrens due to their apparent inability to use food resources in forested areas). They may occur in groups of 10–60, or up to thousands on Arctic islands the current population status of Arctic hare in Nunavut is classified as Secure by CESCC. In northern Baffin Island Arctic hare are locally abundant. Additional details on small prey mammals in Baffin Island can be found in Section 2.3, Appendix 6F-Terrestial Wildlife Baseline Report of the Mary River Project FEIS.

No caribou, wolf or other large mammal tracks were observed during snow tracking surveys conducted between 2014 and 2017; however, similar numbers of Arctic fox and Arctic hare tracks were observed throughout all survey years.

3.4.4 Marine Wildlife

The Mary River FEIS, Volume 8, Section 5.0 and Appendix 8A presents the marine baseline information for the Project area. In total twenty-two marine mammal species are known or expected to occur in the identified Regional Study Area (RSA) including the proposed shipping routes in Baffin Bay and Davis Strait. Species accounts are provided for all species; however, emphasis is placed on species which regularly occur within the Regional Study A. Only one mysticete or baleen whale species, the bowhead whale (*Balaena mysticetus*), occurs regularly in the RSA. Narwhal (*Monodon monoceros*) and beluga (*Delphinapterus leucas*) are abundant in the RSA; other Odontocetes that occur (albeit in low numbers) in the RSA include killer whales (*Orcinus orca*) and northern bottlenose whales (*Hyperoodon ampullatus*). Pinniped species which occur regularly in the RSA include ringed seal (*Pusa hispida*), bearded seal (*Erignathus barbatus*), harp seal (*Pagophilus groenlandicus*), and walrus (*Odobenus rosmarus*). Polar bears (*Ursus maritimus*) also occur throughout the RSA. For graphical representation in the RSA of which

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communities hunt which species of marine animals where, see Figure 3.8 – Land Use Information from DIAND (1982B) and Figure 3.9 – Wildlife Distribution found in Volume 4 of the Mary River Project FEIS.

Marine wildlife in the north Baffin Island (described in the Mary River Project FEIS, Volume 8, Marine Section 5) includes bowhead whale, beluga whale, narwhal, walrus, ringed seals, bearded seals, harp seals, and polar bears.

3.4.4.1 BOWHEAD WHALE

Bowhead whales occur seasonally in the RSA and are typically found alone or in small groups. Bowheads are adapted to living in areas of heavy unconsolidated ice and can navigate extensive distances under ice although they are capable of breaking up to 20 cm of ice in order to breathe. Feeding and calving usually takes place in nearshore, sheltered, shallow waters in summer. During open-water periods bowhead distribution is likely driven by the distribution of the various prey species. Bowheads are baleen whales (filter feeders), eating pelagic crustaceans as well as epibenthic invertebrates. Traditionally, bowheads have been observed feeding along the floe edge and their presence is often dependent on the tides. There are four recognized bowhead stocks, one of which (the Eastern Canada-West Greenland stock) occurs within the RSA. This stock ranges throughout the eastern and central northern Arctic and from northern Baffin Bay to Hudson Strait. Bowhead whales within Davis Strait and Baffin Bay were commercially overexploited in the early 1900's, reduced from an estimated 11,800 whales to perhaps as low as 1,000. The stock has shown a significant recovery in recent decades and may now number greater than 14,000.

Along the proposed northern shipping route, bowhead whales occur during summer and fall. They may summer along the east coast of Baffin Island, or move westward through Lancaster Sound during June and July to feed and nurse calves in inlets and sounds within the Canadian arctic archipelago. The IQ suggests that the number of bowheads using Eclipse Sound appears to be increasing in recent years. It is thought that fall migrants wintering in Davis Strait follow the east coast of Baffin Island south to wintering areas, whereas whales that winter along the west coast of Greenland may cross north Baffin Bay and then move south.

The number of bowheads within the Foxe Basin-Hudson Bay region is estimated to be over 2,000. Bowheads congregate to feed and nurse calves in spring and summer around Southampton Island, along the western Hudson Bay coast, and in a relatively small area in northern Foxe Basin between Igloolik and Fury and Hecla Strait. The IQ indicates that bowheads observed near Hall Beach in spring migrate from southern Foxe Basin. Migrations are not well documented, though most movement is thought to take place through the western and central portion of Foxe Basin and may be influenced by ice cover. During summer, this species tends to select areas of high ice cover, presumably to reduce the risk of predation by killer whales. Northern Hudson Bay, Foxe Basin, and Admiralty Inlet have been identified as summering areas, with whales moving farther into inlets and bays as the ice breaks up. In summer months, bowhead whales north of Igloolik consist primarily of juveniles and females with calves, suggesting that this location is a nursing area. Aerial surveys of the Foxe Basin area identified small numbers of bowheads in northwest Foxe Basin but not Steensby Inlet.

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Hudson Strait has been identified as a primary wintering area for bowhead whales. Bowheads begin winter migrations in October as the sea ice begins to form, heading south towards northeastern Hudson Bay and Hudson Strait. In 1981, over 1,300 bowheads were estimated in Hudson Strait and were observed during aerial surveys. Additional details on Bowhead Whales can be found in Section 5.1.5 Volume 8 of the Mary River FEIS.

3.4.4.2 BELUGA WHALE

Beluga whales have a circumpolar distribution and occur seasonally within the RSA. They are opportunistic feeders, consuming a wide array of fish and invertebrates. Mating is thought to peak prior to mid-April with calving likely occurring in offshore areas during late spring migration. A limited amount of calving may also occur near estuaries and bays that is supported by IQ indicating that Koluktoo Bay and the southern portion of Milne and Navy Board inlets may be calving areas.

Four of the seven recognized populations in Canada occur in the RSA, including the Eastern High Arctic-Baffin Bay, Western Hudson Bay, Eastern Hudson Bay population, and Ungava Bay populations. The Eastern High Arctic Baffin Bay population (estimated at >20,000) summers in the Canadian Arctic archipelago and winters in the loose pack ice of two distinct areas; along the west coast of Greenland and in the North Water Polynya in northern Baffin Bay. Beluga from the smaller population wintering in the North Water begin entering Lancaster Sound in late April or early May with peak movements occurring in late June to July depending on ice conditions. Belugas wintering off the west coast of Greenland generally occupy similar geographic areas between years. Large numbers from the Eastern High Arctic Baffin Bay population migrate past Bylot Island during spring on their way to summering areas concentrated near Somerset Island. Only a small number of animals move into areas inland of Bylot Island, ostensibly for calving and feeding. Eastward fall migrations begin in September, and are concentrated almost exclusively along the southern coast of Devon Island. Belugas were observed in Eclipse Sound, Eskimo Inlet, Koluktoo Bay, Milne Inlet, and White Bay during aerial surveys.

All four populations of beluga in the RSA are known or expected to occur along or in the vicinity of the southern shipping route. Beluga from the Eastern High Arctic Baffin Bay population enter into northern Foxe Basin during spring and remain in the general area of eastern Fury and Hecla Strait throughout the summer. These beluga typically remain in shallower waters where feeding is thought to occur.

The Western Hudson Bay and Eastern Hudson Bay populations occur in the southern shipping route waters from late October through April when the whales are in their wintering grounds, and during fall migrations from summering areas in late September and October. Beluga whales from both populations occur in the vicinity of Igloolik, Hall Beach, and likely Steensby Inlet during July to early September. The very small (possibly extirpated) Ungava Bay beluga population possibly occur year-round within the RSA. The most recent population estimate for the Western Hudson Bay population is about 57,000. The Eastern Hudson Bay population has been in decline.

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The wintering location of the Western Hudson Bay beluga population has not been confirmed but it is thought to be primarily in Hudson Strait. Spring migration to summering areas occurs during late April to May. The majority of animals likely follow the eastern coast of Hudson Bay south to the Belcher Islands, and then across through the pack ice to the Manitoba coast in late May and early June. A small number move westwards towards Southampton Island. Belugas generally remain within estuaries along the coast and in September begin a northward migration towards Southampton Island.

Based on aerial survey results, beluga whales were widespread in Steensby Inlet, Foxe Basin and Hudson Strait but abundance varied with location and month. Additional details on Beluga Whales can be found in Section 5.1.3. Volume 8 of the Mary River FEIS.

3.4.4.3 NARWHAL

Narwhals generally inhabit deep arctic waters of Baffin Bay, the eastern Canadian Arctic, and the Greenland Sea but are seldom found south of 61°. Their diet is thought to be similar to that of beluga, consisting primarily of small cod, flatfish such as Greenland halibut, squid, and other small fish and invertebrates.

Narwhals prefer coastal areas that provide deep water and protection from the wind during summer. They appear to favour deep fjords and the continental slope during winter, in areas where water depths are 1,000 to 1,500 m and marine water upwelling increases biological productivity. Narwhals are highly social animals and can be found in small numbers groups of hundreds or thousands during migration. Based largely on summer distributions, two tentative populations of narwhal occur in Canadian waters; the Hudson Bay population and the Baffin Bay population. However, narwhals are currently assessed as a single population in the eastern Arctic. Narwhals occur throughout the northern shipping route year-round but are found in the RSA primarily during the open-water period. Those that winter in Baffin Bay typically summer in the eastern Canadian Arctic, moving to summering areas in Melville Bay, Eclipse Sound, Smith Sound, and beyond Lancaster Sound. Important summering areas identified within Baffin Bay include Eclipse Sound, Inglefield Bredning, and Smith Sound-Kane Basin.

Recent estimates indicate that approximately 45,000 narwhal summer around Somerset Island, while over 27,000 inhabit waters in the Prince Regent and Gulf of Boothia area, with approximately 20,000 in the Eclipse Sound area, 10,000 in the East Baffin Island fjord areas, and 5,000 in Admiralty Inlet. Survey results from the late 1980's and early 1990's indicated that summer distribution of narwhal within Eclipse Sound, Milne Inlet, Koluktoo Bay, and Tremblay Sound is influenced by presence and distribution of ice and killer whales.

Narwhals begin to migrate out of their summering areas in groups of a few hundred to several thousand just before freeze-up begins in late September. Those summering near Somerset Island enter Baffin Bay north of Bylot Island in mid to late October. Populations summering in Pond Inlet begin migrating down the east coast of Baffin Island in late September. Narwhals generally arrive in their wintering areas in

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November. The Baffin Bay narwhal population winters at two discrete areas in the pack ice in central Baffin Bay, and in polynyas at the north end of Baffin Bay.

Narwhals were identified in aerial surveys throughout in Eclipse Sound, Milne Inlet, and Koluktoo Bay. Narwhale observed during a typical survey often numbered in the thousands. Narwhals were also frequently seen in Tremblay Sound and White Bay. Aerial surveys documented fine scale movements of large groups of narwhal between various areas of Eclipse Sound and surrounding fjords.

A much smaller number of narwhal inhabit waters along the southern shipping route. The Hudson Bay population was estimated to be almost 2,000 in the year 2000, though it may be as many as 3,500 during summer months. The timing and routes of migration used by the Hudson Bay narwhal population are less understood than those of the Baffin Bay population. This population is thought to winter in eastern Hudson Strait and move towards summering areas located primarily in the Repulse Bay area north of Southampton Island during late June while some may move north towards Fury and Hecla Strait, in the vicinity of Igloolik.

Fall migrations to Hudson Strait begin in late August or early September, depending on ice conditions. A small number of narwhals that winter in Baffin Bay are thought to move through Fury and Hecla Strait into northern Foxe Basin during spring migrations in April and May.

Aerial surveys confirmed that narwhal occur in relatively low numbers in Foxe Basin; there were no sightings in Steensby Inlet. Narwhal were most abundant in Hudson Strait during April and June surveys when a small number of individuals were recorded. Additional details on Narwhal can be found in Section 5.1.4, Volume 8 of the Mary River FEIS. No significant change in overall narwhal abundance and distribution was observed in the area from 2014-2017.

3.4.4.4 WALRUS

Walrus have a discontinuous circumpolar distribution and are migratory, moving with the ice. They winter in the offshore pack ice of Davis Strait and along the west coast of Greenland, the North Water Polynya off eastern Devon Island and northern Labrador, as well as in Foxe Basin ranging from the floe edge along the north side of Rowley Island and south to the Melville Peninsula. Walruses are primarily benthic feeders on bivalve molluscs and other invertebrates, and are generally confined to shallow coastal waters up to 100 m.

Four extant stocks occur within Canadian waters however these may be further subdivided. Three of the four identified stocks occur within the confines of the RSA; the Baffin Bay (High Arctic) population, the Foxe Basin population, and the North Hudson Bay-Davis Strait population.

The Baffin Bay walrus population is estimated between 1,700 and 3,000 individuals with summering populations in Kane Basin, Buchanan and Princess Marie bays, Jones Sound, eastern Ellesmere Island, and the Lancaster Sound-Barrow Strait area. Walrus along the northern shipping route winter in the North Water and other polynyas among the Canadian Arctic islands, inhabiting northwest Baffin Bay north from

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Pond Inlet to Kane Basin, Lancaster Sound, Barrow Strait, and Jones Sound. They are also distributed along the west coast of Greenland. Walrus move westward along the southern coast of Devon Island during spring to summering areas in the Canadian Arctic islands. Only a few individuals are now observed among the inlets and fjords south of Bylot Island. Aerial surveys within the vicinity of Eclipse Sound recorded two walrus; one in Eclipse Sound and one in Milne Inlet.

Walrus are considerably more abundant along the southern shipping route. They are year-round residents in northern Foxe Basin, overwintering in small polynyas and shore lead systems near the outlet of Fury and Hecla Strait, to the east of Hall Beach, and among the islands (Rowley, Koch, and the Spicer Islands) located farther to the east of Hall Beach and south of Steensby Inlet. Their distribution appears to be driven by ice and open-water conditions during winter. During the open water period, they move onto beaches and coasts among the islands south of Steensby Inlet and onto drifting pans of ice. Walrus have been observed within Steensby Inlet during late summer, but the degree to which they use other locations within Steensby Inlet is uncertain. The Foxe Basin walrus population is estimated to be approximately 5,500.

Walrus were abundant within northern Foxe Basin portion of the aerial survey route in 2006. They were observed in pack ice or open water with walrus densities in northwest Foxe Basin estimated at about seven times higher than those observed in northeast Foxe Basin or southern Foxe Basin. During the aerial surveys, two terrestrial walrus haulout sites were observed, one at Manning Islands (mid-way between Hall Beach and Spicer Islands) and the other at Bushnan Rock (a small sandy islet west of the gap between Rowley and Koch Islands). Walrus densities in Hudson Strait were lower than any observed in Foxe Basin. Additional details on Walrus can be found in Section 5.1.2, Volume 8 of the Mary River FEIS.

3.4.4.5 RINGED SEAL

The ringed seal is an important element of the Arctic marine system, both as main prey of polar bears, and as a major consumer of marine fish and invertebrates. Ringed seals occur year-round along both proposed shipping routes and in the vicinity of both proposed port sites and are a major traditional food source for the Inuit.

Ringed seals establish a series of breathing holes and subnivean lairs, with many of these structures created shortly after fall freeze up. Birth lairs are constructed on the landfast ice in mid-March and pups are born in April. Landfast ice is preferred for breeding rather than pack ice. The population of ringed seals in the Canadian Arctic is estimated to be at least a few million.

Ringed seals are common throughout Baffin Bay as well as along the length of West Greenland. During winter and spring, ringed seals concentrate on stable shorefast ice, though in areas where fast ice is limited, as in Baffin Bay, increased numbers may occupy offshore pack ice. As ice breaks up during summer, they disperse as solitary animals or small groups throughout open-water areas or to coastal. Though ringed seals were originally thought to remain in the same general region throughout the year

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recent evidence suggests that some members of the population, particularly juveniles, may undertake extensive seasonal movements.

Ringed seals are abundant and have been observed throughout along the proposed northern shipping route, occurring throughout Baffin Bay and Davis Strait, Eclipse Sound, Koluktoo Bay, Navy Board and Pond Inlet.

Ringed seals are abundant along the proposed southern shipping route, occurring throughout Foxe Basin, including the landfast ice of Steensby Inlet and Hudson Strait. Southern Steensby Inlet, Igloolik, Hall Beach, Murray Maxwell Bay, and Rowley Island into Fury and Hecla Strait have been described as important hunting and/or pupping areas for ringed seal. Additional details on Ringed Seal can be found in Section 5.1.1, Volume 8 of the Mary River FEIS.

3.4.4.6 Bearded Seals

The bearded seal has a patchy circumpolar distribution as far north as 85°N. There is no reliable abundance estimate for bearded seals in Canadian waters; however, some have suggested an estimate of >190,000.

Bearded seals typically occur alone or in small groups. Whelping occurs between late April and early May, and pups are typically born on unstable pack ice where they are weaned after 12-18 days. Bearded seals eat a wide variety of foods and are generally considered to be benthic feeders that prey on an array of benthic invertebrates and fish, although pelagic fish are also a food source.

Bearded seal distribution is largely determined by the presence of shallow water but they usually move into areas of open water <200 m deep when the pack ice retreats, while some individuals associate with ice year-round. They are seldom found in fast ice areas, but are widely dispersed in open water areas of pack ice where leads and cracks are frequent, and where ice pans are sufficient for haul out sites.

Bearded seals are considered common in the RSA. Large numbers of bearded seals occur around north eastern Baffin Island and in Lancaster Sound. The many polynyas of northern Foxe Basin support several colonies of bearded seals and is thought to be an area of high density for bearded seals.

During aerial surveys in support of the Project, bearded seals were present in all areas of Foxe Basin and Hudson Strait, and most sightings occurred from April to August 2008 when they are easily observed basking on sea ice. During aerial surveys in June 2008, most bearded seals were sighted near the mouth of Steensby Inlet; densities were lower in northwest Foxe Basin, northeast Foxe Basin, southern Foxe Basin, and Hudson Strait. Bearded seals were observed in small numbers during springtime seal surveys in Eclipse Sound and Milne Inlet in 2007 and 2008. Additional details on Bearded Seal can be found in Section 5.1.7, Volume 8 of the Mary River FEIS.

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3.4.4.7 HARP SEALS

Harp seals occur in the northern Atlantic and Arctic oceans below 84ºN. Three geographically distinct populations occur in the North Atlantic Basin but only one of which occurs in the RSA, the Northwest Atlantic population. This is the largest population, including a total of ~5.9 million animals. This population spends the summer off west Greenland and in the Canadian Arctic. Harp seal whelping occurs from late February to mid March on first year ice or landfast ice offshore Newfoundland and Labrador and in the Gulf of St. Lawrence. Harp seals enter Lancaster Sound in July and August via migration routes along the fast ice edge off east Baffin or across Baffin Bay from Greenland.

Generally, harp seals enter Pond Inlet and Navy Board Inlet at the end of July. They concentrate at the mouth of Navy Board Inlet and occasionally within Eclipse Sound throughout August and September. Harp seals were sighted in relatively high numbers during aerial surveys in Eclipse Sound and Milne Inlet. Harp seals were seen frequently in large groups of 10-50, and in one case 400. Most sightings were in Eclipse Sound. The September exodus from Lancaster Sound proceeds along the north coasts of Devon and Ellesmere islands, and then either across Smith Sound to Greenland, or along the east coast of Baffin. By October, most seals have left the Canadian High Arctic and Greenland.

Smaller numbers of harp seals also move westward into Hudson Bay and Foxe Basin during spring. Some animals move south along the east coast of Hudson Bay, reaching Southampton Island and occasionally as far south as the Belcher Islands near James Bay. Others head west across northern Hudson Bay and disperse along the west coast of the bay and Foxe Basin. There were relatively few sightings of harp seals in Hudson Strait during aerial surveys in 2008. Additional details on Bowhead Whales can be found in Section 5, Volume 8 of the Mary River FEIS.

3.4.4.8 POLAR BEAR

Polar bears have a circumpolar distribution and occur in relatively low densities throughout most of the ice-covered areas in the RSA. Polar bears tend to be more abundant along shore lead systems and polynyas during winter, where less consolidated ice cover provides habitat for prey species. Non-pregnant females, juveniles, and adult males remain active on the pack ice throughout the year, often moving considerable distances with the ice. The distribution and population size of polar bears is likely regulated by the extent of sea ice and the distribution and numbers of their primary prey, the ringed seal.

Female polar bears give birth to 1-3 cubs every 3 to 4 years. Mating occurs from April to June, and females give birth the following December or January in maternity dens, which are excavated in accumulations of snow on stable parts of landfast ice, offshore pack ice, and most often on land within approximately 50 km of the coast. Dens are created in the fall and bears leave their dens in April.

The global polar bear population is estimated at 22,000 to 25,000, of which at least 15,500 occur in Canada or in subpopulations shared with Canada. Three subpopulations of polar bears occur within the RSA: Foxe Basin, Baffin Bay, and Davis Strait with each subpopulation numbering around 2,000.

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Along the northern shipping route, polar bears are distributed throughout Baffin Bay, Lancaster Sound, and along coastal areas. Polar bears from the Baffin Bay subpopulation occupy drifting pack ice and landfast ice between Baffin Island and west Greenland during winter, but can concentrate along the Lancaster Sound fast ice edge. Bears are also concentrated along landfast ice edges across Pond and Navy Board inlets during spring. Bylot Island and coastal Baffin Island are used as summer retreats when sea ice melts and also provide denning habitat for pregnant females. The Davis Strait subpopulation occurs in the Labrador Sea, eastern Hudson Strait, Davis Strait south of Cape Dyer, and an undetermined portion of southwest Greenland. Polar bears are harvested domestically as well as during commercial spring sport hunt based out of Pond Inlet. Small numbers of polar bears were observed during aerial surveys during the open-water season in Milne Inlet, Eclipse Sound, and Eskimo Inlet and on landfast ice in Milne Inlet, Koluktoo Bay, and Navy Board Inlet.

Polar bears from the Foxe Basin subpopulation range over Foxe Basin, northern Hudson Bay and western Hudson Strait during winter and move ashore during the open-water period, concentrating on Southampton Island and along the Wager Bay and other coasts within Foxe Basin. During aerial surveys polar bears were observed on landfast ice, pack ice, terrestrial areas, and in open-water areas primarily in northern Foxe Basin but also in Hudson Strait. Additional details on Polar Bear baseline studies can be found in Section 5.1.6, Volume 8 of Mary River FEIS.

3.5 Socio-Economic Environment

The Inuit of the North Baffin region have experienced tremendous social and cultural change over the course of a few decades. Recent changes, particularly residential schools, have affected family integrity and by implication, social cohesion. Elders are becoming more engaged in community life and in the education of youth in traditional skills. At the same time, a shift toward Western middle-class expectations appears to be taking place among Inuit youth.

The land-based economy is a major part of the livelihoods of many residents of the North Baffin. Harvesting from the land and sea is estimated to produce food worth between $12 million and $20 million per year in this region. The amount of work to harvest this food is estimated to be similar to 350 full-time jobs.

In addition, residents of the region earn money through sales of arts and crafts, through employment, and from various government social programs such as Income Support. The personal income reported by residents of the five North Baffin communities amounted to $83 million per year.

Residents' demand for wage employment is very high. People want to work, even when this work requires flying to remote locations. However, job opportunities in the North Baffin are limited. Inuit employment in North Baffin is characterized by many individuals earning small levels of income, well under what full-time work would pay, and a small number earning full-time, year-round incomes. Most residents working in full-time jobs in Iqaluit do so year-round. In North Baffin, many more full-time workers are engaged in

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these jobs for only short periods. Women who work full-time jobs in North Baffin are more likely to work year-round than are men.

Nunavut relies on federal transfer payments for at least 90 % of its revenue. Government employment is a mainstay of the wage economy, with many of Nunavut's small businesses and retail outlets established to support government needs or those of public servants. The public sector accounts for a large portion of Nunavut's economic activity. Government jobs in administration, education, and health account for about half of all employment earnings in the territory. Construction has been growing as government infrastructure has been established.

These communities have a subsistence economy and have experienced dramatic population growth over the last 20 years. Over 70 % of the population is under 25. Underemployment and lack of opportunities is causing social stress. Community Elders recognize that the communities must position themselves to enter the wage economy.

For many North Baffin households, harvest of country food provides an important contribution to overall well-being. In all five communities, caribou, ringed seal, and Arctic char are of major importance. In addition, walrus is a major species of importance in Hall Beach and Igloolik, while narwhal is a key component of the harvest among households in Arctic Bay, Pond Inlet and, to a lesser degree, Clyde River.

3.5.1 Nearby Communities

There are five communities of north Baffin Island in the immediate vicinity of the Project, which have existing and historical socio-economic and/or ecosystemic ties to the Project area, and for which the Project has a direct effect on the traditional land use of their residents. Listed in alphabetical order, these communities (known as Category 1 communities in literature as they are closest to the Project) include Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet. The ties of these individual communities to the Project are described in more detail:

Arctic Bay is located on northern Baffin Island, 280 km northwest of the Mary River site. Harvest and land use patterns indicate that the effect of Project activities on these current patterns of Arctic Bay residents is less than what it would have been historically. Arctic Bay residents might use the Milne Inlet, Eclipse Sound, and Mary River areas for hunting on a sporadic or occasional basis but other geographic areas are more important to this community's land use.

Clyde River is located in northeastern Baffin Island, 415 km from the Project area. Historical land use information and discussions with Elders from various communities suggest that the people of the Clyde River area used to travel inland from Cambridge Fiord facing Baffin Bay, into the Raven River area east of Angajurjualuk Lake and southeast of Mary River. Harvest patterns suggest that contemporary land use activities are now concentrated closer to the community, however, historical ties to the Mary River area resulted in the inclusion of this community in the study area.

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Hall Beach is located on the mainland just south of Igloolik, 192 km from the Steensby Port site and 288 km southwest of the Mary River site. Hall Beach harvest patterns are distinct from Igloolik despite their proximity, with a concentration of marine harvesting centred on the Hall Beach area. Some hunting occurs on Baffin Island intermixed with Igloolingmiut hunting, including in and around Rowley and Koch islands and Steensby Inlet; thus, the Project shipping route through this area could have both land use and ecosystemic effects on the community.

Igloolik is located on the mainland but is the closest community to the Steensby Port site (155 km) and second-closest geographically to the Mary River Project site (230 km). Historically, Igloolingmiut spent the summer hunting caribou along the western side of North and Central Baffin Island. Current harvest patterns show that while Igloolingmiut use the Baffin coast and marine areas at the mouth of Steensby Inlet, their activities are heavily concentrated around the community on Melville Peninsula and the closest Baffin Island shoreline to the north. Igloolingmiut still hunt around Rowley and Koch islands and even in Steensby Inlet; thus, the Project shipping route through this area could have both land use and ecosystemic effects on the community.

Pond Inlet is geographically the closest community to the Mary River mine site, located approximately 160 km northeast of Mary River. Pond Inlet relies on hunting in the marine environment of Eclipse Sound and Milne Inlet as well as caribou hunting through the Mary River area. As such, Pond Inlet has the closest land use, historical, and ecosystemic ties to the Mary River area. Details on the socioeconomic environment surrounding the Project area are described in detail in Volume 4 of the Mary River Project FEIS, February 2012.

3.5.2 Traditional Land Use

Human habitation of the region extends back at least 4,000 years. The historic period of a region is defined as that point where human activities are documented in written record.

The historic period of the North Baffin region begins in the late 16th century with the first European whaling and exploration in areas adjacent to Baffin Bay. Two ships that over-wintered in the Igloolik in 1822 and 1823 provide the first record of Euro-Canadian exploration in the Foxe Basin area. The Hudson Bay Company, the Royal Canadian Mounted Police, and the church established themselves at different times in the vicinity of each of the existing communities, as early as 1921). The establishment of these institutions, as with the whalers before, influenced land use and settlement patterns through the mid-twentieth century. The establishment of DEW-line sites in Foxe Basin also influenced land use patterns, with Inuit settling near the DEW-line sites seeking part time employment and for trade. Traditional land use patterns changed substantially with the movement of the Inuit into permanent settlements as a result of federal policy and housing initiatives in the 1950s Contemporary Inuit land use was determined through consideration of the Nunavut Wildlife Harvest Study interviews and discussions with local communities, and the results of the MRIKS. Connection with the land continues to be an important aspect of Inuit life and is evident in current land use patterns. Although Inuit now live in permanent settlements, travel and camping continue to be important aspects of Inuit life. Travel routes have been identified linking all the

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communities of north Baffin Island (Clyde River, Pond Inlet, Arctic Bay, Igloolik, and Hall Beach). Travel is an important land use practice of the Inuit as it enables the development of connections to the land, enables individuals to meet with family and friends from other communities, and enables hunting and gathering. For additional and a through breakdown of land use areas surrounding the project information refer to Figures 3.13 – Travel Routes – North Baffin Region (workshop results) and Figure 3.14 – Travel Route – North Baffin Region (interview results) from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS.

Contemporary harvesting activities on North Baffin include wildlife hunting, marine mammal hunting, freshwater and marine fishing, berry picking, egg gathering, sea resource harvesting, and land resource harvesting such as soapstone. See the following figures from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS for geographical representation of identified areas where harvesting activities occur:

- Figure 3.4 - Hall Beach/Igloolik Harvest Locations (Pre-1965)
- Figure 3.5 - Hall Beach/Igloolik Harvest Locations (1965-1974)
- Figure 3.6 - Arctic Bay/Pond Inlet Harvest Patterns (pre-1959)
- Figure 3.7 - Arctic Bay/Pond Inlet Harvest Locations (1959-1964)
- Figure 3.8 - Land Use information from DIAND (1982B) (showing Inuit land use by marine and terrestrial animal activity)
- Figure 3.9 - Wildlife distribution
- Figure 3.10 - Approximate Camp Areas (1930 - 1966) (not sure this is needed)
- Figure 3.19 - Berry Picking Locations - North Baffin Region (workshop results)
- Figure 3.22 - Ocean Resource Collection Areas - North Baffin Region (workshop results)
- Figure 3.31 - Reported Caribou harvest locations in North Baffin (1996 - 2001)
- Figure 3.33 - Reported marine mammal harvest locations on North Baffin (1996 - 2001)
- Figure 3.35 - Reported waterfowl and egg harvest locations in North Baffin (1996 - 2001)
- Figure 3.37 - Reported Fish Harvest Locations in North Baffin (1996 - 2001
- Figure 4.2 - DFO Arctic Char Commercial Fishing Quotas for North Baffin Rivers

3.5.2.1 LAND FAST ICE

Ice is an important component of land use activities, as much of the travel engaged in by residents is on land fast ice. Land fast ice is often used to reduce travel time and to access the floe edge for hunting purposes. For more information refer to Figures 3.13 – Travel Routes – North Baffin Region (Workshop

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Results); Figure 3.14 Travel Routes – North Baffin Region (interview results); and Figure 3.24 – Sea Ice Conditions – North Baffin from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS.

Recreational Land use several parks exist in the vicinity of the Project. Sirmilik National Park of Canada, established in 2001, is one of Canada's newest national parks and covers a considerable landmass with four separate land parcels. The Bylot Island Bird Sanctuary is located within Sirmilik National Park, affording it overlapping legal protection and restrictions on land use. Tamaarvik Territorial Park, located adjacent to the community of Pond Inlet and Little Salmon River, is a relatively small park used mainly for camping. See Figure 7.1 – Parks and Conservation Areas from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS for location of the parks relative to the Project.

Local outfitting resources are available in local communities for tourism activities such as kayaking, nature viewing and polar bear hunting. Cruise ships visit the North Baffin region each summer, specifically the region around Bylot Island and Sirmilik National Park.

3.5.3 Protected Areas

The Project does not overlap with any terrestrial protected areas and/or known critical habitats such as national or critical wildlife areas. Access to Milne Port would be through Baffin Bay into Eclipse Sound or around Bylot Island through Navy Board Inlet. Both paths are adjacent to Sirmilik National Park and Bylot Island Bird Sanctuary, and in proximity to key marine bird habitat sites near Cape Graham Moore or Cape Hay on Bylot Island. No interactions are expected along the southern shipping route through Hudson Straight and Foxe Basin.

For further information, see Appendix 4C (Land Use in the Vicinity of the Mary River Project Report), Volume 4 of the Mary River Project FEIS.

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4 PROJECT INFORMATION

4.1 LOCATION AND ACCESS

The basis of the Project (the Project) is production and shipment of high grade iron ore from Deposit No. 1 located on North Baffin Island in the Qikiqtani Region of Nunavut. There are three (3) main project locations consisting of the Mine Site, Milne Port located north of the Mine Site, and, Steensby Port located south of the Mine Site. The Mine Site is located approximately 160 km south of Pond Inlet (Mittimatalik) and approximately 1,000 km northwest of Iqaluit, as shown on Figure 4.1. Milne Port is connected to the Mine Site by a 115 km Tote Road. A 149 km railway will eventually be constructed to connect Steensby Port to the Mine Site.

4.1.1 PROPONENT NAME AND ADDRESS

The proponent of this ICRP is:

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON, Canada L6H 0C3
Tel: (416) 364-8820 Fax: (416) 364-0193

4.2 PROJECT HISTORY

The Mary River iron ore deposits were originally discovered in 1962 by Murray Watts of British Ungava Explorations Limited (Brunex). Brunex staked ten claim groups in the Project area, including the Mary claims which cover the areas now known as Deposit No. 1. The private company Baffinland Iron Mines Ltd. (BIML) was established in 1963 by the financial participants and prospectors of the Brunex group to hold the Mary River claims and leases and to develop the prospects.

BIML undertook an exploration program from 1963 through 1966, with most of the field work carried out in the summers of 1964 and 1965. This work included the establishment of a 100 km tote road between Milne Inlet and the Mary River camp, and construction of gravel airstrips near the Mary River camp, at Milne Inlet, and a tundra strip at Katiktok Lake about 40 km northwest of Mary River and near Deposit No. 4. Apart from the required land surveys, some metallurgical test work, and re-examinations of project economics, no additional fieldwork was undertaken between 1965 and 2004.

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Figure 4.1 Site Location Map

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In 2002, BIML interests were acquired by Baffinland, with the purpose of revitalizing the Project. The current Baffinland Iron Mines Corporation was formed in early 2004, which now holds exclusive rights to the ore deposits at Mary River. Continuous contemporary exploration work began in 2004. In 2007, a 250,000 tonne bulk sample program was approved by the Nunavut Impact Review Board, and a Memorandum of Understanding was signed with Nunavut Tunngavik Inc. to gain mineral rights over 16,695 ha surrounding Deposits No. 1, 2 and 3. In addition an agreement was signed with Fednav to develop and deliver shipping solutions for the Project and letters of intent for the future sale of iron ore were signed with 3 steel companies (Thyssen Krupp, Salzgitter and Voestalpine). A further agreement for future sale of the iron ore was signed with ROGESA Roheisengesellschaft Saar mbH ("ROGESA"), a pig iron producing company, in 2008.

The year 2008 also saw the completion of a drill program focused on geotechnical, exploration and geomechanical work, as well as further investigations at the Milne Inlet and Steensby Port sites and along the Railway. In addition, a bulk sampling program was undertaken to extract, transport and ship ore for testing in Europe. The results were used to prepare a definitive feasibility study, which found 'excessively robust economics' for a Project based on 18 Mtpa of iron ore production (Baffinland press release, February 23, 2009). In March 2008, the Company submitted a Development Proposal and associated initial permit applications in order to initiate the regulatory review of a Project based on currently defined iron ore reserves. In January 2011, Baffinland submitted a Draft Environmental Impact Statement (DEIS) for stakeholder comment and review including a Preliminary Mine Closure and Monitoring Plan (DEIS, Appendix 10G). In February 2012, Baffinland submitted the FEIS in support of the development of the Project.

The FEIS included the construction, operation, closure and post-closure activities associated with the mine and its related infrastructures, the construction of a 150 km railway to link the Mine Site to a new port facility at Steensby Inlet, and the construction of the Steensby port. On January 13, 2013, Baffinland informed the NIRB that, due to various business drivers, Baffinland was proposing to make changes to the schedule and specific activities in the initial stages of the development associated with the original Mary River Project (File No. 08MN053). Baffinland noted it understood that the request would potentially necessitate a reconsideration of the Terms and Conditions contained within Project Certificate No. 005 as issued by the NIRB on December 28, 2012 for the Mary River Project.

The changes consisted of the re-introduction of shipment of up to 4.2 Mtpa ore via Milne Port, road transport of ore from the Mine Site to Milne Port via the Tote Road, and the deferral of the full-scale development of the original Project (18 Mtpa production, with railway link to Steensby Port and the development of Steensby Port). This phase was termed 'the Early Revenue Phase'. Baffinland received NIRB approval for the ERP amending the Project Certificate in May 2014. The amended Project Certificate allows for the future development of the 18 Mtpa railway operation, for a total combined production rate of 22.2 Mtpa. In 2015, the Type A Water Licence 2AM-MRY 1325 was successfully amended to account for activities approved for the ERP in 2014. The Project is currently working toward the 4.2 Mtpa production rate via Milne Port associated with the ERP.

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4.3 Site Geology

4.3.1 Regional Geology

The North Baffin Island region and Mary River area lie within the Committee Belt, a granite-greenstone terrane mixed with rift basin sediments and volcanic rocks. The belt lies within the Churchill Province, extending from Baker Lake to Greenland, and is divided into five main assemblages: the Archean, the Mary River Group, the Piling Group, the Bylot Supergroup, and the Turner Cliffs-Ship Formation (Aker Kvaerner, 2008).

The Mary River iron deposits are located within the Mary River Group, an assemblage of Late-Archean (2.76 to 2.72 Ga) metasedimentary to metavolcanic rocks that have been folded and preserved in greenstone belts (Aker Kvaerner, 2008). The Mary River Group greenstone belts are present as fragmented remnants stretching from Bylot Island south to Eqe Bay, with a maximum thickness of 4,000 m. Primary sequences within the Group consist of a lower series of metavolcanic rocks and an upper series of turbidite pelitic-greywacke; the stratigraphic position of iron formation, quartzite, conglomerate, minor marble, and volcanic breccia units within the belts, which varies across the region. The Mary River Group is part of the regional Committee Belt, an Archean-aged (2.9 to 2.5 Ga) assemblage of granite-greenstone terranes, granitic migmatites gneissic granitic intrusions, and clastic and carbonate sedimentary units reworked during the Paleo-Proterozoic (2.5 to 1.6 Ga).

4.3.2 Iron Ore Deposit Geology

Iron formations occur in varying thicknesses discontinuously within the Mary River Group metasedimentary units but are typically not present in economically extractable thicknesses or configurations except in the Mine Site area. The high-grade iron ore at Deposits No. 1, 2, 3 and 4 were discovered in 1962, and these initial hematite-magnetite mineralized zones were mapped within extensive belts of banded iron formation in the area over the next three years. Deposit No. 5 was discovered and surface mapped in 2009. The deposits are characterized by zones of massive layered to brecciated hematite to magnetite, variably intermixed with banded oxide to silicate facies iron formation. As typified at Deposit No. 1, the high-grade iron formations are interlayered with thin bands of chlorite-actinolite schist, staurolite-garnet-mica schist, amphibolite, and banded iron formation across their strike width, with the entire assemblage up to 400m thick.

The Mary River iron deposits are considered to belong to an Algoma-type iron formation (Aker Kvaerner, 2008) formed in a volcanic ark setting in an extensional or rift basin during the Archean. Algoma-type deposits are typically characterized by a lower series of volcanics followed by banded iron formation and/or interlayered to pure iron oxides of variable and potentially substantial thickness, in turn overlain by volcanics and volcaniclastic sediments (Gross, 1996).

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4.3.3 Geotechnical Overview

4.3.3.1 Milne Port

The Milne Port area consists of a series of variably dipping, dissected terraces sloping towards the waters of Milne Inlet. The surficial deposits are marine and glacial marine sediments, ranging from coarse beach sediments (gravel and sand) to finer deltaic sediments (clay, silt, sand and gravel) to even finer deep water periglacial silt veneers (silt, clay and fine sand). The soils in the area are often covered by a thin layer of organics at the ground surface. The soils were noted to typically be frozen below 2 m depth and contain ice lenses (Mary River Project FEIS 2.1.3.1). Offshore drilling encountered loose to compact silty sand underlain by sand containing varying amount of gravel and cobbles.

4.3.3.2 Tote Road

The Tote Road generally follows a glacial valley, oriented northwest-southeast to the Mine Site. The surficial deposits along this alignment generally include the following materials:

- Till deposits: veneer (up to 2 m thick) or blanket (up to 10 m thick) with drumlins and moraines (in places);
- Glaciofluvial sediments: outwash gravel and sand forming braided floodplains, terraces and fans or stratified glacial drift (gravel and sand);
- Limited bedrock exposure: especially nearer to the Mine Site/Deposit No. 1 area; and
- Mary River flows across the glacial valley to the southeast of the Mine Site, and several thaw lakes and thermokarst depressions are located along the valley floor.

4.3.3.3 Mine Site

Deposit No. 1 is located along the top and margins of a bedrock hill on the north side of the valley, while the waste rock piles will be located along the west-facing and east-facing side slopes of the hill. Bedrock is exposed at the apex of the deposit with talus present on the upper slopes. The mid slopes on the east side of the deposit comprise up to 50 m (vertical depth) of glacial till, tapering out to near surface bedrock at the base of the slope. The till on the north and west side of deposit is shallower, in the 10 to 15 m range. The till around Deposit No. 1 is typically dominated by boulders, cobbles, gravel and trace to some organics and a moderately thick, wet organic layer is present over the majority of this upper area. The overburden materials are considered to be very ice-rich based on-site investigations, observations from bulk sample road construction and general understanding of the deposit.

Other Project-related infrastructure in the Mine Site area will be located on areas of glaciofluvial terrace along the valley floor directly south and southwest of Deposit No. 1. In addition to the glaciofluvial deposits, there appears to be some direct glacial deposition in and around the south-eastern portion of Sheardown Lake. Overburden depths over the majority of the valley floor are typically noted to be in the 10 to 20 m thickness ranges. Based on the investigations and surficial features in and around these

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deposits, evidence of ice-rich areas and localized massive ice bodies are present, particularly in the vicinity of the existing airstrip areas. A thin organic layer is present in some areas, over the till, in depressions and at the base of some slopes.

Underlying the glaciofluvial materials southwest of the deposit in the valley floor is weak, unconsolidated sandstone; gneissic bedrock to the south, west and north of Deposit No. 1; and amphibolite schists to the east. Often, the upper horizon of the bedrock is highly fractured and often contains ice lenses and/or infilling in the joints.

4.4 Project Summary

A detailed Project Description for the project has been presented in Volume 3 of the Mary River Project Final Environmental Impact Statement and its associated Addendum (Baffinland, 2013).

The Mary River Project consists of mining iron ore from the reserve at Deposit No. 1 at a production rate of 21.5 Million tonnes per year (Mtpa). The Project will be developed in two phases:

- **Early Revenue Phase (ERP):** Ore will be mined at a rate of 3.5 Mtpa and trucked via the Tote Road to Milne Port, from which it will be loaded onto ships during the open water season.
- **Full-scale (21.5 Mtpa) Approved Project:** As global markets improve for the prices of iron ore, the Company intends to proceed with the construction and operation of the larger Approved Project which includes the construction, operation, closure, and reclamation of a large scale mining operation (open-pit mine) and associated infrastructure for extraction, a railway link for the transportation of ore to Steensby Port, and, the construction and operation of a year around port facilities on Steensby Inlet for the shipment of iron ore.

It is expected that the Steensby Port facilities and the Railway will take four (4) years to construct. Upon completion of the Railway and Steensby port construction, an additional 18 Mtpa of iron ore will be transported by rail and transferred to ore carrier vessels from Steensby Port for shipment to international markets. Shipping of ore from Steensby Port will occur year-round and will require vessels with icebreaking capabilities.

The ERP includes a nominal 4.2 million tonnes per annum (Mtpa) road haulage operation from the Mine Site to Milne Port for shipping of iron ore during the open water season. There are 3 main project locations for the ERP – the mine site, Milne Port north of the mine site, and the Tote Road which connects the Mine Site to Milne Port. Only limited development has occurred at the Mine Site, sufficient to support the mining of 4.2 Mtpa of iron ore. The Tote Road has been upgraded to enable safe and efficient transportation of ore by truck from the Mine site to Milne Port. Milne Port has been fully developed and accommodates a 4.2 million tonnes ore stockpile, an ore dock, maintenance facility and associated infrastructure for the operation of the port facilities. Operational activities of the ERP include:

- Ore extraction;

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- Ore processing via crushing;
- Transportation of the ore from the Mine site to Milne Port;
- Loading and shipping of ore from Milne Port;
- Stakeholder and Inuit community engagement; and
- Environmental monitoring and reporting.

Major infrastructure constructed to date at each of the locations consists of the following. Unless noted otherwise in Section 6, this infrastructure will remain in place throughout operation.

1. Milne Port:
   - Ore dock;
   - Ore stockpile;
   - Ore handling facilities (unloading, transfer and stockpiling, reclaiming, ship loading) and associated surface runoff ponds;
   - Camp and service buildings (field offices, maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant);
   - Water supply (intake, transport, storage and distribution);
   - Sewage treatment plant and discharge;
   - Polishing Waste Stabilization Pond (PWSP);
   - Waste management facilities including temporary storage areas;
   - Incinerator;
   - Fuel tank farm and fuel dispensing facilities;
   - Hazardous material storage areas and explosives storage;
   - Landfarm; and
   - Power generation and distribution.
2. Mine Site:
   - Mine Site service roads, ore haul roads, laydown, drainage and diversions;
   - Camp Lake water supply (intake, transport, storage and distribution);
   - Quarries and borrow pits;
   - Power generation and distribution;
   - Permanent camp, construction camp and service buildings (field offices, temporary or transitional construction facilities, light vehicles maintenance shops, ore trucks maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant);
   - Sewage treatment plants, PWSPs and discharge;
   - Mining fleet maintenance facilities;
   - Waste management facilities including temporary storage areas;
   - Incinerator;
   - Landfill;

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- Hazardous material, explosives, and fuel storage areas;
- Temporary crushing facility (crusher trains);
- Airstrip;
- Emulsion plant;
- Waste rock storage with associated runoff control structure; and
- Transitional ore stockpile and runoff control.

3. Tote Road:

- Road embankments and driving surface;
- Water crossings including culverts+bridges and abutments;
- Water withdrawal for dust control; and
- Borrow Pits and Quarries.

In 2017, Baffinland focused on mine production from Deposit No. 1 with 4.54 million tonnes mined and hauled using the Tote Road. 2017 also marked the third season of open water shipping of iron ore at Milne Port with almost 4.1 million tonnes of iron ore shipped between August 2 and October 17. This represents a record-setting performance for the Company, and the largest shipping program by volume ever executed in the Canadian High Arctic.

The Project sites are shown on Figure 4.2, and the Major Project Components are listed in Table 4.1. The Mine site layout is shown on Figure 4.3. Unless otherwise noted in Section 6, all Major Project Components are intended to have a similar lifespan as that of the Project.

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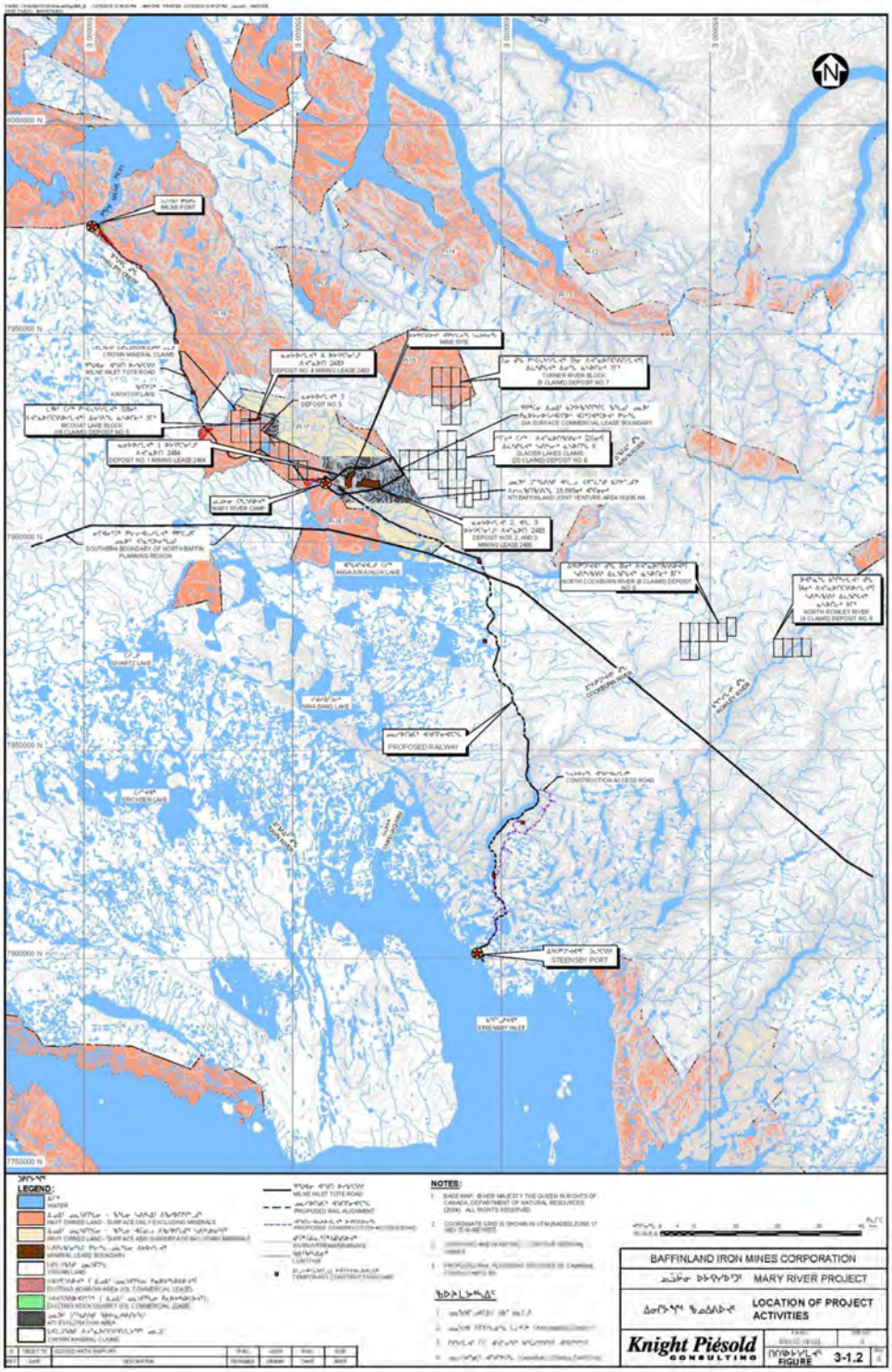


Figure 4.2 Relative Location of Project Areas

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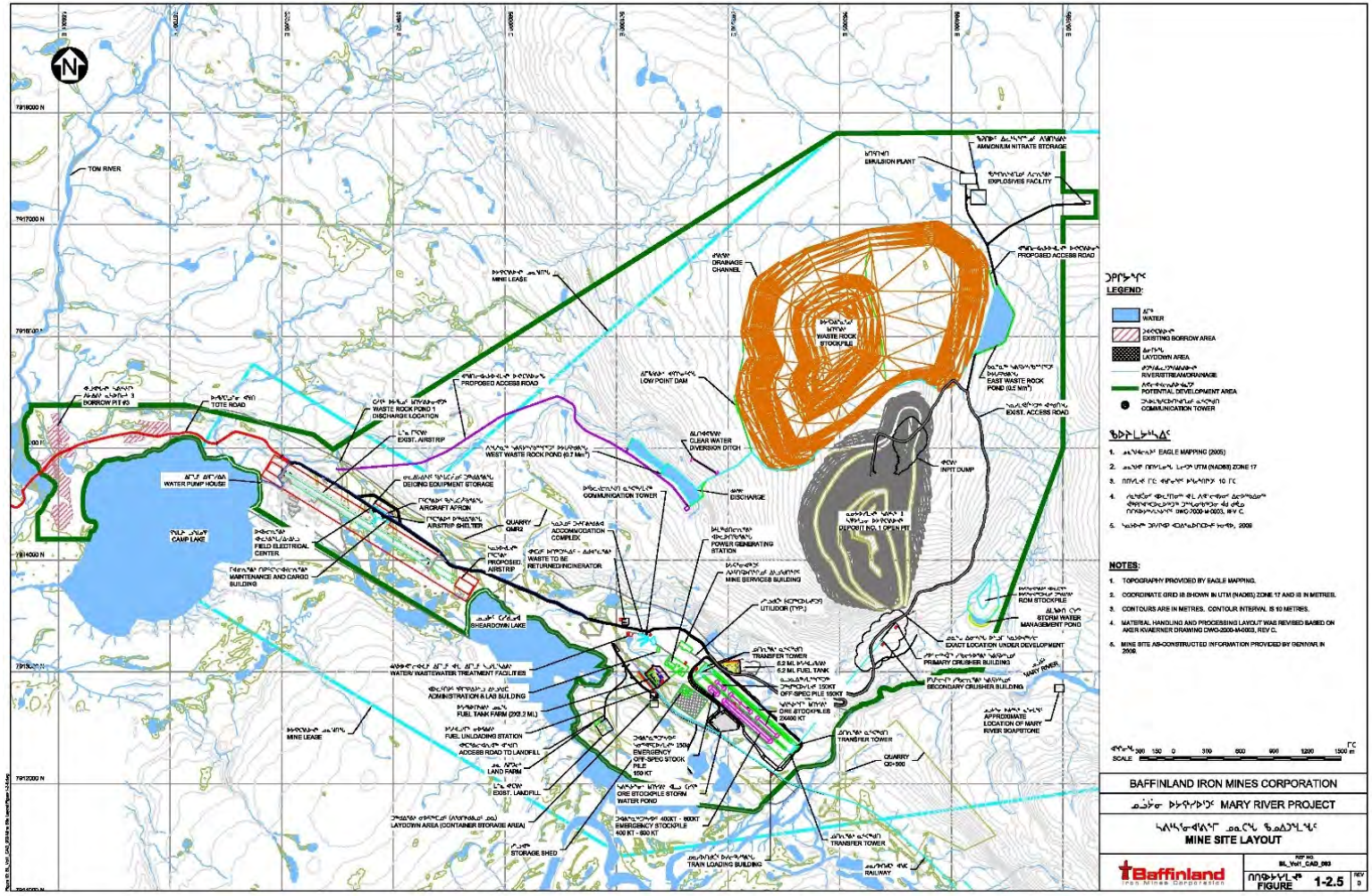


Figure 4.3 Mine Site Layout

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Table 4.1: Major Project Components

Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2018	Land Ownership
Milne Port Site				
Ultimate development area	x	-	On going	IOL
Site development, grading, roads, laydown, drainage	x	x	Completed	IOL
Water supply (intake, transport, storage and distribution)	x	-	Completed	IOL
Quarries and borrow pits	x	-	On going	IOL
Camp	x	-	Completed	IOL
Sewage treatment plant and discharge	x	-	Completed	IOL
Polishing Waste Stabilization Pont (PWSP)	x	-	Completed	IOL
Incinerator	x	-	Completed	IOL
Service buildings (field offices, maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant)	x	-	Completed	IOL
Waste management facilities including temporary storage areas	x	-	Completed	IOL
Landfarm	x	-	Completed	IOL
Power generation and distribution	x	-	Deferred	IOL
Transitional power generation and distribution	x	-	Completed	IOL
Hazardous material storage areas	x	-	Completed	IOL
Fuel tank farm and fuel dispensing facilities (Arctic Diesel, Jet-A Fuel)	x	-	Completed	IOL
Fuel tank farm and fuel dispensing facilities (Marine Diesel)	-	x	Not started	IOL
Ore stockpile	-	x	Completed	IOL
Ore handling facilities (unloading, transfer and stockpiling, reclaiming, ship loading) and associated surface runoff ponds	-	x	Completed	IOL
Ore dock	-	x	Completed	Crown Land
Freight dock	-	x	Not started	Crown land
Explosives storage	x	-	Completed	IOL
Tote Road				
Realignment and grade improvement	x	-	In progress	IOL/Crown
Water crossings improvement/replacement	x	-	On going	IOL/Crown
Bridge construction	x	-	Completed	IOL
Borrow Pits and Quarries	x	-	In progress	IOL/Crown

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Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2018	Land Ownership
Water withdrawal for dust control	x	x	On going	IOL
Mine Site				
Mine Site development, grading, service roads, ore haul roads, laydown, drainage and diversions	x	-	Completed	IOL
Camp Lake water supply (intake, transport, storage and distribution)	x	-	Completed	IOL
Water crossings and surface water diversions	x	-	On going	IOL
Quarries and borrow pits	x	-	On going	IOL
Transitional Camps (early development)	x	-	Completed	IOL
Sewage treatment plants, PWSPs and discharge	x	-	Completed	IOL
Incinerator	x	-	Completed	IOL
Permanent camp and construction camp	x	-	Completed	IOL
Service buildings (field offices, temporary or transitional construction facilities, light vehicles maintenance shops, ore trucks maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant)	x	-	Completed	IOL
Mining fleet maintenance facilities	x	-	Completed	IOL
Mining activities	x	-	On going	IOL
Waste rock storage with associated runoff control structure	x	-	In progress	IOL
Waste management facilities including temporary storage areas	x	-	Completed	IOL
Landfill	x	-	Completed	IOL
Landfarm	x	-	Deferred	IOL
Transitional power generation and distribution	x	-	Completed	IOL
Power generation and distribution	x	-	Deferred	IOL
Hazardous material storage areas	x	-	Completed	IOL
Permanent fuel tank farms and fuel dispensing facilities (arctic diesel, jet A fuel – 15.5 ML)	x		Deferred	IOL
Transitional fuel storage facilities (multiple fuel storage tanks for construction phase)	x	-	Completed	IOL
Temporary crushing facility (crusher trains)	x	-	On going	IOL
Permanent crushing facilities	x	-	Deferred	IOL
Transitional ore stockpile and runoff control	-	x	In progress	IOL
Ore stockpiling (run of mine, crushed ore) and associated runoff control ponds	x	-	Deferred	IOL

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Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2018	Land Ownership
Ore handling facilities (unloading, transfer, tertiary crushing and screening, stockpiling, reclaiming, railway loading) and associated surface runoff ponds	x	-	Deferred	IOL
Airstrip extension	x	-	Completed	IOL
Explosives storage	x	-	Completed	IOL
Emulsion plant	x	-	Completed	IOL
Railway				
Service road (up to 25 km south of Mine Site)	x	-	Deferred	IOL
Railway embankment (up to 25 km south of Mine Site)	x	-	Deferred	IOL
Borrow pits and quarries (up to 25 km south of Mine Site)			Deferred	IOL
Water crossings (bridges and culverts)	x	-	Deferred	IOL
Winter road (up to 25 km south of Mine Site)	x	-	Deferred	IOL
Service road	x	-	Deferred	Crown land
Railway embankment	x	-	Deferred	Crown Land
Winter road	x	-	Deferred	Crown Land
Railway construction and operation	x	-	Deferred	Crown Land
Railway construction camps, sewage treatment facilities, emergency ponds and incinerator	x	-	Deferred	Crown Land
Railway camps associated services facilities	x	-	Deferred	Crown Land
Water crossings (bridges and culverts)	x	-	Deferred	Crown Land
Multiple construction fuel storage units	x	-	Deferred	Crown Land
Mobile explosive units	x	-	Deferred	Crown Land
Tunnel construction and disposal of waste rock	x	-	Deferred	Crown Land
Borrow pits and quarries	x	-	Deferred	Crown Land
Steensby Port Site				
Site development, grading, roads, laydown, drainage	x	-	Deferred	Crown Land
Water supply (intake, transport, storage and distribution)	x	-	Deferred	Crown Land
Water crossings and diversions	x	-	Deferred	Crown Land
Quarries and borrow pits	x	-	Deferred	Crown Land
Camp	x	-	Deferred	Crown Land
Sewage treatment plant, PWSPs and discharge	x	-	Deferred	Crown Land
Incinerator	x	-	Deferred	Crown Land

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Major Infrastructure Components	Authorized under Project Certificate No 005	Authorized under Project Certificate No 005, ERP Amendment[2]	Status of Development as of March 31, 2018	Land Ownership
Service buildings (field offices, temporary construction facilities, light vehicles maintenance shops, ore trucks maintenance shops, vehicle wash stations, ERT, warehouses, concrete batch plant)	x	-	Deferred	Crown Land
Waste management facilities including temporary storage areas	x	-	Deferred	Crown Land
Landfill	x	-	Deferred	Crown Land
Landfarm	x	-	Deferred	Crown Land
Power generation and distribution	x	-	Deferred	Crown Land
Hazardous material storage areas	x	-	Deferred	Crown Land
Fuel tank farms and fuel dispensing facilities (Arctic Diesel, Jet A-Fuel and Marine Diesel)	x	-	Deferred	Crown Land
Railway switch yard	x	-	Deferred	Crown Land
Railway terminal maintenance shop	x	-	Deferred	Crown Land
Ore stockpile	x	-	Deferred	Crown Land
Ore handling facilities (unloading, transfer, tertiary crushing and screening, stockpiling, reclaiming, ship loading) and associated surface runoff ponds	x	-	Deferred	Crown Land
Ore dock	x	-	Deferred	Crown Land
Freight dock	x		Deferred	Crown Land
Airstrip	x	-	Deferred	Crown Land
Explosives storage	x	-	Deferred	Crown Land
Emulsion plant	x	-	Deferred	Crown Land
Overwintering of fuel barge	x	-	Deferred	Crown Land
Dredged sediment disposal area	x	-	Deferred	Crown Land

Note 1: Includes additional authorizations under Type A Water Licence 2AM-MRY1325 – Amendment No. 1

Note 2: Includes additional authorizations under Type A Licence 2AM-MRY1325 – Amendment No. 1, and Type B Licence 8BC-MRY1416

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4.4.1 SITE PLANS

The Mine Site, Milne Port and Steensby Port, final connecting infrastructure and principal camp locations site plans are shown on the series of drawings in Appendix A and described in Table 4.2. These figures represent the intended site layouts upon completion of Project operations including the Railway Execution Phase. Project components that are planned to be progressively rehabilitated following the construction phase are quantified separately, as are components that are located on Inuit Owned Land.

There has been no change to the closure strategy for the approved Railway Execution Phase of the Project (as approved under the Project Certificate No. 005). For drawings to account for interim closure and reclamation adjustments to reflect project development phases until such a time planned closure commences, see documents/figures associated with the Annual Security Review (ASR) process conducted in accordance with Schedule C of Type "A" Water License 2AM-MRY1325 - Amendment No. 1 and Section 9.2 of the Commercial Lease, No. Q13C301, agreed to between Baffinland and the QIA.

Until such time the Railway Execution Phase commences, Steensby Camp and other explorations camps along the proposed railway corridor and exploration areas will be governed by the Exploration Closure and Reclamation Plan (BAF-PH1-830-P16-0038).

Table 4.2: Drawings for Mine Closure and Reclamation

Drawing Number	Drawing Title
E349000-2000-07-014-00001	Areas of Reclamation – Milne Port Layout
H337697-0000-07-126-0014 (Figure 8.10)	Preliminary Mine Closure and Reclamation Plan – Tote Road
H337697-4210-07-012-0001	Preliminary Mine Closure and Reclamation Plan – Mine Site Construction Phase
H337697-4210-07-012-0002	Preliminary Mine Closure and Reclamation Plan – Mine Site Final Closure Phase
H337697-2000-07-012-0001	Preliminary Mine Closure and Reclamation Plan – Railway Alignment
H337697-7000-07-012-0002	Preliminary Mine Closure and Reclamation Plan – Ravn River Rail Camp
H337697-7000-07-012-0003	Preliminary Mine Closure and Reclamation Plan – North Cockburn Camp – Tunnels
H337697-7000-07-012-0004	Preliminary Mine Closure and Reclamation Plan – South Cockburn Lake Rail Camp
H337697-4510-07-012-0001	Preliminary Mine Closure and Reclamation Plan – Steensby Port Construction Phase
H337697-4510-07-012-0002	Preliminary Mine Closure and Reclamation Plan – Steensby Port Final Closure Phase

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4.4.2 Inuit Owned Lands

The Inuit Owned Lands (IOL) surrounding the Project area are shown on Figure 4.2. The Commercial Lease, No. Q13C301, to the Project is held by Baffinland and is leased from the Qikiqtani Inuit Association (QIA). In accordance with this and any future surface leases held with the QIA, this ICRP incorporates the guidelines developed for the Qikiqtani lands entitled the Abandonment and Reclamation (A&R) Policy for Inuit Owned Lands (Version 3.0, QIA 2013). The guiding principles of the A&R Policy require that all disturbed IOL be returned to a safe and stable condition capable of supporting human and wildlife needs consistent to social and cultural needs of the Inuit for the undisturbed lands within that area. The QIA guidelines used for this ICRP are summarized in Appendix B. Milne Port and the Mine Site are entirely located on Inuit Owned Land. The first 25 km of the Railway and access roads are located on Inuit Owned Land. All remaining Project areas are located on Crown land.

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5 PERMANENT CLOSURE AND RECLAMATION

5.1 DEFINITION OF PERMANENT CLOSURE AND RECLAMATION

Permanent closure is defined in the MVLWB Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB/AANDC 2013) as follows:

"Permanent closure is the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining."

Reclamation is defined in the MVLWB Guidelines as follows:

"The process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety."

Baffinland acknowledges that due to various economic drivers (commodity prices, escalation of construction and production costs, extended maintenance shutdown, others), Baffinland may be forced into a temporary or permanent closure scenario. For planning purposes, Baffinland defines two types of temporary closure as follows:

- **Short-term Closure (described in Sections 7.1 and 7.2):** Cease commercial operation for a period of up to one (1) year while maintaining all equipment and facilities in a state of readiness to resume operation with minimal delay or have project components at the ready for use to support closure activities.
- **Long-term Closure (described in Section 7.3):** Extension of a short-term closure to over (1) year for an indefinite period while all Project sites are maintained in a secure condition and all facilities and equipment are de-energized and winterized until the operation resumes or the site is reclaimed as part of permanent closure.

Consideration of future land use is an important closure principle in the continuous refinement of this ICRP. To date, future land use has been considered in numerous aspects of the mine planning, such as:

- Adopting environmental management best practices during mining to reduce impacts where possible;
- Development of additional management plans to address specific land user concerns (e.g. ballast water management);
- Major project considerations such as the avoidance of winter shipping during operations;
- Various planned reclamation activities which are not required to establish physical and chemical stability, such as:
    - Scarification to promote natural revegetation

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- Removal of above-grade buildings
- Re-establishing pre-existing drainage pathways where practical

- Clean up of pre-existing waste (e.g. non-hazardous debris and barrel dump) at Mary River

Moving forward Baffinland will seek further input from communities on potential closure options that promote the desired post-closure land use. Feedback via engagement activities will be compiled and considered within the MCWG to identify feasible options that can be incorporated into future revisions of the ICRP. Baffinland has committed to several closure objectives focusing on land use, which are presented in Table 5.1.

In keeping with the closure principles, the objectives and criteria presented below avoid introducing designs which would require long term active care. This closure principle was adopted with the inclusion of the MVLWB Guidelines following the preparation of the PCRP and FEIS process, resulting in a modified closure approach at the Open Pit from long term passive flooding to include a combination of natural flooding and pumping.

5.1.1 Closure Objectives and Criteria

A description of the closure criteria and applicable monitoring program that is proposed to be implemented to confirm that the objectives were met for each Project component is summarized in Table 5.1 for permanent and temporary closure. In addition to the specific criteria listed below to measure reclamation success, QIA's approval is also required to achieve mine closure as a condition of the Commercial Lease (Q13C301).

As the Project is in the initial years of operations, closure planning is expected to be refined over time using findings from engagement efforts (e.g. MCWG), site-specific operational knowledge, environmental monitoring programs, progressive reclamation, and reclamation research studies.

An important aspect of ongoing closure planning will be periodic assessment of predicted impacts to the biophysical environment, and the assumed reclamation performance for planned closure activities. This process will reduce uncertainties in post closure conditions and allow for increasing detail in the closure design leading up to a FCRP. As outlined in the Project Certificate No 005, one of the primary purposes of the NIRB Monitoring Program for the Project is to assess the accuracy of predictions contained in the environmental impact statements. As a result, the findings of Baffinland's ongoing monitoring and management plans are compared to the predictions made as part of the FEIS and the ERP on a continual basis within the NIRB annual reporting process which allows for comment by Project stakeholders. Tracking and understanding of project impacts/effects is also a focus of the Marine and Terrestrial Environment Working Groups (MEWG, TEWG). These processes and groups are expected to play important roles in informing ongoing closure planning and ICRP updates.

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Table 5.1: Closure Objectives, Criteria and Actions by Major Project Components (Based on ERP – 4.2 Mtpa Nominal)

Project Component	Closure Objectives	Closure Criteria	Actions/Measurements
Site Wide[2]	Drainage pathways for surface runoff are physically stable to limit risk to humans and receiving environment[1].	Drainage pathways will be designed by a professional engineer for long-term stability to mitigate against erosion. No significant signs of deformation, degradation and/or erosion and sedimentation which could contribute to physically unstable conditions as visually observed during geotechnical inspections by a qualified professional engineer. Inspection criteria and schedule will be refined based on the final engineering designs for site grading and specific engineered drainage controls.	Geotechnical assessment, analysis and/or monitoring of the drainage pathways will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9.2). Surface water quality monitoring will be completed post-closure at applicable drainage pathways to ensure all relevant closure objectives and criteria have been met. See closure objective relating to Site Wide Surface Water.
	Mine areas are physically stable for use by humans and receiving environment[1].	No significant signs of deformation or degradation at remaining engineered structures and/or other disturbed areas which could contribute to physically unstable conditions. This will be confirmed by visual monitoring as part of site geotechnical inspections. Inspection criteria and will be refined based on the post closure stability assessment for remaining mine structures and Final Grading Plan.	Geotechnical assessment, analysis and/or monitoring of the mine areas will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9.2). The expected level of effort associated with the different mine areas is included in Section 9. Monitoring scope and duration will be informed by operational performance results where possible, and detailed in the final grading and engineering designs for remaining structures.
	Surface water runoff and seepage that is safe for humans and the receiving environment[1].	Closure water quality meets Type A Water Licence effluent criteria, territorial/federal guidelines, MDMER, and/or site-specific risk-based criteria, as relevant to the specific mine areas and components. At present, water quality predictions for the Open Pit and Waste Rock Stockpile discharges and receiving waterbodies indicate that risk based criteria and/or risk management strategies may be required. Criteria will be refined based on water quality monitoring results during operations and research studies.	Monitoring activities as part of the Closure and Post-Closure Aquatic Monitoring and Reporting Program. Specific testing parameters, frequencies, locations and program durations will be refined over time based on findings of operational monitoring programs and research studies.
	Remaining area will be safe for humans and the receiving environment[1].	No buildings or equipment remain above surface grade following final closure (excluding Ore Dock and Tote Road). Completion of an approved Final Grading Plan that has considered input from MCWG. This criteria is supplemented by several other closure criteria focusing on additional aspects of closure (e.g. chemical and physical stability) Areas with risk to humans, terrestrial wildlife and/or aquatic biota will be managed to reduce hazards to an acceptable level. This criteria will be refined based on the results of planned research studies. Additional, more specific criteria may be added prior to closure to focus on activities such as fish consumption and drinking water quality in particular areas of interest (e.g. Mary's River, Sheardown Lake). These additions will require updated residual effect predictions.	Geotechnical assessment, analysis and/or monitoring of the mine areas will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9.2). The expected level of effort associated with the different mine areas is included in Section 9. Monitoring activities as part of the Closure and Post Closure Aquatic Monitoring and Reporting Program and Post-Closure Fauna and Flora Monitoring Final inspection by a qualified professional[3] and representative of Designated Inuit Organization.

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Project Component	Closure Objectives	Closure Criteria	Actions/Measurements
	Area facilitates the desired wildlife movement	Completion of an approved Final Grading Plan that has considered input from MCWG. To the extent possible, disturbed areas to be scarified to promote natural revegetation. Use of the site by wildlife (i.e. birds, mammals) will be consistent with FEIS, or updated predictions. Detailed metrics will be developed in concert with MCWG and included in the FCRP. Current residual effect predictions for individual wildlife and specific site areas are presented in Appendix G.	Geotechnical assessment, analysis and/or monitoring of the mine areas will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9.2). The expected level of effort associated with the different mine areas is included in Section 9.2 Final inspection by a qualified professional[3] and representative of Designated Inuit Organization. Post closure flora and fauna monitoring (Section 9.5) will address selected metrics to assess wildlife presence and use in comparison with FEIS or updated impact predictions.
	Air quality safe for humans and wildlife	Mean Total Suspended Particulate concentrations and PM 2.5 closure criteria will be developed based on site-specific risk based criteria, in consideration of the NU Ambient Air Quality Standard).	Post-closure dustfall and active ambient monitoring at appropriate locations, for a limited duration post-closure as part of the Air Quality Monitoring Program (Section 9.9)
	Natural revegetation is promoted	Grading and scarification completed as outlined by an approved Final Grading Plan. Baffinland has committed to completing reclamation activities that will promote natural revegetation over long timelines, but specific criteria or goals for vegetation growth post-closure are not planned.	Final inspection by a qualified professional[3] and representative of Designated Inuit Organization.
	Aesthetic conditions of the project areas are similar to surrounding natural conditions	No visible buildings, equipment, or non-local materials. This excludes structures remaining at, and below grade (i.e. concrete foundations) and those which stakeholders have agreed should remain post closure, such as the Ore Dock, Tote Road, and select water crossing abutments. Final grading reflects surrounding topography where possible (i.e. limit steep slopes) and re-establish pre-existing drainage pathways. Activities to promote natural revegetation to the extent possible as outlined in the Final Grading Plan. Criteria may be refined through discussions in the MCWG.	Final inspection by a qualified professional[3] and representative of Designated Inuit Organization.
Open Pit and Mine Workings (including spillway to remain post closure)	Physically stable Open Pit Mine Workings and Spillway to limit risk of failure that could impact humans and receiving environment[1].	Final Open Pit, mine workings and spillway are within final long term stability assessment assumptions/design constraints. No visual indications of significant deformation and degradation is observed during final inspections by a professional engineer. Inspection/monitoring criteria and schedule will be refined based on the final engineering assessments.	Geotechnical assessment, analysis and/or monitoring of the Open Pit, mine workings and spillway will occur as part of the Geotechnical/ Engineering Monitoring Program (Section 9.2). The expected level of effort associated with the different mine areas is included in Section 9.2 Final inspection completed by Inspector of Mines (WSCC).

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Project Component	Closure Objectives	Closure Criteria	Actions/Measurements
	Open Pit Lake water quality is not a risk to humans and receiving environment[1]	The FEIS predictions for pit water quality indicate that there could be potential exceedances for substances that could cause a risk to humans (such as mercury) and the receiving environment (Appendix H, Table 4). To understand this potential risk and mitigation/management options further, Baffinland plans to refine the Pit flooding estimates and water quality predictions in the future using site data. This work is required to develop meaningful criteria.	Monitoring activities as part of the Closure and Post Closure Aquatic Monitoring and Reporting Program and Post-Closure Fauna and Flora Monitoring Specific testing parameters, frequencies, locations and program durations will be developed over time based on findings of operational monitoring programs and pit flooding and water quality research studies (Appendix D).
	Surface runoff and seepage water quality is safe for humans and receiving environment[1].	Achieve "Recognized Closed Mine" status per Section 4 of MDMER. Effluent discharge quality is consistent or improved from the initial FEIS predictions. To understand this potential risk and mitigation/management options further, Baffinland plans to refine the Pit flooding estimates and water quality predictions in the future using site data. This work is required to develop meaningful criteria.	Monitoring activities as part of the Closure and Post Closure Aquatic Monitoring and Reporting Program and Post-Closure Fauna and Flora Monitoring Specific testing parameters, frequencies, locations and program durations will be developed over time based on findings of operational monitoring programs and pit flooding and water quality research studies (Appendix D).
Waste Rock Stockpile	Physically stable Waste Rock Stockpile and to limit risk of failure that would impact humans and receiving environment[1].	Final Waste Rock Stockpile is within final long term stability assessment assumptions/design constraints. No visual indications of significant deformation and degradation is observed during final inspections by a professional engineer. Inspection/monitoring criteria and schedule will be refined based on the final engineering assessments.	Geotechnical assessment, analysis and/or monitoring of the Waste Rock Stockpile will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9.2). The expected level of effort associated with the different mine areas is included in Section 9.2
	Chemically stable Waste Rock Stockpile to limit risk of failure that would impact humans and receiving environment[1].	Confirmation of PAG placement has occurred as outlined in the approved management plans. Golder (2018) outlines the current deposition strategy. Effluent discharge quality is consistent, or improved from FEIS predictions. Achieve "Recognized Closed Mine" status per Section 4 of MDMER. To understand this potential risk and mitigation/management options further, Baffinland plans to refine the water quality predictions in the future using site data. This work is required to develop meaningful criteria.	As-built drawing and confirmatory geochemical sampling results (confirming PAG placement) is deemed acceptable by a professional engineer. Monitoring activities as part of the Closure and Post Closure Aquatic Monitoring Program. Specific testing parameters, frequencies, locations and program durations will be developed over time based on findings of operational monitoring programs and pit flooding and water quality research studies (Appendix D).
Infrastructure and Ancillary Areas **Subcomponents:** • **Quarries and Stockpiles** • **Buildings and Equipment** • **Mine Infrastructure (e.g. pads and laydowns, secondary roads, airstrip, crusher)** • **Transportation Routes (Tote Road, Southern Railway and Ore Dock)**	Physically stable disturbed areas to limit risk of failure that would impact humans and receiving environment[1]	No significant signs of deformation or degradation at remaining engineered structures (e.g. Tote Road sections and select abutments at water crossings, Ore Dock) and/or other disturbed areas (e.g. quarries, laydowns, decommissioned landfills and landfarms) which could contribute to physically unstable conditions. This will be confirmed by visual monitoring as part of site geotechnical inspections. Surface contouring at disturbed areas is completed as outlined in an approved Final Grading Plan.	Geotechnical assessment, analysis and/or monitoring of the infrastructure and ancillary areas will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9.2). The expected level of effort associated with the different mine areas is included in Section 9.2

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Project Component	Closure Objectives	Closure Criteria	Actions/Measurements
• Waste Management Areas (e.g. landfarms and landfills) • Water Management Areas (water treatment systems, settling ponds, pit dewatering system) • Quarries and borrow areas	Chemically stable disturbed areas to limit risk impact to humans and receiving environment[1]	Chemical contaminant sources are removed from site. Residual soils meet federal/territorial soil quality guidelines or site-specific risk based criteria as required (CCME agricultural is assumed at this time). If soil exceeds the adopted criteria it will be removed or risk managed to the satisfaction of a qualified professional[3] to achieve protection of ecological and human health. For areas such as quarries and landfills that will have runoff, closure runoff water quality meets territorial/federal guidelines and/or site-specific risk-based criteria. Mine areas subject to MDMER (e.g. Crusher area).	Post Closure Site Assessment will include an ESA component at potentially impacted areas (e.g. equipment and fuel storage areas). If required, HHERA would also be undertaken. Monitoring activities as part of the Closure and Post Closure Aquatic Monitoring Program. Specific testing parameters, frequencies, locations and program durations will be refined over time based on findings of operational monitoring programs and research studies.

Notes:

[1]Receiving Environment – includes aquatic (freshwater and marine) biota and terrestrial biota.

[2]Site Wide project component – Discussion under this heading includes all project areas.

[3]Qualified Professional assumes a minimum of 3 years experience in the relevant field.

No closure activities are anticipated for the marine environment, consequently no specific closure objectives have been included. Future updates here may be completed as informed by the MEWG.

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5.2 Permanent Closure and Reclamation Requirements

The closure and reclamation approach for the Project was developed on the basis of:

- MVLWB/AANDC Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the NWT (MVLWB/AANDC, 2013); and
- QIA Abandonment and Reclamation Policy for Inuit Owned Lands (2013).

It adheres to generally-accepted rehabilitation criteria and focuses on both physical and chemical stabilization of the site. Land disturbances not needed to support active operations will be concurrently reclaimed.

The main work items for final mine closure and reclamation include:

- Filling the open pit with water to stabilize the pit walls and mitigate falling hazards.
- Installation of a boulder fence and signage around the open pit to prevent inadvertent access.
- Removal of all mining and transportation infrastructure other than the Open Pit, Waste Rock Pile, Milne Port Tote Road, and Milne Port Ore Dock. The Milne Port Tote Road and Ore Dock will be left in place after the Project life, but not maintained.
- Demolition and removal of all buildings and foundations.
- All mining materials and equipment will either be removed from site or disposed of in on-site landfills/approved waste disposal areas.
- Removal of all hazardous materials and wastes will be removed from site to licensed disposal facilities.
- Storage of non-hazardous wastes on site.
- Capping of all landfills and other disposal areas.
- Removal of water management systems and infilling of mine water ponds.
- Roads, airstrips, and development areas will be re-contoured as required to provide long-term stability and reduce the potential for erosion.
- Removal of water crossings and regrading of disturbed project areas to restore natural drainage patterns.
- Scarification of disturbed areas of former mine infrastructure to encourage natural revegetation.
- Monitoring during closure and post closure up until the post-closure site assessment shows that the closure works been successful in meeting the closure criteria.

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These following sub-sections describe each of the mine components, how they are to be rehabilitated and what options were considered, what uncertainties there are with respect to the closure and management, monitoring of the project component following closure.

Project components will be considered closed and reclaimed when closure criteria outlined in Section 5.1.1 are met. As the Project advances through the detailed design phase, changes to the Project may occur that will alter the Interim Mine Closure and Reclamation Plan. Though changes may occur, at this time it is anticipated that the major components of the Project will remain the same.

5.2.1 Open Pit Mine Workings

5.2.1.1 Project Component Description

Mining commenced on a hill crest outcrop, and will progress until Year 10 to 12 of operation at full production volume (based on a nominal 21.5 Mtpa) before an open pit is formed. The mine plans call for conventional open-pit mining methods utilizing 7.5 m benches.

Ore is delivered to the primary crusher (discussed in Section 5.2.5) located south of the deposit via the east main haul road.

The general configuration of the mine pit, haul road and waste rock dump is presented in Figure 5.1.

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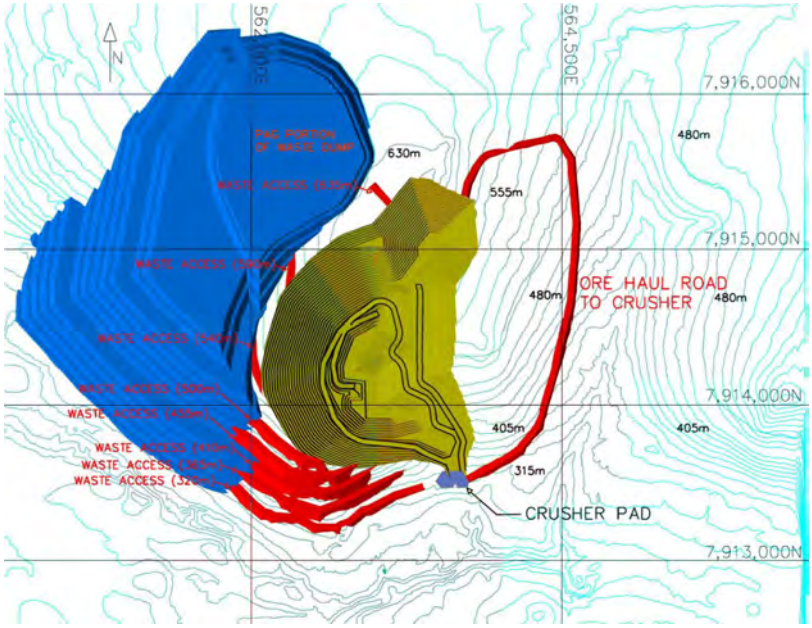


Figure 5.1 General Layout and Development Of Deposit 1 Pit

5.2.1.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions are summarized in Section 3. The current mine workings are free draining and there is no open pit, rather there are the development of benches on the hillside that are largely free draining. Appendix C provides a photolog showing the current mining operations.

The final site condition of the open pit will be a pit lake that drains to the natural environment through the spillway and natural drainage from the southeast corner of the open pit (KP 2008). It is currently anticipated that the discharge from the open pit will not require treatment (AMEC 2010).

The predictions of residual environmental effects presented in the FEIS assumed that upon cessation of operations, the perimeter of the open pit would be barricaded and remain restricted. The need for this restriction is uncertain, and will be assessed during ongoing closure planning.

5.2.1.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

5.2.1.4 Consideration of Closure Options and Selection of Closure Activities

BIML considered two options to address the closure objectives for the Open Pit, including (ensuring the site is physically stable against pit wall slope failure and mitigating the falling risk the void poses to humans and wildlife), including:

- Backfilling the open pit with waste rock; and
- Filling the pit with water (flooding).

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Backfilling of open pits at closure is rarely conducted at mine sites due to the high cost even when sufficient materials are present on the property. The open pit at final closure will have an estimated volume of 43,400,000 m^3 below the lip of the pit, and backfilling this volume of material into the pit is not considered economically viable.

Flooding the pit was found to be more economically viable. The timeline for this process is uncertain, but preliminary estimates suggest that passive pit flooding with water from natural sources such as seepage into the pit, direct precipitation and surface runoff may take between 85 to 150 years (KP 2008). An enhanced pit filling alternative (i.e. active pumping) has also been assessed and suggests that pit filling could be completed in as few as 2 years. This is discussed below in greater detail.

The mining plan and the ongoing waste rock characterization plan will inform the prediction modeling of the mine pit water quality at the end of mine life. Should the modeling indicate potential exceedance of water quality objectives due to prolonged oxidation of the pit walls, alternative pit filling scenarios will be considered to mitigate this effect, including accelerated pit filling. The discussion below regarding accelerated pit filling is largely theoretical as there will be significant limitations and challenges to undertaking an ongoing, year-round pumping operation on the scale that would be required.

Enhanced Pit Filling Alternative

The filling of the pit can be accelerated via pumping water from a nearby water source – thereby complementing the accumulation of natural precipitation and ground water accumulation.

Assisted pit filling is governed by two parameters – technical limitations that drive pumping costs and water source locations/drawdown limits. Costs are driven by materials and equipment required for the operation (e.g., heat-traced piping, pumps, generators, and fuel requirements) as well as the construction and maintenance of the necessary roads and berms. Pumping water to the pit is uphill and therefore significant elevation head will provide technical challenges to any pumping design. Water source drawdown limits are designed to ensure that the volume of water extracted from a given source does not significantly lower the water table and has minimal impact on the aquatic ecosystem. Key factors to consider when calculating maximum acceptable drawdown of a lake include: potential spawning habitat as well as the residency time of the water body. The Department of Fisheries and Oceans (DFO) – Protocol for Winter Water Withdrawal from Ice-covered water bodies in the Northwest Territories and Nunavut, 2010 recommends, in the absence of a waterbody-specific assessment, that water withdrawals should not exceed 10% of the under ice lake water volume. Using this guidance as a proxy, Baffinland evaluated potential lake water sources for pit filling using annual water withdrawal of 10% of the total lake volume. Another consideration is distance to the pit and level terrain, in order to reduce pumping costs.

The Project pit has identified four potential water sources that can theoretically be used for filling the pit – Sheardown Lake, Camp Lake, Mary Lake and Mary River. This information is summarized in Table 5.2.

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Table 5.2: Potential Water Source Pit Fill Data (Conceptual Level)

Water Source	Pumping Distance	Total Volume/ Annual Flow (m^3)	Permissible Annual Water Take (m^3)	Number of Years to Fill Pit
Sheardown Lake (NW Basin)	2 km	8,175,410[1]	820,000	53
Camp Lake	4.7 km	27,511,100[2]	3,000,000	15
Mary Lake	12 km	169,606,250[3]	11,200,000	4
Mary River (at MR-12, east pond discharge location)	< 1 km	78,185,678 (mean)[4] 53,166,261 (10-year dry)[4]	23,000,000 (30% of Mean Annual Discharge)	2

Source:
1. Based on Mary River Project FEIS, Appendix 7C, Figure 4.1-3
2. Based on Mary River Project FEIS, Appendix 7C, Figure 4.1-1
3. Based on Mary River Project FEIS, Appendix 7C, Figure 4.1-7
4. Based on Mary River Project FEIS, Volume 7, Table 7-3.18 – Calculated from the Mary River MAD plus annual inputs from the east pond

Sheardown Lake and Camp Lake are closer to the proposed final pit at a distance of 2 km and 4.7 km respectively, as opposed to Mary Lake which sits at a distance of 12 km from the pit. This results in Sheardown and Camp Lakes having shorter pumping distances than Mary Lake. Unfortunately, Sheardown and Camp Lakes have total volumes of 8,175,410 m^3 and 29,690,200 m^3, allowing to draw maximum volumes of only 820,000 m^3 and 3,000,000 m^3 per annum, thus resulting in a total theoretical pit fill times of 53 and 15 years respectively. In addition to this, Sheardown and Camp Lakes have a very long "residence" time for the water in the lake to completely recycle itself. As a result, it may be necessary to draw even less than 10% of the total lake volume in order to ensure no significant impact to the Sheardown or Camp Lake ecosystem.

The main basin of Mary Lake has a volume of 112,000,000 m^3 providing a total draw volume of 11,200,000 m^3 per annum. Assuming the maximum available volume of water is drawn this will result in a pit fill time of approximately four (4) years. In addition to this Mary Lake has a very high recharge rate completely "recycling" approximately every 1.5 years – resulting in minimal impact to the lakes ecosystem. Unfortunately, Mary Lake is located 12 km from the pit, which would result in substantial pumping costs and technical challenges – which are not expected to be economically feasible.

The Mary River offers the fourth pit filling alternative. DFO (2010) provides guidance on determining ecological flow requirements to establish water withdrawal volumes and rates that are not expected to have an impact. Withdrawals greater than 10% of the instantaneous flow and 30% of the Mean Annual Discharge (MAD) require rigorous assessment. To determine the potential viability of Mary River as a water source, 30% of the MAD has been applied in Table 5.2 to establish a 2-year pit filling period. Pumping may not be possible in low flow years. Between approximately 60 to 70% of the annual flow in the Mary River occurs during a 30 to 35 day freshet period in most years, so much of the annual

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withdrawal would need to take place during this brief period. Given the shorter length of pipeline, Mary River would likely be the preferred option for pit filling, subject to further study.

Periodic pumping involves pumping from the Mary River during the summer months only, when ice cover is not an issue. This period, June to September provides us with a maximum four month pumping window. Pumping during this time is essential as Mary River freezes solid during the winter months. Warm weather pumping also reduces the cost of constructing and maintaining a pipeline.

Assuming pumping continues 24 hours a day for the entire summer period this would require a pumping system that could deliver 8,700 m^3/hour, over approximately a 1 km distance and an approximate elevation head of 200 m. During the winter months the pump and pipeline would be drained and locked out to ensure that the equipment is not damaged by the winter conditions.

Continuous pumping assumes that water will be pumped to the Mine Site pit 24 hours a day all year long. Mary River is not an option for this scenario as it freezes during the winter, leaving Mary Lake the only option for continuous pumping. Technical and economic feasibility is unlikely assuming 24-hour continuous pumping with no delays or malfunctions for the entire year at a pumping rate of 1,300 m^3/hour, over a 12 km distance and 250 m elevation head.

Over winter pumping also presents other challenges including: the heating of pipelines, snow removal, ice removal from discharge and intake points, extreme weather conditions, increased maintenance costs and risk to personnel. Given these conditions it is expected that continuous pumping would not be a technically and economically feasible option.

5.2.1.5 Engineering Work Associated with Closure Activity

The main work items for closing the open pit are as follows:

- Conducting an engineering stability analysis to confirm the long-term stability of the pit walls;
- Barricading the ramps into the pit, construction of a perimeter boulder fence (or equivalent), and installation of hazard signage to mitigate the potential for inadvertent access;
- Removal of dewatering infrastructure used during operation (i.e., pumps, surge box and pipelines);
- Cleanup of any soil contamination (i.e. hydrocarbons, etc.) – see Section 9.6;
- Filling the open pit with water, either naturally or by enhanced filling; and
- Construction of a spillway at the southeast corner of the Open Pit.

The proposed closure activities for the open pit suggest that the open pit be allowed to naturally flood to form a “pit lake”. At closure, inert wastes (i.e., material having insignificant leachability and pollution content) may be disposed of in the open pit. It is anticipated that the open pit will take an estimated 85 to 150 years to passively fill with water from natural sources such as seepage into the pit, direct precipitation and surface runoff (KP 2008). There are a number of different potential scenarios for

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accelerating the pit filling which are presented above in Section 5.2.1.4. These will be further assessed prior to final closure if accelerated filling is deemed required.

Once the open pit fills to the point of overflow, pit drainage will enter the natural environment through the spillway and natural drainage from the southeast corner of the open pit (KP 2008), eventually reaching the receiving waters of Mary River. It is currently anticipated that the discharge from the open pit will not require treatment (AMEC 2010). However, if treatment is required several effective technologies are currently available to manage metal leaching and/or acid rock drainage (ML/ARD). If ML/ARD were to develop, batch treatments will be carried out to adjust the pH and/or metal concentrations of the water in the pit so that it meets discharge requirements before overflow into the environment. The overflow location at the southeast area of the pit will provide emergency access to and from the open pit/pit lake.

5.2.1.6 Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing the open pit mine workings, were assessed as part of the FEIS with respect to VEC/VSEC. These effects, and the methods for their assessment are summarized in Appendix G.

As the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigative measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

5.2.1.7 Uncertainties

As noted in Section 5.2.1.4, there is uncertainty as to the long-term water quality in the open pit. Baffinland will conduct monitoring and research as necessary to resolve uncertainties pertaining to residual effect assessments and environmental risks that may have closure implications. Uncertainties related to the open pit mine workings include whether or not there is potential for the generation of ML/ARD from the contact of water with the final pit. It is currently anticipated that the discharge from the open pit will not require treatment (AMEC 2010); however, there is uncertainty. The mining plan and the ongoing geochemical characterization plan will inform the prediction modelling for mine pit water quality at the end of mine life as presented in the Life-of-Mine Waste Rock Management Plan (Appendix 5 , BAF-PH1-830-P16-0031) and Section 5.2.1.8, Appendix D of the FEIS.

This uncertainty has been highlighted by stakeholders and Baffinland has committed to addressing the concern within the Reclamation Research Plan. A detailed description of the planned research is presented in Appendix D.

There is uncertainty regarding the infilling rate of the open pit. There are two proposed options for options for pit infilling, natural flooding and enhanced pit filling (which uses pumps from nearby lakes. For both methods, the total time to flood the pit is uncertain, and for the enhanced pit filling alternative, the source for the water for flooding has only been identified at a conceptual level. This concern has been

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highlighted by stakeholders, and Baffinland will proactively address this issue within the Reclamation Research Plan. A detailed description of the planned research is presented in Appendix D.

5.2.1.8 Post Closure Monitoring, Maintenance and Reporting

Conceptual modelling of the pit water quality is presented in the Mary River Project FEIS. Open pit monitoring will be done throughout of the life of the Project as per the Type A Water Licence and in accordance with MDMER requirements. Predictions of pit water quality will be updated throughout the life of the Project as more information comes available on the geochemistry of the waste rock and the pit wall. Although indications to-date demonstrate a low probability of ML/ARD, if monitoring results during Operations suggest a potential ML/ARD it shall be dealt with at that time and any associated impacts that ARD and/or ML would have on closure and reclamation planning, monitoring, Long-term maintenance and bonding will be addressed. If there are no indications from test programs or ongoing monitoring of ML/ARD throughout the Operation Phase, at final closure the open pit will be inspected by a qualified engineering professional to assess the physical stability of the pit walls and pit lake and to reconfirm no indicators of ML/ARD.

ARD and ML will be periodically reassessed as a potential issue in the future ICRP revisions and in the Final MCRP. The Final MCRP will present a time frame for the potential development of ML/ARD conditions, if any, and discuss the impact of ML/ARD release on final closure identifying the need for ongoing monitoring, treatment, and potential mitigations

Post-closure monitoring of open pit mine workings includes geotechnical/engineering monitoring (Section 9.2), aquatic monitoring (Section 9.3), Environmental Site Assessment (Section 9.4), fauna and flora monitoring (Section 9.5), and safety compliance inspection (Section 9.7). Maintenance required will depend on the outcome of the monitoring programs, and would be completed as outlined in Section 9. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.1.9 Contingencies

There are two contingencies to address potential water quality concerns in the open pit:

- accelerated pit filling (discussed in Section 5.2.1.4);
- and treatment of water before discharge (discussed below).

Conceptual modelling of the pit water quality is presented in the Life-of-Mine Waste Rock Management Plan (Appendix 5, BAF-PH1830-P16-0031). Open pit monitoring will be done throughout of the life of the Project as per Type A Water Licence Amendment No. 1 requirements and in accordance with MDMER requirements. Predictions of pit water quality will be periodically updated throughout the life of the Project as more information becomes available on the geochemistry of the waste rock and the pit wall.

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Although indications to-date demonstrate a low probability of ML/ARD, in the event that ongoing water quality modelling or field monitoring shows a trend toward exceedance of discharge requirements, then water treatment options will be determined and implemented. Details regarding theoretical treatment options are provided in the Life-of-Mine Waste Rock Management Plan (Section, 3.6.4, BAF-PH1830-P16-0031) and were considered for both metal and ammonia/nitrate removal. Theoretical treatment options for metals removal included:

- Resins
- Polymer Addition
- Sodium Hydrosulfite Treatment
- Ozonation
- Biofilters-Sulphide Precipitation
- Activated Carbon
- Lime Precipitation

Theoretical treatment options for ammonia/nitrate removal include:

- Biological De-nitrification (for removal of both ammonia and nitrate)
- Ion Exchange
- Electro-Chemical Ion Exchange
- Breakpoint Chlorination of Ammonia

If there are no indications from test programs or ongoing monitoring of ML/ARD throughout the Operation Phase, at final closure, the open pit will be inspected by a qualified engineering professional to assess the physical stability of the pit walls and pit lake and to reconfirm no indicators of ML/ARD.

ML/ARD will be periodically reassessed as a potential issue in the future ICRP revisions and in the Final CRP. Reclamation Research to address the uncertainty of what closure and post closure activities are required to ensure open pit runoff water quality meets closure objectives and criteria, including ML/ARD issues, is expected to commence at approximately Year 10 of Operations (when an Open Pit is expected to exist associated with the Project). Based results of this research, the ICRP will be updated to present a time frame for the potential development of ML/ARD conditions, if any, and discuss the impact of ML/ARD release on final closure identifying the need for ongoing monitoring, treatment, and potential mitigations.

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5.2.2 Waste Rock and Overburden Piles

5.2.2.1 Project Component Description

A waste rock disposal area designed for permanent storage of waste rock is located north of the open pit. Based on the current mine plan, an estimated 600 Mt of waste rock and 30 Mt of overburden will be generated from the mining of Deposit No. 1.

The Waste Rock Stockpile design has sufficient capacity to stockpile the entire volume of waste produced by the mine plan. As described in Section 3.3.3, the majority (approximately 85%) of the LOM waste rock produced by the mine is anticipated to be non-potentially acid generating (Non-PAG).

Waste characterization, volume estimation, and monitoring of the Waste Rock ML/ARD is ongoing. The design of the waste rock facility will be updated periodically as necessary throughout the LOM.

The PAG, Non-PAG, and Overburden are handled as three separate streams and are placed in zones within the Waste Rock Facility. Figure 5.2 presents the distribution of PAG, non-PAG, and Overburden in the Waste Rock pile. Figure 5.3 presents the progressive development (construction steps) for the Waste Rock Pile.

The deposition strategy for the water rock area is to promote permafrost aggradation. To support this natural process, the following guidelines for placement and development have been adopted:

- The pile will be constructed in lifts from the bottom up with lift and bench characteristics appropriate for the geotechnical conditions and waste handling equipment. These characteristics will be approved by Mine Operations.
- Waste rock placed within 25 m of the outer edge of the pile should be Non-PAG and be placed during the winter months in lifts of no greater than 2 to 3 m to help advection within the pile.
- A 2 to 3 m thermal barrier of Non-PAG waste rock will be placed during the winter months to the extent practical to protect the permafrost layer during the summer months and allow development of the permafrost into the pile.
- Prior to the placement of any Non-PAG rock on natural ground within 25 m of the outer edge of the pile, snow and non-frozen material will be removed from the footprint to the extent practical.
- PAG rock should all be placed in the same watershed in the waste rock pile (may be modified in future updates to the Waste Rock Management Plan).
- PAG waste rock placement will be segregated from non-PAG rock placement and the location of PAG material documented.
- Waste rock will be placed in lifts while minimizing the overall thickness of the unfrozen material.

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- PAG waste rock should be deposited such that permafrost aggradation in the following seasons occurs to the extent practicable.
- The perimeter of the pile will be a minimum of 31 m from any natural water body.
- Haul ramps for the waste stockpile will be similar in design to those within the pit and will be approximately 20 m wide at maximum 10% grades.

The existing disposal area within the LOM WRF footprint is within the western watershed which drains into Camp Lake. For Phase 1, a pond was constructed to the north of the disposal area as well as collection and diversion ditches along the perimeter of the waste rock pile. Water is discharged from the pond to the Mary River watershed via a lay flat hose to convey the water to an existing water course draining into a tributary of Mary River.

The expanded footprint outlined in the Phase 1 Extension plan is also located in the western watershed up-gradient of the existing WRF and WRF pond. As part of the Phase 1 Extension, the existing WTF pond will be upgraded to accommodate the additional flows attributed to the footprint expansion. Collection ditches and diversion ditches will be constructed considering the pile expansion; a water treatment system is built and is currently operational. The temporary water runoff management plan to be completed in spring 2018 is shown and the permanent upgrade to the water management system is scheduled for fall 2018.

Further phased surface water management (ditches and ponds) will be designed as mining progresses. All phases of the run off management system will be designed such that water discharged from the WRF will be in compliance with applicable water quality discharge criteria outlined in the Type A Water Licence and the MDMER.

Surface water collection systems consisting of collection channels, diversion channels and settlement ponds are implemented as part of the waste dump water management system. In addition to sediment control, these collection systems will minimize the introduction of water into the waste dump foundations, where standing water may adversely affect the thermal regime and, therefore, chemical stability. Runoff water quality will be monitored. Discharge from the sedimentation ponds will be channeled to the Camp Lake Tributary (West pond) and to Mary River (East pond). Figure 5.4 presents the drainage features of the Waste Rock Pile.

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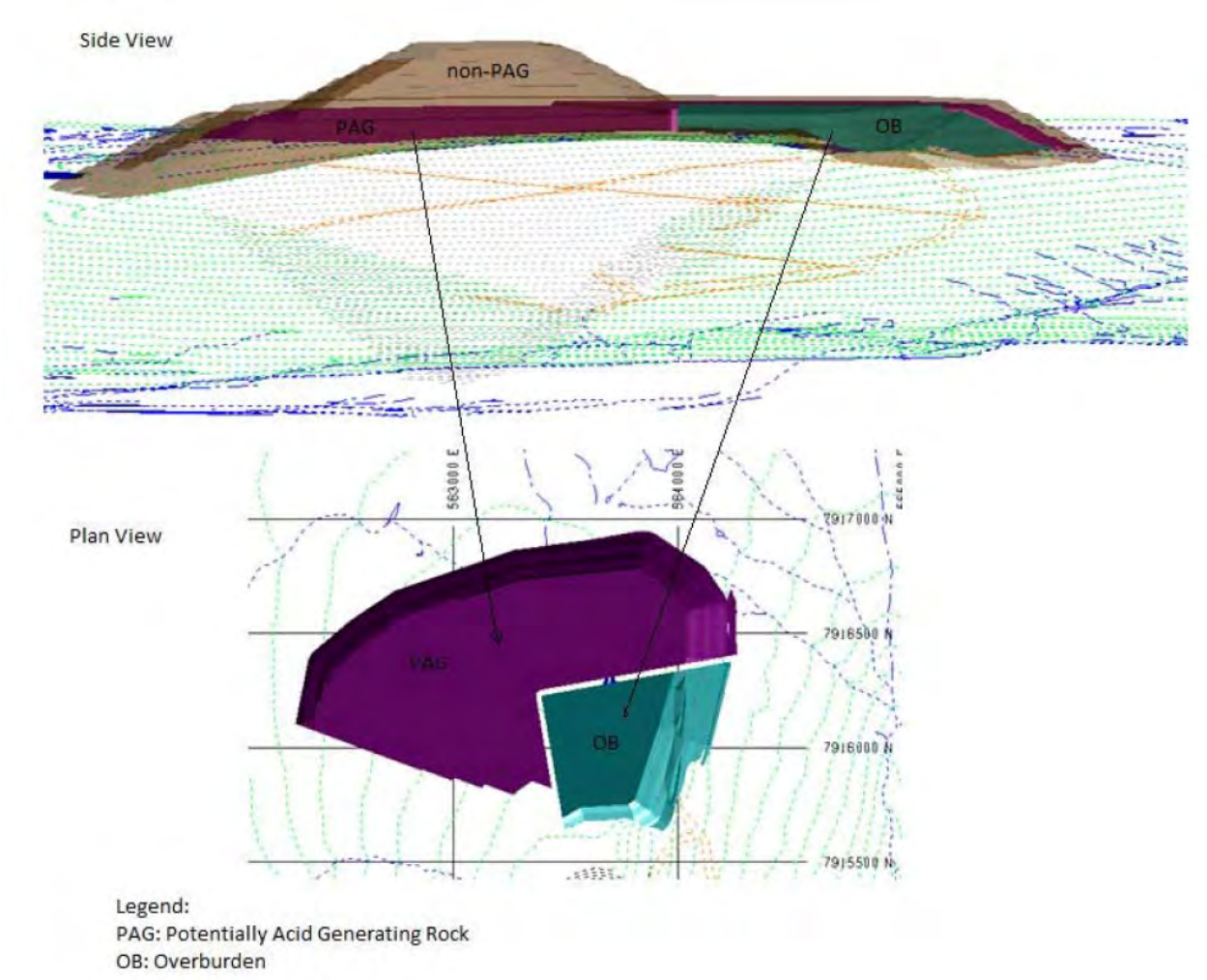


Figure 5.2 Placement of Waste Rock and Overburden

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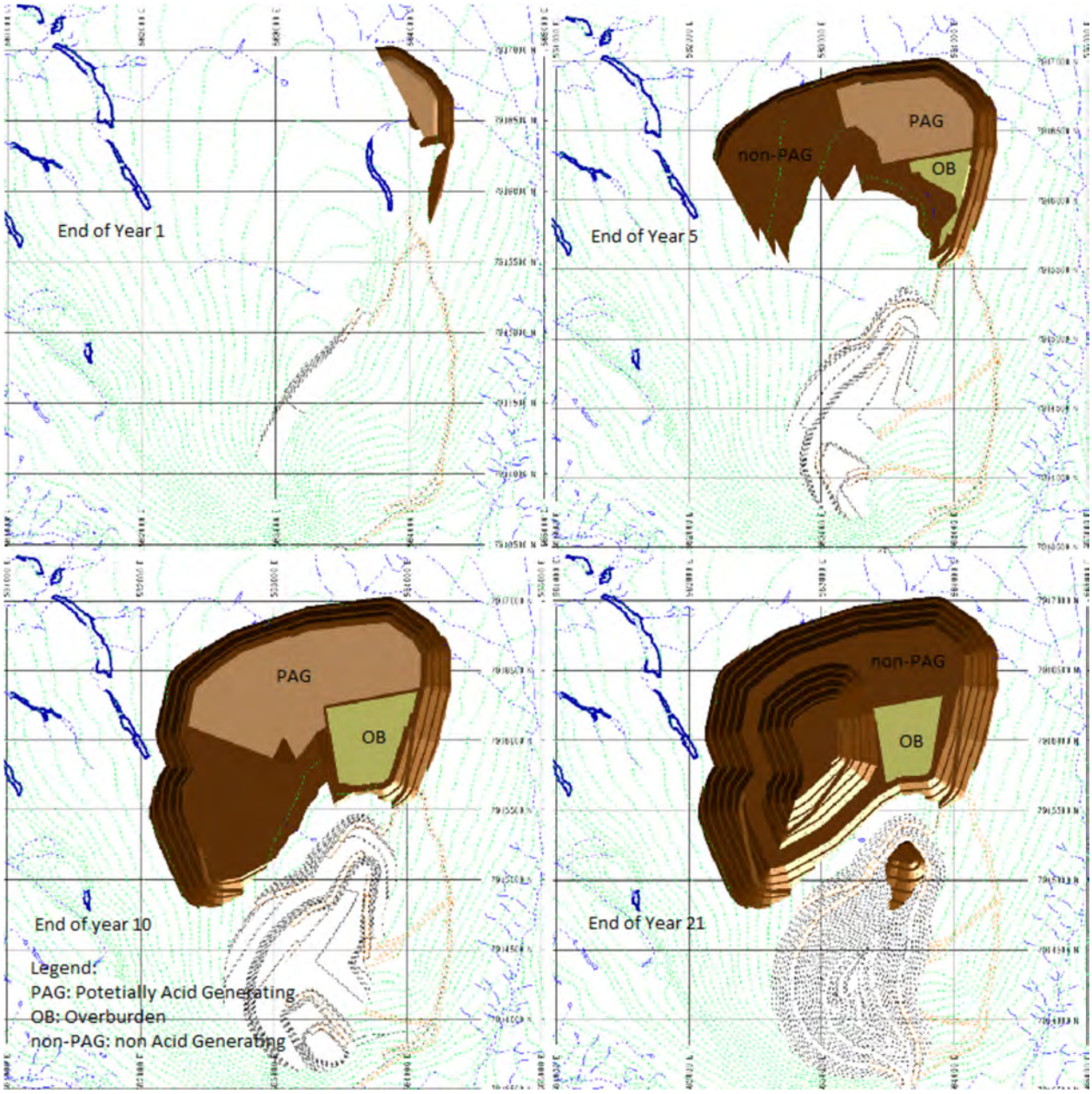


Figure 5.3 Evolution of the Waste Rock Stockpile Over the Life-Of-Mine

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Figure 5.4 Water Management Structures for the Waste Rock Storage Area

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5.2.2.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions are summarized in Section 3.

Figure 5.5 shows the summer 2018 waste rock deposition plan, which provides an oblique view of the existing waste rock pile with superimposed deposition locations noted. In addition, Appendix C provides a photolog showing the current mining operations.

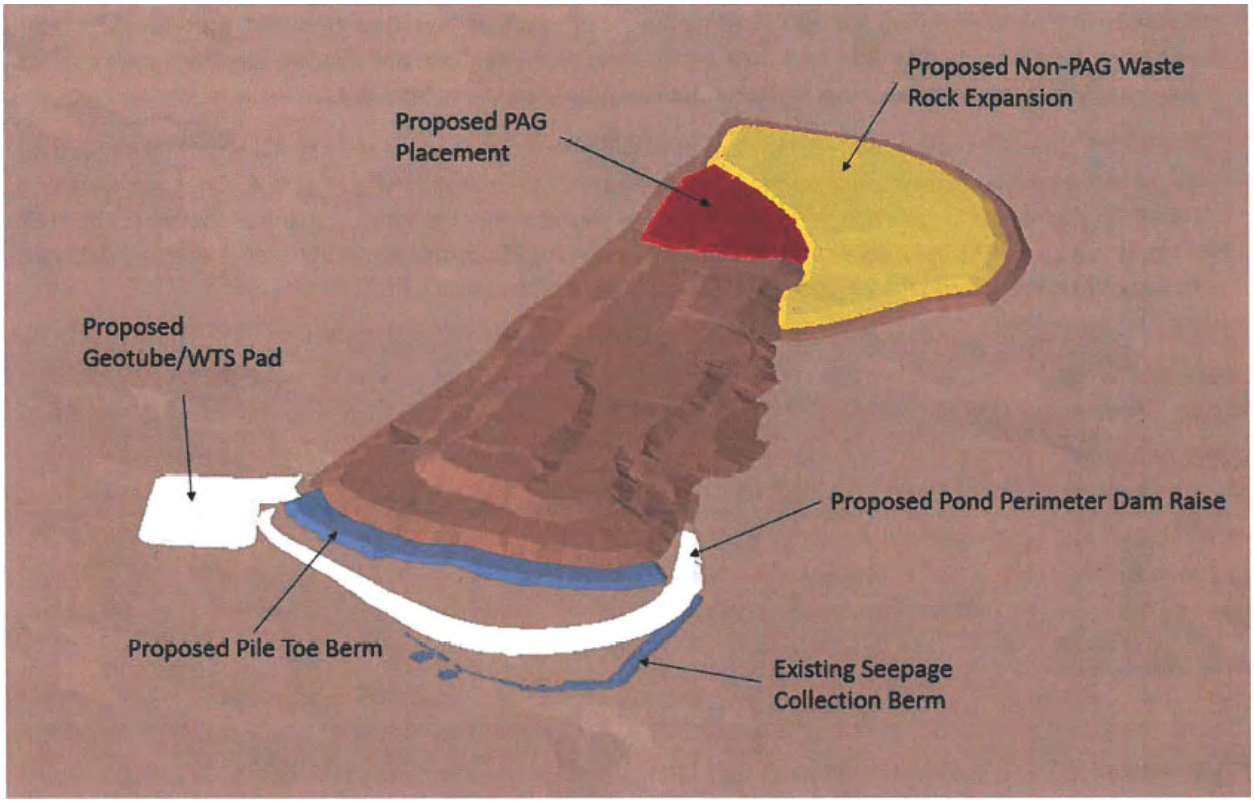


Figure 5.5 Waste Rock Deposition Plan – Summer 2018 – Plan View

At closure, the Waste Rock Stockpile will remain on site. It will contain approximately 630 Mt of waste rock and overburden, with average side slopes of 2H: 1V. As the surrounding terrain is rugged and rocky with minimal vegetation, no active revegetation or contouring is anticipated to be required to enhance its similarity to the surrounding terrain.

5.2.2.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

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5.2.2.4 Consideration of Closure Options and Selection of Closure Activities

Detailed alternative analysis of other closure options have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile). As data are collected and analysis is conducted, the ICRP will be updated as required. Please refer to Appendix D for more detail on reclamation research plans relevant to the Project to address uncertainties related to final closure.

Relevant closure options at the Waste Rock Stockpile will likely be limited to minor changes in PAG/non-PAG material placement occurring as part of the ongoing management of waste materials within the required set backs as outlined within approved management plans.

5.2.2.5 Engineering Work Associated with Closure Activity

The main work items for closing the Waste Rock and Overburden Stockpiles are as follows:

- Cleanup of any soil contamination (i.e. hydrocarbons, etc.) – see Section 9.6, if applicable;
- Monitoring and confirming the freezing (permafrost aggradation) of the pile, with the exception for a shallow “active” zone;
- Monitoring the water quality of any seepage emanating from the waste rock stockpile;
- Conducting an engineering stability analysis ((Section 9.2) to confirm the long-term stability of the slopes of the waste rock pile, and recontouring (if necessary) to ensure the slopes are physically stable;
- Grading at associated water management structures (e.g. two Waste Rock Stockpile Ponds, potential temporary dams) to establish final drainage pathways;
- Accumulated sediments at the Waste Rock Stockpile management ponds will be assessed for leaching and potential impacts to downgradient water quality. Options for managing potential risk from sediments include but are not limited to: covering, excavation, disposal at approved facility.

Mine planning will ensure that at closure the exterior of the dump consists of a layer of non-PAG material up to 50 m thick. To minimize active layer thickness, a stockpile of overburden will be retained to spread a layer of less permeable material over the top of the dump.

Studies of waste rock in permafrost demonstrate that permafrost forms an effective long-term barrier to water and oxygen, thereby preventing significant oxidation of sulphidic waste rock located below the surficial active zone. The surficial “active” zone, which will be subject to seasonal freeze-thaw, will not reach the 50 m thickness of non-PAG material in the long-term (within 200 years) under the influence of climate change (Intergovernmental Panel on Climate Change, 2007). Therefore, over the long term, runoff water quality which is influenced by contact water that flows through the active layer in the waste rock stockpile will not be affected. Following closure, generation of ML/ARD is not anticipated.

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The physical stability of the waste rock stockpile will be investigated at the onset of closure. This investigation will take into account the final geometry of the stockpile, including the aerial extent, height, cross-sections and the volume in place. If geotechnical investigations indicate it necessary, the waste rock stockpile may undergo re-contouring to ensure physical stability. Following re-contouring and stabilization investigations and activities, as required, the waste rock stockpiles will be considered closed.

Based on the current state of the Mine Site prior to mining activities, the Mine Site is characterized by a rugged rocky terrain with minimal vegetation. Therefore, an uncovered waste rock stockpile is considered environmentally compatible with the current undisturbed surrounding areas.

Runoff from the Waste Rock Stockpile will continue to be monitored until runoff meets water quality objectives for closure (described in Section 9.5). Once water quality objectives have been met, the Waste Rock Stockpile ponds will be decommissioned, and runoff will be allowed to discharge directly to the environment.

5.2.2.6 Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing the waste rock pile, were assessed as part of the FEIS with respect to VECs/VSECs. A detailed breakdown of these effects, and the methods for their assessment are summarized in Appendix G. Key FEIS residual effects predictions regarding surface water discharges from the WRF post closure are that any substantive impacts will be localized (see below) and adverse environmental effects on water quality or Arctic Char in the Mine Site LSA are not expected post-closure.

As reported in the Interim Waste Rock Stockpile Seepage Quality model (Appendix 4, BAF-PH1830-P16-0031), predictions indicate that the concentrations of arsenic, copper, lead, nickel, and zinc concentrations in the waste rock stockpile seepage will be below MDMER values. However, there is uncertainty in this model as follows:

- The water quality model is based on the mine plan, waste rock stockpile configuration, water balance and geochemical data. Changes to these assumptions may result in differing water quality;
- A number of assumptions made to develop the model (permafrost extent, stockpile hydrology, acid drainage source terms, etc.) that should be updated where more appropriate data becomes available;
- The current model has considered the surface area based on a review of published and unpublished data from other mine projects which could be different from the actual surface area of the Project waste rock; and
- Current model estimates are based upon simplified estimates of the seepage pH. These pH values can have a significant impact on the estimated loadings and concentrations of metals predicted in the model.

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Details on thresholds and modelled water quality of the specific waters that will receive stormwater from the waste rock stockpile via the east and west ponds are provided in Appendix H. The West Waste Rock Stormwater will discharge to Camp Lake via its tributaries, with increasing dilution and mixing along the way. Conservative modelling of the anticipated water quality of the west pond discharge and the predicted water quality in the receiving waters identified potential exceedances of water quality thresholds (CCME PAL) of mercury and selenium in Camp Lake and tributary L1 and L0 under mean flow and dry year conditions (HQ of 1 and 2, respectively in Camp Lake, higher in the tributaries; see Tables 9 and 10 in Appendix H). HQ (Hazard Quotient) is the ratio of the potential exposure to a substance and the level at which no adverse effects are expected. If the Hazard Quotient is calculated to be less than 1, then no adverse effects are expected as a result of exposure. The same conservative modelling approach completed for the east pond discharge to Mary River (containing fish habitat) identified potential exceedances of water quality thresholds (CCME PAL) of mercury, selenium, and silver under both mean flow and dry flow year conditions (HQ of 4, 1, and 1, respectively). The reason these results are considered highly conservative is explained in Appendix H. The residual effects are considered partially reversible because reversibility may require ongoing water treatment, and the duration of any required treatment is unknown at this time. The QIA has inquired if there will be changes in water quality that may affect the ability to safely consume fish from waterbodies near the Waste Rock Stockpile and Open Pit. The risk associated with consuming arctic char in the Project area is difficult to assess, as baseline sampling results reported in the FEIS found that 29% of arctic char exceeded Health Canada guidelines for mercury (this is not an unusual finding for land-locked char). Nevertheless, as the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigation measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

5.2.2.7 UNCERTAINTIES

Baffinland will conduct monitoring and research as necessary to resolve uncertainties (described above) pertaining to residual effect assessments and environmental risks that may have closure implications.

The primary uncertainties related to the waste rock and overburden pile are:

- whether or not there is potential for the generation of ML/ARD from contact water at the end of life; and
- the rate at which the waste rock pile will aggrade of permafrost and the thickness of the active layer (layer that will be unfrozen during the warmer months of the year).

The mining plan and the ongoing waste rock characterization plan will inform the prediction modeling of the Life-of-Mine Waste Rock Management Plan (Appendix 4, BAF-PH1830-P16-0031).

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Reclamation research programs (Appendix D) have been designed to improve understanding of the expected performance of the waste rock pile closure concept with respect to both drainage water quality as well as with respect to permafrost aggradation through operation and closure.

5.2.2.8 Post Closure Monitoring, Maintenance and Reporting

Post-closure monitoring of waste rock and overburden piles includes geotechnical/engineering monitoring (Section 9.4), aquatic monitoring (Section 9.5), Environmental Site Assessment (Section 9.6), fauna and flora monitoring (Section 9.7), safety compliance inspection (Section 9.9), and air quality monitoring (Section 9.11). Maintenance required will depend on the outcome of the monitoring programs, and would be completed as outlined in Table 5.1. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.2.9 Contingencies

5.2.2.9.1 Waste Rock Stockpile Runoff Water Quality

In the event that research, ongoing water quality modelling, or field monitoring shows a trend toward exceedance of discharge requirements, then water treatment options will be determined and implemented.

Details regarding theoretical treatment options are provided in the Life-of-Mine Waste Rock Management Plan (Section, 3.6.4, BAF-PH1830-P16-0031) and were considered for both metal and ammonia/nitrate removal. Theoretical treatment options for metals removal included:

- Resins
- Polymer Addition
- Sodium Hydrosulfite Treatment
- Ozonation
- Biofilters-Sulphide Precipitation
- Activated Carbon
- Lime Precipitation

Theoretical treatment options for ammonia/nitrate removal include:

- Biological De-nitrification (for removal of both ammonia and nitrate)
- Ion Exchange
- Electro-Chemical Ion Exchange

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- Breakpoint Chlorination of Ammonia

Regular updates on waste rock characterization and prediction of runoff water quality will be provided in future updates of the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) as they are developed and will be incorporated into future versions of the ICRP as appropriate.

5.2.3 Quarries and Ore/Aggregate Stockpiles

5.2.3.1 Project Component Description

This project component includes:

- Mine Site:
  - Quarry D1Q1
  - Quarry D1Q2
  - Quarry QMR2
  - KM 97 Borrow Locations
  - Ore Stockpile
  - ROM Stockpile
- Tote Road:
  - Extended cuts in bedrock along road corridor
- Milne Port:
  - MP-Q1-01
  - MP-Q1-02
  - Borrow Source No. 1
  - Quarry No. 1
  - Ore Stockpiles

The quarries and borrow sources at the Mine Site and Milne Port were developed to construct the site.

The Run of Mine (ROM) stockpile is a small stockpile which is used to temporarily store mined ore prior to feeding it to the primary crusher. Ore is then either crushed to a fine ore product, or left as lump ore. The ore (fine and lump) is moved to the mine site Ore Stockpile is used to temporarily store ore that is ready to haul to Milne Port. Once the ore reaches Milne Port, the crushed ore is stored in a large stockpile until such time that it can be loaded onto a ship. Ore may be stored at the Milne Port ore stockpile for several months over the winter until open water conditions permit shipping.

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5.2.3.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions are summarized in Section 3. Appendix C provides a photolog showing the current mining operations.

Each quarry permit application presents a quarry development plan, drainage information as well as a closure plan. All borrow areas and quarries will be progressively reclaimed maintaining stable side slopes in accordance with the individual site permit. At the onset of closure the borrow areas and quarries will be investigated to assess for potential thermal damage and instability due to thaw impacts. At closure, re-contouring and filling with overburden may be required to ensure slope stability and restore the natural drainage due to thermal disruptions.

The ore/aggregate stockpiles will be depleted upon closure. Soils below the stockpiles will be sent for testing and treatment, if required, as discussed in Section 9.4. The ore/aggregate stockpile bases will be re-contoured as necessary, scarified, and allowed to naturally re-vegetate. If ore/aggregate stockpiles remain at closure, they will be graded and re-contoured for long-term physical stability. There are currently no plans to place a cover material over residual ore for aesthetic purposes unless aesthetic values identified through community engagement on mine closure determine the need for fill placement. Construction of a clean fill cover, and/or placement of residual ore as backfill will be assessed if water quality concerns are present.

5.2.3.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

5.2.3.4 Consideration of Closure Options and Selection of Closure Activities

Detailed alternative analysis of other closure options have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile). As data are collected and analysis is conducted, the ICRP will be updated as required. Please refer to Appendix D for more detail on reclamation research plans relevant to the Project to address uncertainties related to final closure.

Relevant closure options to consider in the future will likely include grading and drainage options assessed as part of the Final Grading Plan.

5.2.3.5 Engineering Work Associated with Closure Activity

Quarries and borrow pits will no longer be needed at closure. Closure of active quarry faces will involve removing all materials, equipment and infrastructure. Active quarry walls will be terraced during operation to closely manage issues related to drainage and will not be altered for closure. The quarry development will reduce the creation of pits and depressions to the degree practicable to reduce the potential for standing water. The quarry pit floor will be left as free draining.

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All site waste will be collected and placed in appropriate containers for removal. Pre and post waste removal inspections will be made to ensure the thoroughness of the program. Waste will include metallic waste, construction material waste and domestic waste.

At the current time, no washroom facilities for personnel are expected at the quarry site. Any requirement for such facilities will be met by easily removable portable toilets. These will be operated in a manner consistent with regulations, and disposal will be in accordance with Baffinland's Waste Management Plan (BAF-PH1-830-P16-0028).

Quarrying activities will be closely managed to avoid the accumulation of unnecessary stockpiles of aggregate. Any stockpiles that do remain will be dealt with as follows:

- Large rock will be spread out on the landscape or used as rip-rap for erosion control
- Medium sized rock will be used to re-contour affected areas to re-establish a more natural appearance to the area
- Small crushed rock will be used to assist in drainage restoration, and spread on the landscape to re-establish more natural contours
- Any collected soils will be spread to allow for the re-establishment of vegetation. No vegetation planting or seeding operations will take be undertaken and natural re-vegetation will be allowed to take place

Quarry access roads will typically be relatively short aggregate structures. The entire road bed will be removed to re-establish desired drainage.

A pre-closure inspection for potentially impacted soils will be completed at the entire site. Any contaminated soils, snow or ice packs, or overburden will be flagged. The extent of the contamination will be assessed, and the material removed for treatment at a site-landfarm or containerized for shipment to a licenced off-site facility.

Other contamination, such as heavy metals or toxins, will require containerization for shipment off site to an appropriate facility (refer to Interim Closure and Reclamation Plan).

Reclamation of uncovered permafrost and ground/ice will involve removing any ponding water and backfilling the impacted permafrost and/or ground ice with available material.

At the end of mining, ore and aggregate stockpiles will have all been used up. The former stockpile areas will be recontoured to match the surrounding terrain (where possible), and scarified to promote natural revegetation and allow vegetation to re-establish through natural processes.

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5.2.3.6 Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing quarries and ore/aggregate stockpiles, were assessed as part of the FEIS with respect to VEC/VSEC. These effects, and the methods for their assessment are summarized in Appendix G.

As the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigative measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

5.2.3.7 Uncertainties

Uncertainties related to the closure of quarries include whether or not the remaining exposed aggregate is PAG, which is addressed in the individual quarry management plans. Ore/aggregate stockpiles have the potential to result in contaminated soils (Section 9.6), and there may be uncertainty in revegetation success, addressed in a reclamation research program (Appendix D).

5.2.3.8 Post Closure Monitoring, Maintenance and Reporting

Post-closure monitoring of quarries and ore/aggregate stockpiles includes geotechnical/engineering monitoring (Section 9.4), aquatic monitoring (Section 9.5), Environmental Site Assessment (Section 9.6), fauna and flora monitoring (Section 9.7), safety compliance inspection (Section 9.9), and air quality monitoring (Section 9.11). Maintenance required will depend on the outcome of the monitoring programs, and would be completed as outlined in Table 5.1. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.3.9 Contingencies

Contingencies related to the revegetation efforts have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile). As data are collected and analysis is conducted, the ICRP will be updated as required.

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5.2.4 Buildings and Equipment

5.2.4.1 Project Component Description

To the extent possible, buildings have been consolidated to hold accommodation, administration, maintenance and laboratory complexes to reduce outside travel of in-building workers. The accommodation buildings consist of a prefabricated modular unit supported on timber cribbing foundations, and house personnel in single dormitory wings. A central core area comprises: kitchen/dining facilities, recreational facilities, and general service space. The fire protection system includes a primary fire pump (with backups) and sprinkler systems for the accommodation, administration, laboratory, and warehouse facilities. See Section 5.2.5 for mining infrastructure, including associated buildings.

Haul trucks equipped with side dump trailers dump directly on the ground. Front end loaders are used to transport the dumped ore to portable feeders, which transfer the ore to telescopic portable radial stackers, which in turn deposit the ore in the stockpiles. There are sets of portable feeders and portable radial stackers, each with a capacity of 1,500 tph. The feeders and stackers are powered by an onboard diesel generator.

5.2.4.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions are summarized in Section 3. Appendix C provides a photolog showing the current mining operations.

Upon Final Mine Closure, buildings and infrastructure will be decommissioned and no longer be features on site. Associated pads and laydown areas will be re-graded to restore natural drainage patterns where possible, and scarified to allow for natural re-vegetation at closure.

5.2.4.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

5.2.4.4 Consideration of Closure Options and Selection of Closure Activities

Detailed alternative analysis of other closure options have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile). As data are collected and analysis is conducted, the ICRP will be updated as required. Please refer to Appendix D for more detail on reclamation research plans relevant to the Project to address uncertainties related to final closure.

5.2.4.5 Engineering Work Associated with Closure Activity

To permit the reclamation of the land area they cover, improve aesthetics, remove the physical hazard they pose to humans and the environment, and address any chemical concerns they may pose, buildings at the Mine Site, Tote Road, and Milne Port will be removed.

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Mechanical equipment will be considered closed and reclaimed when they no longer pose a risk of contamination to the environment, will not be a safety hazard to humans and wildlife, and no longer need long term care.

Removal of the buildings and equipment will involve the following works:

- Decontaminate buildings and equipment as necessary to permit safe working conditions and mitigate the potential for uncontrolled releases;
- Demolish buildings and haul away the refuse;
- The foundations of buildings and equipment (and infrastructure) will be demolished:
  - Concrete foundations will be demolished to grade and exposed rebar will be cut to grade to prevent safety hazards;
  - Concrete foundation areas will be drilled to allow for water infiltration; and
  - Any remaining concrete piles will be cut to grade and covered with overburden,
- Relocate all equipment to the mainland for resale, dispose of on-site as refuse, or donate to the local community;
- Cleanup of any soil contamination (i.e. hydrocarbons, etc.) – see Section 9.6;
- Re-grade the area to restore the natural drainage patterns; and
- Scarify the ground surface around the buildings to support natural revegetation.

Refuse from the demolished buildings and Milne Port will be removed and either:

- Transported to Milne Port for shipment to the mainland for either disposal or salvage
- Disposed of in the open pit (including concrete and rebar)
- Disposed of in the onsite landfills or other approved repository

5.2.4.6 Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing buildings and equipment, were assessed as part of the FEIS with respect to VEC/VSEC. These effects, and the methods for their assessment are summarized in Appendix G.

As the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigative measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

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5.2.4.7 UNCERTAINTIES

Uncertainties related to buildings and equipment are limited to whether or not any such facilities will be left in place, and whether or not any associated contaminated soils may be present upon closure ((Section 9.5). There may be uncertainty in revegetation success, addressed in a reclamation research program (Appendix D).

5.2.4.8 POST CLOSURE MONITORING, MAINTENANCE AND REPORTING

Post-closure monitoring of buildings and equipment includes geotechnical/engineering monitoring (Section 9.4), aquatic monitoring (Section 9.5), Environmental Site Assessment (Section 9.6), fauna and flora monitoring (Section 9.7), safety compliance inspection (Section 9.9), and air quality monitoring (Section 9.11). Maintenance required will depend on the outcome of the monitoring programs, and would be completed as outlined in Table 5.1. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.4.9 CONTINGENCIES

The need for contingencies for the reclamation of buildings and equipment has not been identified by Baffinland at this time. As the project progresses, the need for adaptive management and contingency alternatives may arise due to the outcomes of discussions with the Mine Closure Working Group.

5.2.5 MINING INFRASTRUCTURE

5.2.5.1 PROJECT COMPONENT DESCRIPTION

Mining Infrastructure is comprised of the following main elements:

- Mine Site
  - Camp Pads
  - Laydowns
  - Air Strip
  - Site Roads
  - Water crossings
  - Conduit berms
  - Utilidor / corridor
  - Crushing plant (primary jaw crusher and secondary cone crusher and primary and secondary screens)
- Milne Port
  - Camp Pads
  - Laydowns

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- Freight Dock
- Site Roads
- Water crossings
- Conduit berms

- Tote Road
  - Laydown Areas

Two mobile, self-contained crushing units are used for primary and secondary ore crushing and screening at the Mine Site. This equipment does not require concrete foundations or structural steel feed bins, except that a sacrificial ore pad was prepared as a base for the ore stockpiling. The mobile crushing/screening units are designed to operate year-round. The crusher trains are equipped with one jaw crusher, one cone crusher, one primary screen and one secondary screen. After crushing and screening, the product is reclaimed and loaded into tractor/trailer units for haulage to Milne Port.

Two products are produced, lump and fines, with fines being material smaller than 6.3 mm. Initial bulk tests indicated that a ratio of 3:1 lump to fines was expected on average. Ore is crushed and screened following delivery to the primary crusher and subsequently transported to customers without further processing.

The crushing and screening assembly is located approximately 2.5 km south of the open-pit mine and connected by a 7 km road. The lump product (< 31.5 mm/>6.3 mm) and fines product (<6.3 mm) discharge onto the lump collection conveyor and fines collection conveyor, respectively, for transfer to the local stockpiling area.

Due to the short and variable shipping season (60 – 90 days/season) the Milne Port stockpiles hold the full year's production (up to 3.2 Mt). The two lump stockpiles contain up to 1,200,000 tonnes; the fines stockpiles hold up to 400,000 tonnes. The longitudinal piles are located adjacent to each other in two rows with each row separated into two piles. The stockpile is located close to the ore dock.

A ship loader with two (2) discharge loaders is provided. These loaders rotate 180° and shuttle in and out giving the full loading coverage of the holds without having to reposition the ship. The loaders are anchored to the ore dock and are tall enough to give 15.2 m of air draft. Stairs and/or ladders and catwalks provide access to all operating and maintenance areas of the loaders. Each tower has a set of stairs from the dock to the main deck of the ship loader. Each loader has an adjustable deflector plate in the head box to deflect iron ore straight down and inward (toward shore) for trimming the shore side of the holds.

Where possible, permanent support infrastructure was built at the onset of construction, and used during both the construction and operation phases of the Project. Temporary infrastructure constructed or positioned at Project sites needed only for the construction phase are removed once construction is complete. In line with this strategy, most of the infrastructure developed at the onset of construction activities remains in service for the Life of the Project.

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5.2.5.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions are summarized in Section 3. Appendix C provides a photolog showing the current mining operations.

Relative to pre-development conditions at Milne Port, the remnants of infrastructure including buildings will be removed and laydown areas re-graded to restore natural drainage patterns where possible, and scarified to allow for natural re-vegetation at closure. Milne Port ore dock will remain in place to provide ongoing fish habitat. The water crossings along the Milne Inlet Tote Road will be removed.

The causeway and docks at Milne Port will be left in place. Dock infrastructure at Milne Port will be removed and either recycled, shipped offsite to an appropriate facility for disposal, or deposited within onsite landfill, the open pit or other approved repositories.

The lighting associated with the airstrips will be removed. The airstrips will be re-graded and reclaimed unless otherwise directed by regulatory agencies or the Land Owner to provide emergency/rescue landing spots for regional aircraft, when no other options are available.

The Mine Site utilidor/corridor will be dismantled and disposed of in either the Mine Site landfill or transported offsite to the mainland via sealift for disposal at an approved facility.

The airstrips at the Mine Site and Milne Port will be removed unless otherwise directed by regulatory agencies, Land Owner, or the Mine Closure Working Group to remain in place and left in operating condition. Abandoned airstrips may provide emergency landing locations for regional aircraft or helicopters, when other options are unavailable.

5.2.5.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

5.2.5.4 Consideration of Closure Options and Selection of Closure Activities

Detailed alternative analysis of other closure options have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile).

Baffinland has committed to the establishment of a “Mine Closure Working Group” in order to best incorporate considerations for post-closure land use of the Project site. The role of this Mine Closure Working Group will be to facilitate the integration of community representation and technical expertise by drawing on Inuit knowledge, arctic experience for similar mining operations, and discussion of alternative uses for decommissioned facilities into the reclamation options for various Project components. Several infrastructure components may be of use to the local communities, including the Milne Port ore dock, airstrips at Milne Port, the Mine Site, and at Steensby Port.

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5.2.5.5 Engineering Work Associated with Closure Activity

To permit the reclamation of the land area they cover, improve aesthetics, remove the physical hazard they pose to humans and the environment, and address any chemical concerns they may pose, mine infrastructure at the Mine Site, Tote Road, and Milne Port will be removed.

Removal of mine infrastructure will involve the following works:

- Decontaminate buildings and equipment as necessary to permit safe working conditions and mitigate the potential for uncontrolled releases;
- Salvage infrastructure that could be sold (crushers, etc.) on or donated to the local community;
- Demolish structures (ex: mine site utilidor/corridor) and haul away the refuse;
- Demolish foundations of infrastructure:
    - Concrete foundations will be demolished to grade and exposed rebar will be cut to grade to prevent safety hazards;
    - Concrete foundation areas will be drilled to allow for water infiltration; and
    - Any remaining concrete piles will be cut to grade and covered with overburden,
- Remove culverts and bridges that form water crossings for mine site and Milne Port site roads;
- Relocate crushers and screening plants to the mainland for resale, for disposal on-site, or donate to the local community;
- Cleanup of any soil contamination (i.e. hydrocarbons, etc.) – see Section 9.6;
- Re-grade the area to restore the natural drainage patterns; and
- Scarify the ground surface around the buildings to support natural revegetation.

Refuse from the mine infrastructure will be removed and either:

- Transported to Milne Port for shipment to the mainland for either disposal or salvage
- Disposed of in the open pit (including concrete and rebar)
- Disposed of in the onsite landfills or other approved repository

5.2.5.6 Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing mining infrastructure, were assessed as part of the FEIS with respect to VEC/VSEC. These effects, and the methods for their assessment are summarized in Appendix G.

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As the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigative measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

5.2.5.7 Uncertainties

Uncertainties related to mining infrastructure are limited to whether or not any such facilities will be left in place, and whether or not any associated contaminated soils may be present upon closure ((Section 9.5). There may also be uncertainty in revegetation success, addressed in a reclamation research program (Appendix D).

5.2.5.8 Post Closure Monitoring, Maintenance and Reporting

Post-closure monitoring of mining infrastructure includes geotechnical/engineering monitoring (Section 9.4), aquatic monitoring (Section 9.5), Environmental Site Assessment (Section 9.6), fauna and flora monitoring (Section 9.7), safety compliance inspection (Section 9.9), and air quality monitoring (Section 9.11). Maintenance required will depend on the outcome of the monitoring programs, and would be completed as outlined in Table 5.1. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.5.9 Contingencies

The need for contingencies for the reclamation of mine infrastructure has not been identified by Baffinland at this time. As the project progresses, the need for adaptive management and contingency alternatives may arise due to the outcomes of discussions with the Mine Closure Working Group.

5.2.6 Transportation Routes

5.2.6.1 Project Component Description

Transportation routes on site include the Mine Haul Road, Tote Road and the Ore Dock at Milne Port. A southern rail route to Steensby Port has been approved, but a specific timeline to begin construction on this aspect of the project has not been developed.

The total estimated length of the Mine Haul Road is approximately 10 km from the open-pit to the primary crusher and the waste dump areas and was constructed based on the following design criteria:

- Width three times the width of haul trucks (20 m)
- Design speed: 50 km/h
- Maximum gradient: 10 %
- Runaway lanes as required

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The Mine Haul Road was constructed with a minimum granular fill thickness of 1.5 m. The road structure consists of 300 mm surface course of Granular A, overlying a 300 mm layer of base fill, overlying a 900 mm layer of sub-base rock fill.

The Tote Road, a gravel all-season road, is approximately 98.5 km. Kilometer marking "0" begins at the ore stockpile located approximately 2.5 km from the Milne Port ore dock. The Tote Road ends at kilometer marking "98.5" at the Mine Site ore crushing and loading pad. A fleet of highway trucks is used for ore hauling along the Tote Road and consist of a 600 HP tri-drive tractor and two identical side-tipping trailers with a combined payload of approximately 150 t. The trucks and trailers assembly are custom designed for Arctic conditions.

The four (4) single lane modular bridge crossings constructed as part of the Tote Road upgrade program were constructed to replace the pre-existing side-by-side sea-can style bridge crossings. These bridges are designed to suit the mobile equipment and trucks used on the Tote Road during construction and operations. The bridges are located at chainages km 17, km 62, km 80 and km 97 along the Tote Road between Milne Port and the Mary River Mine Site. These bridges are single lane sized to meet the Nunavut Mine Health and Safety Act requirements for the design vehicles' widths. The bridge span was designed to meet the water's design volume and flow rate. The deck height was designed to meet the requirements of the Navigable Waters Protection Act (NWPA) by Transport Canada.

5.2.6.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions are summarized in Section 3. Appendix C provides a photolog showing the current mining operations.

Bridges, culverts and other water crossings along the Milne Inlet Tote Road will remain in place until all the closure activities requiring Milne Port access at the Mine site are completed. This road is part of the Inuit-Owned Lands referenced in the Nunavut Land Claims Agreement. It is designated for public use and communication to communities has indicated the road will be left in good physical condition in accordance with Project requirements, with water crossings removed. The final decision on the removal of the water crossings will remain with the Land Owner although the removal cost of the bridge spans has been included for closure planning. Bridge abutments will be left in place where needed to maintain long-term stability of the section of the road abutting the watercourse; however, this strategy will be reviewed at each location based on the performance of the structure throughout the Project life cycle. For example, bridge abutments at the Mary River crossing are within the river and will need to be removed to restore the stream bed and banks as described below. Ongoing engagement with communities and discussions with QIA will occur to confirm an approach for the Tote Road and water crossings such that an acceptable level of liability exists for transfer of these remaining structures.

Milne Port ore dock will remain in place to provide ongoing fish habitat and will potentially be utilized for local community use following closure.

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5.2.6.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

5.2.6.4 Consideration of Closure Options and Selection of Closure Activities

Detailed alternative analysis of other closure options have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile).

Baffinland has committed to the establishment of a "Mine Closure Working Group" in order to best incorporate considerations for post-closure land use of the Project site. The role of this Mine Closure Working Group will be to facilitate the integration of community representation and technical expertise by drawing on Inuit knowledge, arctic experience for similar mining operations, and discussion of alternative uses for decommissioned facilities into the reclamation options for various Project components. Several infrastructure components may be of use to the local communities, including the Tote Road and water crossings, Milne Port ore dock, airstrips at Milne Port, the Mine Site, and at Steensby Port.

Future closure options assessment for the bridge abutments at water crossings will consist of evaluating which structures will remain, and which will be removed/graded, based on long term stability considerations. Additional discussion on the approach for assessing structures prior to final closure, and focus areas for post-closure monitoring are presented in Section 9.

5.2.6.5 Engineering Work Associated with Closure Activity

To permit the reclamation of the land area they cover, improve aesthetics, remove the physical hazard they pose to humans and the environment, and address any chemical concerns they may pose, mine infrastructure at the Mine Site, Tote Road, and Milne Port will be removed.

Closure of transportation infrastructure will involve the following works:

- Water crossings, including bridges, along the Tote Road may be left in place at the land owners request. Ongoing engagement with communities and discussions with QIA will occur to confirm an approach for the Tote Road and water crossings such that an acceptable level of liability exists for transfer of these remaining structures.
- The ore dock at Milne port will remain in place with all surface infrastructure removed. The ore dock may potentially be used by communities subject to approval by the land owner CIRNAC.
- Remove road embankment fill from within the high water limits of the water body.
- Relocate excavated material from the water crossing location and place in areas located more than 30 metres from any water body. This material could be used at nearby grading in borrow areas and quarries.

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- Streambed and banks will be restored and stabilized. This will require communication with DFO prior to commencing work.
- Removed culverts will be flattened and disposed of in on-site landfills or demobilized. Ditching will be subject to grading as necessary to establish post-closure drainage pathways.
- Abandoned sections of the Tote Road are expected to be transferred 'as is'. If any additional closure activities are desired by the parties receiving responsibility for the structures, this will be confirmed via ongoing engagement with the applicable communities and QIA.
- Cleanup of any soil contamination (i.e. hydrocarbons, etc.) – see Section 9.6

In the even construction the southern rail route to Steensby Port is constructed, the following closure activities have been assumed in mine planning and environmental impact predictions:

- Environmental site assessments at railroad maintenance and fueling facilities where impacts are expected.
- Geochemical sampling of ballast materials to understand potential ML/ARD concerns.
- Removal of ore spillage into the ballast from movement of trains.
- Ballast cleaning and disposal of recovered fines.

5.2.6.6 Tie replacement and disposal of used ties. Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing transportation routes, were assessed as part of the FEIS with respect to VECs/VSECs. These effects, and the methods for their assessment are summarized in Appendix G.

As the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigative measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

5.2.6.7 Uncertainties

Uncertainties related to the transportation routes may include which infrastructure may be left in place and whether or not any associated contaminated soils may be present upon closure (Section 9.6). There may also be uncertainty in revegetation success, addressed in a reclamation research program (Appendix D).

5.2.6.8 Post Closure Monitoring, Maintenance and Reporting

Post-closure monitoring of transportation routes includes geotechnical/engineering monitoring (Section 9.4), aquatic monitoring (Section 9.5), Environmental Site Assessment (Section 9.6), fauna and flora monitoring (Section 9.7), safety compliance inspection (Section 9.9), and air quality monitoring (Section 9.11). Maintenance required will depend on the outcome of the monitoring programs, and would be

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completed as outlined in Table 5.1. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.6.9 Contingencies

The need for contingencies for the reclamation of mine infrastructure has not been identified by Baffinland at this time. As the project progresses, the need for adaptive management and contingency alternatives may arise due to the outcomes of discussions with the Mine Closure Working Group.

5.2.7 Waste, Landfills and other Disposal Areas

5.2.7.1 Project Component Description

This mine closure component includes:

- Milne Port
  - Landfarm
  - Contaminated snow containment area
  - Non-hazardous waste disposal locations
- Mine Site
  - Non-Hazardous Waste Disposal Locations
- Milne Port and Mine Site disposal of fuel and hazardous materials, including:
  - Fuel Tank Farm and Fuel Dispensing Facilities (Arctic Diesel, Jet–A Fuel)
  - Hazardous Material Storage Areas
  - Waste Management Facilities Including Temporary Storage Areas
  - Hazardous Waste and Hazardous Chemicals
  - Fuel
  - Explosives Storage

Landfarm and Contaminated Snow Containment Area

The Milne Port landfarm package includes the landfarm containment area and the contaminated snow containment area constructed south of the accommodation camp, near the Milne Inlet Quarry (Q1). The landfarm containment area was constructed to store/remediate the petroleum hydrocarbon (PHC) contaminated sand/gravel materials removed from the old bulk fuel bladder farm during decommissioning, and for storage of contaminated soils during continuing mining operations. This remediation occurs through volatilization and natural biological processes. The contaminated snow containment area was constructed as a storage location for contaminated snow removed from the tank farm's berm containment areas and subsequent snow contaminated during mine operations. The

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landfarm containment area grade slopes towards the sump in the southwest corner to facilitate draining of the soil material.

The design basis for the landfarm containment area water capacity is 3,383 m^3 with 0.3 m of design freeboard. The design basis for the contaminated snow containment area water capacity storage is 929 m^3 with 0.3 m of design freeboard.

The landfarm and contaminated snow containment has been constructed as primarily rectangular in shape to optimize the earthworks materials (granular fills and liner installation). The berms have side slopes not steeper than 2H:1V and a 1.0 m wide horizontal liner length for appropriate liner anchoring in the outer berm. Access to the landfarm package is from the old Tote Road just north of the Q1 quarry site to the south side. The access road contains a 500 mm diameter culvert crossing over a seasonal drainage that is not fish habitat.

The landfarm package was constructed using raised earthworks. All earth fill materials used during construction were compacted during above-freezing summer temperatures to achieve the design compaction required. Both the soil containment and the snow containment compartments were sealed with HDPE liner material for storage of the runoff/seepage, and covered with a layer of fill material. Trucks deposit contaminated soils and snow inside each compartment by driving inside the appropriate area and dumping into the surface gravels as called for in the design.

FUELS AND TANK FARM

The Milne Port Tank Farm and dispensing infrastructure includes the marine pipeline (connecting the marine manifold building to the arctic diesel system), the arctic diesel system, the Jet-A1 system, the fuel dispensing systems, the secondary containment earth dyke with synthetic liner, and all interconnecting piping. The package was designed for marine loading/offloading, tank truck loading/offloading, vehicle fueling, and genset fuel feed at the port facility. The tank farm includes:

- Three (3) 12 ML arctic diesel field-fabricated tanks with tag numbers 2613-TK-004, 2613-TK-005, and 2613-TK-006, and two (2) 5 ML arctic diesel field-fabricated tank with tag number 2613-TK-001 and 2613-TK-002
- Three (3) 0.75 ML Jet-A1 fuel pre-fabricated tanks with tag numbers 2614-TK-007, 2614-TK-008, and 2614-TK-009

These tanks are all vertical single wall steel construction, designed to API 650, located within an earth dyke with synthetic liner. The secondary containment dyke is designed to the requirements of the National Fire Code of Canada. The tank farm includes space for two extra tank pads for future expansion of one additional 0.75ML Jet-A1 tank (2614-TK-010) and one additional 12 ML arctic diesel tank (2613-TK-003). The tanks are equipped with spiral access stairways and guardrails at the roof of each tank.

The Milne Port tank farm is refuelled annually by ocean going tanker. A floating hose is deployed from the ship and connected to the onshore manifold. An aboveground steel marine pipeline transfers the fuel

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from the shore manifold to the tank farm. The ship floater manifold connection is equipped with a gate valve and check valve assembly to enable ship-to-shore connection and to prevent backflow. All connections are contained within a spill containment assembly with a hinged and lockable cover.

The fuel dispensing system includes two (2) prefabricated fuel dispensing modules: the Arctic Diesel Fuel Module, and the JetA1 Fuel Module. The existing Arctic Diesel Fuel Module is located to the west side of the tank farm. The new modules are insulated and heated 40 ft ISO shipping containers, complete with piping, fuel transfer equipment, temperature corrected delivery systems, electrical and control components, and code compliant fire suppression systems. Access to the fuelling equipment is through lockable equipment doors and side rollup door.

The Milne Port tank farm was constructed as a rectangular shape 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 the berm top width is 600 mm. The secondary containment area includes ten (10) tank foundation pads, ramp loading areas, dyke access roads and dyke walls, and dyke access stairs on the east side behind the fuelling module. Inside the primary dyke containment area, there is a 1% slope towards the sump.

There are two (2) access ramps into the dyke containment area to allow emergency vehicle and maintenance vehicle access. One ramp is on the south side, into the existing/modified dyke area. The second ramp is on the east side, leading from the fueling area down into the new dyke area. 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. 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. The liner is buried 450 mm below the floor of the dyke.

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

- Tank construction will adopt the API 650 12th Edition, 2013, Welded Steel tanks for Oil Storage
- Tank inspection, repair, alteration and reconstruction will use API 653 4th Edition, 2009; including Addendums 1 and 2
- National Building Code of Canada 2010
- National Fire Code of Canada 2010
- NFPA 30, 2012 Edition, Flammable and Combustible Liquids Code
- CCME Environmental Code of Practice for Aboveground Storage Tank Systems containing Petroleum Products, 2003

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- ANSI B31.3-2012, Process Piping
- CSA W47.1-09, Certification of Companies for Fusion Welding of Steel
- CSA W59-03 (R2008) – Welded Steel Construction (Metal Arc Welding)
- *Canadian Environmental Protection Act* 1999 (2008 Update)
- Storage Tank System for Petroleum Products and Allied Petroleum Products Regulations
- CSA W178.2-08, Certification of Welding Inspectors

Fuel is delivered to the mine site via bulk fuel truck loaded from the project's Milne Port facility. The Mine Site Tank Farm and dispensing infrastructure includes a 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 Mine Site 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 0.5 ML each, vertical single wall steel construction, designed to API Standard 650. The secondary containment dyke is designed to the requirements of the National Fire Code of Canada. The tanks are equipped with spiral access stairways and guardrails at the roof of each tank.

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. The diesel dispensing module is located on the plant-south side of the tank farm. Access to the fueling equipment is through lockable equipment doors and side rollup door. 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 Mine Site tank farm was 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 600 mm. 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 fueling module. The containment area around the tank farm and dispensing package was 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 450 mm below the floor of the dyke.

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Solid Waste Management Infrastructure

Solid waste management infrastructure includes the incinerators, waste management buildings, and the hazardous waste containment areas. The incinerator is used to dispose of applicable non-hazardous waste. The waste management building provides a heated indoor area for waste to be appropriately sorted to meet the incinerator's burning 'recipe' requirements. The hazardous waste containment areas are lined containment cells used to store hazardous waste/contaminated material in support the Project's site drainage monitoring strategy. The incinerator equipment is modular and operates within three sea containers attached to the rear of the waste management buildings. Residual ash from the incinerators are sent to the project's landfill for disposal.

Each of the three sea containers housing the incinerator equipment has an access port that penetrates the rear wall of the foldaway building. The waste management buildings are rectangular in shape with truck door access on one side.

The hazardous waste containment areas have been constructed rectangular in shape to optimize the earthworks materials (granular fills and liner installation). The berms have side slopes not steeper than 1.5H:1V and a 1.0 m wide horizontal liner length for appropriate liner anchoring in the outer berm. The containment area has a 4% grade access ramp on the west side and a drainage pond on the east side.

The waste management building pad and the hazardous waste containment areas have all been constructed using raised earthworks. The pre-cast concrete block foundation arrangement in the waste management building and poured concrete floor with sumps in each half of the building serves as effluent containment. The hazardous waste containment areas have been sealed with liner material for storage of the runoff/seepage or spills, and been covered with a layer of fill material.

Landfills

The project's landfill has been designed in accordance with the "Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories" (Ferguson, Simek Clark Engineers & Architects, 2003). Only non-hazardous, non-organic and inert waste is disposed of in the facility. All liquid industrial waste and hazardous waste is diverted for proper hazardous waste disposal to a licensed facility off site.

The area method is used for waste disposal wherein a low height berm will be constructed along two sides of the landfill site and then waste will be disposed of against the berms and directly onto the ground downstream of the berms. Sand and gravel will be used as the cover material. In order to achieve permafrost encapsulation in the landfill site, the final cover will be thicker than the active layer. No fencing will be required as the inert waste should not attract wildlife, and public access to the area is restricted. Because of permafrost in the area, no groundwater protection system is included. In addition, landfill gas is not expected to be an issue as the deposited waste will be non-hazardous and inert. Therefore, a landfill gas collection system was not installed in the landfill site.

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EXPLOSIVES FACILITY

The explosives facility package includes the explosives plant building (i.e., the emulsion plant) and the explosives shop (storage for raw materials). These facilities were designed for modular installation in arctic conditions. In support of the overall Mary River project development the use of explosives is required to produce construction aggregate and to facilitate mining activities. The facility's purpose is to manufacture and store the explosives and materials required to facilitate this objective and to minimize potential environmental impacts, specifically for water quality and wildlife during the period where blasting operations are conducted. The design premise for these facilities is based on achieving a zero effluent process. Contaminated waste water generated from the manufacturing operations are collected and re-used in the process, including truck wash water. The explosives facility and the operational policies in place meet or exceed the applicable regulations as part of the following acts:

- *Canada Explosives Act*
- *Transport of Dangerous Goods Act*
- Occupational Health & Safety, Nunavut – *Explosives Use Act*
- Northwest Territories/Nunavut *Mine Health and Safety Act* and Regulations

All infrastructure and manufacturing processes are licensed and approved by Natural Resources Canada (NRCan) – Explosives Regulatory Division. Magazine storage sites are licensed by the Nunavut Workers Safety and Compensation Commission (WSCC).

The explosives facility is located south of the Mine Site stockpile. The access road intersects the treated effluent pond access road mid-way between the stockpile and the treated effluent's approved discharge point. The explosives facility is located more than 65 m away from the facility's storage containers, more than 350 m from the explosives magazine, and more than 970 m from the ore crushing and screening pad. The facility pad was constructed of raised earthworks complete with drainage culverts and access ramps.

5.2.7.2 PRE-DISTURBANCE, EXISTING, AND FINAL SITE CONDITIONS

The pre-disturbance site conditions are summarized in Section 3. Appendix C provides a photolog showing the current mining operations.

The landfarm and contaminated snow containment area located at Milne Port provides onsite treatment of contaminated soils. Once no longer required, the landfarm and contaminated snow containment area will be closed to physically and geotechnically stabilize for the long term, make surface runoff and seepage water quality safe for humans and wildlife, and to encourage the desired wildlife movement. Post-closure water quality run-off objectives in receiving water bodies from landfarms will be met and no long-term active care is expected to be required.

The fuels and tank farm at Milne Port and Mine Site, assuming they are not to be maintained, will be decommissioned and removed during closure. Soils will be tested for contamination. The area will be

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regraded to restore natural drainage patterns where possible, and scarified to allow for natural re-vegetation.

Solid waste management infrastructure includes the incinerators, waste management buildings, and the hazardous waste containment areas. The incinerators and waste management buildings will be decommissioned and removed from the site and affected footprint regraded to restore natural drainage patterns where possible and scarified to allow for natural re-vegetation. The hazardous waste containment areas will be evaluated for any remaining hazardous material/soils and addressed as per the Hazardous Materials and Hazardous Waste Management Plan. The area will be re-graded and scarified to allow for natural re-vegetation at closure.

The Mine Site Landfill Facility is operated to house only non-hazardous material. Project landfills will be progressively covered with overburden, as cells are completed, to allow the contents of the landfill to remain permanently frozen to physically and geotechnically stabilize in the long term, make surface runoff and seepage water quality safe for humans and wildlife, and encourage the desired wildlife movement upon site abandonment, such that post-closure water quality run-off objectives in receiving water bodies are met and no long-term active care is required.

The explosives facility will be removed from the site. The associated footprint will be re-graded to restore natural drainage patterns where possible, and scarified to allow for natural re-vegetation at closure.

A list of non-salvageable materials has been developed and will be provided annually as part of the Annual Security Review process conducted in accordance with Schedule C of Type “A” water licence 2AM-MRY1325.

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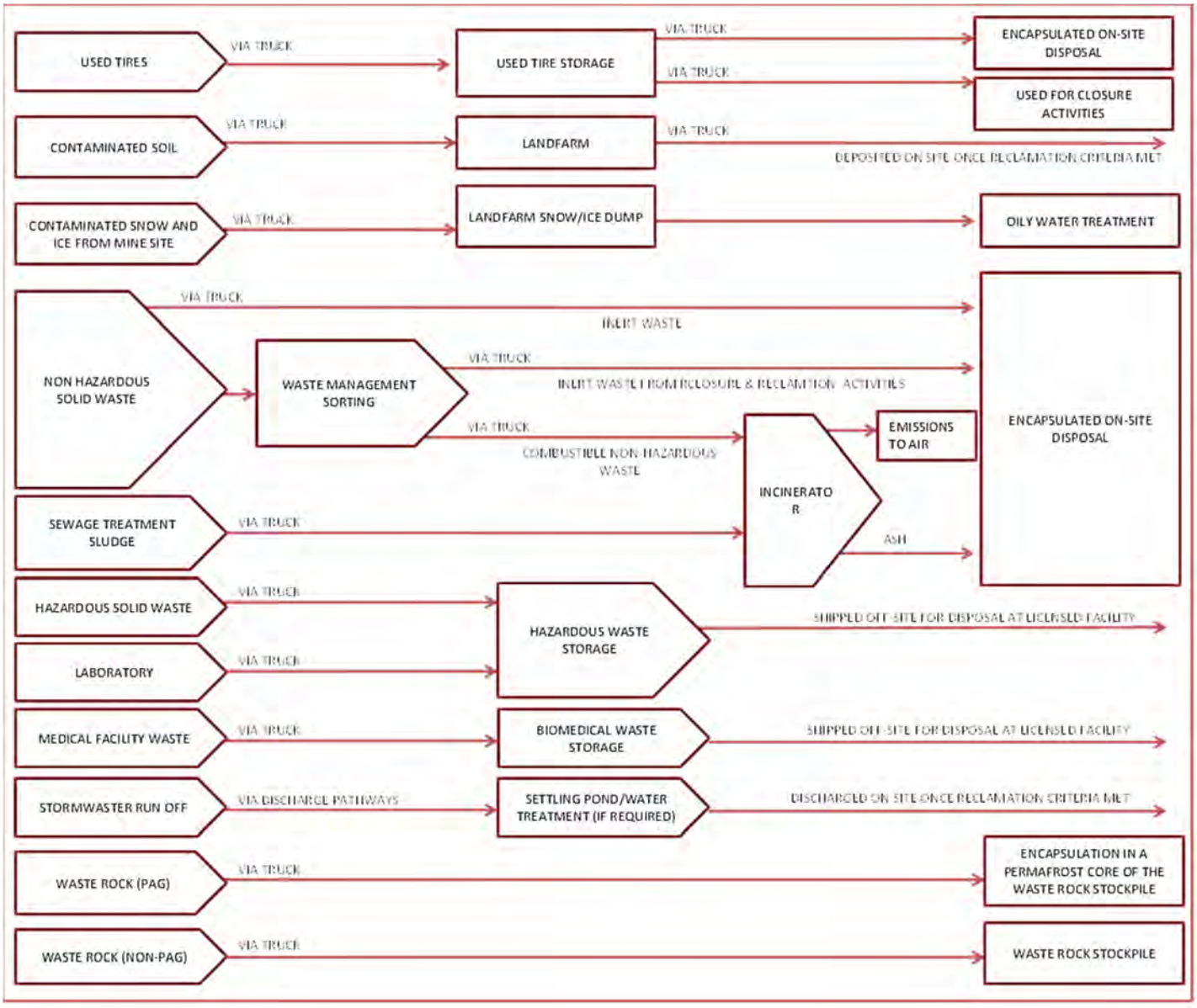


Figure 5.6 Major Waste Streams and Methods of Transportation

5.2.7.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

5.2.7.4 Consideration of Closure Options and Selection of Closure Activities

Detailed alternative analysis of other closure options have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile). As data are collected and analysis is conducted, the ICRP will be updated as required. Please refer to Appendix D **Error! Reference source not found.**for

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more detail on reclamation research plans relevant to the Project to address uncertainties related to final closure.

No major closure options are being considered for this mine component. The closure activities discussed below is expected to be relevant for all existing and any future changes to project infrastructure within this mine component (e.g. additional non-hazardous landfills).

5.2.7.5 Engineering Work Associated with Closure Activity

At final closure, Baffinland will undertake a comprehensive site Phase 1 Environmental Site Assessment (ESA) to determine extent of contaminated areas and appropriate techniques and methods to deal with such sites.

The onsite landfill located at the Mine Site will be reclaimed by capping the landfill with 1.5 m of overburden or equivalent material to freeze the core of the landfill. The landfill sites will be scarified to encourage natural re-vegetation.

At the end of Project life, Baffinland will consider transferring the facilities to a third party, should a third party express such an interest. The rationale for the approach is to eliminate sources of contamination on-site to the extent reasonably possible. Figure 5.6 demonstrates the major waste streams expected to be generated during closure and reclamation activities and the respective expected transportation and disposal approach.

The stock of explosives will be depleted towards the end of the operations phase and any remaining explosives will be securely contained and shipped from the site by a licensed contractor to an approved facility for disposal or reuse or detonated in a controlled and safe fashion by experienced and licensed personnel at appropriate locations away from sensitive receptors.

Oil, grease, ammonium nitrate and chemicals will be transported offsite for disposal at an approved facility or where applicable for reuse. All batteries and hazardous waste will be removed and disposed of or recycled at an approved facility offsite.

Combustible non-hazardous wastes will be incinerated at the Project incinerators. Once the incinerators are no longer required, they will be disposed of in one of the site non-hazardous landfills, or shipped to the mainland to be disposed of off-site.

Liners will be removed from polishing ponds and Polishing Waste Stabilization Ponds (PWSPs), and berms will be re-graded and levelled.

A list of non-salvageable materials has been developed and will be provided annually as part of the Annual Security Review process conducted in accordance with Schedule C of Type “A” water licence 2AM-MRY1325.

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5.2.7.6 Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing landfills and other disposal areas, were assessed as part of the FEIS with respect to VEC/VSEC. These effects, and the methods for their assessment are summarized in Appendix G. Following closure, no residual effects related to landfills and other disposal areas are anticipated with the required mitigation (e.g. reclamation/remediation, as required), with the exception of vegetation. Loss of vegetation within the PDA is a residual effect — it is not expected that disturbed areas will become re-vegetated until after closure of the mine. Regeneration of the disturbed area is a slow process and will not occur until beyond the life of the project.

As the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigative measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

5.2.7.7 Uncertainties

Uncertainties related to the closure of landfills and other waste disposal areas is whether or not the remaining land contains contaminated soils (Section 9.6), and there may be uncertainty in revegetation success, addressed in a reclamation research program (Appendix D).

5.2.7.8 Post Closure Monitoring, Maintenance and Reporting

Post-closure monitoring of landfills and other waste disposal areas includes geotechnical/engineering monitoring (Section 9.4), aquatic monitoring (Section 9.5), Environmental Site Assessment (Section 9.6), fauna and flora monitoring (Section 9.7), safety compliance inspection (Section 9.9), and air quality monitoring (Section 9.11). Maintenance required will depend on the outcome of the monitoring programs, and would be completed as outlined in Table 5.1. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.7.9 Contingencies

The need for contingencies for the reclamation of waste, landfills, and other disposal areas has not been identified by Baffinland at this time. As the project progresses, the need for adaptive management and contingency alternatives may arise due to the outcomes of discussions with the Mine Closure Working Group.

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5.2.8 Water Management Systems

5.2.8.1 Project Component Description

The water management systems on site include:

- Milne Port and Mine Site
  - Stockpile settling ponds
- Milne Port
  - Water Treatment System
  - Sewage Treatment System
- Mine Site
  - Raw Water System
  - Contact Water Ponds
    - (1) Open Pit Dewatering System
    - (2) Stockpile Settling Ponds
  - Water Treatment System
  - Sewage Treatment System

Stockpile Settling Ponds

The stockpile settling ponds were constructed to temporarily retain the runoff water from stockpile areas and contain the sediment load to meet the water quality standards in accordance with applicable effluent quality criteria. During normal operation, runoff from the stockpile area drains to the stockpile settling ponds. The ponds are equipped with overflow weirs designed to allow the unloaded surface water to drain through a controlled discharge to permitted discharge point(s). The ponds were designed with sufficient retention time to ensure the sediment would gravity-settle to the bottom of the pond before the water reaches the overflow weirs. Water in the stockpile settling ponds will be monitored as part of the site drainage monitoring strategy to meet applicable effluent quality criteria.

The ponds have been constructed rectangular in shape to optimize the earthworks materials (granular fills and liners) and to fit within the foreshore areas and not encroach near the shoreline. The pond berms have design side slopes not steeper than 3H:1V and the berm top width is 2.0 m to meet the access and liner anchoring requirements. The overflow weir design slopes are 5H:1V exiting the pond. The ponds were excavated to meet the elevation requirements of the design, and the berms constructed with raised earthworks. It has been sealed with exposed HDPE liner material for storage of the runoff and sediments without any leakage.

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Milne Port – Water Treatment System

The Milne Port water treatment system includes an adsorption clarifier water treatment plant designed to treat raw water for the removal of colour, turbidity and other impurities to provide a high-quality effluent. The high-quality effluent from the adsorption clarifier is then disinfected for potable and domestic use. The process combines flocculation and clarification in the mono-media roughing filter. Flocs are formed and retained in the coarse mono-media. The dual media filter provides polishing of the pre-treated water to provide a high-quality effluent. Disinfection involves UV and chlorination.

The Milne Port water treatment building is a foldaway building located west of the new accommodation facilities. There is an overhead door on the west side of the building and a man door on the east and west. The system includes the outdoor piping connecting the water treatment plant to the sewage treatment plant, and the piping between the water treatment plant and the accommodations facility. These pipes are HDPE DR11, pre-insulated with 50 mm (2 inch) insulation and heat traced for year-round use. The system is fed by water truck. The project is approved to source water from km 32 Lake and from Phillips Creek (summer months only).

Milne Port – Sewage Treatment System

The Milne Port sewage treatment plant (STP) is a membrane bioreactor (MBR) wastewater treatment plant designed for treatment of domestic wastewater. The STP is a packaged plant that comes with containerized inlet screen, equalization tank, post equalization tank screen, aeration tank, membrane tanks, UV disinfection systems and a sludge dewatering unit. The plant is housed inside six (6) 40 ft modified high-cube shipping containers that were interconnected when installed. The system includes the outdoor piping connecting the accommodations facility to the sewage treatment plant, the effluent discharge piping and the potable water inlet. These pipes are HDPE DR11, pre-insulated with 50 mm (2 inch) insulation and heat traced for year-round use.

During normal operation, the treated effluent from the sewage treatment plant (STP) is pumped to the permitted discharge point at Milne Inlet via the treated effluent discharge pipeline. The pumps and motors (duty/standby) start and stop as required to empty the containment tanks inside the STP. The treated effluent discharge pipeline is a 50 mm (2 inch) diameter HDPE DR11 pipeline. The pipeline is approximately 750 m long, above ground, pre-insulated with 50 mm (2 inch) insulation and heat traced for year-round use.

In the event that the treated effluent does not meet discharge requirements, the off-spec effluent is pumped to the effluent pond located south of the fuel tank farm. Once the ‘problem’ in the STP is corrected, the off-spec effluent from the pond will be treated insitu or transported via vacuum truck and re-processed through the STP before directly discharging to Milne Inlet.

The Mine Site Water Systems include the facility’s raw water system (including the raw water jetty), water treatment system, sewage treatment system, and the treated effluent discharge system.

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Off-Spec Effluent Ponds

The off-spec effluent pond(s) have been constructed to store the off-spec effluent from the Project Sewage Treatment Plant (STP). During normal operation, the treated effluent from the STP will be directed to the permitted discharge point(s). In the event that the treated effluent does not meet discharge requirements, the off-spec effluent will be pumped to the pond. Once the problem in the STP is corrected, the off-spec effluent from the pond will be transported via vacuum truck and re-processed through the STP before directly discharging to the permitted discharge point(s).

The pond(s) have been constructed as rectangular shape to optimize the earthworks materials (granular fills and liner). The pond berms have side slope not steeper than 3H:1V and the berm top width is 3.0 m to meet the access and liner anchoring requirements. The pond(s) have been constructed with raised earthworks on top of the laydown pads. It has been sealed with liner material for storing the off-spec effluent without any leakage. In general, the following materials are used to construct a PWSP:

- Type 8 (150 mm minus) as main/core material of berm
- Type 5 (32 mm minus) for covering the core material on top and inside surface of the berm
- Type 6/Type 9 (9.5 mm minus) for liner bedding and anchoring
- Type 4 Geomembrane (Enviro liner 6060 HD)
- Non-woven geotextile (Layfield LP7) for protection of the liner material
- Jersey barrier for truck safety (if applicable)

Mine Site – Raw Water System

The Mine Site raw water system is a pumping arrangement that draws water from Camp Lake (west of the main accommodation facilities) to the water treatment system for treatment and distribution. The raw water system includes a raw water pumphouse (a heated and insulated sea container) installed on a jetty built out from the east side of Camp Lake. The pump draws water up through the wet well below the pumphouse, and pumps the water through a 100 mm (4 inch) HDPE DR11 pipeline over 4 km to the water treatment building. This pipeline is pre-insulated and heat traced for year-round use.

Mine Site – Water Treatment System

The Mine Site water treatment system includes an adsorption clarifier water treatment plant designed to treat raw water for the removal of colour, turbidity and other impurities to provide a high quality effluent. The high quality effluent from the adsorption clarifier is then disinfected for potable and domestic use. The process combines flocculation and clarification in the mono-media roughing filter. Flocs are formed and retained in the coarse mono-media. The dual media filter provides polishing of the pre-treated water to provide a high quality effluent. Disinfection involves UV and chlorination. The system is fed by the raw water system drawing from Camp Lake.

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The Mine Site water treatment building is a foldaway building located south of the fuel tank farm and southwest of the sewage treatment building. The system includes the outdoor piping connecting the water treatment plant to the sewage treatment plant, and the piping between the water treatment plant and the accommodations facility. These pipes are HDPE DR11, pre-insulated with 50 mm (2 inch) insulation and heat traced for year-round use.

MINE SITE – SEWAGE TREATMENT SYSTEM

The Mine Site sewage treatment plant is a membrane bioreactor (MBR) wastewater treatment plant designed for treatment of domestic wastewater. The STP is a packaged plant that comes with containerized inlet screen, equalization tank, post EQ screen, aeration tank, membrane tanks, UV disinfection systems and a sludge dewatering unit. The plant is housed inside six (6) 40 ft modified high-cube shipping containers that were interconnected when installed. The Mine Site sewage treatment plant is located southeast of the fuel tank farm, north east of the water building, and south of the accommodations facility. The system includes the outdoor piping connecting the accommodations facility to the sewage treatment plant and the connection for the effluent discharge piping. These pipes are HDPE DR11, pre-insulated with 50 mm (2 inch) insulation and heat traced for year-round use.

MINE SITE – TREATED EFFLUENT DISCHARGE

During normal operation, the treated effluent from the sewage treatment plant (STP) is pumped to the permitted discharge points at Mary River via the treated effluent discharge pipeline. In the event that the treated effluent does not meet discharge requirements, the off-spec effluent would be trucked from the STP to one of the three existing PWSPs for storage and eventual treatment/discharge as required. Once the 'problem' in the STP is corrected, the off-spec effluent from the pond(s) will be treated insitu or transported via vacuum truck and re-processed through the STP before directly discharging to Mary River. The treated effluent discharge pipeline is a 50 mm (2 inch) diameter HDPE DR11 pipeline from the STP to the tee connection (valve box/branch) with the remainder of the pipeline (from the valve box/branch to the Mary River discharge) being 75 mm (3 inch) diameter HDPE DR11. The pipeline is approximately 2 km long, above ground, pre-insulated with 50 mm (2 inch) insulation and heat traced for year-round use.

5.2.8.2 PRE-DISTURBANCE, EXISTING, AND FINAL SITE CONDITIONS

The pre-disturbance site conditions are summarized in Section 3. Appendix C provides a photolog showing the current mining operations.

Disturbances to the surrounding areas of the Project may cause thermal disruptions to the permafrost zone resulting in ponding, settlement and/or subsidence due to changes in the active zone (the upper 1 to 2 m of soil). During closure these areas will be drained of excess water, filled with clean material to insulate and re-establish the active layer and graded, restoring the natural drainage of the area as necessary. The natural drainage of water courses will be re-established for long-term stability.

Stockpile settling ponds will be removed during closure, following decommissioning of the ore stockpiles, when management/treatment of site drainage is no longer required.

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The Milne Port and Mine Site water treatment systems buildings will be removed and re-used. Outdoor piping will also be removed and affected footprints regraded to restore natural drainage patterns where possible, and scarified to allow for natural re-vegetation.

The Milne Port and Mine Site sewage treatment plants will be removed and potentially reused. Outdoor piping including the treated effluent discharge system will also be removed and affected footprints regraded to restore natural drainage patterns where possible, and scarified to allow for natural re-vegetation.

The off-spec effluent pond(s) will be removed concurrently with the decommissioning of the sewage treatment plants. The affected footprints will be regraded to restore natural drainage patterns where possible, and scarified to allow for natural re-vegetation.

5.2.8.3 Closure Objectives and Criteria

The closure objectives are presented in Section 5.1.1 and closure criteria are presented in Table 5.1.

5.2.8.4 Consideration of Closure Options and Selection of Closure Activities

Detailed alternative analysis of other closure options have not been completed by Baffinland due to the early stage of the Project and the absence of Project components which represent the largest uncertainty at closure (Open Pit, Permanent Waste Rock Stockpile). As data are collected and analysis is conducted, the ICRP will be updated as required. Please refer to Appendix D for more detail on existing reclamation research plans relevant to the Project to address uncertainties related to final closure.

Although modifications to the existing water management infrastructure and corresponding sequencing of their closure may change, no significant closure options are expected to be considered for this mine component as no structures are planned to remain following reclamation.

5.2.8.5 Engineering Work Associated with Closure Activity

The water supply system at the Mine Site and Milne Port will be demolished, removed and either sealifted to the mainland for disposal/salvage or will be disposed of in the onsite landfills or other approved repository.

The sewage treatment plants located at the Mine Site and Milne Port will be decommissioned as per the manufacturer's specifications. The remaining sewage treatment plant components will be either transported for sealift to the mainland for disposal or salvaged or disposed of in the onsite landfill.

The site water management ponds (Off-spec, Stockpile Settling Ponds, etc.) will be decommissioned when they are no longer required and water quality is found to consistently meet effluent criteria ((Section 5.1.1). Ponds will be decommissioned as follows:

- Soils and sediment will be tested as part of the Site Environmental Assessment work and impacted soils and sediment will be cleaned up as necessary (Section 9.6);

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- Liners, where present, will be removed and disposed of in non-hazardous waste containment area;
- The ponds will be filled with clean material and perimeter berms will be regraded to restore natural drainage patterns;
- The ground will be scarified around the pond areas to encourage natural revegetation.

Water crossings (bridges and culverts) will be decommissioned and the drainage channels restored to natural drainage conditions.

As pumping equipment is no longer required (cessation of mine dewatering, decommissioning of a pond, decommissioning of a water treatment plant, etc.), the associated pumps and pipes will be decommissioned. Pipes will be disposed of in the non-hazardous waste areas and ownership of pumps will either transferred (sold) off-site or donated to the local communities.

5.2.8.5.1 Materials Suitability for Closure Needs

Reclamation activities shall restore the physical and chemical stability of areas where material was removed or altered for Project purposes (i.e., excavation activities). Reclamation activities may include, but are not limited to, replacing those affected areas with suitable cover materials sourced locally, importing/producing fill, restoring drainage to limit unnatural standing water through re-grading, routing of any trapped surface water and scarification. All such reclamation activities shall be performed in a manner that will reduce the risk of erosion and sedimentation to the surrounding environment and limit disturbance to the permafrost.

Criteria for sourcing suitable materials for closure needs requires consideration of several chemical (i.e., pH, sodicity, salinity, saturation, etc.) and physical (i.e., texture, moist consistency, content, etc.) properties. A comprehensive assessment of suitable materials for closure needs will be completed prior to the use of any material for cover purposes focusing on the following objectives:

- Identifying and mapping suitable locations of material as well as its distribution. Locations will be evaluated for chemical and physical stability, impact to natural environment, etc.
- Geochemical and physical characteristics for suitability for reclamation such as the consistency to prevent erosion, porosity, ability to alter natural snow and water runoff conditions, stability, etc.
- Determining depth and volumes of material types
- Development of a schedule of availability.

5.2.8.6 Predicted Residual Effects

The predicted residual effects at planned closure, including those encompassing water management, were assessed as part of the FEIS with respect to VEC/VSEC. These effects, and the methods for their assessment are summarized in Appendix G. With the removal of facilities and rehabilitation of the previously disturbed land, residual effects are expected to be limited to loss of vegetation within the PDA;

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it is not expected that disturbed areas will become re-vegetated until after closure of the mine. Regeneration of the disturbed area is a slow process and will not occur until beyond the life of the project.

As the project progresses, data will be collected through the environmental monitoring programs which can provide an indication of the accuracy of the predicted effects. These data can also be used to give an indication of the performance of the site mitigative measures and management systems, used as the basis for revising the prediction of residual effects, or implementing adaptive management.

5.2.8.7 Uncertainties

Uncertainties related to the decommissioning of water management systems include whether or not there are associated contaminated soils (Section 9.6), and there may be uncertainty in revegetation success, addressed in a reclamation research program (Appendix D).

5.2.8.8 Post Closure Monitoring, Maintenance and Reporting

Post-closure monitoring of waste rock and overburden piles includes geotechnical/engineering monitoring (Section 9.4), aquatic monitoring (Section 9.5), Environmental Site Assessment (Section 9.6), fauna and flora monitoring (Section 9.7), safety compliance inspection (Section 9.9), and air quality monitoring (Section 9.11). Maintenance required will depend on the outcome of the monitoring programs, and would be completed as outlined in Table 5.1. Baffinland will report on the results of all monitoring programs on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

5.2.8.9 Contingencies

The need for contingencies for the reclamation of mine infrastructure has not been identified by Baffinland at this time. As the project progresses, the need for adaptive management and contingency alternatives may arise due to the outcomes of discussions with the Mine Closure Working Group.

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6 PROGRESSIVE RECLAMATION

6.1 DEFINITION OF PROGRESSIVE RECLAMATION

Most of the Project areas will be actively used during the Construction and Operation phases of the Project, although where practical, areas which are no longer needed to carry out Project activities will be progressively reclaimed. As per CIRNAC Guidelines[6], "Progressive reclamation takes place prior to permanent closure to reclaim components and/or decommission facilities that no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, minimize the duration of environmental exposure, and enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may provide valuable experience on the effectiveness of certain measures that might be implemented during permanent closure."

6.2 OPPORTUNITIES FOR PROGRESSIVE RECLAMATION

This section describes the proposed progressive rehabilitation measures that will be completed during the construction and/or operation phases of the Project. In accordance with the objectives and guidelines presented in Section 5.1.1, progressive rehabilitation will be implemented to achieve the Projects site abandonment goal and closure principles. Table 6.1 presents Baffinland's proposed progressive rehabilitation schedule. This schedule will be updated in future ICRPs as additional opportunities are identified.

Table 6.1: Summary of Conceptual Current and Proposed Progressive Rehabilitation Schedule

Phase:	Construction (ERP)				Operation (ERP)				Operation (ERP & Rail Phase)			
Year:	1	2	3	4	1*	2*	3*	4*	1	2	3	4
Milne Port												
PWSP (exploration)												
Bladder Farm												
Quarry (Q1)												
Mary River Mine Site												
Bladder Farm												
Quarry (QMR2)												
Laydown Areas												
Borrow Pits												

[6] MVLWB/AANDC, Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, November 2013

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Phase:	Construction (ERP)				Operation (ERP)				Operation (ERP & Rail Phase)			
Rail Route												
Rail Access Road												

***Rail phase construction begins**

6.2.1 Proposed Progressive Rehabilitation Measures

The overall intent of the proposed progressive rehabilitation measures is to assist in achieving Baffinland's site abandonment goal to return project sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities in as minimal duration as reasonably practical. The progressive rehabilitation measures proposed as part of the ICRP are expected to be technically and economically feasible and reflect Project closure principles. Closure criteria, to determine if the closure objectives outlined in subsections below have been achieved by closure activities, are consistent with the closure criteria described in Table 5.1. It should be noted participation of the local communities, through their QIA representatives, and other applicable government stakeholders, in the consideration of alternative progressive reclamation activities is encouraged via the Mine Closure Working Group (refer to Section 2.4 for more information). The experience gained and lessons learned from the closure of the Nanisivik and Polaris mine sites, which are located in a similar climate zone, will be used, where applicable, as a benchmark for the progressive rehabilitation of disturbed Project areas.

6.2.1.1 Landfarm Operation

Hydrocarbon-contaminated soils will be excavated and treated in the Project landfarm(s) throughout the life of the Project to maintain the chemical stability of the site and any discharges. During Operations, soils treated in Project landfarm(s) that meet Nunavut Contaminated Site Remediation Tier-1 Guidelines[7] for industrial/commercial land uses will be used in select locations. The use of treated soils meeting these criteria is restricted to areas deemed as a low risk of exposure to transportation pathways and a defined in prescribed operational control procedures. During Operations, soils treated in Project landfarm(s) that meets Nunavut Contaminated Site Remediation Guidelines[8] for agricultural or residential land uses will be spread over land as or used of as cover material. Soils treated in Project landfarm(s) that do not meet Nunavut Contaminated Site Remediation Guidelines[8] for industrial/commercial land uses will be kept in containment for further treatment. Another approach that may be utilized is a risk-based methodology for the establishment of hydrocarbon criteria that are protective of human and ecological health. The

[7] Environmental Guideline for Contaminated Site Remediation, Department of the Environment, Government of Nunavut, March 2009

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methods to be followed are outlined Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standards for Petroleum Hydrocarbons (PHC) In Soil (2008).

Once no longer required, landfarms will be closed as described in Section 5.2.7.

6.3 Completed Progressive Reclamation

To date, progressive reclamation efforts have commenced, or been completed, at several areas on site. Reductions in reclamation security in response to successfully demonstrating closure criteria have been met. The following lists progressive reclamation works have occurred to date, as well as the publicly available reports summarizing completed activities:

- Fuel Bladder Farm at Milne Port. See Appendix E.8 of the 2014 QIA and NWB Annual Report for Decommissioning Reports related to this activity.
- Quonset Hut at the Mine Site. See Appendix E.8 of the 2014 QIA and NWB Annual Report for Decommissioning Reports related to this activity.
- Calcium chloride salt storage. Ongoing long-term management of calcium chloride salt storage and use at the Project Site includes waste segregation of salt bags and proper disposal of collected materials in accordance with Baffinland's Waste Management Plan (BAF-PH1-830-P16-0028) as well as identifying and containing compromised salt packages to prevent materials being distributed around the site. Currently salt is stored at both the Mary River Mine Site and Milne Port Site for use in future exploration drilling as well as for dust suppression on Project roads and camp pads.
- Km 97 Borrow Source. Borrowing in this area has led to thawing of the underlying permafrost soils, which has caused considerable increase in ponded water; and, there is settlement resulting from thaw of both the ground ice in the soil matrix and thaw of ice wedges. Although approved, due to resource limitations, only minor work was completed thus far. See the Borrow Source Reclamation Plan, Milne Inlet Tote Road, Km 97, submitted to AANDC on June 19th, 2015.
- Disposal and off-site transport of historical inventory of remaining incinerator bottom ash at the Mine Site and Milne Port. Ash that was tested and determined to be non-hazardous was disposed of at the Landfill Facility while ash that was identified as hazardous was transported off-site for disposal in a licenced facility in Southern Canada. See Appendix E.2 of the 2015 QIA and NWB Annual Report for more information related to this activity.
- Demobilization of equipment and supplies not required for near term activities, as well as the current inventory of hazardous waste and other materials by means of sealift from Milne Port Site was undertaken in 2015. See Appendix E.4 of the 2015 QIA and NWB Annual Report for more information related to this activity.

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- Decommissioning activities completed for former contractor (Nuna) work shop no longer required at Milne Port to provide for the completion of the southeast extent of Ore Stockpile Pad. Decommissioning activities included disassembly of the building structure, remediation of the underlying soil footprint, removal of structure power supply (generators) and remediation of the underlying soil footprint of the west generator. Refer to Appendix E.8.1 of the 2015 QIA and NWB Annual Report for the Nuna Shop Decommissioning Report.
- Former Rotary Biological Contactor (RBC) sewage treatment plant was removed from the site by the contractors.
- Commencement of decommissioning of the Mine Site Bladder Farm and Generator Berm Bladder at the Mine Site exploration camp. The bladders and piping was removed from these facilities. A single bladder containing oily water remains in the Mine Site Bladder Farm. The lined berms will be converted to other uses such as the storage of drummed fuel.
- Ongoing management of hydrocarbon impacted soils from historical decommissioning efforts, as well as from period spills resulting from day-to-day fuel handling and management activities at both the Mine site and Milne Port. These soils have been placed in the Milne Port Landfarm Facility for biotreatment to meet the objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation, 2010. For approximate quantities of hydrocarbon impacted soils deposited in the Landfill Facility during 2015, refer to Table 2.5.2 of the 2015 QIA and NWB Annual Report.
- Disassembly of contractor (Anmar) tent structure and equipment was completed after a large-scale fire at Milne Port. The fire debris, residual waste material, and soils were characterized under the direction of a qualified consultant provided by Qikiqtaaluk Environmental Inc. (QE). The hazardous and potentially hazardous waste material was sorted and packaged for off-site transport to waste receiving facilities in Quebec. Refer to Appendix E.8.2 of the 2015 QIA and NWB Annual Report for QE's final summary report for the remediation conducted. The report includes the manifests and Certificates of Disposal/Recycling provided by the receiving facilities.

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7 TEMPORARY CLOSURE

7.1 SHORT-TERM TEMPORARY MINE CLOSURE – CARE AND MAINTENANCE

Short-Term Temporary "Care and Maintenance" activities will occur when the Project ceases operations for a period of less than one (1) year with the intent of resuming operational activities or final closure activities. When entering a "Care and Maintenance" phase, the main objective is to maintain all equipment and facilities in a state of readiness to resume operation with minimal delay or have project components at the ready for use to support closure activities.

Care and maintenance of the Project sites will be implemented and executed by operational maintenance staff and other support personnel on site and will be carried out within approximately six (6) months of the initiation of the Temporary Closure Care and Maintenance phase based on the level of effort required. Access to the Project sites, buildings and structures will be restricted to authorized persons only, as during operations. Buildings where potential hazards exist will be locked or otherwise secured.

The Mine Site Reclamation Policy for Nunavut (2002) and the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (2013) require that contingency measures be established in the ICRP for Temporary Closure of a mine site. Temporary closure is defined as the planned shutdown of a mine site for a period of less than one (1) year. This section of the report presents the plans for suspension of activities of less than one (1) year. Section 0 below covers Long-term Temporary Closure beyond one year.

7.1.1 HEALTH AND SAFETY OF WORKERS AND THE PUBLIC DURING TEMPORARY CLOSURE

The health and safety of workers and the Public will be ensured during Temporary Closure Care and Maintenance. Infrastructures will be kept secure by routine maintenance and inspections to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful. Access to buildings and infrastructures will be restricted to authorized personnel only (Section 7.1.2).

Employees on site will be trained in site-specific health and safety requirements. Baffinland commits to abide by all applicable *NWT/Nunavut Mines Safety Act* and Regulations, and the *Explosives Use Act*.

Baffinland will ensure that emergency procedures are updated, if required, and implemented and that all equipment necessary to properly carry out these procedures will be accessible and kept in good working condition.

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7.1.2 Restriction of Access and Site Security

During Temporary Closure Care and Maintenance, the Mine Site and Milne Port will be maintained in a secure condition through the provision of on-site site security. Mine dewatering and water treatment, where required, will be ongoing. As a result, a number of operational maintenance staff, environmental personnel and other support personnel will be onsite at the Mine Site and Milne Port. Access to buildings, structures, and storage compounds will be restricted to authorized persons, as during operations. Buildings where potential hazards exist will be locked or otherwise secured. Fences and/or barriers with signs will be constructed to restrict access as required.

Security personnel will carry out routine inspections of security, safety and environmental measures and maintain a record of these inspections. Contact information will be provided to pertinent government and Inuit agencies to facilitate their communication and potential access to the Mine Site and/or Milne Port, if and when necessary.

The explosives contractor will manage explosives in accordance with applicable regulatory requirements as per NRCan Permit and the *Mine Safety Act*.

During Temporary Closure Care and Maintenance, reclamation activities such as re-grading may continue as per the progressive reclamation plan (Section 6). Erosion and discharge streams will be controlled as part of regular maintenance activities. Additionally, all unused pipelines will be drained and/or care will be taken that lines and pipes do not freeze and rupture.

7.1.3 Security of Mine Openings

Due to the current configuration of Deposit No 1 as an above grade deposit, an open pit is not expected to occur until years 10 to 12 of operation at full production volume (21.5 Mtpa nominal). If a pit exists, the entrance ramp to the open pit will be fenced using boulders or other means to prevent inadvertent access. Signage indicating an “Open Hole” will already be in place around the open pit perimeter during operations as per NWT/Nunavut *Mines Safety Act* Regulations. In a short-term temporary closure scenario where suspension of mining activities is expected to last less than one year, pit dewatering and the subsequent treatment and discharge would likely continue in a manner consistent with ongoing operations at the time.

7.1.4 Security of Mechanical, Hydraulic Systems and Electrical Systems

During Temporary Closure Care and Maintenance, equipment required for the security and safety of the infrastructure systems, including environmental aspects, will be maintained in working condition.

Buildings will be locked or otherwise secured to prevent inadvertent access once the Mine Site, Tote Road and Milne Port are evacuated by the majority of the personnel, except as required by the onsite staff for site maintenance and security. Non-essential machinery, equipment and systems will be left in a no-load condition or removed from site. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards.

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7.1.5 Hazardous Materials & Waste Management Sites

During or prior to Temporary Closure Care and Maintenance, an inventory of all hydrocarbon products, chemicals, explosives and hazardous wastes/materials (e.g., used oils, ammonium nitrate and greases) will be updated and the materials stored in a secure and environmentally sound manner.

All storage facilities that contain any such materials will be secured and monitored. Inert waste will be disposed of in the landfill site at the Mine Site or other approved repositories.

During Temporary Closure Care and Maintenance, the non-hazardous waste management facilities at the Project will continue as in normal operations on an as-required basis. If waste management facilities are no longer required, landfills will be covered with 1.5 m of overburden.

If the Temporary Closure Care and Maintenance phase lasts longer than one (1) year, all hazardous materials and wastes will be removed from Project sites via sealift and disposed of at a licensed hazardous waste disposal facility in Southern Canada (Section 7.2.5).

7.1.6 Docks and Airstrip

During Temporary Closure Care and Maintenance activities, the airstrip, dock infrastructure and equipment will be left in place. All non-essential airstrip and dock machinery, equipment and systems will be left in a no-load condition. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards.

7.1.7 Control of Effluents

The water management requirements at the Mine Site and Milne Port during Temporary Closure Care and Maintenance will include:

- Domestic sewage treatment
- Surface/discharge waters, as per applicable regulatory requirements

The drainage system established during operations will be retained and surface water will continue to collect in existing settlement ponds and, where required by the Water Licence, waters will be treated prior to discharge to the receiving environment.

The waste rock stockpile will be monitored during operations (Section 9). Current investigations identify that most of the waste rock will not be prone to metal leaching or acid drainage; however, if ongoing work characterization studies show that the minor portion waste rock that is potentially acid generating (PAG) could cause unacceptable impact to runoff and seepage, the waste rock stockpile construction strategy will be modified accordingly. If treatment is required, water will be batch treated with lime dosing for Acid Rock Drainage (ARD) affected water or a treatment plant such as a High Density Sludge (HDS) treatment plant may be provided.

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The Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) provides treatment options in the event that waste rock run-off requires treatment. The Fresh Water Supply, Sewage, and Wastewater Management Plan (BAF-PH1-830-P16-0010) provide the design criteria and operations and maintenance requirements for the collection and treatment of the site's wastewater.

7.1.8 Stabilization of Stockpiles

Ore and waste rock stockpiles will be visually assessed for stability at the start of the Temporary Closure Care and Maintenance period and stabilized if required. The stockpiles will be periodically inspected.

7.1.9 Site Inspection Program

The general site areas at the Mine Site, Milne Port and Tote Road will be periodically inspected by onsite security personnel. Visual inspections of the Mine Site and Milne Port will be carried out to verify the physical stability of quarries/borrow pits, waste rock stockpiles and pit walls. Section 9 identifies the environmental management and monitoring plans that will be implemented during any potential Temporary Closure Care and Maintenance period.

7.1.10 Notification of Temporary Closure

Employees, local communities, and the public will be notified in advance of any scheduled short term temporary closure activities.

7.2 Short-Term Temporary Closure Monitoring, Maintenance, and Reporting

During the Temporary Closure Care and Maintenance period, all terms and conditions of Type 'A' Water Licence 2AM-MYR-1325 will remain in force. "Care and Maintenance" monitoring program will include routine inspection, monitoring and reporting as required by Type' A' Water Licence Amendment No.1 2AM-MYR-1325 and its associated management plans. As the facilities are not operational, key monitoring requirements are established within the following management plans:

- Environmental Protection Plan (BAF-PH1-830-P16-0008)
- Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (BAF-PH1-830-P16-0026)
- Terrestrial Environmental Management and Monitoring Plan (BAF-PH1-830-P16-0027)
- Fresh Water, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010)
- Air Quality and Noise Abatement Management Plan (BAF-PH1-830-P16-0002)
- Emergency Response Plan (BAF-PH1-830-P16-0007)
- Spill Contingency Plan (BAF-PH1-830-P16-0036)
- Explosives Management Plan (BAF-PH1-830-P16-0009)
- Waste Management Plan (BAF-PH1-830-P16-0028)

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- Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011)
- Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031)
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039)

Throughout a Temporary Closure Care and Maintenance period, Baffinland would continue to report on its activities on an annual basis to the NIRB (as per Project Certificate No. 005), the NWB (as per Type A Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301). If a Care and Maintenance monitoring schedule is required differing from Operations, it will be established in compliance with the applicable management plans, in consultation with applicable regulators.

During any care and maintenance period, regulatory compliance monitoring will continue to abide by all applicable project authorizations. Environmental Monitoring Programs may be modified and/or suspended, in consultation with applicable regulators and land owners, until recommencement of Operations. Long-Term Mine Closure and Suspension of Activities

Baffinland may extend the mine closure over a longer timeframe than one (1) year should economic conditions deteriorate while the facility is in Temporary Closure Care & Maintenance. In the event the Project ceases operation for a period of greater than (1) year with the intent of resuming activities in the future, Long-Term Temporary Mine Closure activities will occur. Long-term Temporary Mine Closure activities will ensure the Project sites are maintained in a secure condition, and all facilities and equipment are de-energized and winterized. Hazardous waste and explosives would be removed from the site. Personnel necessary, including environmental personnel, to maintain site security and project monitoring requirements would remain on site.

A detailed “Long Term Care and Maintenance Plan” would be submitted to the NWB and the Land Owner at least 60 days prior to entering the Long-term Mine Closure period. Site personnel will conduct general inspections periodically and may decrease that frequency if the site inspections indicate that the site infrastructure is stable. A record of these inspections will be maintained. The names of contact persons will be provided to the pertinent regulators and government agencies such as CIRNAC and Landlord for their information, and to facilitate their access to the site, if and when necessary. The Project could reopen when the circumstances requiring the Long-term Temporary Closure change (e.g., when economic or other conditions that caused the temporary cessation of operations is no longer of concern).

The following sub-sections describe the detailed activities that would be undertaken to secure the Project components in the event of Long-Term Temporary Mine Closure.

Table 5.1 provides an overview of the actions taken for each component of the Project for a Long-term Temporary Closure scenario. Once these measures have been implemented, the labour force on site is reduced to the minimum required to ensure security of the site and ongoing monitoring requirements. It

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is expected the following activities will be carried out within approximately six (6) months of the initiation of Long-term Temporary Closure based on the level of effort required.

7.2.1 Health and Safety of Workers and the Public During Long-term Temporary Closure

Health and safety of workers and the Public will be ensured during Long-term Temporary Closure. Infrastructures will be kept secure by routine maintenance and inspections to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful.

Access to buildings and infrastructures will be restricted to authorized personnel only (Section 7.2.2). Safety will be reinforced by an inspection program (Section 7.2.9).

Employees on site will have been trained for site-specific health and safety. Baffinland commits to abide by the NWT/Nunavut *Mines Safety Act* and Regulations, and the *Explosives Use Act*.

It will be ensured that emergency procedures will be applicable and that all equipment necessary for these procedures will be accessible and kept in good working condition.

7.2.2 Restriction of Access and Site Security

During Long-term Temporary Closure, the Mine Site and Milne Port will be maintained in a secure condition. Access to the buildings, structures and storage compounds will be locked and/or fenced/gated. Potentially unsafe areas will be posted with appropriate signage. Unused machinery and equipment will be removed, where practical.

The explosives contractor will manage explosives in accordance with applicable regulatory requirements by NRCan and the Mines Safety Act. On commencement of Long-term Temporary Closure, explosives will be either removed from the Project or/and detonated in a controlled and safe fashion by experienced and licensed personnel at appropriate locations away from sensitive receptors.

During Long-term Temporary Closure, reclamation activities such as re-grading will continue as per the progressive reclamation plan (Section 6). Erosion and discharge streams will be controlled as part of regular maintenance activities. Additionally, care will be taken that lines and pipes do not freeze and break.

7.2.3 Security of Open Pit

Following notice of Long-term Temporary Closure the pit walls of the open pit will be inspected by a qualified engineer to assess the physical stability. Pit water will be monitored during the course of the operation for any indication of contamination at levels that exceed MDMER or may adversely affect the receiving environment. During Long-term Temporary Closure the decision to continue with dewatering of the open pit will be evaluated based on the planned duration of closure, and forecasts for market conditions at the time.

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It is anticipated that the final configuration of the open pit will take an estimated 85 to 150 years to passively fill with water from natural sources such as direct precipitation and surface runoff (KP 2008). Therefore, it is anticipated that the open pit will not completely flood during Long-term Temporary Closure and drainage from the open pit is not considered to be a discharge issue.

Other Long-term Temporary Closure activities to close out the open pit include the following as per NWT/Nunavut *Mines Safety Act* Regulations:

- Barricading access ramps into the open pit.
- Placing of fencing and "Danger"/"Open Hole" signage as necessary.
- Baffinland will engage communities and land users to help assess if additional access restrictions are required. This feedback will focus on effective language for signage, and identification of the priority locations for barriers to deter land users and wildlife.

7.2.4 Security of Mechanical, Hydraulic, and Electrical Systems

All buildings will be locked and/or otherwise secured to prevent inadvertent access once the Project is evacuated by the majority of the personnel, except as required by the onsite staff for site maintenance and security. All non-essential machinery, equipment and systems will be left in a no-load condition. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards.

7.2.5 Hazardous Materials and Waste Management Sites

Inert waste will first be disposed of in the landfill site at the Mine Site or other approved repositories. During operations the landfills will be covered with an interim soil cover layer to reduce infiltration and promote permafrost advancement within the waste. As such, contaminated runoff or seepage from the landfill sites are not anticipated during Long-term Temporary Closure. The required thickness of the soil cover to completely encapsulate waste in permafrost will be informed by thermistor measurements at the site.

During or prior to the Long-term Temporary Closure an inventory of all hydrocarbon products, chemicals, explosives and hazardous wastes (e.g., used oils, ammonium nitrate and greases) will be updated and all hazardous materials and wastes will be shipped south to the appropriate hazardous waste disposal facility via sealift. All storage facilities that contained any such materials will be secured and monitored. Inert waste will be disposed of in the landfill site at the Mine Site or other approved repositories.

7.2.6 Stabilization of Stockpiles

At the onset of Long-term Temporary Closure the waste rock stockpile may undergo minor re-contouring and the physical and chemical stability of the waste rock stockpile will be assessed. Following this investigation and according to the stockpile geometry at the time of Long-term Temporary Closure, aspects related to erosion, runoff control, slopes, benches, and discharges will be addressed.

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Ore stockpiles are expected to be depleted prior to Long-term Temporary Closure. In the event the ore stockpiles remain during Long-term Temporary Closure, they will be monitored.

7.2.7 Docks and Airstrip

During Long-term Temporary Closure activities, airstrip the ore dock, ore dock office, and the ship loader will be left in place. All non-essential machinery, equipment and systems will be left in a no-load condition. Live electrical systems will be fenced, locked, or otherwise secured against inadvertent entry or contact, and appropriate signs will be placed to warn of potential hazards. The dock office will be secured to prevent inadvertent access. Infrastructure will be kept secure by routine maintenance and inspections to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful. The names of contact persons will be provided to the pertinent regulators and government agencies such as AANDC for their information, and to facilitate their access to the site, if and when necessary.

7.2.8 Control of Effluents

Mine Site and Milne Port water management will be required during Long-term Temporary Closure, including:

- Domestic sewage treatment
- Surface/discharge waters, as per applicable regulatory requirements

Surface water will be collected in settlement ponds and those for the ore stockpiles and waste rock stockpile will be tested for MDMER requirements. The waste rock stockpile will be monitored during operations. Based on current investigations it is anticipated that most of the waste rock will not be prone to metal leaching or acid drainage. However, if ongoing work characterization studies show that the minor portion waste rock that is potentially acid generating (PAG) could cause unacceptable impact to runoff and seepage, the waste rock stockpile construction strategy will be modified accordingly. If treatment is required, water will be batch treated with lime dosing for Acid Rock Drainage (ARD) affected water or in a treatment plant such as a High-Density Sludge (HDS) treatment.

The Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) provides treatment options in the event that waste rock run-off requires treatment. The Fresh Water Supply, Sewage, and Wastewater Management Plan (BAF-PH1-830-P16-0010) provide the design criteria and operations and maintenance requirements for the collection and treatment of the site's wastewater.

7.2.9 Site Inspection Program

The Project areas at the Mine Site, Milne Port and Tote Road will be periodically inspected by onsite security personnel. Visual inspections of the Mine Site and Milne Port will be carried out to verify the physical stability of quarries/borrow pits, docks, and port facilities, waste rock stockpiles and pit walls. The environmental management and monitoring requirements for the Long-term Temporary Closure Care and Management period are identified in Section 7.3.

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7.3 Long-Term Temporary Closure Monitoring, Maintenance, and Reporting

During Long-term Temporary Closure, all terms and conditions of Type 'A' Water Licence Amendment No. 1 2AM-MYR-1325 would remain in force unless an amendment to this Licence is requested by Baffinland as part of the "Long-Term Care and Maintenance Plan". The application for a licence amendment would identify the changes proposed for the facilities required to be shutdown, the location of new discharges (if any), updates to any management plans and/or the AEMP (if required), and an indication of sites to be permanently rehabilitated. A monitoring schedule, if differing from Operations, will be established as part of the "Long-Term Care and Maintenance Plan" in compliance with the AEMP and other applicable Management Plans in consultation with applicable regulators.

Routine inspection, monitoring and reporting as required by the Type' A' Water Licence 2AM-MYR-1325 Amendment No. 1 and its associated management plans remain applicable. As the facilities are not operational, key monitoring requirements are established within the following management plans:

- Environmental Protection Plan (BAF-PH1-830-P16-0008)
- Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (BAF-PH1-830-P16-0026)
- Terrestrial Environmental Management and Monitoring Plan (BAF-PH1-830-P16-0027)
- Fresh Water, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010)
- Air Quality and Noise Abatement Management Plan (BAF-PH1-830-P16-0002)
- Emergency Response Plan (BAF-PH1-830-P16-0007)
- Spill Contingency Plan (BAF-PH1-830-P16-0036)
- Explosives Management Plan (BAF-PH1-830-P16-0009)
- Waste Management Plan (BAF-PH1-830-P16-0028)
- Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011)
- Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031)
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039)

Baffinland will continue to report on its activities throughout the Long-term Temporary Closure period on an annual basis to the NIRB (as per Project Certificate No.005, Amendment No. 1), the NWB (as per Type A Water Licence 2AM-MYR-1325 Amendment No. 1) and the Land Owners (as per Commercial Lease Q13C301).

Although regulatory compliance monitoring will continue to abide by all applicable project authorizations. Environmental Monitoring Programs outlined in the Project Certificate will likely be suspended in consultation with applicable regulators and landowners, until Operations recommence.

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8 INTEGRATED SCHEDULE OF ACTIVITIES

Based on current estimates of the level of effort required for closure activities, the primary Final Closure phase is expected to be three (3) years, with the flooding of the open pit continuing after the primary closure phase is completed. Following the Final Closure Phase a minimum of fifteen (15) years of post-closure safety and environmental monitoring and treatment, as and if required, will be conducted. A fifteen (15) year post-closure phase is estimated to be required based on the existing closure design and impacts assessment determinations described in the FEIS and addendums. This estimate is expected to be validated by the operations monitoring program results observed, and their comparison against residual effects predictions and environmental significance determinations. Where concerns in project tracking are identified, specific reclamation research programs may be developed to address uncertainties.

Upon initiation of Final Closure activities, a Short Term Temporary Care and Maintenance phase would be implemented consistent with Section 7.1, as required, to facilitate final closure planning and logistics. It is expected this phase to last no longer than one (1) year for a planned closure scenario. As consistent with the activities outlined in Section 7.1, the Short Term Temporary Care and Maintenance period prior to Final Closure activities would focus on maintaining a state of readiness of project components. Although activities would be consistent, the primary difference in a Short Term Temporary Care and Maintenance period prior to Final Closure is activities would be performed to ensure project components are maintained in a state of readiness to support final closure activities rather maintained in a state of readiness with the intent of resuming operational activities in the future. Table 5.1 presents an overview of the actions to be taken for each major Project component (by Project site) for Short Term Temporary Care and Maintenance as well as Long-Term Temporary Closure and Final Closure. The sub section below outlines the planned activities, including this Short Term Temporary Care and Maintenance period, for Final Closure activities.

It should be noted that Baffinland also recognizes that Short Term Temporary Care and Maintenance and Long-term Temporary Closure could occur during the construction or commissioning phases of the Project. The Project is being implemented in gradual phases and therefore not all components of the approved Project would be in place, or operational, should various economic drivers force the Company in Temporary Closure, Long-term Closure or Final Closure. Table 4.1 presents the current status of components related to the Project at the time of publishing.

8.1 DURATION OF CLOSURE ACTIVITES

The activities to achieve Baffinland's Site Abandonment Goal (Section 2.2.2) are undertaken with the intent of achieving component-specific closure criteria, as outlined in Table 5.1 in as short duration as practicable. For planned closure, once the decision has been made to permanently close the Project and the NWB and Land Owners have approved Baffinland's Final Closure Plan, it is anticipated that the major closure activities, as described in Section 8.2, will be completed between July and October over a period

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three (3) years. This period is preceded by a one year final closure planning period (Year 0) and proceeded by a fifteen (15) year post-closure monitoring period (Year 4 to 18), that will extend further depending on the timing of pit filling, which could take 80+ years, or as few as 2 if the pit is actively infilled.

In a planned closure scenario, final closure planning (Year 0) is anticipated to require 1 year. The reclamation program will be predominantly an earthworks exercise with a simple demolition contract and therefore a relatively simple engineering scope. This would indicate long durations for planning, design, procurement, and coordination are not required. In addition, based on the information developed and reviewed to date as part of this document, the level of information developed and discussed during the ongoing ASRs, and the expected content and review process for future ICRP revisions and the Final CRP, it is expected reclamation strategies would be developed in sufficient detail that the final closure planning period would be expedited and any required approval processes initiated well in advance. It is therefore reasonable to assume that excessive review, planning and revision of the reclamation scope and methodology would not be required and a year duration for a final closure planning period (Year 0) would be sufficient in a planned closure scenario. For the purpose of the ASR and unplanned closure, a two (2) year final closure planning period is assumed to be required. This is based on the assumption a 3rd Party would need additional time to go through a regulatory approval processes that, in a worst-case scenario, is not reasonably expected to be able to be completed in year or less.

The expectation of an active final closure and reclamation activity period of three (3) years is based on estimated duration and level of effort required for identified active closure activities[8]. Based on the ASR process, all active closure activities have a case-by-case person days associated with them to complete each task or sub-task. The summation of the total person days needed to complete the comprehensive list of active closure tasks expected to be required to meet closure objectives and criterion – including consideration of productivity factors and travel time – demonstrates it can be accommodated in three (3) year period assuming final closure and reclamation work is conducted only during the summer month period (mid-June to mid-September) with a total site-wide available camp space of no more than 100 beds.

The expectation of a fifteen (15) year post-closure monitoring period (Year 4 to 18) is based on findings from the Mary River FEIS that show no significant adverse residual effects are predicted for the VECs (Valued Ecosystem Component) or VSECs (Valued Socio-Economic Component) associated with the Project. The post-closure monitoring period is expected to be 5 (five) years of intensive monitoring, with less frequent monitoring being undertaken over the next ten (10) years as closure conditions reach equilibrium. As shown in the Mary River FEIS, the Project is not expected to compromise the ecosystemic integrity of the Nunavut Settlement Area. In addition, no significant adverse residual effects are

[8] Estimated duration and level of effort required for identified closure activities is described in 'Annual Security Review (ASR)' documentation required under Section 9.2 of the Commercial Lease, No. Q13C301, and under Part C and Schedule C of the NWB Type "A" Water Licence No. 2AMMRY1325.

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predicated to occur to VSECs identified within the socio-economic environment, and the Project is expected to have significant positive effects for most of the VSECs as the Project reflects the priorities and policies of the Government of Nunavut as well as the aspirations of local communities, and is expected to enhance the future well-being of the residents and communities of the Nunavut Settlement Area and the rest of Canada. See Appendix H for further discussion on Predicted Residual Effects.

Based on this understanding, Baffinland is currently expecting fifteen (15) years Post Closure monitoring and reporting to be required to confirm the prediction that no significant adverse residual effects have been actualized by the Project. This duration in compliance with Section 12.3 of QIA Commercial Lease No.: Q13C301 and was selected as a reasonable time-frame to demonstrate closure activity effectiveness based on the information currently available. As the project progresses into Operations and ongoing monitoring results are developed (such as the rate of pit infilling), if information indicates that fifteen (15) years of post-closure monitoring is not a sufficient amount of time to determine closure activity effectiveness, or vice-versa, is overly conservative, this duration will be re-evaluated in consultation with the Land-Owner(s) and other stakeholders.

8.2 Summary of Activities during Final Closure by Year

A high level schedule for planned Final Closure (by year) has been developed assuming productive use of resources performed in a logical manner with consideration given to unique challenges of working in the Arctic, such that reclamation can be accomplished in a timely fashion, in accordance with the ICRP and the regulatory framework established by the Inuit, Federal and Territorial governments. This schedule will be reviewed and revised to include additional and more detailed information as the final closure phase is approached. New information, when available, will be provided in subsequent revisions of the ICRP.

The current high level Final Closure schedule (by year) for planned closure includes, is presented in Figure 8.1.

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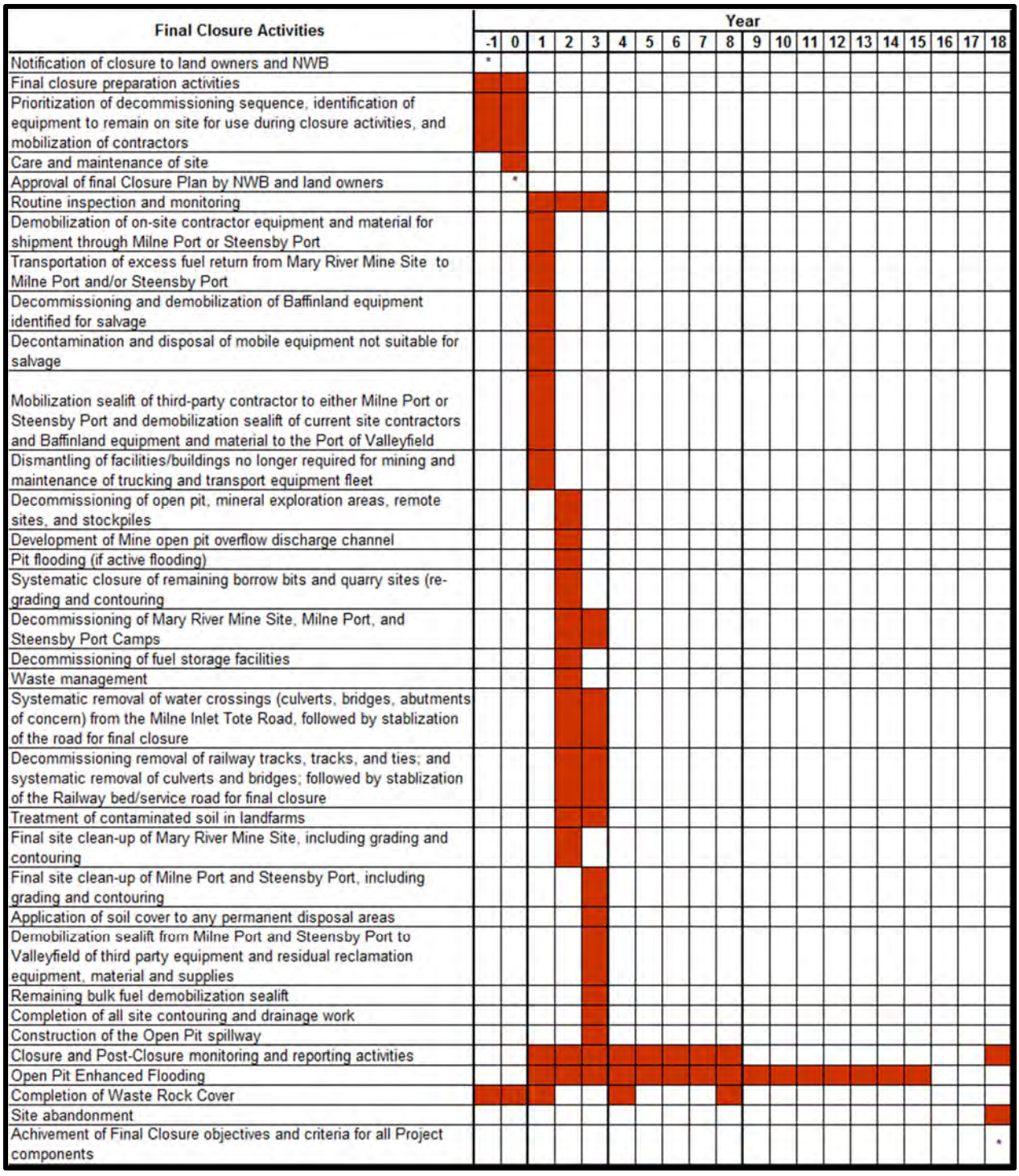


Figure 8.1 Schedule of Final Closure Activities

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Baffinland anticipates that all Project sites will be fully decommissioned and rehabilitated by the end of the third year of Final Closure based on level of effort estimates for direct closure activities. The Post-Closure monitoring and reporting activities to be conducted during this period are discussed in Section 9. Post-closure activities will be extended if closure criteria are not met in this timeframe.

By the end of Year 18, Baffinland expects that the Final Closure objectives and criteria for all project components will be achieved.

Maintenance to engineered structures during closure activities Years 1 to 3 will depend on results from operational monitoring. It is likely that a small level of effort will be required to maintain water and waste management structures until they are permanently closed. Maintenance is not anticipated beyond Year 4, and would be addressed only as needed.

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9 POST-CLOSURE SITE ASSESSMENT

This ICRP is considered to be a living document that will be updated regularly with additional detail incorporated from research and the results of monitoring plans as the Project evolves or approaches Final Closure.

The monitoring programs presented in the subsequent sub-sections are conceptual in nature at this stage of the Project life (initial phased operations). As the project advances a more detailed study design for assessing residual environmental impacts following completion of reclamation activities will be developed. This study will primarily consist of the post-closure inspection/monitoring programs described below, which are designed to assess the conditions at the site against the agreed upon closure objectives and criteria, as well as, site visits by the Designated Inuit Organization. Additional activities, such as human health and ecological risk assessments, and.

Final Closure activities could result in substantial changes to the Project sites and therefore Baffinland expects the Final Closure and Reclamation Plan to include updated management plans based upon the knowledge gained through studies during the design, construction and operational phases of the Project, and consideration of the anticipated changes.

The following management plans, which include monitoring and reporting requirements, are expected to be updated to support closure and post-closure activities. As these plans are refined and increasing detail is available for closure designs, contingency procedures and/or corrective action levels will be added. The management plans include, but are not limited to:

- Surface Water and Aquatic Ecosystems Management Plan:
    - Updated to reflect re-contoured and natural drainage features re-established to pre-project condition, to the extent reasonably possible.
    - Consideration that sedimentation ponds will be breached and re-profiled.
    - As infrastructure is removed, amended to account for the site final configuration.
- Fresh Water Supply, Sewage, and Wastewater Management Plan:
    - Updated to reflect sewage and wastewater treatment plants will be decommissioned, dismantled and disposed of.
- Waste Management Plan:
    - Modified to account for disposal of equipment, material and waste resulting from demolition and dismantling of facilities considered.
- Terrestrial Environment Mitigation and Monitoring Plan:
    - Modified to account for closure activities.

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- Aquatic Effects Monitoring Plan:
    - As some infrastructure is removed, the AEMP will be amended to account for the site final configuration.
- Shipping and Marine Wildlife Management Plan
    - Modified to account for closure activities
- Air Quality and Noise Abatement Management Plan
    - Modified to account for the decommissioning of facilities

After the closure works, the site will not be considered closed out until assessments of the site conditions show that the closure objectives and criteria (Section 5.1.1) are met. Until those closure objective and criteria are met, monitoring of the site will continue in accordance with the project management plans, as applicable.

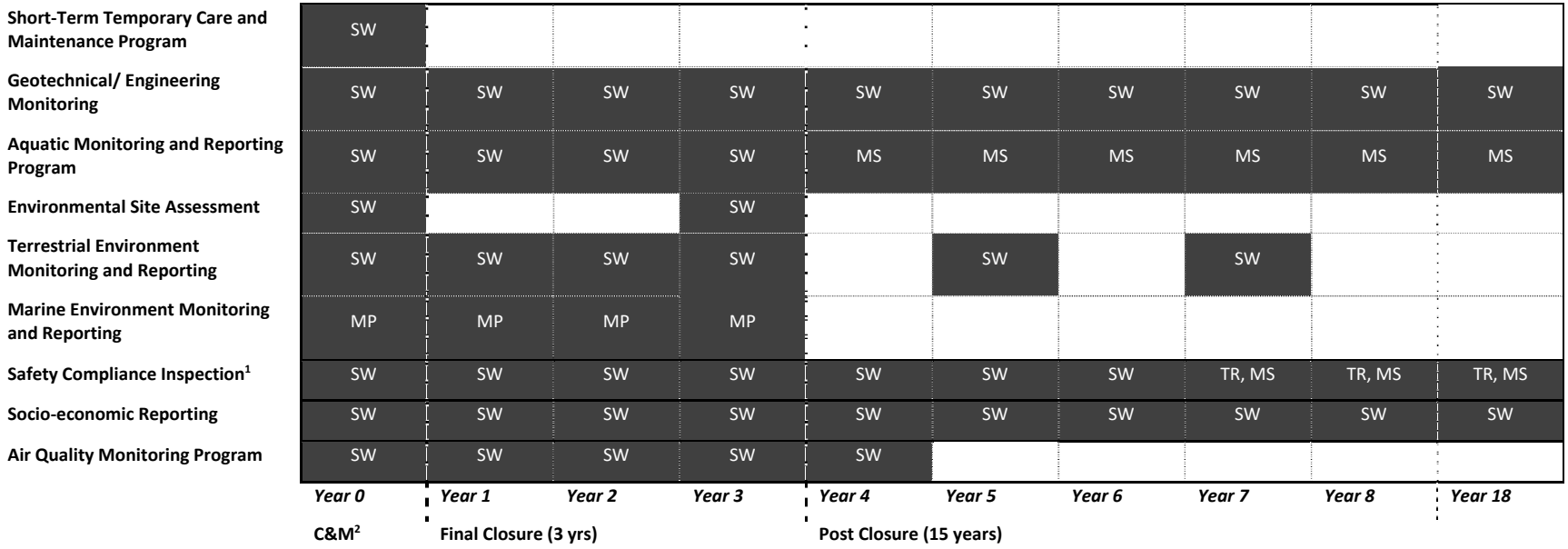
Monitoring the NIRB requirements, as required during planned closure, are dealt with in the implementation of current management plans that will be updated regularly throughout the life of the Project and through the monitoring and reporting programs shown below. These management plans will still be applicable during closure and, as necessary, post-closure monitoring. See Table 11.3 for concordance to NIRB Project Certificate requirements.

Based on current environmental effect predictions, post-closure monitoring is expected to be required over a fifteen (15) year period, although this time period may be revised, as necessary, as the monitoring programs are further developed to address additional information obtained over the Project lifecycle. Post-closure monitoring would be completed for a period of five (5) years, with a final monitoring assessment completed ten (10) years following.

Figure 9.1 represents the anticipated closure and post closure monitoring program schedule by closure/post-closure year. After closure activities are completed, the results from each monitoring and reporting program will be used to assess if prediction of no significant environmental or social effects are actualized.

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NOTES:

SW = Site Wide, MP =Milne Port; TR =Tote Road; MS =Mine Site (including Open Pit and Waste Rock Stockpile)

1. Frequency will be established at the discretion of the Chief Inspector of Mines in consultation with Baffinland
2. Care and Maintenance Phase, up to one (1) year
3. Post Closure activities are expected to last fifteen (15) years but will be extended if closure criteria are not met in that timeframe

Figure 9.1 Anticipated Closure and Post Closure Monitoring & Reporting Program Schedule for Major Mine Areas

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The following subsections provide outlines of monitoring programs proposed for closure and/or post-closure.

9.1 Short-Term Temporary Care and Maintenance Program

As described in Section 8, the anticipated Short-Term Temporary Care and Maintenance program includes routine inspection, monitoring and reporting as required by Type 'A' Water Licence Amendment No. 1 2AM-MYR-1325 and its associated management plans. Please refer to Section 7 for more information. The Short-Term Temporary Care and Maintenance period is expected to last no longer than one (1) year for a planned closure scenario. The goal of the Short-Term Temporary Care and Maintenance period is to maintain required project facilities as necessary to support the upcoming active closure activities. As further definition of the Short-Term Temporary Care and Maintenance program is developed, it will be provided in future ICRP revisions and/or incorporated into the Closure and Post Closure Monitoring Plan submitted as part of the Final Closure and Reclamation Plan. If a Care and Maintenance monitoring schedule is required differing from Operations, it will be established in compliance with the AEMP and other appropriate management plans in consultation with applicable regulators and landowners.

Baffinland will continue to report on its activities in this Temporary Care and Maintenance period on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type A Water Licence 2AM-MYR-1325), and the Land Owners (as per Commercial Lease Q13C301). Through a Care and Maintenance monitoring program, regulatory compliance monitoring will continue to abide by all applicable project authorizations and adaptive management similar to that of Year 1 of Final Closure.

9.2 Long-Term Maintenance

During care and maintenance and closure, facilities that are not yet decommissioned will need to be maintained until closure conditions are stabilized. All facilities are expected to be stabilized prior to demobilization of heavy equipment in Year 3. At this time, the only infrastructure that will require continued maintenance is the pit flooding equipment, which is anticipated to be completed between year 8 and year 15. The Open Pit spillway, which will be constructed during closure activities, will be designed and constructed to minimize maintenance requirements post-closure. The geotechnical monitoring (below) will identify the need for maintenance activities on all remaining engineered structures.

Other facilities such as the ore dock and sections of the Tote Road may be left in place following negotiations with QIA and would be left as is. Closure activities for these remaining structures will seek to limit residual liability in these areas, as agreed upon with QIA. Any other facility or structure left in place, such as the airstrip and open pit spillway, would only be left if there were no long-term maintenance required, or as agreed upon with QIA.

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9.3 Regulatory Reporting

Given the uncertain regulatory framework that will exist at the planned end of mining (2040), Baffinland has conservatively assumed that all existing regulatory and permitting reporting requirements from the operations phase will continue until the end of closure activities (Year 3). In post-closure, reporting associated with the monitoring programs discussed below is assumed to capture data collection and interpretation requirements for regulatory and permitting purposes as well as QIA and other public agency interests. In some cases, such as NWB and NIRB annual reports, a small level of additional effort may be required as a preamble to appended post-closure monitoring reports. If additional reporting scope is required by NWB and NIRB post-closure, it will be added to the existing monitoring/reporting to streamline reporting/review efforts when possible.

9.4 Geotechnical Engineering Monitoring

Up until post-closure (following completion of the closure activities), Baffinland will report on all Geotechnical/Engineering Monitoring results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type A Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

The objective of the geotechnical/engineering monitoring will be to confirm the long-term physical stability of the remaining engineered structures and disturbed areas on site, as indicated by closure objectives and criteria in Table 5.1.

Post-closure site assessment/geotechnical engineering monitoring will comprise both engineering analyses and post-construction performance monitoring of both permanent geotechnical structures and disturbed areas (where no permanent structure or significant landform structure will remain). Table 9.1 presents the proposed requirements for post-closure analyses and monitoring. The year prior to Final Closure Activities (Year 0), Baffinland will commission an inspection of the site and review of the design or as-built information (where available) for each of the permanent site features to confirm the scope of post-closure geotechnical assessments (analyses and monitoring). The scope and duration of monitoring and assessments required will be developed and confirmed based on operational performance results and available construction records. If features are no longer needed during mining, this assessment may be completed earlier in the mine's lifespan. Complete studies will be submitted to QIA for review with planned ICRP updates.

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Table 9.1: Proposed Post-Closure Geotechnical Assessment and Monitoring Requirements

Mine Feature	Permanent Structure / Disturbed Area	Engineering consideration	As-built Assessment Completed	Monitoring	Analyses and monitoring
Milne Port					
Ore and Freight Docks	Permanent structure	Stability and erosion	Operations	X	
Port site drainage	Disturbed area	Erosion	Post-closure		X
Abandoned quarry sites	Disturbed area	Stability and erosion	Operations	X	
Tote Road					
Former (removed) water crossings	Disturbed area	Erosion	Post-closure	X	
Remaining water crossing abutments	Permanent structure	Erosion	Post-closure		X
Road	Disturbed area	Erosion	Operations	X	
Cut and fill slopes	Permanent structure	Stability and erosion	Operations	X	
Mine Site					
Site drainage	Disturbed Area	Erosion	Post-closure	X	
Open pit	Permanent structure	Stability and erosion	Post-closure		X
Waste rock pile (s)	Permanent structure	Stability and erosion Permafrost Stability	Post-closure		X
Former stockpiles	Disturbed Area	Erosion	Post-closure	X	
Landfill site	Permanent structure	Erosion	Post-closure		X
Site Wide					
Site wide - other	Structure	Stability and erosion	Prior to mining	X	
			Operations	X	
	Disturbed area	Erosion	Prior to mining	X	
			Operations	X	

Following the completion of closure works for each mine feature/area, a construction record will be prepared. Construction records will include:

- description of the works that were completed;
- description of deviations that were made from the design (where appropriate);

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- stamped as-built drawings of the completed structure or landform (final grading);
- confirmation of what closure objectives have been met for this structure;
- laboratory results (where appropriate);
- a photolog; and
- confirmation of performance monitoring requirements.

9.4.1 Geotechnical Engineering Analyses

Geotechnical engineering analyses will be required for all permanent structures (i.e. pit wall slopes, waste rock slopes, permafrost covers, port embankments, etc.). The requirements for analyses are as follows:

- appropriately detailed construction records;
- monitoring records indicate that the structure has been performing well;
- slope stability, erosion protection analyses, or other evaluation of the structure to demonstrate long-term stability;
  - based on as-built records, or
  - based on the closure design where as-built conditions have been confirmed to be consistent with the design;
- thermal analyses of the permafrost cover to demonstrate long term post closure permafrost stability
- meets closure criteria (Table 5.1).

These requirements may be found to have already been met for some structures that were constructed during, or prior to operations, provided the records listed above are available.

9.4.1.1 Slope Stability

Slope stability analyses will be used to confirm the long-term stability of permanent constructed structures on site, except for where analyses are deemed not to be required to confirm long-term stability by a NU engineer. Slope stability analyses may be modelled using industry standard software packages such as Geostudio, RocScience, or Plaxis. Slope stability assessments will include both static and pseudo-static (earthquake loading) conditions, and will provide an indication of the potential for liquefaction.

Open Pit

Slope stability modelling of the open pit will be completed for both the transient flooding conditions as well as for long term flooded conditions. Rock mass quality and strength characteristics will be collected during operations once pit development has begun and will be used to inform the assessment.

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Under transient conditions, the pit will likely undergo worst case conditions when hydraulic back pressure on the walls from groundwater inflow is at its strongest. Once the pit has flooded, this backpressure will become counterbalanced with the pit lake water, which should improve the pit stability.

Waste Rock

The waste rock pile will be analyzed in consideration of permafrost aggradation. Monitoring of aggradation through operations will inform the stability assessment to confirm the thickness of the active layer that is to be incorporated in the model for the stability assessment.

Permafrost stability will be also modelled using Geostudio package or other appropriate software to ensure the long term performance. The geothermal model will be established taking into account seasonality, climate change and heat generation within the waste rock.

9.4.1.2 Erosion Protection and Drainage

Drainage features will be assessed for design runoff events. Peak discharges would be modelled using the rational method or by HEC-HMS and/or HEC-RAS for large catchments over 80 ha.

As no dams will remain on site, there is no anticipated requirement for conducting dam safety or evaluation programs. Decommissioning and breaching of dams will occur in accordance with all applicable regulations.

Revetment designs (shoreline protection) would be evaluated in accordance with the recommendations set out in the US Army Corps of Engineers (USACE) Shoreline Protection Manual.

Bridge abutments that are to remain within the Mary River will be assessed for erosion potential. Amongst the methods that could be employed to assess the stability of the riprap erosion protection include the Tractive Force Method.

A Final Grading Plan will be developed to outline reclamation activities and expectations for site conditions post-closure. It will be developed in consultation with local communities and in consideration of planned future land uses and environmental goals (e.g., minimizing wind erosion). The Final Grading Plan will address a variety of topics, and is expected to include information such as:

- Site drainage strategies and construction criteria
- Covering methods for foundations that are left in place
- Quarry reclamation, particularly in areas of permafrost disturbance
- Risk management using soil covers for any areas of impacted soil
- Covering landfills
- Regrading procedures at bermed and/or lined areas (e.g. landfarms)

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- Grading of rock cuts and/or infill locations along Tote Road
- Grading options to promote desired wildlife and human travel
- Priority areas for scarifying to promote natural revegetation

The Final Grading Plan will describe the above information and provide the objectives that these activities will target.

9.4.2 Geotechnical Monitoring Inspections

Geotechnical inspections will be carried out at regular intervals following the completion of the closure works. Inspections will review the performance of structures relative to the closure objectives.

Site wide inspections of the condition of all site features are to be carried out the year following completion of closure activities (Year 4), as well as in Years 8 and 18.

The Open Pit should be inspected regularly during filling, and then 5 years following filling. For the purposes of devising a monitoring program, it is assumed that enhanced pit filling will take ten (10) years to complete. The final inspection would be completed in year 18.

As part of these inspections, site conditions are to be compared to the construction records, where available. During monitoring inspections, it is expected special attention will be given to the following areas:

1. Milne Port
    a) Ore and freight docks – integrity of dock embankment and indication of shore erosion.
    b) Port site drainage – indications of excessive erosion.
2. Tote Road
    a) Abandoned quarry sites – site condition and advancement of re-vegetation.
    b) Former water crossing – bank stability and indications of excessive stream bank erosion.
    c) Road – bed erosion and progress of re-vegetation cover.
3. Mine Site
    a) Overall site drainage patterns and indication of erosion channels.
    b) Open pit water level and barriers to access.
    c) Open pit spillway
    d) Integrity of waste rock stockpile slopes (erosion, slumping of slopes).
    e) Landfill site status (indication of bank erosion, depression of cover material)
    f) Waste Rock temperature readings to ensure stability/permafrost aggradation

All geotechnical/engineering inspections and assessments will be carried out by licensed NU engineer.

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9.4.3 Additional Site Observations

In addition to the detailed geotechnical/engineering monitoring inspections described above carried out by licensed NU engineer, as part of the Closure and Post-Closure Aquatic Monitoring and Reporting Program (Section 9.5), sampling personnel will be trained to identify and document any suspected cases of physical or geotechnical instability of lands and structures remaining on site (e.g., visible signs of cracking, any indication of seepage, indication erosion that has taken place, natural re-vegetation progress, slope ratios, etc.). Therefore, in the interim years between full geotechnical/engineering monitoring inspections, suspected cases of physical instability will be identified and documented for annual review by licensed NU engineer. If the licensed NU engineer deems it necessary in order to meet established closure criteria, an action plan will be developed and implemented as appropriate to correct the situation and ensure long-term physical stability of the project component or lands in question. The component or lands in question, and similar components or lands, will also then become an area of focus for the subsequent detailed geotechnical/engineering monitoring inspections carried out by licensed NU engineer to confirm acceptable corrective action.

9.5 Closure and Post-Closure Aquatic Monitoring and Reporting

The Closure and Post-Closure Aquatic Monitoring and Reporting Program focuses on detecting the discharge of potential contaminants from various Project components. During Final Closure, the Aquatic Monitoring and Reporting Program will be maintained as outlined by the AEMP (BAF-PH1-830-P16-0039), the SWAEMP (BAF-PH1-830-P16-0026), and in accordance with Type 'A' Water Licence 2AM-MRY1325. If the monitoring schedule is required to be revised from Operations, it will be established in compliance with the AEMP, SWAEMP, and other applicable management plans in consultation with applicable regulators and landowners. It is expected that any additional water quality/quantity monitoring programs developed to focus on specific areas of the Project site (e.g. tote road, quarries) will be rolled into a single plan for the post-closure phase. This includes Environmental Effects Monitoring required by MDMER (below), as well as the Core Receiving Environment Monitoring Program (CREMP). An important detail of this post-closure monitoring program will be the clear distinction of what closure criteria will apply to which areas, such that an appropriate monitoring schedule is developed. For example, MDMER requirements will apply at the Open Pit and Waste Rock Stockpile, and in addition Water Licence effluent criteria, CCME PAL and/or risk-based criteria informed by baseline and operational water quality data will be considered for these and other areas of the site. Refinement of these criteria to numerical values, will occur in cooperation with QIA. In these other areas, post closure monitoring schedules will be informed by the large amount of performance monitoring results acquired throughout operations to allow a refined focus on the specific parameters/locations of concern. Existing water quality monitoring locations are presented on Figure 9-1 and Figure 9-2 below. It is expected that this level of monitoring would decrease during care and maintenance and closure activities (Years 0-3) to reflect the end of mining activities and removal of "end of pipe" discharge locations, but would not be discontinued until an appropriate duration of post-reclamation monitoring has been at each area. In some areas, geotechnical inspection and monitoring will continue after water quality monitoring in order to identify unexpected erosion and

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sedimentation issues. If concerns are observed, water quality monitoring may be required. Monitoring at the Mine Site (i.e. Waste Rock Stockpile and Open Pit), which represent the largest environmental risk, will continue until Year 18.

As currently described in Section 5.2.1, the Open Pit will be filled by natural infilling and active pumping from local water sources (enhanced pit filling). Where possible, Baffinland would like to avoid unnecessary stresses to the nearby aquatic environment that may be associated with water extraction, while also avoiding a closure scenario that requires long-term active care. To achieve this, Baffinland has tentatively assumed a flooding period of 10 years would be achieved. Closure planning for this element will focus on refining estimates for active pumping from the likely water sources in combination with updated estimates for natural infilling based on new information regarding pit geometry, bulk rock hydraulic conductivity and site hydrological processes. In addition to water quality monitoring which will occur periodically throughout flooding, an additional 3 year monitoring period has been assumed to confirm closure criteria are met and the spillway is functioning as per design intent.

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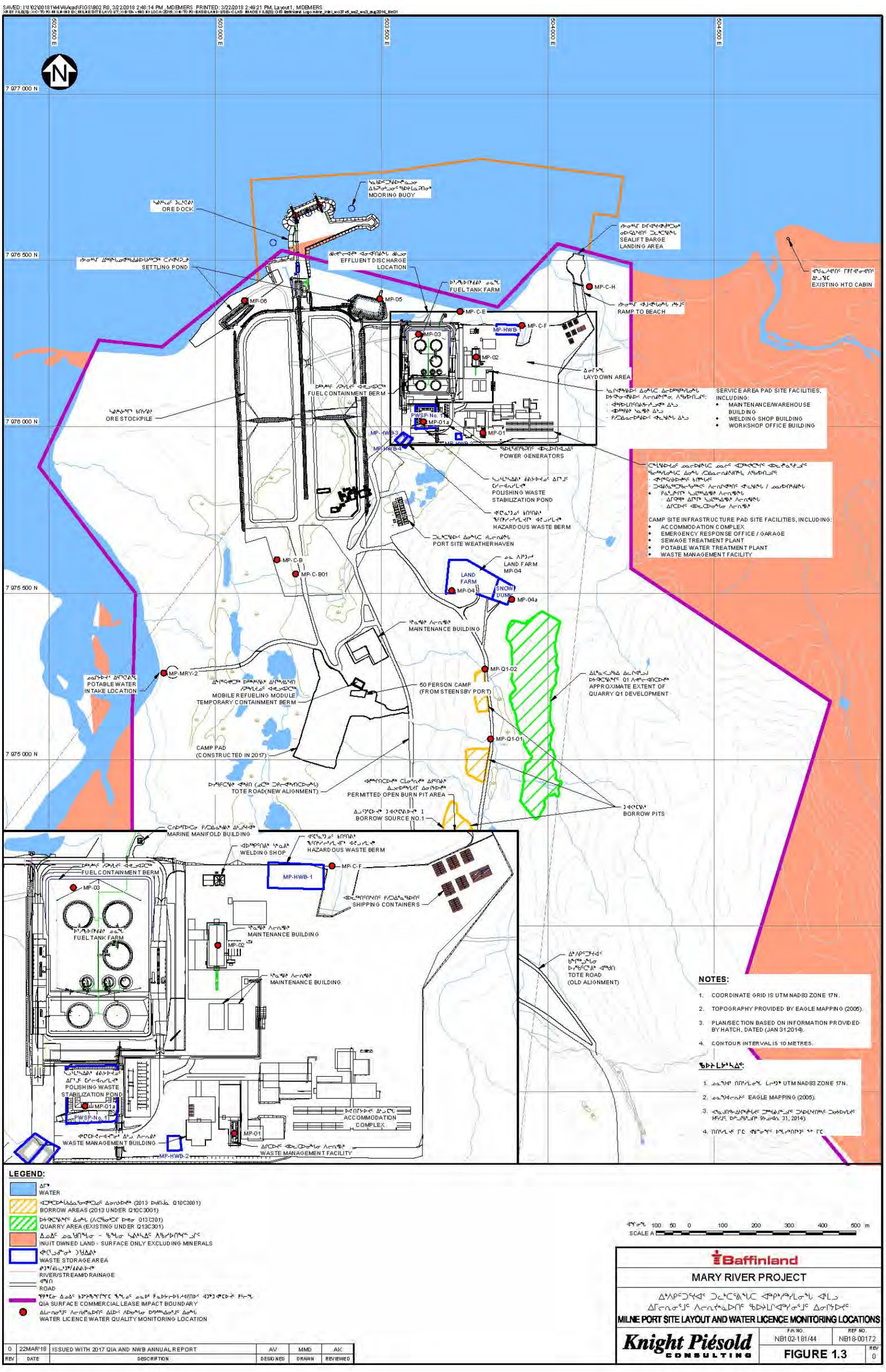


Figure 9.2 Milne Port Site Plan

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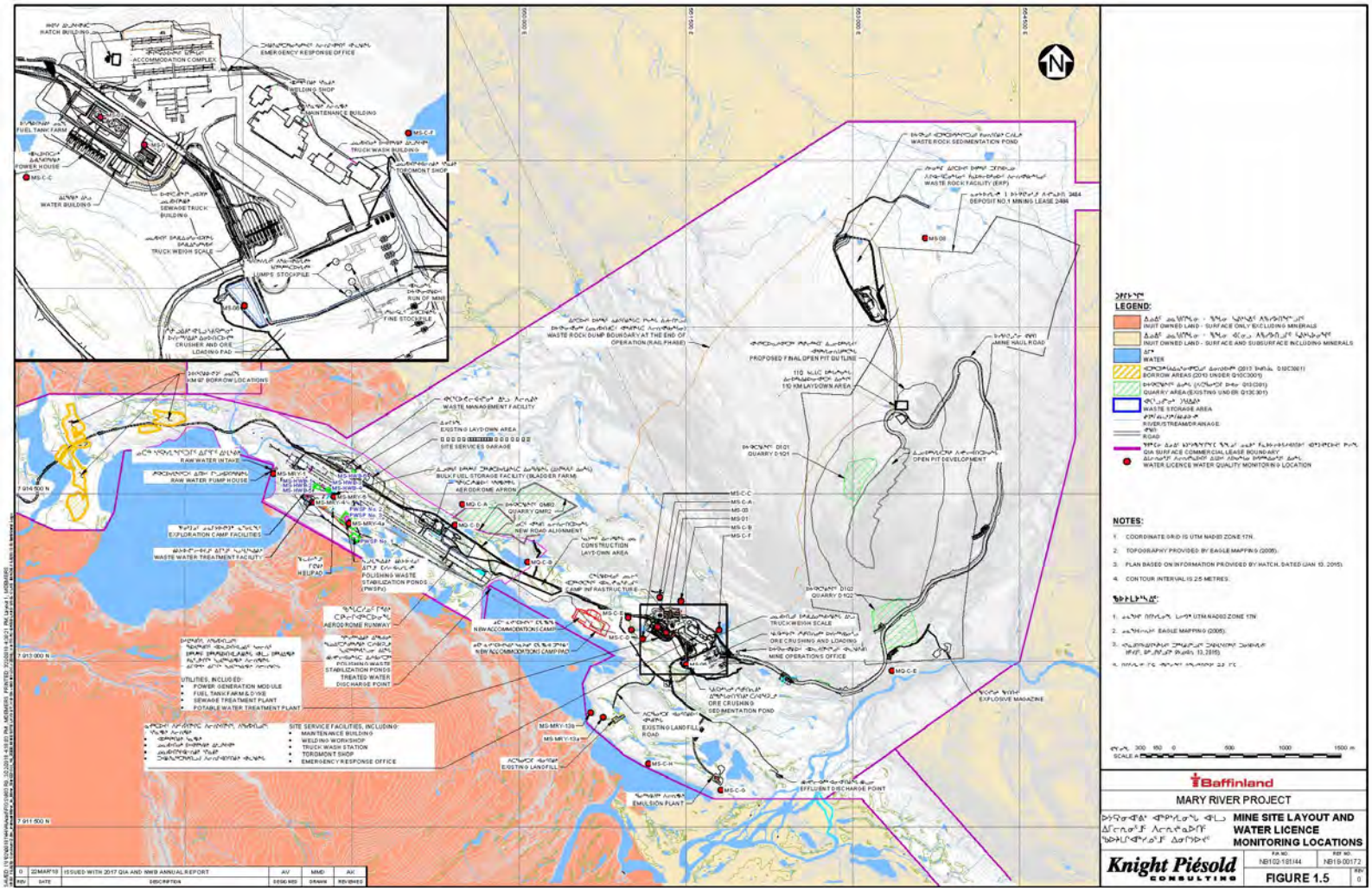


Figure 9.3 **Mary River Mine Site Plan**

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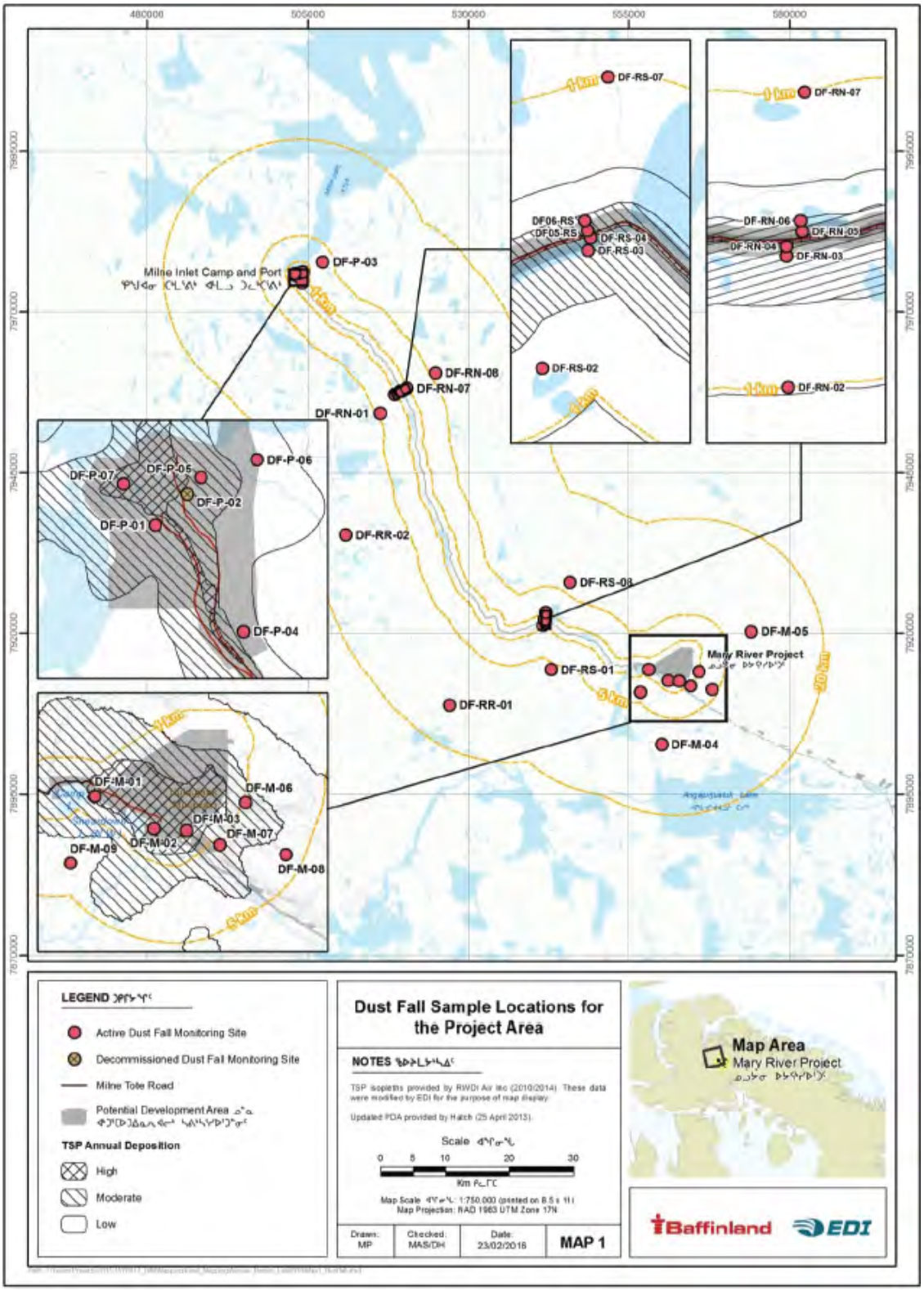


Figure 9.4 Dust Fall Sample Locations for the Project Area

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It is expected that sampling of the revised, approved locations will take place up to three (3) time per year, during open water season. It is during these annual sampling events, that sampling personnel will identify and document any suspected cases of physical or geotechnical instability of lands and structures remaining on site as described in Section 9.4.

Aquatic monitoring at Post-Closure will be conducted in Years 4-6 at water crossings along Tote Road to verify the closure criteria are met in these watercourses.

Baffinland will report on its Closure and Post-Closure Aquatic Monitoring and Reporting Program on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), the NWB (as per Type 'A' Water Licence 2AM-MYR-1325), AANDC Land Lease 47H/16-1-2, and the Land Owners (as per Commercial Lease Q13C301).

9.5.1 Environmental Effects Monitoring Program (EEM)

Mandated by the Metal and Diamond Mining Effluent Regulations, Schedule 5, the EEM Program focuses on determining if the discharge of mine contact water to the receiving environment will result in adverse environmental effects on the receiving streams and water bodies. This program will be carried out throughout mining, and as the locations of the mine contact water will not change after Final Closure (i.e., open pit water discharge, and, waste rock stockpile runoff discharge), it is expected the EEM component of the AEMP will remain relatively unchanged until Baffinland has achieved the "Recognized Closed Mine" status under Section 4 of the MDMER. Procedures for EEM monitoring are detailed in the existing AEMP including sampling locations, number of samples for each location, frequency of sampling and methods of interpretation.

Baffinland expects to conduct the EEM Program annually during Final Closure activities (Year 0 to 2) as required by the MDMER. This timeline would satisfy MDMER in order to achieve "Recognized Closed Mine" status, with the exception of the Open Pit. A modified EEM program would likely be designed through discussions with regulators to satisfy the delayed discharge via the Open Pit spillway, which built on the completed work at the Waste Rock Stockpile that can commence as soon as mining reaches 10% designed production capacity. Years 16-18 have been allocated conservatively to complete remaining EEM requirements for mine effluent at site.

Baffinland will report on any new EEM Program results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

9.5.2 Core Receiving Environment Monitoring Program (CREMP)

The CREMP focuses on follow-up monitoring to validate predictions to aquatic valued ecosystem components (VECs) and key indicators. As a component study of the AEMP, the CREMP evaluates potential mine-related influences on water quality, sediment quality, and/or biota (including phytoplankton, benthic invertebrates and/or fish) within aquatic environments near the Mine Site. Water

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and sediment quality monitoring programs, incorporating benchmarks derived from the Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CWQG-PAL), established by the Canadian Council of Ministers of the Environment (CCME), and baseline data, are performed on receiving aquatic environments near the Mine Site, including the Camp Lake, Sheardown Lake, Mary Lake Systems as well as Reference Lake 3 and various reference tributaries.

Baffinland expects to conduct the CREMP during care and maintenance (Year 0), as well as annually during Final Closure activities (Year 1 to 3) to assess whether component-specific closure criteria are met. Post Closure monitoring would then be conducted the first three years following completion of Final Closure activities (Years 4 to 6) and the Years 7, 8 and 18 at the Mine Site to confirm closure objectives are met

Baffinland will report on any new CREMP results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment).

9.5.3 Lake Sedimentation Monitoring Program

A Lake Sedimentation Monitoring Program is also performed annually under the AEMP and monitors dust and sediment deposition rates in Sheardown Lake NW to evaluate potential mine-related influences on biota (e.g. fish larvae hatching success). Annual monitoring reports for the Lake Sedimentation Monitoring Program further discuss the methods used and annual monitoring results and are provided as appendices to the Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Reports, required under Baffinland's Type A Water Licence and Commercial Lease with the QIA.

Baffinland expects to conduct the Lake Sedimentation Monitoring Program annually during Final Closure activities (Year 1 to 3) to assess whether component-specific closure criteria are met.

9.6 Environmental Site Assessment

An Environmental Site Assessment will be conducted at the onset of closure for areas that are expected to be contaminated with hydrocarbons or chemicals. Soil materials found to exceed the appropriate cleanup criteria for hydrocarbons (based on CCME contaminated sites guidelines or site-specific risk-based criteria) will be remediated onsite in the landfarm units, removed offsite to a licensed waste management facility, or the risk will be managed using site controls (e.g. covers).

The objective of the Environmental Site Assessments will be to determine areas of focus for final closure activities and to demonstrate conformance with CCME contaminated sites guidelines or site-specific risk-based criteria at the Mine Site, Milne Port, Tote Road and Steensby Port.

If not already done so, in the year prior to Final Closure activities (Year 0), Baffinland will commission a confirmatory sampling program at project sites to help determine adequacy of Final Closure activities' ability to meet closure criteria. Based on results, closure activities will be modified accordingly to ensure closure objectives are met. The year following completion of closure activities (Year 4), a second Environmental Site Assessment of project sites will be conducted to confirm CCME contaminated sites

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guidelines or site-specific risk-based criteria have been met. If results indicate CCME contaminated sites guidelines or site-specific risk-based criteria have not been met, additional closure activities will be performed as necessary to ensure closure objectives are achieved.

If there is reason to suspect an area of soil has been contaminated by chemicals other than hydrocarbons (such as explosives), samples will be collected, and the soil will be tested. If the applicable regulatory requirements are exceeded, an appropriate method of disposal will be sought in consultation with the appropriate authorities.

Baffinland will report on any new Environmental Site Assessment and/or Human Health and Ecological Risk Assessment (HHERA) results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

9.7 Terrestrial Environment Monitoring and Reporting

The Terrestrial Environment Monitoring and Reporting program will occur during temporary care and maintenance (Year 0), and during closure activities (Years 1-3). Terrestrial environment monitoring during closure includes vegetation monitoring (exotic invasive vegetation) and caribou movement monitoring. Other monitoring programs such as vegetation health, migratory bird, and caribou habitat monitoring will continue during active closure as well, but may be discontinued during post closure, based on monitoring results to date.

The objective of the Terrestrial Environment Monitoring and Reporting program will shift focuses slightly from the operational project phase to determine if Project areas encourage the desired re-growth of vegetation and wildlife movement upon completion of Final Closure activities. Given the long operational period, effects monitoring programs will diminish quickly in scope post-closure. As noted in Section 2.4, Baffinland intends to establish a Mine Closure Working Group and Baffinland expect this Mine Closure Working Group to help drive desired wildlife movement and passive re-vegetation considerations upon completion of Final Closure activities.

Baffinland expects to resume the Terrestrial Environment Monitoring and Reporting program the second year following completion of closure activities (Year 5) incorporating lesson learned from Operations. This schedule was determined to allow for a one (1) year wildlife/vegetation activity normalization period between active Final Closure activities and Post-Closure monitoring activities to help ensure an accurate representation of abandonment conditions. A follow up monitoring program is planned in Year 7.

The Terrestrial Environment Monitoring and Reporting program is expected to be a focused program that's main objective will be develop evidence of use or occupation of key indicator species in the avian and terrestrial environment for the Project area (visual sighting of species, bones, antlers, tracks, and trails, etc.). It is expected to be conducted by a team of two (2) experts for no more than two (2) weeks accompanied by an associated Bear Monitor. Baffinland will evaluate the re-vegetation of rehabilitated

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areas and conduct an invasive species assessment. Results of the Terrestrial Environment Monitoring and Reporting period in Year 5 are anticipated to be confirmed using a similar, second period two (2) years after the first, in Year 7.

The Mary River Project FEIS assessed there to be negligible adverse residual effects post-closure to fauna and flora. Post-closure, the loss of vegetation will be reversed with natural re-vegetation and the residual effects on fauna species will gradually lessen with time as the project areas are naturally re-vegetated. The risk of invasive plant species colonizing the area is expected to be negligible, however, it will be monitored post-closure.

Baffinland will report on any new Terrestrial Environment Monitoring and Reporting g program results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325) and the Land Owners (as per Commercial Lease Q13C301).

9.8 Marine Environment Monitoring and Reporting

Discharges to the marine environment will be captured under the Closure and Post-Closure Aquatic Monitoring and Reporting Program (Section 9.5).

The MEWG will be functioning during the life of the Project to continually evaluate if there are any residual effects from Project activities on the marine environment at the Port. Based on current information that suggest effects on marine mammals is related to ship interaction, it is anticipated that there will be no significant residual effects at closure on the marine environment when ship interaction is removed. As long as shipping activity is occurring during closure, marine monitoring and reporting in place during operation will continue, as outlined in the Shipping and Marine Wildlife Management Plan and Marine Environmental Effects Monitoring Plan at the time of closure. If operational monitoring indicates that the prediction of no significant residual effects at closure on the marine environment may be inaccurate, additional Post-Closure Marine Monitoring will be evaluated in the light of this new information.

9.9 Safety Compliance Inspection

The objective of the Safety Compliance Inspection will be to determine if project components are closed and reclaimed in compliance with the Northwest Territories (NT) and Nunavut (NU) *Mine Health and Safety Act* and Regulations, and the *Explosives Use Act* and Regulations. The Safety Compliance Inspection will be conducted by an Engineer/Inspector of Mines under the direction of the Chief Inspector of Mines working on behalf of the Workers' Safety and Compensation Commission (WSCC) of the Northwest Territories and Nunavut. Inspection frequency and scope will be established at the discretion of the Chief Inspector of Mines in consultation with Baffinland.

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Baffinland will report on any Safety Compliance Inspection results on an annual basis to the NIRB (as per Project Certificate No. 005 and its Amendment), AANDC Land Lease 47H/16-1-2, the NWB (as per Type 'A' Water Licence 2AM-MYR-1325 and its Amendment) and the Land Owners (as per Commercial Lease Q13C301).

9.10 Socio-economic Reporting

As per condition 149 of the Project Certificate No. 005, Baffinland published a Closure Scenario Report in September 2014 and submitted it to the Nunavut Impact Review Board (NIRB). The report examines the potential socio-economic and cultural impacts closure may have on Inuit employees and analysis of the risk of temporary and permanent mine closure.

Socio-economic and monitoring during closure will be governed by the following legislative drivers and agreements:

- The *Nunavut Labour Standards Act*
- Human Resources Skills and Development Canada's (HRSDC) Employment Insurance Regulations
- The Nunavut Agreement on Labour Market Development
- Canada-Nunavut Labour Market Agreement
- Inuit Impact and Benefit Agreement between the Qikiqtani Inuit Association and Baffinland

In the event of permanent layoffs due to closure, under the Canada-Nunavut Agreement on Labour Market Development, Baffinland will engage with the Government of Nunavut to establish a Labour Market Partnership with the aim to develop and implement strategies for dealing with labour force adjustments. Under the Partnership Program a Joint Labour Adjustment Committee would be established to assist affected employees, a primary step being conducting a Needs Assessment to determine what labour adjustment issues have been addressed and determine appropriate programming required (e.g., job-search assistant, resume preparation, vocational counseling). Baffinland will also draw the on the expertise of the Mining Industry Human Resources Council (MiHR) who has developed a Mining Workforce Transition Kit that may address the specific needs of employees and their communities.

Socio-economic reporting, as required by the Project Certificate and in accordance with articles of the Inuit Impacts and Benefits Agreement, will be reported on in the Annual Report to the Nunavut Impact Review Board and the Implementation Report for the IIBA for the life of the project.

9.11 Air Quality Monitoring and Reporting

During reclamation activities (e.g., construction/regrading), air quality monitoring and reporting will be consistent with operations, occurring across the entire site, as outlined in the Air Quality and Noise Abatement Management Plan. Air quality data will be collected via active TSP, SO_2, NO_2 sampling and passive sampling for dustfall, including metal deposition. As no one area of the mine will close

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substantially within the 3-year closure construction period, site-wide post-closure ambient air quality monitoring will be executed following closure. As all the major impacts are removed, only 1 year of post-closure monitoring is planned to confirm ambient levels of TSP, $PM_{2.5}$, SO_2 and NO_2 are within the closure criteria (NU standards).

Baffinland expects to continue this monitoring during the first year of post closure activities (Year 4). TSP and $PM_{2.5}$ were selected as particulate matter poses health concerns due to their ability to be inhaled and accumulate in the respiratory system. Small particulate matter (e.g., $PM_{2.5}$) also has the ability to behave in the atmosphere like a gas and due to is small particle size, can disperse over greater distances than larger sized particulates before deposition.

Emissions of nitrogen oxides and sulphur oxides (i.e., NO_x and SO_x) are generated by fuel combustion in both stationary and mobile equipment. It should be noted there are negligible residual effects expected during post-closure as the primary sources of dust will no longer be in operation. During post-closure, stationary and mobile equipment will no longer be in use, with few exceptions such as truck traffic during monitoring programs. Accordingly, NO_x and SO_x emissions are expected to be negligible. However, to demonstrate that ambient conditions are below the criteria stated in the Environmental Guideline for Ambient Air Quality, Department of Environment, Government of Nunavut, October 2011 (200 µg/m^3 24 hr average for nitrogen dioxide and 150 µg/m^3 24 hr average for sulphur dioxide), a post-closure monitoring program consisting of up to five (5) sample locations using BAM-1020 or similar with a remote data logger for a period of not more than one (1) month during summer months is expected. Monitoring will be focused on locations identified through operational experience as having particulate emissions higher than other areas.

As indicated respectively by project component in Table 5.1, if Air Quality Monitoring program results demonstrate Mean TSP concentrations less than the risk-based criteria developed in consideration of the NU Ambient Air Quality Standard are met, the project component will be considered to have met the associated closure objectives. Dust deposition has been identified as a potential concern for the health of vegetation and wildlife, however, no residual effects of the Project on caribou health are anticipated due to metal exposure from dustfall. Most dustfall will be associated with the Mine Site and the primary metals are relatively innocuous to caribou (FEIS, Volume 6, Section 5.2.4). The potential effects of metals on plants either from aerial deposition or uptake from soils are highly dependent on site-specific conditions and the plant species themselves. Thresholds have not been developed for dust effects on plants, and the literature acknowledges a lack of data of effects of atmospheric emissions and its effects on Arctic vegetation, leading to uncertainty in effects predictions. In an effort to further address this uncertainty, Baffinland is undertaking additional reclamation research on natural re-vegetation to better understand reclamation options. A dustfall monitoring program is being conducted to confirm project related activities will have a not significant effect on vegetation.

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10 FINANCIAL SECURITY

Closure and reclamation costs for the Mary River Project are determined under the Annual Security Review (ASR) process conducted in accordance with Schedule C of the Type "A" Water Licence Amendment No. 1 2AM-MRY1325 and Commercial Lease No. Q13C301. Under the ASR process, Baffinland, the respective landowners (QIA & the Crown), the NWB, and other interested parties confer to determine the estimated closure and reclamation costs for an upcoming year on an annual basis. This approach allows for Baffinland to post financial security in incremental adjustments prior to the commencement of work. Publicly available ASR document submissions for a respective year, describing in detail, annual estimated closure and reclamation costs, can be downloaded from the NWB FTP site at: ftp.nwb-oen.ca, with Username: "public", and the Password: "registry", without the quotes.

10.1 Preliminary Mine Closure and Reclamation Plan Costs

Prior to commencement of the ASR process, which is the current overriding process to determine Project closure and reclamation costs, Baffinland's estimated closure and reclamation costs were established and outlined in the Preliminary Mine Closure and Reclamation Plan (Rev D, H337697-0000-07-126-0014) which was submitted as part of the Mary River Project FEIS (FEIS Appendix 10G). Estimated costs and assumptions were made based on project design and costs available at the time of development using the Mining RECLAIM spreadsheet provided by Aboriginal Affairs and Northern Development Canada (AANDC). Details used to develop the Preliminary Mine Closure and Reclamation Plan (PCRP) Closure and Reclamation Cost Estimate are available within PCRP, Appendix B and C, and are summarized in the Section 10.1.2 for information purposes.

10.1.1 Addendum to PCRP Closure and Reclamation Cost Estimate

An addendum to the PCRP Closure and Reclamation Cost Estimate has been developed to support the Type 'A' Water License 2AM-MRY1325 amendment process for 2015. This addendum has been made using current and updated estimated closure and reclamation costs, established through the ASR process, for Milne Port and the Tote Road aggregated with estimated closure and reclamation costs for Mary River Mine Site, the Railway and Steensby Port that were presented in Baffinland's original submission of the PCRP in February 2012. The purpose of this addendum is to incorporate consideration of Baffinland's ERP to support the Type "A" Water License 2AM-MRY1325 amendment process. Details of the results of this process can be found in the following document: *Final Environmental Impact Statement (FEIS) Closure and Reclamation – Financial Security Estimate Addendum, H349001-0000-07-220-0001.*

Baffinland notes that the *Final Environmental Impact Statement (FEIS) Closure and Reclamation – Financial Security Estimate Addendum, H349001-0000-07-220-0001* does not override the ASR process and the ASR is still the governing process to determine reclamation financial security.

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10.1.2 Summary of PCRP Closure and Reclamation Cost Estimate

The PCRP Closure and Reclamation Cost Estimate was developed using the Mining RECLAIM spreadsheet (ver 6) provided by Aboriginal Affairs and Northern Development Canada (AANDC) (formerly Department of Indian Affairs and Northern Development). The Mining RECLAIM spreadsheet model identifies several reclamation components:

- Open pit
- Waste Rock pile
- Buildings and Equipment
- Chemicals
- Water
- Mobilization
- Post Closure
- Ongoing water monitoring

Several reclamation strategies ("Objectives") were listed for each component, and broken down into lists of actions that were priced separately. A unit cost spreadsheet provided a range of prices for actions which was completed where possible with the most accurate available or Project-specific costs at the time of estimate. To best estimate the total reclamation cost, some actions were modified or adapted to the strategies defined in the PCRP. The financial cost obtained was based on the information available at the time of publishing. Several assumptions and estimations have been made and are described in Appendix D of the PCRP. To make up for uncertainties, the highest prices of the range provided by the MINING RECLAIM unit costs spreadsheet were systematically chosen.

It should be noted this estimate of the financial cost of final closure and reclamation measures required for the fully developed Project as described in the original Mary River Project FEIS. It addresses Project-related activity areas and infrastructure related to the original the Project proposed in the FEIS including mobilization and post-closure monitoring. This estimate was intended to represent Baffinland's estimated closure and reclamation security for the Project, based on the information available at the time, at a planned closure scenario occurring at end of mine life.

10.1.2.1 Final Mine Closure Cost

MINING RECLAIM calculated the grand total capital costs required for the Project closure and reclamation. The cost was split into land and water liability. Additionally, the cost associated to Inuit Owned Land (IOL) and federal owned (Crown Land) was differentiated from north to south and therefore Milne Port, Tote Road, Mine Site, and the first 25 km of the Railway were attributed to IOL. The remaining section of the Railway and Steensby Port are located on federally owned land and were attributed to Crown Land. Costs relating to the infrastructure, equipment and remediation actions on these sites were attributed to the

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corresponding category. Less tangible components, such as chemicals and soil management, water management and post-closure monitoring and maintenance were attributed on a basis of two thirds (2/3) to IOL and one third (1/3) to Crown Land. This was based on two of the main sites (Milne Port, Mine Site) being in IOL and one site (Steensby Port) located in Crown Land.

The Ultimate Project closure and reclamation cost, at the time of estimate, was $518,711,208. The break down between land and water liability and IOL/Crown Land is presented in Table 10.1.

Table 10.1: Total Cost and Breakdown for Mary River Project Closure and Reclamation

	Total Cost	Percentage	Land Liability	Water Liability
Inuit Owned Land	$411,234,800	79.2	$405,430,454	$6,106,421
Federal Owned Land	$107,476,408	20.7	$105,391,574	$2,160,637
Total	$518,711,208	100	$510,822,029	$8,267,058

10.2 Total Financial Security Posted

Table 10.2: Summary of Security Amounts Posted Under the Commercial Lease and Water Licence for the Period 2013-2018

	2013	2014	2015	2016	2017	2018
Inuit Owned Land and/or Water	$26,200,000	$39,793,000	$47,517,500	$48,845,50	$51,384,000 $64,642,000*	$83,709,271
Crown Land and/or Water	$9,800,000	$166,000	$166,000	$1,210,000	$1,298,555	$1,298,555
Total	$36,000,000	$39,959,000	$47,683,500	$50,055,500	$52,682,555 $65,940,500*	$85,007,826

*This additional security was posted to reflect a mid-year Addendum to the 2017 Workplan that affected the security requirements under the BIMC-QIA Commercial Lease but not under the Water Licence.

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11 CONCORDANCE TABLES

Table 11.1 has been prepared to demonstrate conformity of the ICRP with the MVLWB/AANDC, Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, November 2013. The concordance table and ICRP have been structured to be consistent with the 'template' provided in pages 31 to 42 of the Guidelines.

Table 11.1: Conformity Assessment of the CIRNAC Guidelines to the ICRP

CIRNAC Guideline	ICRP Section
1.0 Plain Language Summary i. Plain language summary of CRP, with key aspects of current plan, major uncertainties and how they will be addressed, and differences from previous plans	Section 1
2.0 Introduction i. Purpose and scope of the closure and reclamation plan as it relates to Boards' requirements, previous versions of CRP, expectation of stakeholders. Approval dates of previous CRPs	Section 2.1
ii. General project description, description of proponents, spatial and temporal extent of project	Section 2.1
iii. Status of plan (e.g. interim CRP, final CRP, etc.)	Section 2.3.1
iv. Goal of the closure and reclamation plan.	Section 2.2
v. Identify closure and reclamation planning team. Describe, list or show important internal/external organizational relationships and specific responsibilities that facilitate/manage closure and reclamation	Section 2.3
vi. Outline approach to engagement, how they have or will integrate local community values into the CRP, strategies for engaging communities in CRP development and implementation	Section 2.4
vii. Identify relevant regulatory authority and existing/required permits, authorizations, agreements related	Section 2.5
viii. Conformance table showing where CRP satisfies applicable licences/permits. List of additional standards/guidelines to be followed	Section 11
3.0 Project Environment i. Overview of pre-disturbance atmospheric environment (e.g. climate, temperature, precipitation, air quality), including maps, tables, figures	Section 3.1
ii. Overview of pre-disturbance physical (terrestrial) environment (e.g. physiography, geology, permafrost, geological hazards, hydrogeology), including maps, tables, figures	Section 3.2
iii. Overview of pre-disturbance chemical environment (e.g. soil/sediment chemistry, surface water/groundwater quality, ARD and metal leaching potential), including maps, tables, figures	Section 3.2
iv. Overview of pre-disturbance biological environment (e.g. vegetation, aquatic life, terrestrial wildlife, avifauna, overall ecosystem), including maps, tables, figures	Section 3.3.3
4.0 Project Information i. Site location, regional and local context of affected areas, access points and methods of access, including maps and photos	Section 4.1
ii. History of ore discovery, exploration, previous development and operations, ownership changes, summary of application, permitting, and licencing process to date	Section 4.2

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CIRNAC Guideline	ICRP Section
iii. Description of site geology, mining resource, extraction methods and rational for footprint and specific target areas, including maps, figures, tables	Section 4.3
iv. Project summary, including life of mine plan through closure and reclamation and various options proposed from EA	Section 4.4
v. List of all project components	Table 4.1
5.0 Permanent Closure and Reclamation i. Definition of permanent closure and reclamation	Section 5.1
ii. Indicate components that may require passive long-term care and expected timelines for relinquishment	Section 5.1.1
iii. Description of project components, including details (e.g. dimensions, footprint, relative locations on map), lifespan and current status, with supporting maps, figures, photos.	Section 5.2 (Sections 5.2.X.1)
iv. Description of pre-development, existing, and projected final site conditions using maps, photos, figures as appropriate. Illustrate relevant water bodies, topographic modifications, and vegetation changes. Identify important/unique environmental conditions with bearing on closure.	Section 5.2 (Sections 5.2.X.2)
v. List of closure objectives and criteria for each component, with any uncertainties noted with reference to the associated reclamation research plan	Table 5.1
vi. Alternatives analysis of various closure options with clear demonstration of pros and cons, risk scenarios and unique/novel closure situations for the specific component.	Section 5.2 (Sections 5.2.X.4)
vii. Selection of preferred closure activity with rationale for selection/rejection of others	Section 5.2 (Sections 5.2.X.4)
viii. Description of engineering work (e.g. demolition, construction) necessary for selected closure activity, with supporting information for proposed work to prove proposed technology or engineering will be successful	Section 5.2 (Sections 5.2.X.5)
ix. Assessment of potential negative residual effects remaining after completion of reclamation. Provide results of risk assessments and discuss how any predicted residual effects compare to stakeholders' preferences and or to company's commitments made during EA.	Appendix G
x. Identify uncertainties associated with the risks of various closure options and how to select the best closure activity, how to best implement a selected closure activity, how to define closure criteria, how Traditional Knowledge will inform closure planning and more. Include how each uncertainty will be addressed (reclamation research, engineering study plan, etc.).	Section 5.2 (Sections 5.2.X.7)
xi. Description of what post closure monitoring will occur (e.g. fugitive dust, stream flow, wildlife and aquatic life movement etc.) and why, including sampling locations, frequencies, duration, maintenance activities, methods of reporting	Section 5.2 (Sections 5.2.X.8), Section 9
xii. List of possible contingencies should closure activity not be successful in meeting closure criteria and objectives, with identification of preferred contingency with rationale	Section 5.2 (Sections 5.2.X.9)
6.0 Progressive Reclamation i. Definition of progressive reclamation	Section 6.1
ii. Opportunities for progressive reclamation during life of the project, including location, aerial extent of work, description of planned reclamation activities and any planned/required monitoring	Section 6.2

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CIRNAC Guideline	ICRP Section
iii. Summary and location of completed progressive reclamation activities, including a list of reports detailing any reclamation that has occurred, and any lessons learned that will inform closure planning	Section 6.3
7.0 Temporary Closure i. Closure goal and closure objective of temporary closure	Section 7.1 and 0
ii. Selected temporary closure activities for each project component (must include minimum activities identified by MVLWB guidelines)	Section 7.1 and 0
iii. Monitoring activities during temporary closure	Section 7.2 and 7.3
iv. Contingencies for unforeseen events/conditions during temporary closure if response different from normal operations, including effects on any monitoring activities and plans to address any effects	Section 5.2 (Sections 5.2.X.9)
v. Temporary closure schedule, including anticipated timing/sequence of events, description of temporary closure activities for each component, duration and approximate end date of closure period	Section 7.1 and 0
8.0 Integrated Schedule of Activities i. Component-specific schedule depicting operations, closure dates, and expected start and end times for selected closure activities, including progressive reclamation, initiation and completion of research, timeframes for meeting closure criteria and monitoring and reporting phases	Section 8
ii. Description of schedule uncertainties	Section 8
9.0 Post-Closure Site Assessment i. Description/study design of post-closure impact assessment	Section 9, See also Appendix G
10.0 Financial Security i. Estimates of total liability of permanent closure (including post-closure monitoring programs and activities)	Section
ii. Cost breakdown for each project component	Section 10.1.1 and ASR documentation
iii. Match estimate with timing of closure and reclamation activities	Section 10.1.1 and ASR documentation
11.0 References i. List of documents/reports that support characterization of baseline environmental data, geochemical analyses and predicted ML/ARD potential, and relevant engineering work related to support the CRP	Section 13
Appendix A – Glossary of Terms and Definitions i. Plain language explanation of discipline specific technical terms and key closure and reclamation planning terms	Section 12.1
Appendix B – List of Acronyms, Abbreviations, Units, and Symbols	Section 12.2
Appendix C – Record of Engagement i. Table outlining all completed engagement specific to closure, including issues identified by engaged parties and how company has addressed them	Appendix E
Appendix D – Lessons Learned from Other Projects i. Summary table of relevant on-site closure issues/concerns dealt with at other projects, the completed activity, lessons learned and application to managing project closure and reclamation	Appendix F
Appendix E – Reclamation Research Plans i. Reclamation research plans required to address uncertainties. Plans should describe the	Appendix D

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CIRNAC Guideline	ICRP Section
uncertainty, research/study objective, overview of tasks, linkages to other research/studies, project research schedule, costs and references.	

Table 11.2 has been prepared to characterize the content of the ICRP and updated with reference to this ICRP. The concordance table is consistent with the principles of the Qikiqtani Inuit Association (QIA) Abandonment and Reclamation Policy for Inuit Owned Lands ('the Policy') and structured in accordance with Appendix C of the QIA Security Policy (v3).

Table 11.2: QIA Abandonmenta and Reclamation Policy for Inuit Owned Lands Concordance Table

Item	QIA Abandonment and Reclamation Policy for Inuit Owned Lands (v3)	Baffinland Response
1	Have **all** reports and plans including addendums and responses been submitted?	Yes
2	Are the submitted reports and plans executable standalone documents with adequate rational and detail?	Yes
3	Do all reports and plans contain appropriate referencing (document name, author, section, and page number) to **all** supporting information?	Yes
4	Do the reports and plans demonstrate a firm understanding, of QIA's *Guiding Principles on Reclamation* and provide rationale on how these principles have been satisfied?	Yes
5	Has IQ and consultation with Community Land and Resources Committee(s) been applied? Has the Tenant provided detailed community consultation records?	Closure and reclamation issues discussed at hearings related to the Project Certificate. Commitment to Mine Closure Working Group in the future to incorporate community input and IQ.
6	Are **all** the components that are considered in the abandonment and reclamation plan listed?	Yes
7	Does each component of the Project have an abandonment and reclamation objectives and criteria?	Yes
8	Has an A&R plan been provided with a financial security estimate?	Yes. Financial security estimate is conducted in accordance to Section 9.2 of Commercial Lease, No. Q13C301

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Item	QIA Abandonment and Reclamation Policy for Inuit Owned Lands (v3)	Baffinland Response
9	Have Table 1, 2, 3 and 4 of Appendix B been used in completing the financial security estimate?	Yes – was adapted to suit project specific requirements.
10	Has evidence been provided to support the Policy assumptions for all reports and plans?	Yes

Table 11.3 has been prepared to show all the Project Certificate No. 005 commitments outlined in Appendix A of the Project Certificate that apply to this ICRP. Where the Project Certificate Terms and Conditions have requirements for Construction, Operations, Temporary Closure/Care and Maintenance, Closure and Post Closure Monitoring the requirements are dealt with by a current Management Plan that will be updated regularly throughout the life of the Project. These Management Plans will still be applicable during Closure and, as necessary, Post Closure Monitoring, however an initial post closure monitoring program has been outlined in this document to tie residual effects and proposed Post Closure Monitoring.

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Table 11.3: NIRB Project Certificate Term and Conditions Concordance Table

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
2	Meteorology and Climate – Climate Change Validation and Studies	To provide feedback on the impacts that climate change might be having on the Project.	The Proponent shall provide the results of any new or revised assessments and studies done to validate and update climate change impact predictions for the Project and the effects of the Project on climate change in the Local Study Area and Regional Study Area as defined in the Proponent's Final Environmental Impact Statement.	1 – Climate Change	None planned at this time however any research conducted during Closure and Post-Closure Phases will be provided during Annual Reporting.	Both	Section 9.11
3	Meteorology and Climate – Green House Gas Emissions	To confirm that the Proponent is exploring and implementing concrete steps to reduce greenhouse gases.	The Proponent shall provide interested parties with evidence of continued initiatives undertaken to reduce greenhouse gas emissions.	1 – Climate Change	Air Quality Monitoring Program. Results of Closure Phase Air Quality Monitoring Program and any other initiatives taken to reduce greenhouse gas emissions during Closure and Post-Closure Phases will be provided during Annual Reporting.	Both	Section 9.11
4	Climate Change – Consultation on Climate	To promote public awareness and engagement of affected groups.	The Proponent shall endeavor to include the participation of Inuit from affected communities and other communities in Nunavut when undertaking climate-change related studies and research.	1 – Climate Change	Air Quality Monitoring Program Mine Closure Working Group	Both	Section 9.11 Section 2.4
5	Meteorology and Climate – Weather Monitoring Data	To provide families of employees with up to date information.	The Proponent shall endeavour to explore and implement reasonable measures to ensure that weather-related information for the various Project sites is readily accessible to the public on a continual basis throughout the life of the Project.	2 – Air Quality	Air Quality Monitoring Program. Results of Closure Phase Air Quality Monitoring Program will be provided during Annual Reporting	Both	Section 9.11

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
6	Meteorology and Climate – Emissions	To provide feedback on the Project's emissions.	The Proponent shall provide the results of any emissions calculations conducted to determine the level of sulphur dioxide (SO_2) emissions, nitrogen oxide (NOX) emissions and greenhouse gases generated by the Project using fuel consumption or other relevant criteria as a basis.	2 – Air Quality	Air Quality Monitoring Program	Both	Section 9.11
11	Air Quality – Incineration Management Plan	To mitigate impacts to air quality from incineration activities.	The Proponent shall develop and implement an Incineration Management Plan that takes into consideration the recommendations provided in Environment Canada's Technical Document for Batch Waste Incineration (2010).	2 – Air Quality	Waste Management Plan (carried over from Operations) will apply when incinerators in operation	Both	Section 5.2.7
14	Noise and Vibration – Noise and Vibration Monitoring	To mitigate noise and vibration at Project sites, especially living areas.	The Proponent shall conduct noise and vibration monitoring at Project accommodations sites located at the Mary River mine site, Steensby Inlet Port site, and Milne Inlet Port site. Sampling shall be undertaken during the summer and winter months during all phases of Project development.	3 – Noise and Vibration	Considered, however no monitoring proposed during closure and negligible residual effects expected.	Both	N/A
15	Noise and Vibration	To enhance public safety when travelling around the Project area.	Noise and Vibration Monitoring – The Proponent shall collaborate to the extent possible with the Qikiqtani Inuit Association and local Hamlet organizations when undertaking consultation with all affected communities regarding railway, tote road and marine shipping operations. During these consultations, it is recommended that the Proponent provide information including video, audio, and photographic representation as well as any other aids (i.e. models) that may enhance the general public's understanding of railway, tote road and marine shipping	3 – Noise and Vibration	When undertaking consultation with all affected communities, collaboration with the Qikiqtani Inuit Association and local Hamlet organizations performed via Mine Closure Working Group sessions.	Both	Section 2.4

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			operations, as well as all safety considerations for members of the public who may be travelling around the project area.				
17	Hydrology and Hydrogeology – Effluent Management	To prevent impacts to water bodies from effluent.	The Proponent shall develop and implement effectives measures to ensure that effluent from project-related facilities and/or activities, including sewage treatment plants, ore stockpiles, and mine pit, satisfies all discharge criteria requirement established by the relevant regulatory agencies prior to being discharged into the receiving environment.	8 – Water Quality	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section 9.3.1
18	Hydrology and Hydrogeology – Pit Lake Monitoring	To enhance predictions for mine site closure conditions.	The Proponent shall carry out continued analyses over time to confirm and update, accordingly, the approximate fill time for the mine pit lake identified in the FEIS.	8 – Water Quality 9 – Surface water and sediment quality	None. ICRP will be reviewed annually and updated regularly throughout the life of the Project to confirm and/or update, accordingly the approximate fill time for the mine pit lake identified in the FEIS.	IOL	Section 2.3.1.3
19	Hydrology and Hydrogeology – Water Infrastructure Monitoring	To mitigate impacts to natural water flow.	The Proponent shall ensure that it develops and implements adequate monitoring and maintenance procedures to ensure that the culverts and other conduits that may be prone to blockage do not significantly hinder or alter the natural flow of water from areas associated with the proposed mine. In addition, the Proponent shall monitor, document and report the withdrawal rates for water removed and utilized for all domestic and industrial purposes.	8 – Water Quality 9 – Surface water and sediment quality	Will be addressed in Annual Report.	Both	N/A

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
20	Groundwater/Surface Waters – Explosives	To ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the areas surrounding the Project.	The Proponent shall monitor the effects of explosives residue and related by-products from project-related blasting activities as well as develop and implement effective preventative and/or mitigation measures, including treatment, if necessary, to ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the Project and surrounding areas.	8 – Water Quality 9 – Surface water and sediment quality	None. Negligible once closure activities have ceased	N/A	N/A
24	Groundwater/Surface Waters – Effluent Management	To mitigate impacts to groundwater and surface waters from effluent	The Proponent shall monitor as required the relevant parameters of the effluent generated from Project activities and facilities and shall carry out treatment if necessary to ensure that discharge conditions are met at all times.	8 – Water Quality	Aquatic Monitoring and Reporting Program	Both	Section 9.5
27	Landforms, Geology and Geomorphology – Natural Aesthetics	To mitigate impacts to natural aesthetics.	The Proponent shall include within its public consultation report information related to the sentiments expressed by affected communities about the impacts that changes to the topography and landscape have had on the aesthetic value of the Project area.	4 – Landforms, soil and permafrost	Geotechnical/Engineering Monitoring	Both	Section 9.2
28	Landforms, Geology and Geomorphology – Permafrost	To ensure that permafrost integrity is maintained.	The Proponent shall monitor the effects of the Project on the permafrost along the railway and all other Project affected areas and must implement effective preventative measures to ensure that the integrity of the permafrost is maintained.	4 – Landforms, soil and permafrost	Geotechnical/Engineering Monitoring	Both	Section 9.2
30	Landforms, Geology and Geomorphology – Quarries	To provide oversight on quarry design and management.	The Proponent shall develop site-specific quarry operation and management plans in advance of the development of any potential quarry site or borrow pit.	4 – Landforms, soil and permafrost	Geotechnical/Engineering Monitoring	Both	Section 9.2

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32	Vegetation – Construction and Operations	To prevent introduction of invasive species.	The Proponent shall ensure that equipment and supplies brought to the Project sites are clean and free of soils that could contain plant seeds not naturally occurring in the area. Vehicle tires and treads in particular must be inspected prior to initial use in Project areas.	5 – Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
33	Vegetation – Monitoring	To facilitate monitoring.	The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP).	5 – Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
37	Vegetation – Monitoring	To prevent establishment of invasive species.	The Proponent shall incorporate protocols for monitoring for the potential introduction of invasive vegetation species (e.g. surveys of plant populations in previously disturbed areas) into its Terrestrial Environment and Monitoring Plan. Any introductions of non-indigenous plant species must be promptly reported to the Government of Nunavut Department of Environment.	5 – Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
38	Vegetation – Adaptive Management	To mitigate impacts to vegetation abundance, diversity and health.	The Proponent shall review, on an annual basis, all monitoring information and the vegetation mitigation and management plans developed under its Environmental Management System, Terrestrial Environment and Monitoring Plan (TEMMP) and adjust such plans as may be required to effectively prevent or reduce the potential for significant adverse project effects on vegetation abundance, diversity and health.	5 – Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5

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39	Vegetation – Reclamation and Revegetation	To prevent erosion and promote progressive revegetation of disturbed areas.	The Proponent shall develop a progressive revegetation program for disturbed areas that are no longer required for operations, such program to incorporate measures for the use of test plots, reseeding and replanting of native plants as necessary. It is further recommended that this program be directly associated with the management plans for erosion control established for the Project.	5 – Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 6 Section 9.5
40	Vegetation – Reclamation and Revegetation	To prevent erosion and promote progressive revegetation of disturbed areas.	The Proponent shall include revegetation strategies in its Site Reclamation Plan that support progressive reclamation and that promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment.	5 – Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 6 Section 9.5
41	Freshwater Aquatic Environment – Setbacks	To mitigate impacts of runoff into freshwater aquatic habitat.	Unless otherwise approved by regulatory authorities, the Proponent shall maintain a minimum 100-metre naturally-vegetated buffer between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching.	4 – Landforms, soil and permafrost 5 – Vegetation	Geotechnical/Engineering Monitoring	Both	Section 9.2
42	Freshwater Aquatic Environment – Setbacks	To mitigate impacts of runoff into freshwater aquatic habitat.	The Proponent shall maintain minimum a 30-metre naturally-vegetated buffer between the mining operation and adjacent water bodies.	4 – Landforms, soil and permafrost 5 – Vegetation	Geotechnical/Engineering Monitoring	Both	Section 9.2
44	Freshwater Aquatic Environment – Explosives	To mitigate impacts of explosives on freshwater aquatic habitat.	The Proponent shall meet or exceed the guidelines set by Fisheries and Oceans Canada for blasting thresholds and implement practical and effective measures to ensure that residue and by-products of blasting do not negatively affect fish and fish habitat.	8 – Water Quality	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section 9.3.1

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45	Freshwater Aquatic Environment – General	To mitigate impacts to freshwater aquatic habitat.	The Proponent shall adhere to the No-Net-Loss principle at all phases of the project to prevent or mitigate direct or indirect fish and fish habitat losses.	10 – freshwater fish, fish habitat, and other aquatic organisms	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section9.3.1
46	Freshwater Aquatic Environment – Drainage	To mitigate impacts to freshwater aquatic habitat.	The Proponent shall ensure that runoff from fuel storage and maintenance facility areas, sewage and wastewater other facilities responsible for generating liquid effluent and runoff meet discharge requirements.	8 – Water Quality	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section 9.3.1
49	Terrestrial Wildlife and Wildlife Habitat – Terrestrial Environment Working Group	The TEWG will provide direction and guidance to the Proponent regarding: adding to baseline information during construction and before project operations commence; monitoring and reporting regarding effects occurring during operations; and providing advice regarding changes that may be required to make sure the management of negative impacts is effective and that lasting damage is prevented.	The Proponent shall establish a Terrestrial Environment Working Group ("TEWG") which will act as an advisory group in connection with mitigation measures for the protection of the terrestrial environment and in connection with its Environmental Effects Monitoring Program, as it pertains to the terrestrial environment. Members may consider the draft terms of reference for the TEWG filed in the Final Hearing, but they are not bound by them. The role of the TEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments.	7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5

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50	Terrestrial Wildlife and Habitat – General	To ensure appropriate and responsive adaptive management.	The Proponent shall continue to develop and implement Project-specific monitoring for the terrestrial environment, and will demonstrate appropriate refinements to design, incorporation of analytical methods and elaboration of methodologies. The monitoring plan shall contain clear thresholds to allow for the assessment of long-term trends and cumulative effects where project interactions are identified. Coordination and cooperation will be required where data collection, analysis and interpretation, or responsibility for mitigation and management requires the efforts of multiple parties (e.g., government, Qikiqtani Inuit Association, communities).	7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
51	Terrestrial Wildlife and Habitat – General	To promote coordination of monitoring efforts.	The Proponent, either directly or as part of the TEWG, shall consider and, where appropriate, cooperate with relevant regional and/or community-based monitoring initiatives that raise issues or produce information pertinent to mitigating project-induced impacts. The Proponent shall give special consideration for supporting regional studies of population health and harvest programs for North Baffin caribou which help address areas of uncertainty for Project impact predictions.	7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
55	Terrestrial Wildlife and Habitat – Reporting	To mitigate potential impacts to wolves.	The Proponent shall develop an adaptive management plan applicable to wolves and wolf habitat in collaboration with the Government of Nunavut-Department of Environment (GN-DOE) to ensure	7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5

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			compliance with the *Nunavut Wildlife Act.* Consideration must be given to the following: a. Monitoring for active wolf dens within a 10 km radius from the mine site, under the direction and prior approval of the GN DOE, and reporting the results through NIRB's Annual Reports on terrestrial wildlife in the Potential Development Area (PDA); b. Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying such habitat as ecologically sensitive; c. Developing "wolf indices" for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline; and d. Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the Project Development				
56	Terrestrial Wildlife and Habitat – Reporting		The Proponent shall develop a strategy for the recovery of terrestrial wildlife habitat in a progressive manner that is consistent with the *Nunavut Wildlife Act.* Overall, this will require the integration of a decision-making process and the identification of mitigation responses to cumulative impacts on caribou survival, breeding propensity, and population dynamics.	7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
57	Terrestrial Wildlife and Habitat – Aircraft Disturbances	To mitigate and monitor for impacts to wildlife.	The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the	7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting Reporting requirements	Both	Section 9.5

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			following information: a. Description of all updates to terrestrial ecosystem baseline data; b. A description of the involvement of Inuit in the monitoring program; c. An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in the baseline report; d. A detailed presentation and analysis of the distribution relative to mine structures and activities for caribou and other terrestrial mammals observed during the surveys and incidental sightings; e. Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn; f. A summary of the chronology and level of mine activities (such as vehicle frequency and type); g. An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; and h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.		will be addressed in Annual Report.		
58	Terrestrial Wildlife and Habitat – Explosives	To mitigate and monitor for impacts to wildlife.	Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes: a. An examination for trends in the	7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting. Reporting requirements will be	Both	Section 9.5

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			measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting; b. A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behavior and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails; c. A description of the extent of dust fall based on measured levels of dust fall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets; d. A demonstration and description of how the monitoring results, including the railway, road traffic, air traffic and dust fall contribute to cumulative effects of the project; e. Any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program; f. Any updates to information regarding caribou migration trails. Maps of caribou migration trails, primarily obtained through any new collar and snow tracking data, shall be updated (at least annually) in consultation with the Qikiqtani Inuit Association and affected communities, and shall be circulated as new information becomes available.		addressed in Annual Report.		

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59	Terrestrial Wildlife and Habitat – Operations (General)	To mitigate aircraft disturbance to wildlife and Inuit harvesting.	The Proponent shall ensure that aircraft maintain, whenever possible (except for specified operational purposes such as drill moves, take offs and landings), and subject to pilot discretion regarding aircraft and human safety, a cruising altitude of at least 610 metres during point to point travel when in areas likely to have migratory birds, and 1,000 metres vertical and 1,500 metres horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Terrestrial Environment Working Group) and use flight corridors to avoid areas of significant wildlife importance. The Proponent, in collaboration with the Terrestrial Environment Working Group shall develop a program or specific measures to ensure that employees and subcontractors providing aircraft services to the Project are respectful of wildlife and Inuit harvesting that may occur in and around project areas.	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
61	Terrestrial Wildlife and Habitat – Public Engagement	To mitigate Project impacts to wildlife.	Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered by the work being carried out. An operational definition of 'endangered' shall be provided by the Terrestrial Environment Working Group.	6 – Birds 7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
62	Terrestrial Wildlife and Habitat – Waste Management	To prevent increased harvesting pressure on wildlife.	The Proponent shall prohibit project employees from transporting firearms to site and from operating firearms in project areas for the purpose of wildlife harvesting.	None.	None.	N/A	N/A

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63	Birds – Awareness	To keep communities up to date with Project operations.	The Proponent shall liaise with local Hunters and Trappers Organizations in advance of carrying out terrestrial wildlife surveys. At a minimum, The Proponent shall also meet annually in person with Hunters and Trappers Organizations to discuss wildlife monitoring and mitigation plans and address community concerns regarding wildlife interactions. The Proponent may be required to facilitate these meetings through payment of honoraria and meeting costs.	6 – Birds 7 – Terrestrial wildlife and habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
64	Birds – Species at Risk	To prevent human-carnivore interactions.	The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures: a. Installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e. storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.); and b. Installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting).	6 – Birds 7 – Terrestrial wildlife and habitat	Geotechnical/Engineering Monitoring	Both	Section 9.5

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65	Birds – Species at Risk	To prevent disturbance to birds and bird habitat.	The Proponent shall ensure all employees working at project sites receive awareness training regarding the importance of avoiding known nests and nesting areas and large concentrations of foraging and moulting birds.	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
66	Birds – Project Infrastructure	To prevent impacts to sensitive bird species.	If Species at Risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure must be avoidance. The Proponent shall establish clear zones of avoidance on the basis of the species-specific nest setback distances outlined in the Terrestrial Environment Management and Monitoring Plan.	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
67	Birds – Construction/Clearing Activities	To prevent impacts to sensitive bird species.	The Proponent shall ensure that the mitigation and monitoring strategies developed for Species at Risk are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans and management plans that may become available during the duration of the Project.	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
68	Birds – Construction/Clearing Activities	To prevent potential injuries to birds.	The Proponent shall ensure flashing red, red strobe or white strobe lights and guy-wire deterrents are used on communications towers established for the Project. Consideration should also be given to reducing lighting when possible in areas where it may serve as an attractant to birds or other wildlife.	6 – Birds	Geotechnical/Engineering Monitoring Terrestrial Environment Monitoring and Reporting	Both	Section 9.2 Section 9.5
69	Birds – Flight Altitude Requirements	To prevent nesting by birds in active Project areas.	Prior to bird migrations and commencement of nesting, the Proponent shall identify and install nesting deterrents (e.g. flagging) to discourage birds from	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5

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			nesting in areas likely to be disturbed by construction/clearing activities taking place during the nesting season.				
70	Birds – Flight Altitude Requirements	To prevent impacts to birds and nesting areas.	The Proponent shall protect any nests found (or indicated nests) with a buffer zone determined by the setback distances outlined in its Terrestrial Environment Mitigation and Monitoring Plan, until the young have fledged. If it is determined that observance of these setbacks is not feasible, the Proponent will develop nest-specific guidelines and procedures to ensure bird's nests and their young are protected.	6 – Birds	Geotechnical/Engineering Monitoring Terrestrial Environment Monitoring and Reporting	Both	Section 9.2 Section 9.5
71	Birds – Monitoring	To mitigate aircraft disturbance to birds.	Subject to safety requirements, the Proponent shall require all project related aircraft to maintain a cruising altitude of at least: a. 650 m during point to point travel when in areas likely to have migratory birds b. 1100 m vertical and 1500 m horizontal distance from observed concentrations of migratory birds c. 1100 m over the area identified as a key site for moulting snow geese during the moulting period (July-August), and if maintaining this altitude is not possible, maintain a lateral distance of at least at least 1500 m from the boundary of this site.	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
72	Birds – Monitoring	To mitigate aircraft disturbance to birds.	The Proponent shall ensure that pilots are informed of minimum cruising altitude guidelines and that a daily log or record of flight paths and cruising altitudes of aircraft within all Project Areas is maintained and	None.	None.	N/A	N/A

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			made available for regulatory authorities such as Transport Canada to monitor adherence and to follow up on complaints.				
73	Birds – Monitoring	To develop appropriate mitigation and monitoring of impacts to birds.	The Proponent shall develop detailed and robust mitigation and monitoring plans for migratory birds, reflecting input from relevant agencies, the Qikiqtani Inuit Organization and communities as part of the Terrestrial Environment Working Group and to the extent applicable the Marine Environment Working Group.	6 – Birds	Terrestrial Environment Monitoring and Reporting Mine Closure Working Group	Both	Section 9.5 Section 2.4
74	Birds – Monitoring	To develop appropriate mitigation and monitoring of impacts to birds.	The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds under the Proponent's Environmental Management System, Terrestrial Environment Mitigation and Monitoring Plan prior to construction. The key indicators for follow up monitoring under this plan will include: peregrine falcon, gyrfalcon, common and king eider, red knot, seabird migration and wintering, and songbird and shorebird diversity.	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
75	Birds – Monitoring	To assess the extent of terrestrial habitat loss.	The Proponent's monitoring program shall assess and report, on annual basis, the extent of terrestrial habitat loss due to the Project to verify impact predictions and provide updated estimates of the total project footprint.	6 – Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.5
76	Marine Environment – Ice Breaking and Shipping	To mitigate potential impacts to the marine environment.	The Proponent shall develop a comprehensive Environmental Effects Monitoring Program to address concerns and identify potential impacts of the Project on the marine environment.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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77	Marine Environment – Ice Breaking and Shipping	The MEWG will consult with, and provide advice and recommendations to the Proponent in connection with mitigation measures for the protection of the marine environment, monitoring of effects on the marine environment and the consideration of adaptive management plans. The role of the MEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments.	A Marine Environment Working Group ("MEWG") shall be established to serve as an advisory group in connection with mitigation measures for the protection of the marine environment, and in connection with the Project Environmental Effects Monitoring program, as it pertains to the marine environment. Membership on the MEWG will include the Proponent, Environment Canada, Fisheries and Oceans Canada, Parks Canada, the Government of Nunavut, the Qikiqtani Inuit Association, the Mittimatilik Hunters and Trappers Organization, and other agencies or interested parties as determined to be appropriate by these key members. Makivik Corporation shall also be entitled to membership on the MEWG at its election. The MEWG members may consider the draft terms of reference	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
78	Marine Environment – Ice Breaking and Shipping	To obtain accurate and current ice information.	The Proponent shall update the baseline information for landfast ice using a long-term dataset (28 years), and with information on inter-annual variation. The analysis for pack and landfast ice shall be updated annually using annual sea ice data (floe size, cover, concentration) and synthesized and reported in the most appropriate management plan.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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79	Marine Environment – Shoreline Effects and Sediment Redistribution	To assist in the development of nautical charts for Canadian waters.	The Proponent shall provide the Canadian Hydrographic Services with bathymetric data and other relevant information collected in support of Project shipping where possible, to assist in the development of nautical charts for Canadian waters.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
87	Marine Environment – Ballast Water	To prevent invasive species introductions resulting from Project shipping.	The Proponent shall develop a detailed monitoring program at a number of sites over the long term to evaluate changes to marine habitat and organisms and to monitor for non-native introductions resulting from Project-related shipping. This program needs to be able to detect changes that may have biological consequences and should be initiated several years prior to any ballast water discharge into Steensby Inlet and Milne Inlet to collect sufficient baseline data and should continue over the life of the Project.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
89	Marine Environment – Ballast Water	To prevent impacts to marine water quality resulting from ballast water exchange.	The Proponent shall develop and implement an effective ballast water management program that may include the treatment and monitoring of ballast water discharges in a manner consistent with applicable regulations and/or exceed those regulations if they are determined to be ineffective for providing the desired and predicted results. The ballast water management program shall include, without limitation, a provision that requires ship owners to test their ballast water to confirm that it meets the salinity requirements of the applicable regulations prior to discharge at the Milne Port, and a	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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			requirement noting that the Proponent, in choosing shipping contractors will, whenever feasible, give preference to contractors that use ballast water treatment in addition to ballast water exchange.				
92	Marine Environment – Spill Prevention	To ensure adequate spill response capacity.	The Proponent shall ensure that it maintains the necessary equipment and trained personnel to respond to all sizes of potential spills associated with the Project in a self sufficient manner.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
103	Marine Environment – Traffic Log and Shipping Information	To monitor effectiveness of mitigation of shipping impacts to marine wildlife.	The Proponent shall report annually to the NIRB regarding project-related ship track and sea ice information, including: a. A record of all ship tracks taken along both shipping routes covering the entire shipping season; b. When employing ice-breaking, an overlay of ship tracks onto ice imagery to determine whether ships are effectively avoiding shore leads and polynyas; c. A comparison of recorded ship tracks to the expected nominal shipping route, and probable (if any) extent of year-round shipping during periods of ice cover and open-water; d. An assessment of the level of adherence to the nominal shipping route and the spatial extent of the shipping zone of influence; and e. When employing ice-breaking, marine bird and mammal species and number of individuals attracted to ship tracks in ice.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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106	Marine Environment – Shipboard Observers	To ensure that interactions with marine mammals and Project shipping activities are effectively monitored.	The Proponent shall ensure that shipboard observers are employed during seasons where shipping occurs and provided with the means to effectively carry out assigned duties. The role of shipboard observers in shipping operations should be taken into consideration during the design of any ore carriers purpose-built for the Project, with climate controlled stations and shipboard lighting incorporated to permit visual sightings by shipboard observers during all seasons and conditions. Any shipboard lighting incorporated should be in accordance with the *Canada Shipping Act, 2001's Collision Regulations*, and should not interfere with safe navigation of the vessel.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
113	Marine Environment – Arctic Char	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet	The Proponent shall conduct monitoring of marine fish and fish habitat, which includes but is not limited to, monitoring for Arctic Char stock size and health condition in Steensby Inlet and Milne Inlet, as recommended by the Marine Environment Working Group.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
114	Marine Environment – Arctic Char	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet.	In the event of the development of a commercial fishery in the Steensby Inlet area or Milne Inlet-Eclipse Sound areas, the Proponent, in conjunction with the Marine Environment Working Group, shall update its monitoring program for marine fish and fish habitat to ensure that the ability to identify Arctic Char stock(s) potentially affected by Project activities and monitor for changes in stock size and structure of affected stocks and fish health (condition,	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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			taste) is maintained to address any additional monitoring issues identified by the MEWG relating to the commercial fishery.				
120	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals associated with Project shipping.	The Proponent shall ensure that, subject to vessel and human safety considerations, all project shipping adhere to the following mitigation procedures while in the vicinity of marine mammals: a. Wildlife will be given right of way; b. Ships will when possible, maintain a straight course and constant speed, avoiding erratic behavior; and c. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife have moved away from the immediate area.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
121	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall immediately report any accidental contact by project vessels with marine mammals or seabird colonies to Fisheries and Oceans Canada and Environment Canada respectively, by notifying the appropriate regional office of the: a. Date, time and location of the incident; b. Species of marine mammal or seabird involved; c. Circumstances of the incident; d. Weather and sea conditions at the time; e. Observed state of the marine mammal or sea bird colony after the incident; and, f. Direction of travel of the marine mammal	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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			after the incident, to the extent that it can be determined				
122	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall summarize and report annually to the NIRB regarding accidental contact by project vessels with marine mammals or seabird colonies through the applicable monitoring report.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
123	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall provide sufficient marine mammal observer coverage on project vessels to ensure that collisions with marine mammals and seabird colonies are observed and reported through the life of the Project. The marine wildlife observer protocol shall include, but not be limited to, protocols for marine mammals, seabirds, and environmental conditions and immediate reporting of significant observations to the ship masters of other vessels along the shipping route, as part of the adaptive management program to address any items that require immediate action.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
124	Marine Environment – Marine Mammal Interactions	To prevent impacts to marine mammals and marine fish populations from increased harvesting pressures in Project areas.	The Proponent shall prohibit project employees from recreational boating, fishing, and harvesting of marine wildlife in project areas, including Steensby Inlet and Milne Inlet. The Proponent is not directed to interfere with harvesting by the public in or near project areas, however, enforcement of a general prohibition on harvesting in project areas by project employees during periods of active employment (i.e. while on site and between work shifts) is required.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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125	Marine Environment – Public Engagement	To assess acceptability of acoustic deterrent devices for the general public.	Prior to use of acoustic deterrent devices, the Proponent shall carry out consultations with communities along the shipping routes and nearest to Steensby Inlet and Milne Inlet ports to assess the acceptability of these devices. Feedback received from community consultations shall be incorporated into the appropriate mitigation plan.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
125 a	Marine Environment – Public Engagement	To ensure public acceptability of project vessel anchor sites and reduce potential conflicts between project marine shipping and local harvesting.	The Proponent shall consult with potentially-affected communities and groups, particularly Hunters' and Trappers' Organizations regarding the identification of project vessel anchor sites and potential areas of temporary refuge for project vessels along the shipping routes within the Nunavut Settlement Area. Feedback received from community consultations shall be incorporated into the most appropriate mitigation or management plans.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
127	Marine Environment – Public Engagement	To promote public awareness and engagement with Project shipping activities.	The Proponent shall ensure that communities and groups in Nunavik are kept informed of project shipping activities and are provided with opportunity to participate in the continued development and refinement of shipping related monitoring and mitigation plans.	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A
128	Marine Environment – Public Engagement	To ensure habitat compensation is acceptable to local communities.	The Proponent shall consult with local communities as fish habitat off-setting options are being considered and demonstrate its incorporation of input received into the design of the Fish Habitat Off-Setting Plan required to offset the Harmful Alteration, Disruption or	N/A – Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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			Destruction of Fish and Fish Habitat (HADD).				
129	Population Demographics – Qikiqtaaluk Socio-Economic Monitoring Committee	Description of the general monitoring framework to be developed in consultation with the Qikiqtaaluk Socio-Economic Monitoring Committee.	The Proponent is strongly encouraged to engage in the work of the Qikiqtaaluk Socio-Economic Monitoring Committee along with other agencies and affected communities, and it should endeavor to identify areas of mutual interest and priorities for inclusion into a collaborative monitoring framework that includes socio-economic priorities related to the Project, communities, and the North Baffin region as a whole.	N/A – Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
130	Population Demographics – Project-specific monitoring	Recognizing that some Project-specific socio-economic monitoring initiatives may be best addressed in smaller more focused working groups, this is encouraged where possible.	The Proponent should consider establishing and coordinating with smaller socio-economic working groups to meet Project specific monitoring requirements throughout the life of the Project.	N/A – Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
131	Population Demographics – Monitoring demographic changes	To monitor demographic changes affecting the North Baffin communities and the territory as a whole in order to understand changes and to evaluate the Proponent's predictions as related to population demographics.	The Qikiqtaaluk Socio-Economic Monitoring Committee is encouraged to engage in the monitoring of demographic changes including the movement of people into and out of the North Baffin communities and the territory as a whole. This information may be used in conjunction with monitoring data obtained by the Proponent from recent hires and/or out-going employees in order to assess the potential effect the Project has on migration.	N/A – Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10

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132	Population Demographics – Training programs	To develop training programs in ways which contribute to limiting the potential for migration to occur as North Baffin residents seek training and employment opportunities in the larger centre of Iqaluit.	The Proponent is encouraged to partner with other agencies such as Hamlet organizations in the North Baffin region, the Municipal Training Organization, and the Government of Nunavut in order to adapt pre-existing, or to develop new programs which encourage Inuit to continue living in their home communities while seeking ongoing and progressive training and development. Programs may include driver training programs offered within Hamlets, providing upgraded equipment to communities for use in municipal works, providing incentives for small businesses to remain operating out of their community of origin, or supplementing existing recreational facilities and programming in North Baffin communities.	N/A – Related to Education and Training	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
133	Population Demographics – Monitoring demographic changes	Training programs may be developed with the goal of limiting the potential for migration to occur as North Baffin residents may choose to seek employment and therefore move from smaller North Baffin communities to the larger centre of Iqaluit.	The Proponent is encouraged to work with the Qikiqtaaluk Socio-Economic Monitoring Committee and in collaboration with the Government of Nunavut's Department of Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders, design and implement a voluntary survey to be completed by its employees on an annual basis in order to identify changes of address, housing status (i.e. public/social, privately owned/rented, government, etc.), and migration intentions while respecting confidentiality of all persons involved. The survey should be designed in collaboration with the Government of Nunavut's Department of	N/A – Related to Population demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10

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			Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders. Non-confidential results of the survey are to be reported to the Government of Nunavut and the NIRB.				
134	Population Demographics – Employee origin	Project-specific information regarding employee origin is important to comparing predictions of labour availability and employment opportunities with actual levels of employment from various demographic segments over different geographic areas.	The Proponent shall include with its annual reporting to the NIRB a summation of employee origin information as follows: a. The number of Inuit and non-Inuit employees hired from each of the North Baffin communities, specifying the number from each; b. The number of Inuit and non-Inuit employees hired from each of the Kitikmeot and Kivalliq regions, specifying the number from each; c. The number of Inuit and non-Inuit employees hired from a southern location or other province/territory outside of Nunavut, specifying the locations and the number from each; and d. The number of non-Canadian foreign employees hired, specifying the locations and number from each foreign point of hire.	N/A – Related to Population demographics	Included in Annual Report to NIRB and the Annual IIBA Implementation Report	Both	Section 9.10
145	Livelihood and Employment – Barriers to employment for women	To monitor and understand the existence of barriers to employment for women specifically relating to childcare availability and costs.	The Proponent is encouraged to work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor the barriers to employment for women, specifically with respect to childcare availability and costs.	N/A – Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 9.10
146	Livelihood and Employment – Availability of	To lessen the barriers to employment as relating to the	The Government of Nunavut and the Qikiqtani Inuit Association are strongly encouraged to investigate the possibility	N/A – Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10

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	childcare for Project employees	availability of childcare.	for Project revenue streams to support initiatives or programs which offset or subsidize childcare for Project employees.		and the Closure Working Group closer to mine Closure		
147	Livelihood and Employment – Affordability of housing	To lessen the barriers to maintaining employment as relating to the availability and costs of housing.	The Proponent is encouraged to work with the Government of Nunavut and the Nunavut Housing Corporation to investigate options and incentives which might enable and provide incentive for employees living in social housing to maintain employment as well as to negotiate for and obtain manageable rental rates.	N/A – Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 9.10
152	Economic Development and Self-Reliance, and Contracting and Business Opportunities – IIBA contract requirements	To improve ability of small businesses to access Project contract and sub-contract opportunities.	The Qikiqtani Inuit Association is encouraged to provide the Board and the Qikiqtaaluk Socio-Economic Monitoring Committee with information regarding the effectiveness of any provisions within the Inuit Impact and Benefit Agreement which may require that larger contracts be broken down into smaller size in order that they are reasonably managed by smaller businesses in the North Baffin region, while respecting any confidential or privileged information.	N/A – Related to Economic Development and Self-Reliance	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure.	Both	Section 9.10
153	Human Health and Well-Being – Employee and family health and well-being	To provide adequate medical services on site, including those that contribute to the mental health and well-being of all employees.	The Proponent is encouraged to employ a mental health professional to provide counseling to Inuit and non-Inuit employees in order to positively contribute toward employee health and well-being.	N/A – Related to Human health and well-being	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Closure Working Group closer to mine Closure	Crown	Section 9.10
154	Human Health and Well-being – Indirect impacts to health and well-being	To understand the indirect impacts of the Project upon health and well-being.	The Proponent shall work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor potential indirect	N/A – Related to Human health and well-being	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working	Both	Section 9.10

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			effects of the Project, including indicators such as the prevalence of substance abuse, gambling issues, family violence, marital problems, rates of sexually transmitted infections and other communicable diseases, rates of teenage pregnancy, high school completion rates, and others as deemed appropriate.		Group closer to mine Closure		
156	Human Health and Well-Being – Support initiatives	To assist with fostering well-being within point-of-hire communities.	The Proponent is encouraged to assist with the provision and/or support of recreation programs and opportunities within the potentially affected communities in order to mitigate potential impacts of employees' absences from home and community life.	N/A – Related to Human health and well-being	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 9.10
157	Human Health and Well-Being – Counseling and treatment programs	To make available, necessary treatment and counseling services for employee and family well-being.	The Proponent should consider providing counseling and access to treatment programs for substance and gambling addictions as well as which address domestic, parenting, and marital issues that affect employees and/or their families.	N/A – Related to Human health and well-being	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 9.10
158	Community Infrastructure and Public Services – Impacts to health services	To monitor indirect Project impacts to health and social services provided by the Government of Nunavut.	The Proponent is encouraged to work with the Government of Nunavut and other parties as deemed relevant in order to develop a Human Health Working Group which addresses and establishes monitoring functions relating to pressures upon existing services and costs to the health and social services provided by the Government of Nunavut as such may be impacted by Project-related in-migration of employees, to both the North Baffin region in general, and to the City of Iqaluit in particular.	N/A – Related to Community Infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 9.10

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159	Community Infrastructure and Public Services – Impacts to infrastructure	To monitor Project-related impacts to infrastructure within the Local Study Area communities.	The Proponent is encouraged to work with the Government of Nunavut to develop an effects monitoring program that captures increased Project-related pressures to community infrastructure in the Local Study Area communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit.	N/A – Related to Community Infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 9.10
160	Community Infrastructure and Public Services – Distribution of benefits	To ensure the distribution of benefits is done in a way that off-sets Project-related impacts to infrastructure or services.	The Government of Nunavut and the Qikiqtani Inuit Association are encouraged to cooperate to ensure in a broad sense, that Project benefits	N/A – Related to Community Infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Both	Section 9.10
161	Community Infrastructure and Public Services – Policing	To ensure the territorial government and its policing service are adequately prepared to handle any Project-related increases to the need for service and associated impacts.	The Government of Nunavut should be prepared for any potential increased need for policing, and ensure that the Royal Canadian Mounted Police is prepared to handle ongoing Project-related demographic changes and subsequent crime prevention that may be needed as a result of the development, operation, and closure of the Project.	N/A – Related to Community Infrastructure and public service	Will be addressed by the Socio-Economic Monitoring Committee and the Closure Working Group closer to mine Closure	Crown	Section 9.10
162	Culture, Resources and Land Use – Public consultation	To ensure the ongoing and consistent involvement of Elders and community members in developing and revising monitoring and mitigation plans.	The Proponent should make all reasonable efforts to engage Elders and community members of the North Baffin communities in order to have community level input into its monitoring programs and mitigative measures, to ensure that these programs and measures have been informed by traditional activities, cultural resources,	N/A – Related to Cultural resources and Land use	Will be addressed by the Community Working Group and the Closure Working Group closer to mine Closure	Both	Section 9.10

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			and land use as such may be implicated or impacted by ongoing Project activities.				
163	Culture, Resources and Land Use – Public consultation	To involve communities in the development and evolution of management and monitoring plans.	The Proponent shall continue to engage and consult with the communities of the North Baffin region in order to ensure that Nunavummiut are kept informed about the Project activities, and more importantly, in order that the Proponent's management and monitoring plans continue to evolve in an informed manner.	N/A – Related to Cultural resources and Land use	Will be addressed by the Community Working Group and the Socio-Economic Monitoring Committee and the Closure Working Group loser to mine Closure	Both	Section 9.10
164	Socio-Economic Impacts – Shipping notification	In order to inform members of North Baffin communities of planned Project shipping transits such that community members' planned travel routing may be adjusted to avoid interaction with Project ships and/or ship tracks.	The Proponent is required to provide notification to communities regarding scheduled ship transits throughout the regional study area including Eclipse Sound and Milne Inlet, real-time data regarding ships in transit and any changes to the proposed shipping schedule to the MEWG and agencies within Pond Inlet on a weekly basis during open water shipping, and to the RSA communities on a monthly basis.	N/A – Related to Cultural resources and Land use	Part of already established Marine safety protocols on site and though IIBA Implementation.	Both	Section 9.10
165	Socio-Economic Impacts – Emergency shelters	In order to provide for human safety precautions in the event of adverse weather or other emergency situations along segments of linear transportation infrastructure.	The Proponent is strongly encouraged to provide buildings along the rail line and Milne Inlet Tote Road for emergency shelter purposes, and shall make these available for all employees and any land users travelling through the Project area. In the event that these buildings cannot, for safety or other reasons be open to the public, the Proponent is encouraged to set up another form of emergency shelters (e.g. seacans outfitted for survival purposes) every 1 kilometre along the rail line and Milne Inlet Tote Road. These	N/A	Part of already established Marine safety protocols on site. Will be addressed by the Community Working Group	Both	Section 9.10

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			shelters must be placed along Tote Road and rail routing prior to operation of either piece of infrastructure, and must be maintained for the duration of project activities, including the closure phase.				
166	Socio-Economic Impacts – Public Consultation	To ensure members of the public are able to access shipping information on an as-required basis in order to inform potential users of the scheduled Project activities which could require deviations to land users' schedules or routing.	The Proponent should ensure through its consultation efforts and public awareness campaigns that the public have access to shipping operations personnel for transits into and out of both Steensby Inlet port and Milne Inlet port either via telephone or internet contact, in order that any questions regarding ice conditions or ship movements that could assist ice users in preparing for travel may be answered by Project staff in a timely fashion.		Part of already established Marine safety protocols on site	Both	Section 9.10
168	Governance and Leadership – Monitoring program	Outline variables that are relevant to the Project and which should be adopted by the QSEMC's monitoring program.	The specific socioeconomic variables as set out in Section 8 of the Board's Report, including data regarding population movement into and out of the North Baffin Communities and Nunavut as a whole, barriers to employment for women, project harvesting interactions and food security, and indirect Project effects such as substance abuse, gambling, rates of domestic violence, and education rates that are relevant to the Project, be included in the monitoring program adopted by the Qikiqtani Socio-Economic Monitoring Committee.	N/A – Related to Governance and leadership	Will be addressed by the Socio-Economic Monitoring Committee closer to mine Closure	Both	Section 9.10
169	Governance and Leadership – Monitoring economic effects	To maintain transparency inform communities in relation to economic	The Proponent provide an annual monitoring summary to the NIRB on the monitoring data related to the regional and cumulative economic effects (positive and	N/A – Related to Governance and leadership	Will be addressed by the Socio-Economic Monitoring Committee closer to mine Closure	Both	Section 9.10

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
		benefits associated with the Project.	negative) associated with the Project and any proposed mitigation measures being considered necessary to mitigate the negative effects identified.				
175	Accidents and Malfunctions – Ship track markers in ice cover	To ensure that measures taken to mark the shipping track(s) during periods of ice cover are effective in advising ice-based travelers, and that, where necessary, revisions to this practice can be made to ensure public safety.	The Proponent shall, in coordination and consultation with the Qikiqtani Inuit Association and the Hunters and Trappers Organizations of the North Baffin communities and Coral Harbour, provide updates to its Shipping and Marine Mammals Management Plan to include adaptive management measures it proposes to take should the placement of reflective markers along the ship track in winter months not prove to be a feasible method of marking the track to ensure the safety of ice-based travelers.	N/A – Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
177	Accidents and Malfunctions – Foreign flagged vessels	To ensure foreign flagged ships operating in Canadian waters are held to the same standard as domestic ships with regard to emergency response planning.	The Proponent shall enroll any foreign flagged vessels commissioned for Project-related shipping within Canadian waters into the relevant foreign program equivalent to Transport Canada's Marine Safety Delegated Statutory Inspection Program.	N/A – Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
180	Transboundary Effects – Makivik Corporation involvement in the Marine Environment Working Group	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	The Marine Environment Working Group established for this Project shall invite a representative from Makivik Corporation to be a member of the Group	N/A – Related to Marine Monitoring	Will be addressed in Annual Report. And in Marine Environmental Working Group	Crown (Marine)	N/A

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post-Closure Monitoring Program	IOL/ Crown land	ICRP Ref
181	Transboundary Effects – Marine Environment Working Group reporting	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	Regardless of whether Makivik Corporation participates as a member of the Marine Environment Working Group, the Marine Environment Working Group will provide Makivik Corporation with regular updates regarding the activities of the Marine Environment Working Group throughout the Project life cycle.	N/A – Related to Marine Monitoring	Will be addressed in Annual Report. And in Marine Environmental Working Group	Crown (Marine)	N/A
182	Transboundary Effects – Reporting to Marine Environment Working Group (MEWG)	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	Baffinland shall make available to Makivik Corporation any ship route deviation reports provided to the NIRB in accordance with the terms and conditions set out in Section 4.12.4 of the Final Hearing Report.	N/A – Related to Marine Monitoring	Will be addressed in Annual Report. And in Marine Environmental Working Group	Crown (Marine)	N/A

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Table 11.4 has been prepared to show concordance with Part J, Number 2 of the Type 'A' Water Licence, 2AM-MRY1325.

Table 11.4: Type 'A' Water Licence 2AM-MRY1325 Amendment No.1, Part J, Item 2

TYPE 'A' WATER LICENCE 2AM-MRY1325, Schedule J	ICRP Section
a. Detailed description, including maps and other visual representations, of the preconstruction conditions for each site, accompanied by a detailed description of the proposed final landscape, with emphasis on the reclamation of surface drainage over the restored area	3 & 5.2
b. A description of how progressive reclamation will be employed and monitored throughout the life of the mine, plus reclamation scheduling and coordination of activities with the overall sequence of the project; details of reclamation scheduling and procedures for coordinating reclamation activities within the overall mining sequence and materials balance	6
c. Implications of any updated water balance and water quality model prediction results and any adaptive management measures that may be required	5.2.1.9, 5.2.2.9, & Appendix D
d. An evaluation of closure and reclamation measures for each mine component, including the goals, objectives, closure criteria and the rationale for selection of the preferred measures	Table 5.1
e. A comprehensive assessment of materials suitability, including geochemical and physical characterization and a schedule of availability for reclamation needs. Particular attention shall be given to cover materials, including maps showing sources and stockpile locations of all reclamation construction materials	5.2.8.5.1
f. An assessment and description of any required post-closure treatment for pit water that is not acceptable for discharge, taking into consideration further studies completed and updated modeling information	5.2.1
g. Contingency measures for all reclamation components including action thresholds that are linked to the monitoring programs	5.1.1
h. Monitoring programs to assess reclamation performance and environmental conditions including monitoring locations for surface water and Ground Water, parameters	9
i. Monitoring schedules and overall timeframes	9
j. QA/QC procedures for managing the demolition landfill and other waste disposal areas	5.2.7
k. A list of non-salvageable materials and disposal locations	5.2.4, 5.2.5, & 5.2.7
l. Rock storage facility closure design plans and sections including the types of material placed and volumes	5.2.2

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TYPE 'A' WATER LICENCE 2AM-MRY1325, Schedule J	ICRP Section
m. Protocol for the disposal of any contaminated soil;	Section 9.4
n. An assessment of the Long-term physical stability of all remaining project components;	Table 5.1
o. A revised closure and reclamation cost estimate; and	10.1
p. A detailed implementation schedule for completion of reclamation work	Table 5.1

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12 GLOSSARY OF TERMS, ACRONYMS, OR ABBREVIATIONS

12.1 GLOSSARY OF TERMS

Term	Meaning
Abandonment	The permanent dismantlement of a facility so it is permanently incapable of its intended use. This includes the removal of associated equipment and structures.
Acid-Base Accounting (ABA)	Acid-Base Accounting (ABA) is a screening procedure whereby the acid-neutralizing potential and acid-generating potential of rock samples are determined.
Acid generating (AG)	Production of acidity irrespective of its effect on the adjacent pore water or whether the material is net acid producing or neutralizing.
Acid rock drainage (ARD)	Acidic drainage stemming from open pit, underground mining operations, waste-rock or tailings facilities that contains free sulphuric acid and dissolved metals sulphate salts, resulting from the oxidation of contained sulphide minerals or additives to the process. The acid dissolves minerals in the rocks, further changing the quality of the drainage water.
Acid Potential (AP)	Maximum potential acid generation from a sample. The calculation of AP (or MPA) is an integral part of acid/base accounting.
Acidity	Measure of the capacity of a solution to neutralize a strong base.
Active layer	The layer of ground above the permafrost which thaws and freezes annually.
Alkalinity	Measure of the capacity of a solution to neutralize a strong acid.
Backfill	Material excavated from a site and reused for filling the surface or underground void created by mining. Reinsertion of materials in extracted part(s) of the ore body. Materials used for backfilling can be waste-rock or overburden. In most cases backfill is used to refill mined-out areas in order to: ▪ Assure ground stability. ▪ Prevent or reduce underground and surface subsidence. ▪ Provide roof support so that further parts of the ore body can be extracted and to increase safety. ▪ Provide an alternative to surface disposal. And ▪ Improve ventilation.
Background	An area near the site under evaluation not influenced by chemicals released from the site, or other impacts created by onsite activity.
Baseline	A surveyed condition and reference used for future surveys.
Benign	Having little or no detrimental effect.
Berm	A mound or wall, usually of earth, used to retain substances or to prevent substances from entering an area.

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Term	Meaning
Best Management Practices	Any program, technology, process, operating method, measure, or device that controls, prevents, removes, or reduces pollution and impact on the environment.
Biodiversity	The variety of plants and animals that live in a specific area.
Bioremediation	The use of microorganisms or vegetation to reduce contaminant levels in soil or water.
Borrow Pit	A source of fill or embanking material.
Care and Maintenance	A term to describe the status of a mine when it undergoes a temporary closure.
Closure	When a mine ceases operations without the intent to resume mining activities in the future.
Closure Criteria	Detail to set precise measures of when the objective has been satisfied.
Closure Goal	The guiding statement that provides the vision and purpose of reclamation. Attainment of the closure goal happens all closure objectives have been satisfied. By its nature, the closure goal is a broad, high-level statement and not directly measurable.
Closure Principles	A fundamental basis for the selection of closure objectives.
Closure Objectives	Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles.
Comminution	Size reduction of an ore by crushing and/or grinding to such a particle size that the product is a mixture of relatively clean particles of mineral and gangue. In order to produce a relatively pure concentrate, it is necessary to grind the ore fine enough to liberate the desired minerals.
Contaminant	Any physical, chemical, biological or radiological substance in the air, soil or water that has an adverse effect. Any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.
Contouring	The process of shaping the land surface to fit the form of the surrounding land.
Cumulative Effects	The combined environmental impacts that accumulate over time and space as a result of a series of similar or related actions or activities.
Crushing	Comminution process that reduces the particle size of run-of-mine ore to such a level that grinding can be carried out. This is accomplished by compression of ore against rigid surfaces, or by impact against surfaces in rigidly constrained motion path.
Cryoconcentration	Concentration of solutes due to exclusion by ice.
Decommissioning	Process by which a mining operation is shut down i.e.: permanently closing a site. Removing equipment, buildings and structures. Rehabilitation and plans for future maintenance of affected land and water are also included.
Dewatering	Process of removing water from an underground mine or open pit, or from the surrounding rock or non-lithified area. The term is also commonly used for the reduction of water content in concentrates, tailings and treatment sludges.

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Term	Meaning
Disposal	The relocation, containment, treatment or processing of unwanted materials or materials that are not reusable. This may involve the removal of contaminants or their conversion to less harmful forms.
Drainage	Manner in which the waters of an area exist and move, including surface streams and groundwater pathways. A collective term for all concentrated and diffuse water flow.
Drainage Chemistry	Concentrations of dissolved components in drainage, including element concentrations, chemical species and other aqueous chemical parameters.
Effluent	Treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond or a treatment plant.
End Land Use	The allowable use of disturbed land following reclamation. Municipal zoning and/or approval may be required for specific land uses.
Environment	Interrelated physical, chemical, biological, social, spiritual and cultural components that affect the growth and development of living organisms.
Erosion	The wearing away of rock, soil or other surface material by water, rain, waves, wind or ice, the process may be accelerated by human activities.
Evaporation	Physical process by which a liquid is changed into a gas.
Existing Operation	An installation in operation or, in accordance with legislation existing before the date on which this Directive is brought into effect, an installation authorized or in the view of the competent authority the subject of a full request for authorization, provided that that installation is put into operation no later than one year after the date on which this Directive is brought into effect.
Frost Heave	Annual ground displacements and differential ground pressures due to the freezing of water within soils.
Geochemistry	Science of the chemistry of geological materials and the interaction between geological materials with the environment.
Geology	Study of the earth, its history and the changes that have occurred or are occurring, and the rocks and non-lithified materials of which it is composed and their mode of formation and transformation.
Grade	Dimensionless proportion of any constituent in an ore, expressed often as a percentage, grams per tonne (g/t) or parts per million (ppm).
Ground Thermal Regime	Temperature conditions below the ground surface. A condition of heat losses and gains from geothermal sources and the atmosphere.
Groundwater	All subsurface water that occurs beneath the water table in rocks and geologic formations that are fully saturated. Distinct from surface water.
Humidity Cell Test	Kinetic test procedure used primarily to measure rates of acid generation and neutralization in sulphide-bearing rock.
Hydrogeology	Science of the groundwater circuit (interrelationship of geologic materials and processes with water).
Hydrology	The science that deals with water, its properties, distribution and circulation over the Earth's surface.

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Term	Meaning
Inert Waste	Material having insignificant leachability and pollution content which will not require laboratory analysis.
Infiltration	Entry of water into a porous substance.
Inukshuk	A stone representation of a person, used as a milestone or directional marker by the Inuit of the Canadian Arctic.
In Situ Treatment	A method of managing or treating contaminated soils, sludges and waters "in place" in a manner that does not require the contaminated material to be physically removed or excavated from where it originated.
Landfill	An engineered waste management facility at which waste is disposed by placing it on or in land in a manner that minimizes adverse human health and environmental effects.
Leachate	Solution obtained by leaching e.g. water that has percolated through soil containing soluble substances and that contains certain amounts of these substances in solution.
Leaching	Passage of a solvent through porous or crushed material in order to extract components from the liquid phase. For example, gold can be extracted by heap leaching of a porous ore, or pulverized tailings. Other methods are tank leaching of ore, concentrates or tailings and in-situ leaching.
Lithology	Composition of rocks, including physical and chemical characteristics such as colour, mineralogical composition, hardness and grain size.
Migration	The movement of chemicals, bacteria, and gases in flowing water or vapour.
Mineral Resource	Concentration or occurrence of natural, solid, inorganic or fossilized organic material in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.
Mining	Methods and techniques to extract ore from the ground, including support facilities (e.g. stockpiles, workshops, transport, ventilation) and supporting activities in the mine itself or in the vicinity.
Mining Operation	Any extraction of ore from which mineral substances are taken, where the corporate intent is to make an operating profit or build continuously toward a profitable enterprise.
Mitigation	The process of rectifying an impact by repairing, rehabilitating or restoring the affected environment, or the process of compensating for the impact by replacing or providing substitute resources or environments.

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Term	Meaning
Monitoring	Observing the change in geophysical, hydrogeological or geochemical measurements over time. Process intended to assess or to determine the actual value and the variations of an emission or another parameter, based on procedures of systematic, periodic or spot surveillance, inspection, sampling and measurement or another assessment methods intended to provide information about emitted quantities and/or trends for emitted pollutants.

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Term	Meaning
Naturally Re-vegetate or Natural Re-vegetation	For the purposes of the Mary River Project natural re-vegetation will include scarification and covering with overburden as required and allowing the surrounding natural vegetation to encroach and be re-established on the disturbed area.
Neutralization	Raising the pH of acidic solutions or lowering the pH of alkaline solutions to near-neutral pH (about pH 7) values through a reaction in which the hydrogen ion of an acid and the hydroxyl ion of a base combine to form water.
Neutralization Potential (NP)	General term for a sample's or a material's capacity to neutralize acidity.
Objectives	Objectives describe what the reclamation activities are aiming to achieve. The goal of mine closure is to achieve the Long-term objectives that are selected for the site.
Open Pit Mining	Mining operation takes place on the surface. Mining operation and environment are in contact over an extended area.
Operator	Any natural or legal person that is responsible for the control, operation, and maintenance of the mine, mineral processing plant, tailings dam and/or related facilities including the after-closure phases.
Ore	Mineral or variety of accumulated minerals of sufficient value as to quality and quantity that it/they may be mined at a profit. Most ores are mixtures of extractable minerals and extraneous rocky material.
Orebody (mineral deposit)	Naturally occurring geological structure consisting of an accumulation of a desired mineral and waste-rock, from which the mineral can be extracted, at a profit, or with a reasonable expectation thereof.
Overburden	Layer of natural grown soil or massive rock on top of an orebody. In case of open pit mining operations it has to be removed prior to extraction of the ore
P	Phosphate
Passive Treatment	Treatment technologies that can function with little or no maintenance over long periods of time.
Permafrost	Ground that remains at or below zero degrees Celsius for a minimum of two consecutive years.
Permafrost Aggradation	A naturally or artificially caused increase in the thickness and/or area extent of permafrost.
Permeability	The ease with which gases, liquids, or plant roots penetrate or pass through soil or a layer of soil. The rate of permeability depends upon the composition of the soil.

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Term	Meaning
Phreatic Surface	The term phreatic is used in Earth sciences to refer to matters relating to ground water below the water table (the word originates from the Greek phrear, phreat- meaning “well” or “spring”). The term ‘phreatic surface’ indicates the location where the pore water pressure is under atmospheric conditions (i.e. the pressure head is zero). This surface normally coincides with the water table.
Potentially Acid Generating (PAG)	Rock or overburden material that has the potential to produce acidity irrespective of its effect on the adjacent pore water or whether the material is net acid producing or neutralizing.

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Term	Meaning
Progressive Reclamation	Actions that can be taken during mining operations before permanent closure, to take advantage of cost and operating efficiencies by using the resources available from mine operations to reduce the overall reclamation costs incurred. It enhances environmental protection and shortens the timeframe for achieving the reclamation objectives and goals.
Primary Crushing	Process of reducing ore into smaller fragments to prepare it for further processing and/or so that it can be transported to the processing plant. In underground mines, the primary crusher is often located underground, or at the entrance to the processing plant.
Quarry	Whole area under the control of an operator carrying out any activity involved in the prospecting, extraction, treatment and storage of minerals, including common related infrastructures and waste management activities, being not a mine. It is distinguished from a mine because it is usually open at the top and front, and used for the extraction of building stone, such as slate, limestone, gravel and sand.
Reclamation	The process of returning a disturbed site to its natural state or one for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
Rehabilitation	Activities to ensure that the land will be returned to a form and productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.
Remediation	The removal, reduction, or neutralization of substances, wastes or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future.
Restoration	The renewing, repairing, cleaning-up, remediation or other management of soil, groundwater or sediment so that its functions and qualities are comparable to those of its original, unaltered state.
Re-vegetation	Replacing original ground cover following a disturbance to the land.
Risk Assessment	Reviewing risk analysis and options for a given site, component or condition. Risk assessments consider factors such as risk acceptability, public perception of risk, socio-economic impacts, benefits, and technical feasibility. It forms the basis for risk management.
Run-of-mine (ROM)	Run of mine. Unprocessed conveyed material (ore) from the mining operation.
Runoff	Part of precipitation and snowmelt that does not infiltrate but moves as overland flow and drains off the land into bodies of water.
Scarification	Seedbed preparation to make a site more amenable to plant growth.
Screening	Separating material into size fractions.
Security Deposit	Funds held by the Crown or designated owner of the land that can be used in the case of abandonment of an undertaking to reclaim the site, or carry out any ongoing measures that may remain to be taken after the abandonment of the undertaking.

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Term	Meaning
Sediment	Solid material, both mineral and organic, that has been moved by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.
Seismic	Relating to an earthquake or to other tremors of the Earth, such as those caused by large explosions.
Solubility	Quantity of solute that dissolves in a given volume and type of solvent, at given temperature and pressure, to form a saturated solution. The degree to which compounds are soluble depends on their ability, and that of the other dissolved species, to form ions and aqueous complexes in particular drainage chemistry.
Sump	An underground catch basin in a mine where water accumulates before being pumped to the surface.
Supernatant	The clear liquid that floats about the sediment or precipitate.
Surface Water	Natural water bodies such as river, streams, brooks, ponds and lakes, as well as artificial watercourses, such as irrigation, industrial and navigational canals, in direct contact with the atmosphere.
Sustainable Development	Industrial development that does not detract from the potential of the natural environment to ensure benefits for future generations.
Tailings	Material rejected from a mill after most of the recoverable valuable minerals have been extracted.
Taliks	Unfrozen zones that can exist within, below, or above permafrost layers. They are usually located below deep water bodies.
Temporary Closure	When a mine ceases operations with the intent to resume mining activities in the future. Temporary closures can last for a period of weeks, or for several years, based on economical, environmental, political, or social factors.
Thermokarst	A landscape characterized by shallow pits and depressions caused by selective thawing of ground ice, or permafrost.
Topsoil	Natural huminous layer on top of the orebody, which has to be stripped prior to start-up of ore extraction.
Traditional Knowledge	A cumulative, collective body of knowledge, experience, and values built up by a group of people through generations of living in close contact with nature. It builds upon the historic experiences of a people and adapts to social, economic, environmental, spiritual and political change.
Ultramafic	Igneous rock composed chiefly of mafic minerals, e.g. monomineralic rocks composed of hypersthenes, augite, or olivine.
Waste-rock, Discard, or Spoil Material	All rock materials, except ore and tailings that are produced as a result of mining operations.
Watershed	A region or area bordered by ridges of higher ground that drains into a particular watercourse or body of water.
Water Table	The level below where the ground is saturated with water.

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Term	Meaning
Weathering	Processes by which particles, rocks and minerals are altered on exposure to surface temperature and pressure, and atmospheric agents such as air, water and biological activity.

12.2 Acronyms and Abbreviations

The following are acronyms or abbreviations that may be used in this document:

Abbreviation	Description
General	
A&R	Abandonment and Reclamation
ARD	Acid Rock Drainage
Baffinland	Baffinland Iron Mines Corporation
CCME	Canadian Council of Ministers of the Environment
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EHS	Environmental Health and Safety
EIS	Environmental Impact Statement
EMMP	Environmental Mitigation and Monitoring Plans
ERP	Proposed Early Revenue Phase
ESA	Environmental Site Assessment
FEIS	Final Environmental Impact Statement
FOL	Federal Owned Lands
Ga	Giga-annum (billion years)
HADD	Harmful Alteration, Disruption, or Destruction
HTA/HTO	Hamlets, Hunters, and Trappers Association/Organization
HTO	Hunters and Trappers Organization
ICRP	Interim Closure and Reclamation Plan
IIBA	Inuit Impact and Benefits Agreement
IOL	Inuit Owned Lands
IQ	Inuit Qaujimajatuqangit (Inuit knowledge, or traditional knowledge)
KI	Key Indicator
LAC	Land Advisory Committee
LSA	Local Study Area
MASL	Metres above Sea Level
Mary River	Nuluujaak
MDAG	Mineral Development Advisory Group
MERA	Mineral and Energy Resource Assessment
ML	Metal Leaching
MOU	Memorandum of Understanding
Mtpa	Million Tonne-Per-Annum
NLCA	Nunavut Land Claims Agreement
NSA	Nunavut Settlement Area
NWT	Northwest Territories
PAG	Potential Acid Generating

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Abbreviation	Description
PCRP	Preliminary Closure and Reclamation Plan
PDA	Potential Development Area
PDW	Pre-Development Works
PLA	Production Lease Area
PPR	Personal Property Registry
RA(s)	Responsible Authority(ies)
RMO	Resource Management Officer
RSA	Regional Study Area
TC-NWPP	Transport Canada Navigable Waters Protection Program
the Project	Mary River Project
TK	Traditional Knowledge
VC	Valued Component
VEC	Valued Ecosystem Component
VSEC	Valued Socio-Economic Component
Federal and Territorial Acts	
AWPPA	Arctic Waters Pollution Prevention Act
BCANU	Business Corporations Act (Nunavut)
CEAA	Canadian Environmental Assessment Act
CEPA	Canadian Environmental Protection Act, 1999
CLA	Commissioner's Land Act
CNPA	Canada National Parks Act
CWA	Canada Wildlife Act
EG&GANU	Engineers, Geologists and Geophysicists Act (Nunavut)
EMAANU	Emergency Medical Aid Act (Nunavut)
EPANU	Environmental Protection Act (Nunavut)
EUANU	Explosives Use Act (Nunavut)
EXA	Explosives Act
FA	Fisheries Act
FPANU	Fire Prevention Act (Nunavut)
LSANU	Labour Standards Act (Nunavut)
MBCA	Migratory Birds Convention Act, 1994
MH&SANU	Mine Health and Safety Act (Nunavut)
NW&NSRTA	Nunavut Waters and Nunavut Surface Rights Tribunal Act
PHANU	Public Health Act (Nunavut)
TDGA	Transportation of Dangerous Goods Act, 1992
TDGANU	Transportation of Dangerous Goods Act (Nunavut)
TLA	Territorial Lands Act
TPANU	Territorial Parks Act (Nunavut)
WANU	Wildlife Act (Nunavut)
WCANU	Workers' Compensation Act (Nunavut)
Federal and Territorial Regulations	
AWPPR	Arctic Waters Pollution Prevention Regulations
CFAEAP&R	Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements
CLR	Commissioner's Land Regulations
CMR	Canada Mining Regulations

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Abbreviation	Description
CRFR	AECB Cost Recovery Fees Regulations, 1996
CSLR	Comprehensive Study List Regulations
CSLRNU	Comprehensive Study List Regulations (Nunavut)
CSRNU	Camp Sanitation Regulations (Nunavut)
ELR	Exclusion List Regulations
EURNU	Explosives Use Regulations (Nunavut)
EXR	Explosives Regulations
FPRNU	Fire Prevention Regulations (Nunavut)
ILR	Inclusion List Regulations
LLR	Law List Regulations
MBSR	Migratory Bird Sanctuary Regulations
MH&SRNU	Mine Health and Safety Regulations (Nunavut)
MDMER	Metal and Diamond Mining Effluent Regulations
NA&PSR	Nunavut Archaeological and Palaeontological Sites Regulations
NBRLUP	North Baffin Regional Land Use Plan
NPWR	National Parks Wildlife Regulations
NWTFR	Northwest Territories Fishery Regulations
NWTWR	Northwest Territories Waters Regulations
PCSRNU	Propane Cylinder Storage Regulations (Nunavut)
SCP&RRNU	Spill Contingency Planning and Reporting Regulations (Nunavut)
TDGR	Transportation of Dangerous Goods Regulations
TDGRNU	Transportation of Dangerous Goods Regulations (Nunavut)
TDR	Territorial Dredging Regulations
TLR	Territorial Lands Regulations
TLUR	Territorial Land Use Regulations
TPRNU	Territorial Parks Regulations (Nunavut)
TQR	Territorial Quarrying Regulations
WAR	Wildlife Area Regulations
WCRNU	Workers' Compensation Regulations (Nunavut)
WSRNU	Wildlife Sanctuaries Regulations (Nunavut)
Federal Government Departments and Agencies	
AANDC	Aboriginal Affairs and Northern Development Canada
CTA	Canadian Transportation Agency
DFO	Fisheries and Oceans Canada
DOJ	Department of Justice Canada
EC	Environment Canada
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada, formerly Indian and Northern Affairs Canada and prior to that Aboriginal Affairs and Northern Development Canada
NRCan	Natural Resources Canada
PCH	Parks Canada Agency (Canadian Heritage)
TC	Transport Canada
Territorial Government Departments and Agencies	
CGSNU	Department of Community and Government Services
CLEYNU	Department of Culture, Language, Elders and Youth
DOJNU	Department of Justice

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Abbreviation	Description
DOENU	Department of Environment
ED&TNU	Economic Development & Transportation
GN	Government of Nunavut
H&SSNU	Department of Health and Social Services
WSCC	Workers Safety and Compensation Commission of the Northwest Territories and Nunavut
Institutions Of Public Government	
CLARC	Community Land and Resource Committee
CLO	Community Liaison Officer
IPGs	Institutions of Public Government
MVLWB	Mackenzie Valley Land and Water Board
NIRB	Nunavut Impact Review Board
NPC	Nunavut Planning Commission
NSRT	Nunavut Surface Rights Tribunal
NWB	Nunavut Water Board
NWMB	Nunavut Wildlife Management Board
Inuit Organizations	
DIO	Designated Inuit Organizations
MHTO	Mittimatalik Hunters and Trappers Organization
NTI	Nunavut Tunngavik Incorporated
QIA	Qikiqtani Inuit Association
RIA	Regional Inuit Association
RWO	Regional Wildlife Organization

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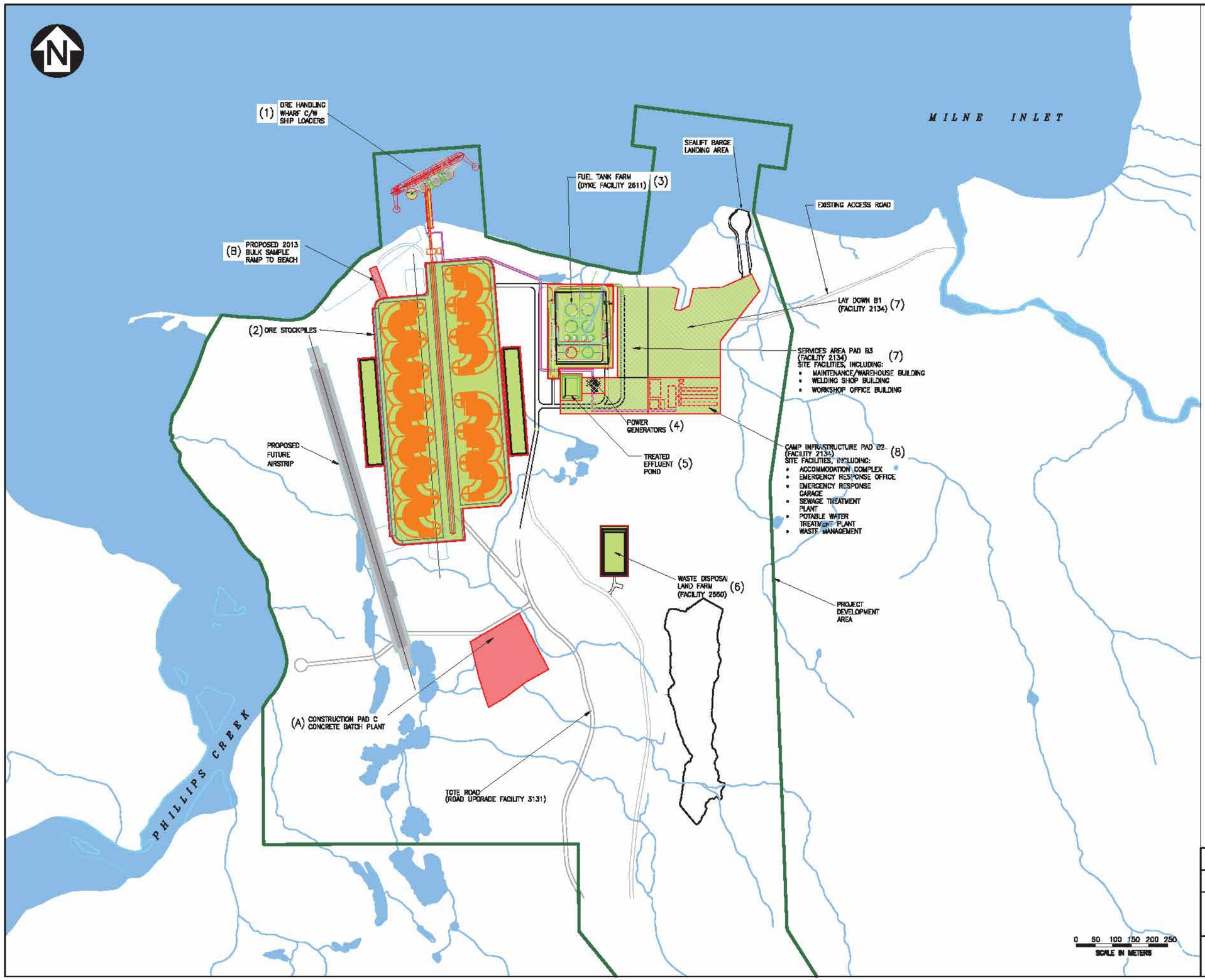
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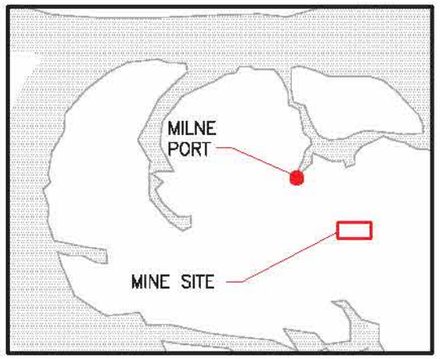
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Appendix A Preliminary Mine Closure and Reclamation Plan Drawings

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RECLAMATION AREA - AFTER CONSTRUCTION

AREA ID	m²
A	31,597
B	1,835
TOTAL	33,432

RECLAMATION AREA - AFTER OPERATION

AREA ID	m²
1	4600
2	267,770
3	42,630
4	2,760
5	4,450
6	10,500
7	116,730
8	20,000
TOTAL	451,460

LEGEND:

( ) RECLAMATION AREA ID

RECLAMATION AREA - AFTER CONSTRUCTION

RECLAMATION AREA - AFTER OPERATION

BAFFINALND IRON MINES CORPORATION

MARY RIVER PROJECT

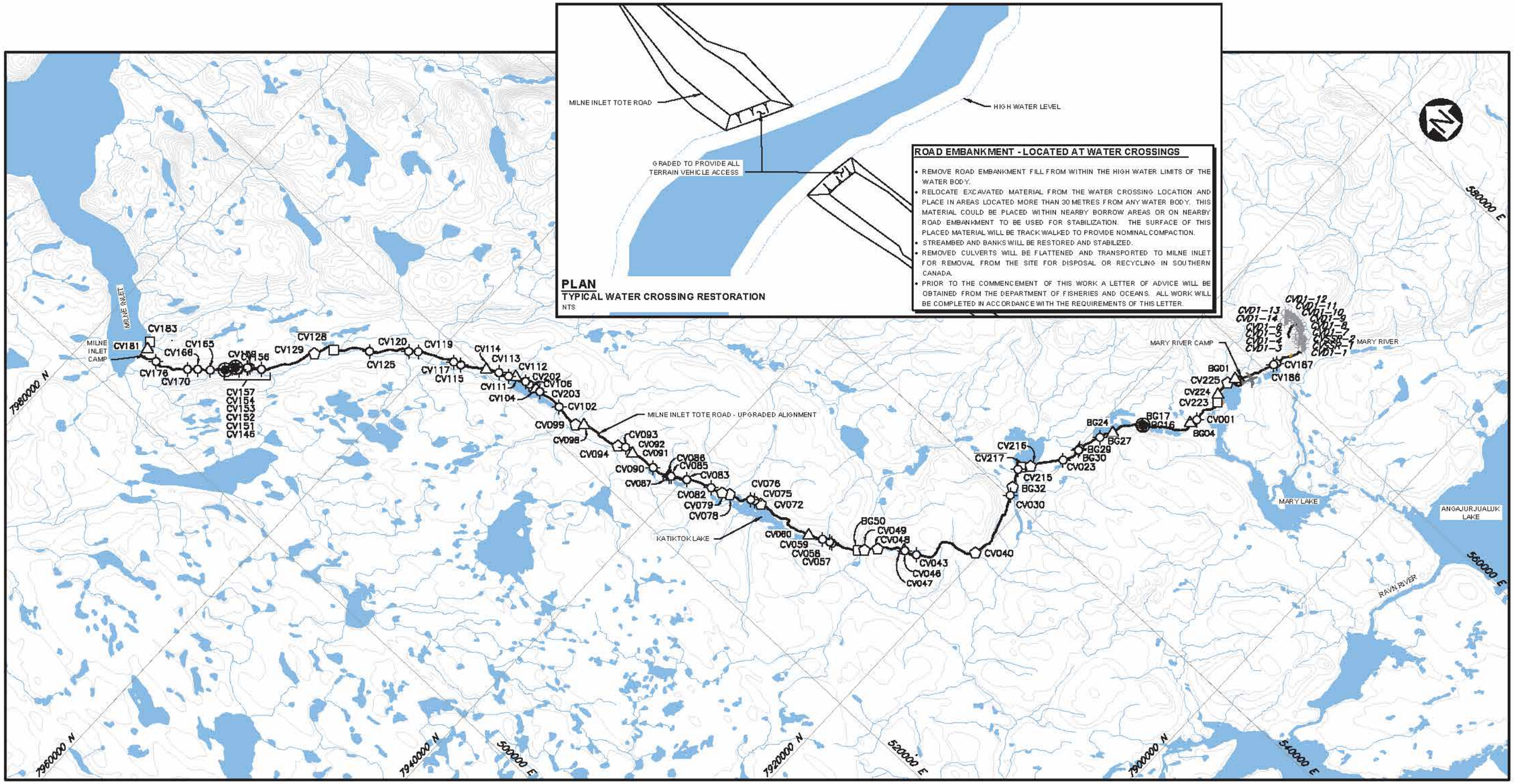
AREAS OF RECLAMATION - MILNE PORT LAYOUT

Baffinland

REF NO. BIL_ARP_CAD_001

FIGURE NO. E3408660-2668-87-014-0001

REV 0



LEGEND:

- WATER
- MILNE INLET TOTE ROAD - UPDATED ALIGNMENT
- AIRSTRIP
- EXPLORATION CAMP LOCATION
- CULVERT LOCATION
- EXTRA SMALL CROSSING
- SMALL CROSSING
- MEDIUM CROSSING
- LARGE CROSSING
- EXTRA LARGE CROSSING

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 17.
2. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004). ALL RIGHTS RESERVED.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. MILNE INLET TOTE ROAD ALIGNMENT SURVEY PROVIDED BY GENIVAR (SURVEY COMPLETED IN JULY 2008).
5. NOT FOR CONSTRUCTION.

SCALE A: 3 1.5 0 5 10 15 km

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

MILNE INLET TOTE ROAD
WATER CROSSING RESTORATION

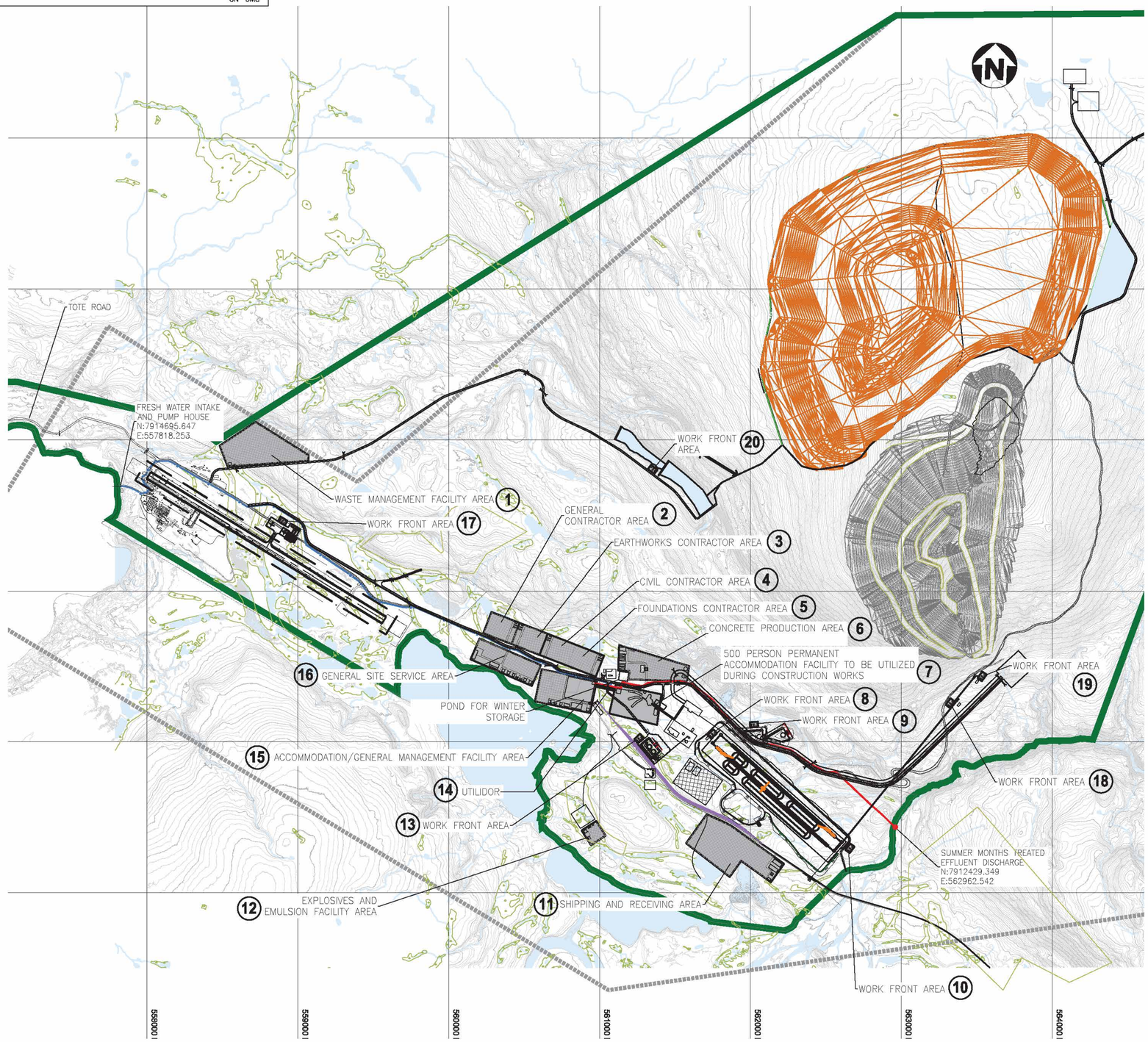
Knight Piésold CONSULTING

P/A NO. NB102-181/29 | REF NO. 1

FIGURE 8.10 | REV 0

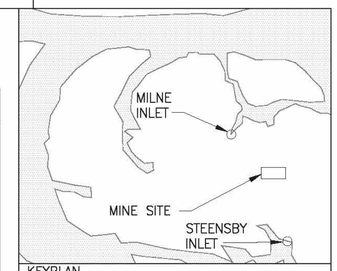
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XREF Files: Base Map_Milne Access_borrow road.dgn Default Dec 2008; Existing Roads.dgn Default Dec 2008; Milne Inlet to Mary River Project Boundary.dgn Default Dec 2008

DWG. NO. H337697-4210-07-012-0001



RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	102,610
2	30,000
3	30,000
4	30,000
5	30,000
6	71,540
7	63,380
8	1,860
9	1,860
10	1,860
11	133,540
12	132,30
13	1,860
14	2,800
15	81,160
16	66,400
17	1,860
18	1,860
19	1,860
20	1,860
TOTAL	**669,540**



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- RAILWAY ALIGNMENT
- TREATED EFFLUENT PIPELINE
- FRESHWATER PIPELINE
- ACCESS ROAD
- POTENTIAL DEVELOPMENT AREA
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND

NOTES:

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
4. MINE SITE AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR.
5. PROPOSED PERMANENT WORKS LAYOUT SHOWN FOR REFERENCE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

SCALE 300 150 0 500 1000 1500 mm

SCALE 1:15,000

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				

REVISIONS

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		

ISSUE AUTHORIZATION

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY M. LU DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

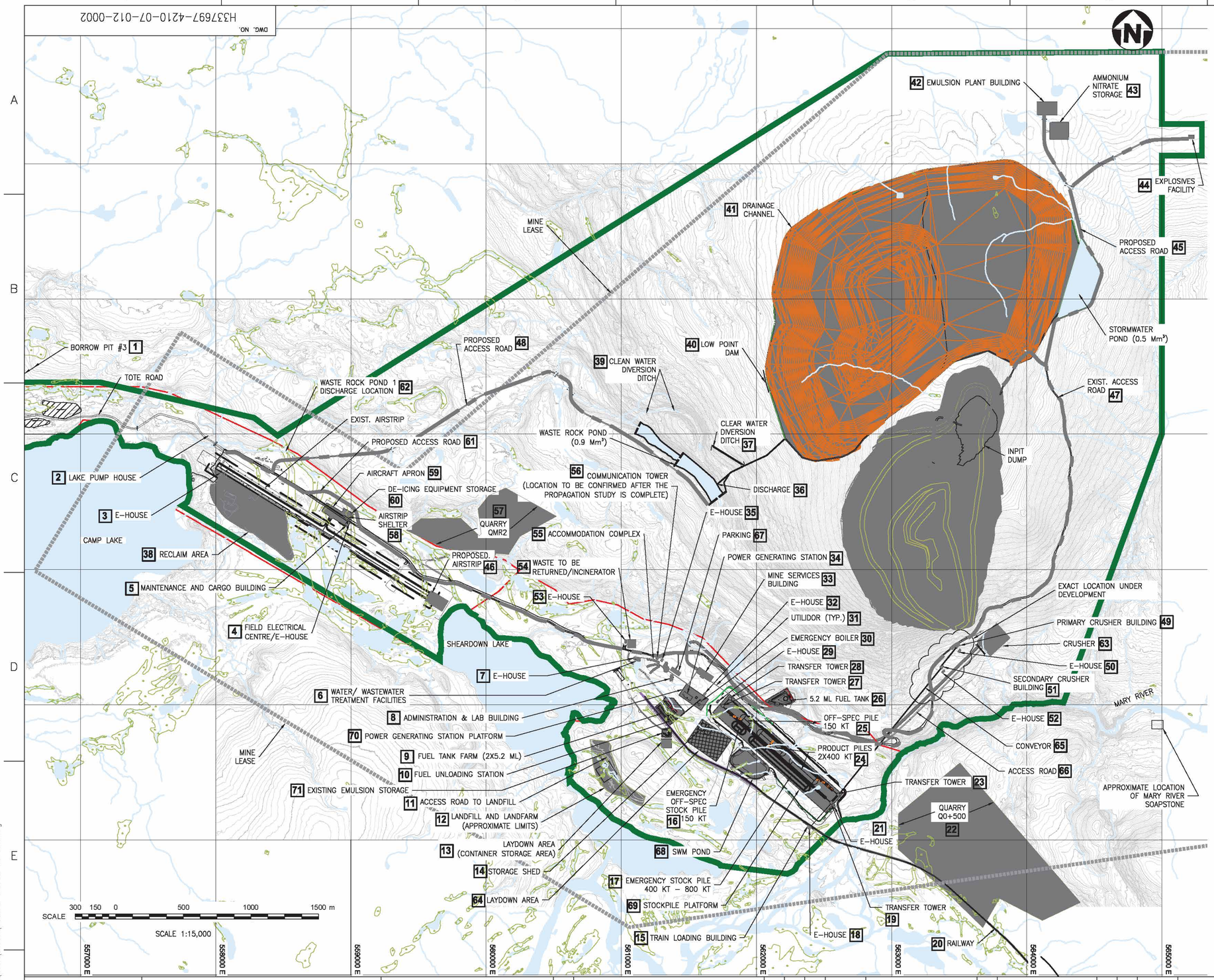
MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
MINE SITE CONSTRUCTION PHASE

SCALE	DWG. NO.	REV.
AS NOTED	H337697-4210-07-012-0001	A

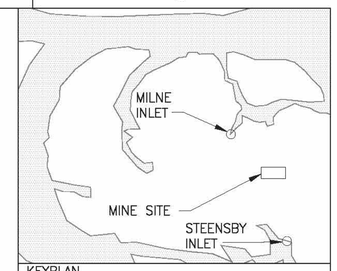
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DWG. NO. H337697-4210-07-012-0002



RECLAMATION AREA - AFTER OPERATION

AREA	m²
1	38,850
2	20
3	290
4	40
5	230
6	870
7	290
8	940
9	24,190
10	600
11	4,900
12	76,300
13	4,420
14	4,320
15	370
16	5,760
17	31,450
18	140
19	200
20	26,750
21	140
22	817,690
23	200
24	28,000
25	5,760
26	16,340
27	200
28	200
29	290
30	380
31	2,000
32	290
33	5,750
34	2,550
35	250
36	700
37	800
38	175,780
39	2,400
40	3,300
41	5,080,000
42	14,260
43	17,380
44	1,020
45	27,900
46	13,500
47	56,800
48	34,560
49	500
50	290
51	350
52	290
53	290
54	870
55	5,740
56	220
57	260,310
58	510
59	14,620
60	890
61	41,500
62	500



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER OPERATION
- WATER
- EXISTING BORROW AREA
- TEMPORARY LAYDOWN AREA
- ACCESS ROAD
- RIVER/STREAM/DRAINAGE
- POTENTIAL DEVELOPMENT AREA
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
- COMMUNICATION TOWER

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 2 METRES.
4. MINE SITE INFRASTRUCTURE IS BASED ON EIS AND AMEC DRAWINGS ADDITIONAL DETAILS PROVIDED IN DRAWINGS : A1-164512-6120-121-0100 A1-165926-6000-121-GAD-0100 A1-159952-6020-121-0200
5. MATERIAL HANDLING AND PROCESSING LAYOUT WAS REVISED BASED ON AKER KVAERNER DRAWING DWG-2000-M-0003, REV C.
6. MINE SITE AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR, SURVEYED AS OF JAN. 2009.

AREA	m²
63	30,000
64	48,500
65	3,460
66	58,300
67	3,400
68	43,600
69	133,670
70	16,800
71	6,570
TOTAL	**7,200,570**

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DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH™

DESIGNED BY A. GREGORCZYK DATE	DRAWN BY M. LU DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
MINE SITE FINAL CLOSURE PHASE

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-4210-07-012-0002	A

DWG. NO. H337697-2000-07-012-0001

570000 E | 585000 E | 600000 E | 615000 E

7905000 N | 7890000 N | 7875000 N | 7860000 N | 7845000 N | 7830000 N | 7815000 N | 7800000 N

MINE SITE

BR-MN-1 AND BR-MN-2

Q0+500 | 0+00 | Q4+100 | Q7+500 | Q8+500 | 10+00 | Q10+250 | Q14+500 | Q18+100 | 20+00 | Q22+500 | Q25+500 | Q28+400 | BR-25-1 | 30+00 | Q35+000 | Q35+500 | Q38+700 | 40+00 | Q42+000 | Q44+300 | Q44+000 | Q45+000 | Q45+800 | 45+450.15 | Q48+000 | Q50+000 | 50+00 | Q53+700 | Q56+750 | 57+10.00 | 60+00 | Q61+400 | Q64+400 | Q67+200 | 70+00 | Q71+000 | Q74+200 | Q77+200 | 79+206.38 | Q79+600 | 80+00 | Q82+700 | Q85+200 | Q89+600 | QA11 | 90+00 | 90+350.00 | Q92+000 | QA12 | QA13 | Q95+400 | Q96+100 | Q96+700 | BR-95-1 | QA1 | QA2 | QTR6 | 100+00 | QA3 | QA4 | QA14 | TUNNEL # 2 | Q110+200 | QTR7 | QA5 | QA7 | QA6 | QTR8 | 110+00 | Q114+600 | QTR9 | Q116+800 | 120+00 | QA8 | 120+00 | QTR4A | QA9 | 120+00 | Q127+800 | 130+00 | Q128+000 | Q131+100 | Q133+500 | QA10 | BR-138-1 | Q139+600 | 140+00

END OF AREA 1
START 0F AREA 2

AREA 1

AREA 2

ᑎᑎᕗᑦ ᐅᖃᐅᓯᖅ ᓄᓇᕗᑦ 3-2.5
FIGURE 3-2.5

ᑎᑎᕗᑦ ᐅᖃᐅᓯᖅ ᓄᓇᕗᑦ 3-2.6
FIGURE 3-2.6

ᑎᑎᕗᑦ ᐅᖃᐅᓯᖅ ᓄᓇᕗᑦ 3-2.7
FIGURE 3-2.7

ᑎᑎᕗᑦ ᐅᖃᐅᓯᖅ ᓄᓇᕗᑦ 3-2.8
FIGURE 3-2.8

ᑎᑎᕗᑦ ᐅᖃᐅᓯᖅ ᓄᓇᕗᑦ 3-2.9
FIGURE 3-2.9

ᐅᓂᒃᑳᖓ
MARY RIVER

ᐅᓂᒃᑳᖅ ᓯᕗᓪᓕ
MARY LAKE

ᐃᓕᓴᕐᒥ ᓯᕗᓪᓕ
RAVN RIVER

ᐃᓕᓴᕐᒥ ᓯᕗᓪᓕ
RAVN RIVER

ᐊᖏᕐᕉᕐᓗᒃᑐᖅ ᒪᓕᖅ
ANGAJURJUALUK LAKE

ᓯᓚᑦ ᑎᒍᓂᐅᓂᒃ 200ᓂᓕ ᐃᓄᐃᑦᑐᓂᐅᓂᒃ ᓄᓇᕗᒻᒥᔪᖅ
RAVN RIVER AREA 200 PERSON CAMP

RAVN RIVER BRIDGE
BR-37-1

IPARQAK FORD

EXISTING MID-RAIL DRILL CAMP

ᐅᖃᐅᓯᖅᑐᑦ ᑭᒃᑯᓂᒃ ᐃᓄᐃᑦ 200ᓂᓕ ᐃᓄᐃᑦᑐᓂᐅᓂᒃ
EXPANDED MID-RAIL AREA 200 PERSON CAMP

PINGIMAJUQ RIDGE

ᑐᓴᕐᓂᖅ ᐊᖏᕐᕉᕐᓗᒃᑐᖅ
PROPOSED RAILWAY ALIGNMENT

ᑲᑎᒪᔨᖅᑕᐅᓯᒪᔪᖅ ᐊᖏᓂᒃ ᐃᓕᖅ
SHARED OR INTEGRAL ACCESS ROAD (WITH EXCEPTIONS)

ᐃᓕᐳᒍᓐᓇᒃ ᒪᓕᖅ
COCKBURN RIVER

ᐃᓕᐳᒍᓐᓇᒃ ᒪᓕᖅ
COCKBURN LAKE

ᐃᓕᐳᒍᓐᓇᒃ ᒪᓕᖅ
SOUTH COCKBURN LAKE

ᐅᖃᐅᓯᖅ ᑲᓇᑕ ᐃᓕᖅ
NORTH COCKBURN LAKE

ᑲᓇᑕ ᐃᓕᖅ ᐃᓚᖅᓯᒪᓕᒃ
COCKBURN LAKE BRIDGE

ᑲᓇᑕ ᐃᓕᖅ ᐃᓚᖅᓯᒪᓕᒃ
COCKBURN TUNNELS AREA 100 PERSON CAMP

ᐊᑐᕐᓗᒃ
NINA BANG LAKE

ᐃᓕᓴᕐᓂᖅ ᐊᖏᕐᕉᕐᓗᒃᑐᖅ
CONSTRUCTION ACCESS ROAD

ᐅᖃᐅᓯᖅ ᐊᖏᕐᕉᕐᓗᒃᑐᖅ (400ᓂᓕ ᐃᓄᐃᑦᑐᓂᐅᓂᒃ)
SOUTH COCKBURN CAMP (400 PERSON)

ᑐᓴᕐᓂᖅ ᐊᖏᕐᕉᕐᓗᒃᑐᖅ
STEENSBY PORT

ᑐᓴᕐᓂᖅ ᐃᓕᓴᕐᒥ
STEENSBY INLET

TUNNEL CONSTRUCTION

TUNNEL #1	APR YEAR 2 - APR YEAR3
TUNNEL #2	APR-AUG YEAR 2

MAJOR BRIDGE CONSTRUCTION

BR-MN-1	
ABUTMENTS, FOUNDATIONS	SEP-NOV YEAR 1
PIERS, PILES, MISC. STEEL WORKS	APR-JUN YEAR2
BR-MN-2	
ABUTMENTS, FOUNDATIONS	OCT-DEC YEAR 1
PIERS, PILES, MISC. STEEL WORKS	JUN-SEP YEAR2
BR-25-1	
ABUTMENTS, FOUNDATIONS	MAY-JUN YEAR 2
PIERS, PILES, MISC. STEEL WORKS	SEP-NOV YEAR 2
BR-37-1	
ABUTMENTS, FOUNDATIONS	JUN-JUL YEAR 2
PIERS, PILES, MISC. STEEL WORKS	APR-OCT YEAR 3
BR-95-1	
ABUTMENTS, FOUNDATIONS	JUN-JUL YEAR 2
PIERS, PILES, MISC. STEEL WORKS	NOV-SEP YEAR 3
BR-138-1	
ABUTMENTS, FOUNDATIONS	OCT-NOV YEAR 1
PIERS, PILES, MISC. STEEL WORKS	APR-NOV YEAR 2
SIGNALING WORKS (STARTING FROM THE PORT)	JUL-NOV YEAR 4
TRACK LAYING	APR-SEP YEAR 4

YEAR	YEAR 1	YEAR 2	YEAR 3	YEAR 4
CONSTRUCTION ACCESS ROAD				
RAILWAY EMBANKMENT				

	YEAR 1	YEAR 2	YEAR 3	YEAR 4
ᐅᖃᐅᓯᖅ 1	ᐊᑐᓕ ᑎᒍᔪ 2 - ᐊᑐᓕ ᑎᒍᔪ 3			
ᐅᖃᐅᓯᖅ 2	ᐊᑐᓕ - ᐊᑐᒍᓗ ᑎᒍᔪ 2			
ᐊᑐᐅᓂᒃᑲᖅ ᐃᓕᓴᕐᓂᖅ ᐊᖏᕐᕉᕐᓗᒃᑐᖅ				
BR-MN-1 ᑐᓂᓯᔪᓐᓇᖅ ᑐᓴᕐᓂᖅ ᑐᖓᓕᖅ	ᓯᑎᐊᓂ–ᓄᐊᓕᓂ ᑎᒍᔪ 1 ᐃᐊᐊᓂ–ᓴᓐᓂ ᑎᒍᔪ 2			
BR-MN-2 ᑐᓂᓯᔪᓐᓇᖅ ᑐᓴᕐᓂᖅ ᑐᖓᓕᖅ	ᐅᐱᐊᓂ–ᑎᓯᓕᓂ ᑎᒍᔪ 1 ᓴᓐᓯᓗᑎᓂ ᑎᒍᔪ 2			
BR-25-1 ᑐᓂᓯᔪᓐᓇᖅ ᑐᓴᕐᓂᖅ ᑐᖓᓕᖅ	ᒪᐃᓴᓐᓂ ᑎᒍᔪ 2 ᓯᑎᐊᓂ–ᓄᐊᓕᓂ ᑎᒍᔪ 2			
BR-37-1 ᑐᓂᓯᔪᓐᓇᖅ ᑐᓴᕐᓂᖅ ᑐᖓᓕᖅ	ᒪᐃᓴᓐᓂ ᑎᒍᔪ 2 ᐊᐃᓐᓂ–ᐅᑐᓕᓂ ᑎᒍᔪ 3			
BR-95-1 ᑐᓂᓯᔪᓐᓇᖅ ᑐᓴᕐᓂᖅ ᑐᖓᓕᖅ	ᒪᐃᓴᓐᓂ ᑎᒍᔪ 2 ᐅᑐᓕᓂ–ᓯᑎᐊᓂ ᑎᒍᔪ 3			
BR-138-1 ᑐᓂᓯᔪᓐᓇᖅ ᑐᓴᕐᓂᖅ ᑐᖓᓕᖅ	ᐅᑐᓕᓂ–ᓄᐊᓕᓂ ᑎᒍᔪ 1 ᐅᑐᓕᓂ–ᓄᐊᓕᓂ ᑎᒍᔪ 2			
ᖃᐅᔨᓴᖅᑎᑦᑎᓂᒃ ᐃᓕᓴᕐᓂᖅ (ᐱᓕᕆᔨᒃᑐᑦ ᑐᓂᓯᔪᓐᓇᖅ)	ᓴᓇᓗᓄᐊᓕᓂ ᑎᒍᔪ 4			
ᐊᖏᕐᕉᕐᓗᒃᑐᖅ ᑐᖓᓕᖅ	ᐊᐃᓐᓂ–ᑎᑎᕗᓂ ᑎᒍᔪ 4			

	ᑎᒍᔪ 1	ᑎᒍᔪ 2	ᑎᒍᔪ 3	ᑎᒍᔪ 4
ᐃᓚᖅᑎᑦᑎᓂᒃ ᐊᖏᕐᕉᕐᓗᒃᑐᖅ				
ᐊᖏᕐᕉᕐᓗᒃᑐᖅ ᑐᖓᓕᖅ				

ᑐᑭᓯᐅᑦ
LEGEND:

- ᐃᒥᒃ WATER
- ᑭᐅᖃᖅ/ᐊᓚᓪᓕᑦ/ᐊᔾᓴᐃᓕᐅᓂᒃ RIVER/STREAM/DRAINAGE
- ᑐᓂᓯᔪᓐᓇᖅᓴᖅ ᐅᖃᓕᒫᒃ POTENTIAL QUARRY
- ᓯᓚᑐᓂᓕ ᐃᓕᓴᕐᓂᖅ SNOWMOBILE CROSSING LOCATIONS
- ᐃᓂᒋᔭᐅᓂᐅᓂᒃ ᑕᕆᓪᓕᐊᔾᓂᓂ ᓴᓇᖅᐅᓂᒃᓯᓂ PROPOSED RAILWAY CONSTRUCTION CAMP LOCATION
- ᐃᓄᐃᑦ ᓄᓇᕗᒻᒥᔪᖅ - ᖃᓄᐃᓂ ᓴᓇᓴᓪᓕ ᐱᖁᓯᐅᑎᑦᓯᓚᑦ INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- ᐃᓄᐃᑦ ᓄᓇᕗᒻᒥᔪᖅ - ᖃᓄᐃᓂ ᐊᑕᓪᓗ ᐱᖁᓯᐅᑎᑦᓯᓚᑦ ᓴᓇᓴᓪᓕ INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS

ᖃᐅᔨᓴᖅᑎᑦᑎᓂᒃ

1. ᓄᓇᕗᒻᒥᔪᖅ ᑎᑎᕗᓂᖅ: dATM ᑲᓇᑕᒧᑦ
2. ᓄᓇᕗᒻᒥᔪᖅ ᑎᑎᕗᓂᖅ ᒪᓕᒃᑐᖅ UTM (NAD83) ZONE 17
3. ᑎᑎᕗᓂᖅ ᒥᑦ: ᐊᖑᓂᓕᕆᔨᑦ ᐅᖃᓕᓂᐅᑎᑦᓯᑦ ᐊᐅᔾᔨᖅᑎᑦᓯᑦ
4. ᑯᒪᓕᖕᓂᒃ ᐃᑲᖏᐃᑦ ᓇᓗᓇᐃᔨᖅᓯᒪᓕᖅ ᓴᖅᓄᑎᓂᓕ ᐊᒪᓗ ᑎᑎᕗᓂᖅ ᑮᐅᔨᖅᑎᑦᓯᑦ Canarail

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES (2004). ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. STREAM CROSSINGS ARE SHOWN ON PLAN AND PROFILE DRAWINGS BY CANARAIL.

SCALE 350 175 0 700 1050 1400 m

SCALE 1:175,000

RECLAMATION AREA - AFTER OPERATION

RAILWAY

AREA	m²
1	260,450
2	1,242,170
TOTAL	1,502,620

ACCESS ROAD

AREA	m²
1	269,440
2	1,247,730
TOTAL	1,517,170

DRAWING NO.	DRAWING TITLE		DESCRIPTION	CHK'D	APP'D	DATE	REV.	ISSUE FOR	AUTH. BY	DATE
		A	ISSUED FOR INFORMATION							
REFERENCE DRAWINGS		REVISIONS					ISSUE AUTHORIZATION			

HATCH™

Baffinland Iron Mines Corporation

DESIGNED BY DATE	DRAWN BY M.L. DATE
CHECKED BY DATE	DISCIP. ENGR. DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
RAILWAY ALIGNMENT

SCALE OR AS NOTED

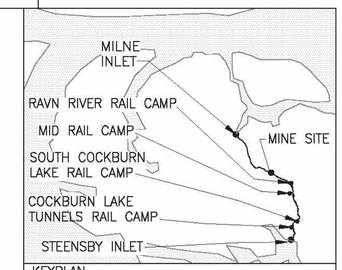
DWG. NO. H337697-2000-07-012-0001

REV. A

DWG. NO. H337697-7000-07-012-0002

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	80
2	1,300
3	58,160
4	56,240
5	7,740
6	320
7	70
8	250
9	70
10	130
11	12,000
12	100
13	1,300
14	70
15	15,210
TOTAL	**153,040**



KEYPLAN

595500 E

595000 E

7895500 N

7894000 N

1 FRESH WATER INTAKE AND PUMP HOUSE N:7895658.80 E:594610.99

2 FRESHWATER STORAGE TANK AND POTABLE WATER TREATMENT PLANT

3 EXPLOSIVES MAGAZINE

4 AVAILABLE LAYDOWN AREA APPROX. 56200m²

5 CAMP ACCESS ROAD

6 GENERAL COMPLEX/SITE SERVICES MAINTENANCE AND STORAGE

7 ERT OFFICE/DEBRIEF /COMMAND CENTER

8 ERT FACILITY

9 WASH CAR COMPLEX

10 LUNCHROOM FACILITY

11 200 PERSON CONSTRUCTION CAMP

12 INCINERATOR BUILDING

13 WASTE MANAGEMENT FACILITY

14 POWER GENERATOR FACILITY

15 ACCESS ROAD

CULVERT CROSSING

W.L. 164.7 ±
W.L. 148.7 ±
W.L. 148.8 ±
W.L. 146.2 ±
W.L. 148.0 ±
W.L. 149.4 ±
W.L. 144.3 ±
W.L. 139.4 ±
W.L. 139.1 ±
W.L. 133.9 ±
W.L. 134.3 ±
W.L. 132.6 ±
W.L. 133.6 ±
W.L. 139.5 ±
W.L. 138.2 ±
W.L. 135.5 ±

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- PRE-DEVELOPMENT LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- FUTURE RAILWAY ALIGNMENT

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
3. CONTOURS ARE IN METERS. CONTOUR INTERVAL IS 10 METERS.

SCALE 100 50 0 100 200 300 400 500 m

SCALE 1:5,000

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN RAVN RIVER RAIL CAMP

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-7000-07-012-0002	A

Oct 28, 2011 - 2:44pm
Login name: fun51283
Drawing Name: P:\289980 - Mary River\CAD\Civil\Roads\Reclaim\H337697-7000-07-012-0002 - Standard\H337697-7000-07-012-0002.dwg
Layout: RAVN RIVER CAMP

DWG. NO. H337697-7000-07-012-0003

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	3,550
2	1,300
3	1,300
4	63,520
5	7,130
6	320
7	130
8	70
9	70
10	250
11	12,000
12	70
13	100
14	24,390
15	60,900
TOTAL	**175,100**

595500 E

598000 E

7876500 N

N

EXPLOSIVES MAGAZINE (15)

ACCESS ROAD (14)

200 PERSON CONSTRUCTION CAMP (11)

ERT FACILITY (10)

ERT OFFICE/DEBRIEF /COMMAND CENTER (9)

WASH CAR COMPLEX (8)

LUNCHROOM FACILITY (7)

GENERAL COMPLEX/SITE SERVICES MAINTENANCE AND STORAGE (6)

CAMP ACCESS ROAD (5)

(12) POWER GENERATOR FACILITY

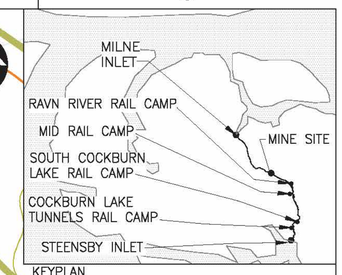
(13) INCINERATOR BUILDING

(1) FRESH WATER INTAKE AND PUMP HOUSE N:7876430.04 E:595602.59

(2) FRESHWATER STORAGE TANK AND POTABLE WATER TREATMENT PLANT

(3) WASTE MANAGEMENT FACILITY

(4) AVAILABLE LAYDOWN AREA



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- RAILWAY ALIGNMENT
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
3. CONTOURS ARE IN METERS. CONTOUR INTERVAL IS 10 METERS.

SCALE 100 50 0 100 200 300 400 500 m

SCALE 1:5,000

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY Y. HUANG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

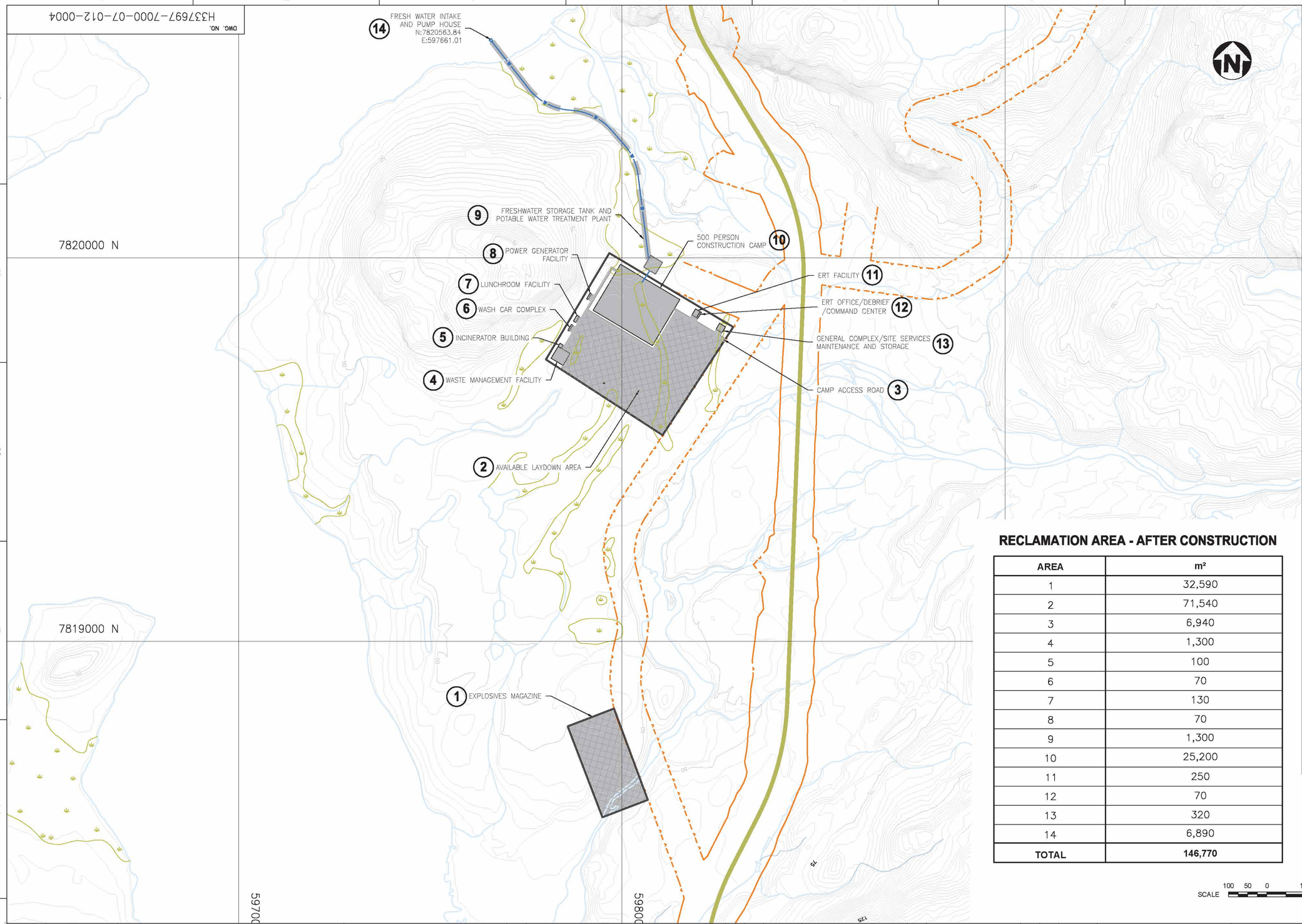
MARY RIVER PROJECT

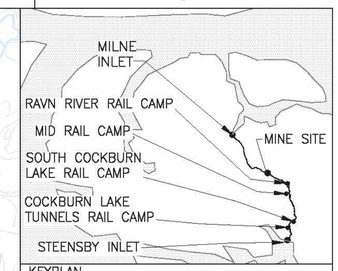
PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN MID RAIL CAMP

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-7000-07-012-0003	A

Oct 28, 2011 - 3:46pm Login name: fun51283 Layout: Mid Rail Camp
Drawing Name: P:\289980 - Mary River\CAD\Civil\Routes\Reclaim\H337697-7000-07-012-0003 - Standard\H337697-7000-07-012-0003.dwg

DWG. NO. H337697-7000-07-012-0004





KEYPLAN

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	32,590
2	71,540
3	6,940
4	1,300
5	100
6	70
7	130
8	70
9	1,300
10	25,200
11	250
12	70
13	320
14	6,890
TOTAL	**146,770**

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- RAILWAY ALIGNMENT
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
3. CONTOURS ARE IN METERS. CONTOUR INTERVAL IS 10 METERS.

SCALE 100 50 0 100 200 300 400 500 m

SCALE 1:5,000

Oct 28, 2011 - 4:04pm Login name: fun51283
Drawing Name: P:\289980 - Mary River\CAD\Civil\Roads\Reclaim\H337697-7000-07-012-0004 - Standard\H337697-7000-07-012-0004.dwg
Layout: SOUTH COCKBURN LAKE CAMP

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN SOUTH COCKBURN LAKE RAIL CAMP

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-7000-07-012-0004	A

DWG. NO. H337697-4510-07-012-0001

FRESH WATER INTAKE AND PUMP HOUSE
N:7804826.580
E:596600.563

593000 E
594500 E
596000 E
597500
599000 E

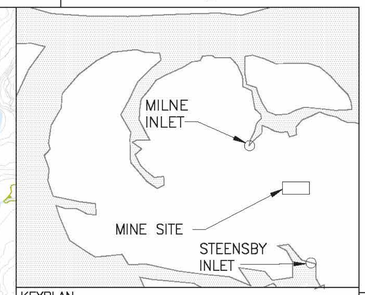
1 CONCRETE PRODUCTION AREA
2 GENERAL SITE SERVICE AREA
3 ACCOMMODATION/GENERAL MANAGEMENT FACILITY AREA
4 WORK FRONT AREA
5 WASTE MANAGEMENT FACILITY
6 WORK FRONT AREA
7 RAIL CONTRACTOR AREA
8 SHIPPING AND RECEIVING AREA
9 GENERAL CONTRACTOR AREA
10 EARTHWORKS CONTRACTOR AREA
11 FOUNDATIONS CONTRACTOR AREA
12 CIVIL CONTRACTOR AREA
13 WORK FRONT AREA
14 CIVIL AIRSTRIP CONTRACTOR AREA
15 WORK FRONT AREA
16 EXPLOSIVES AND EMULSION FACILITY AREA
17 MARINE CONTRACTOR AREA
18 WORK FRONT AREA
19 WORK FRONT AREA
20 2 x 150 MAN FLOATING CAMP
21 1 FUEL BARGE

TREATED EFFLUENT DISCHARGE
N:7801463.153
E:593427.722

3 Km LAKE

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	127,420
2	76,330
3	105,030
4	1,860
5	15,540
6	1,860
7	353,740
8	120,640
9	24,000
10	26,000
11	26,000
12	26,000
13	1,860
14	19,980
15	1,860
16	13,230
17	20,000
18	1,860
19	1,860
20	7,140
21	3,570
TOTAL	**975,780**



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREAS
- FORESHORE AREA
- RIVER/STREAM/DRAINAGE
- POTENTIAL DEVELOPMENT AREA
- FUTURE RAILWAY ALIGNMENT
- ACCESS ROAD
- TREATED EFFLUENT PIPELINE
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.
5. PROPOSED PERMANENT WORKS LAYOUT SHOWN FOR REFERENCE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

SCALE 300 150 0 500 1000 1500 m

SCALE 1:15,000

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				

REVISIONS

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		

ISSUE AUTHORIZATION

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
STEENSBY PORT CONSTRUCTION PHASE

SCALE OR AS NOTED | DWG. NO. H337697-4510-07-012-0001 | REV. A

Oct 28, 2011 - 4:39pm Login name: fun51283
Drawing Name: P:\2859980 - Mary River\CAD\Civil\Roads\Reclaim\H337697-4510-07-012-0001 - Standard\H337697-4510-07-012-0001.dwg
Layout: STEENSBY INLET

DWG. NO. H337697-4510-07-012-0002

m

694500 E | 696000 E | 697500 E | 699000 E

7803500 N | 7802000 N | 7800500 N | 7799000 N | 7797500 N

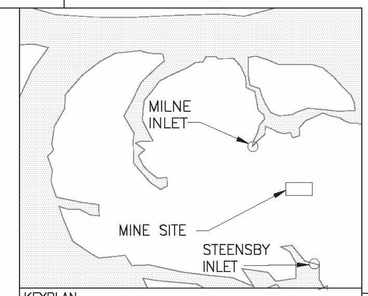
1 FUEL STORAGE
2 STORM WATER MANAGEMENT POND
3 OPTIONAL RAILWAY SPUR
4 WASTE TRANSFER STATION
5 PERMANENT LAYOUT AREA
6 TERTIARY CRUSHER PRODUCT CONVEYOR
7 FINE CONVEYOR
8 LUMP CONVEYOR
9 TRANSFER HOUSE
10 TERTIARY CRUSHING STATION
11 TRANSFER HOUSE
12 LUMP STACKER/RECLAIMER & TRIPPER
13 ORE STOCKPILE STORM WATER POND
14 LUMP PRODUCT YARD CONVEYOR
15 LUMP STOCK PILE
16 UNIT SUBSTATION
17 SHIP LOADER FEED CONVEYOR
18 TRANSFER HOUSE
19 SHIP LOADER FEED CONVEYOR
20 DRIVE HOUSE
21 ORE LOADING DOCK
22 E-HOUSE
23 ORE DOCK OPERATIONS FACILITY
24 PORT SURGE BIN BUILDING
25 LUMP PRODUCT RECLAIMER
26 LUMP STOCK PILE
27 FINES STACKER & TRIPPER
28 FINES YARD CONVEYOR
29 FINE STOCK PILE
30 OVERSIZE LUMP CONVEYOR
31 PRIMARY SCREENING STATION
32 BARGE LOCATION
33 TRANSFER HOUSE
34 UNIT SUBSTATION
35 SCREEN FEED BIN CONVEYOR
36 RAIL RECLAIM CONVEYOR
37 UNIT SUBSTATION
38 TWIN ROTARY RAIL CAR DUMPER c/w LCR (6000MTPH)
39 RAILWAY SPUR TRACKS
40 PERMANENT LAYDOWN AREA
41 STORAGE SHEDS
42 UNHEATED STORAGE BUILDING
43 POWER PLANT BUILDING
44 SOLID WASTE DISPOSAL & INCINERATOR SYSTEM
45 ACCESS ROAD
46 INSPECTION SHED
47 E-HOUSE
48 E-HOUSE
49 CONTAINER STORAGE & VEHICLE PARKING
50 SEWAGE TREATMENT BUILDING
51 RAIL & LIGHT VEHICLE MAINTENANCE BUILDING
52 UTILDORS
53 ACCOMMODATION BUILDING
54 E-HOUSE
55 LAKE PUMP HOUSE
56 E-HOUSE
57 LANDFILL
58 MOW MATERIAL STORAGE
59 E-HOUSE
60 FIRE PUMP HOUSE BUILDING
61 ADMINISTRATION, LAB & FIRST AID BUILDING
62 POTABLE WATER TREATMENT BUILDING
63 E-HOUSE
64 EMERGENCY BOILER HOUSE
65 E-HOUSE
66 E-HOUSE
67 AIR STRIP SHELTER
68 FIELD ELECTRICAL CENTRE
69 CARGO STORAGE BLD
70 DEICING EQUIPMENT STORAGE
71 AMMONIUM NITRATE STORAGE
72 RAILWAY TO FREIGHT DOCK
73 UNIT SUBSTATION
74 PROPOSED FREIGHT DOCK & FUEL UNLOADING
75 DOCK OFFICE BUILDING
76 DOCK OFFICE BUILDING
77 ACCESS ROAD
78 HELICOPTER PAD
79 FRESHWATER PIPELINE
80 EFFLUENT PIPELINE
81 RAILWAY

ON HOLD FOR PROPAGATION STUDY
COMMUNICATION TOWER
ACCESS ROAD
RUNWAY
AIRSTRIP
STEENSBY INLET

RECLAMATION AREA - AFTER OPERATION

AREA	m²
1	100,430
2	25,320
3	8,100
4	26,010
5	130,440
6	430
7	300
8	420
9	490
10	580
11	350
12	360
13	49,330
14	3,150
15	74,220
16	140
17	1,200
18	410
19	1,110
20	750
21	15,440
22	140
23	220
24	220
25	360
26	29,670
27	220
28	1,250
29	52,050
30	460
31	1,800
32	24,000
33	240
34	100
35	22,500
36	830
37	100
38	1,280
39	16,000
40	198,780
41	24,510

AREA	m²
42	1,080
43	3,740
44	2,500
45	89,100
46	3,500
47	130
48	60
49	5,300
50	480
51	8,880
52	2,080
53	5,260
54	140
55	40
56	40
57	10,000
58	2,670
59	140
60	290
61	900
62	290
63	140
64	130
65	140
66	40
67	230
68	360
69	540
70	520
71	15,630
72	29,030
73	220
74	2,200
75	610
76	220
77	7,650
78	1,430
79	6,260
80	24,420
81	114,380
TOTAL	**1,154,480**



KEYPLAN

LEGENDS:

- RECLAIMED AREA AFTER OPERATION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREAS
- FORESHORE AREA
- RIVER/STREAM/DRAINAGE
- POTENTIAL DEVELOPMENT AREA
- FUTURE RAILWAY ALIGNMENT
- ACCESS ROAD
- TREATED EFFLUENT PIPELINE
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.
5. PROPOSED PERMANENT WORKS LAYOUT SHOWN FOR REFERENCE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

SCALE 300 150 0 500 1000 1500 m

SCALE 1:15,000

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

ISSUED FOR USE

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
B	PDA BOUNDARY UPDATED	DF	SP	TH	07/02/12
A	ISSUEDE FOR INFORMATION	DF	AG	TH	11/09/11

REVISIONS

REV.	ISSUE FOR	AUTH. BY		DATE
B	ENVIRONMENTAL PERMITTING	SP	TH	07/02/12
A	ENVIRONMENTAL PERMITTING	SP	TH	11/09/11

ISSUE AUTHORIZATION

HATCH™

Baffinland Iron Mines Corporation

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
STEENSBY PORT FINAL CLOSURE PHASE

SCALE OR AS NOTED

DWG. NO. H337697-4510-07-012-0002

REV. B

Appendix B Mine Closure and Reclamation Planning Guidelines, Regulations and Lease Requirements

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The following tables provide cross-referencing to where responses to key Mine Closure and Reclamation Planning guidelines, regulations or lease requirements can be found in this document. The referenced section of this ICRP provides an outline, at a conceptual level, of how the proponent plans to address the particular requirement.

Table B-1: Territorial Lands Act

Territorial Land Use Regulations (TLUR 2010)		
Key Mine Closure and Reclamation Plan Guidelines	**TLUR Section**	***ICRP* (Section)**
All closure work shall be carried out in accordance with permit requirements as stated in the *Territorial Land Use Regulations.*	s. 8 through 10, 31	2.5
"Subject to the terms and conditions of his permit or the express written authority of an inspector, every permittee shall replace all materials removed by him in the course of excavating, other than rock trenching, and shall level and compact the area of excavation."	s. 12	Table 5.1
"Restore the channel and bed of the stream to their original alignment and cross-section."	s. 13.(1 b)	Table 5.1
"Subject to the terms and conditions of his permit, every permittee shall, after completion of a land use operation, restore the permit area as nearly as possible to the same condition as it was prior to commencement of the land use operation."	s. 18	Table 5.1
Remove all buildings equipment, machinery, and storage equipment/containers and materials onsite.	s. 19.(1)	5.2.4
A final plan will be issued to the "engineer" within 60 days following completion of the land use operation or expiration of the permit.	s. 33	2.3.1.4
All plan drawings shall be: • Drawn to scale that clearly illustrates all mine features. • Shows the scale on the drawing. and • Provide geographic co-ordinates.	s.35	Appendix A
"In order to ensure that a permittee compiles with the terms and conditions of his permit with these Regulations, the engineer may include in the permit a condition that the permittee deposit with the Minister a security deposit not exceeding $100,000."	s. 36	

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Table B-2: Nunavut Impact Review Board

Guidelines for the Preparation of an Environmental Impact Statement for Baffinland Iron Mines Corporation's Mary River Project (2009)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* (Section)**
"To ensure that issues associated with the effective closure and reclamation of all Project Components is considered at the earliest possible stage in the mine development process, thereby influencing mine design to take into account environmental issues related to mine closure and reclamation."	All
"To establish major targets for reclamation of lands potentially affected by the Project."	Table 5.1
"Description of reclamation methods, time frames and schedules, including proposed notice periods to employees and public."	5
"Description of temporary closure measures and a discussion of at what point a temporary closure should be considered permanent for the purposes of requiring implementation."	0
"Discussion of research programs to address challenges to reclamation, given the local conditions."	Appendix D
"Considerations for the Projection of public health and safety."	7.1.1, & 7.2.1
"Description of closure and post - closure monitoring of environmental components."	9
"Discussion of the need for long - term monitoring and maintenance by establishing physical and chemical stability."	9
"Discussion on reduction or elimination of environmental effects once the mine ceases operation."	Table 5.1 & 9
"Discussion regarding re-establish conditions that permit the land to return to similar pre-mining land use."	Table 5.1 & 5.1.1
"Consideration for ML/ARD potential of rocks, in association with related waste rock management strategies."	5.2.1.9 & 5.2.2.7
"Any considerations for the restoration of the natural aesthetics of the Project."	Table 5.1

Table B-3: AANDC (CIRNAC) Guidelines

Mine Site Reclamation Guidelines for the Northwest Territories (2007)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* Report Section**
Develop and implement preventive and control strategies to effectively minimize the potential for ARD and ML to occur.	5.2.2
Where ARD and ML are occurring as a result of mine activities, mitigate and minimize impacts to the environment.	5.2.1.9 & 5.2.2.9
Re-establish the pre-mining ground cover, which may involve encouraging self-sustainable indigenous vegetation growth.	5
Remediate any sources of contamination that may have been created during the development and operation of the mine site in order to protect humans, wildlife, and environmental health.	Table 5.1
Ensure physical stability of residual earth structures for environmental, human, and wildlife safety.	Table 5.1

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Mine Site Reclamation Guidelines for the Northwest Territories (2007)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* Report Section**
Open Pit: • Minimize access to protect human and wildlife safety. • Implement water management strategies to minimize and control migration and discharge of contaminated drainage, and if required, collect and treat contaminated water. • Stabilize slopes to minimize erosion and slumping.	5.2.1
Waste Rock: • Minimize erosion, thaw settlement, slope failure, collapse or the release of contaminants or sediments.	5.2.2
Buildings and infrastructure, equipment: • Return area to its original state or to a condition compatible with the end land-use targets.	5.2.4
Restore natural drainage patterns where surface infrastructure has been removed.	Table 5.1
Landfills: • Control erosion and effects to the ground thermal regime.	5.2.7
Water Management Systems: • Dismantle and remove/dispose of as much of the system as possible and restore natural or established new drainage patterns. • Stabilize and protect from erosion and failure for the long term.	Table 5.1 & 5.2.8

Table B-4: AANDC (CIRNAC) Policies

Mine Site Reclamation Policy for Nunavut (2002) and Mine Site Reclamation Policy for the Northwest Territories (2002)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* Report Section**
Areas should be returned to viable and self sustaining areas where practical.	5.1.1
Use best management principles such as progressive reclamation and reduce the environmental risk.	6
Communication and consultation shall be undertaken with all applicable parties.	2.3.1.3 & 2.4
Closure impacts for all mine components.	Table 5.1
Closure costs estimates should be undertaken by a third party using a recognized methodology such as RECLAIM. Closure cost estimates should include contingency factors.	10
Inclusion of a progressive reclamation plan.	6
Removal/stabilization of all structures.	5.2.4 & 5.2.5
Reclaim and stabilize waste rock stockpiles remaining on site.	5.2.2
Reclaim the disturbed surface areas to acceptable standards.	Table 5.1
Water quality at closure shall meet or exceed the accepted standards.	Table 5.1

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Mine Site Reclamation Policy for Nunavut (2002) and Mine Site Reclamation Policy for the Northwest Territories (2002)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* Report Section**
Temporary Closure measures shall be included in the Preliminary Closure Plan and cost estimate.	7
Inclusion of a post - closure monitoring program.	9
Detailed closure and decommissioning of the following: • Buildings and other structures. • Roads. • Airstrips. • Waste rock stockpiles. • Ore stockpiles • Quarries. • Open pit. • Petroleum and chemical storage areas and facilities. • Pipelines. • Power corridors. • Sewage and waste disposal areas and Mine drainage.	5.2
Re-vegetation of the site where practical.	5
Meet or exceed applicable water standards.	Table 5.1
Recycle materials where practical.	5.2.7
Closure cost estimate to be calculated for the total financial security for final closure.	10
Utilization of a recognized methodology for calculating the closure costs (i.e. RECLAIM model).	10
Establish financial security to be provided to the Minister of Aboriginal Affairs and Northern Development Canada (previously Indian Affairs and Northern Development).	10

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Table B-5: AANDC (CIRNAC) Guideline

Mine Reclamation in the Northwest Territories and Yukon (1992)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* Report Section**
Preliminary Closure Plan objectives are to: • Protect the public health and safety. • Prevent and/or reduce the environmental deterioration. • Return all disturbed areas to the original state or an accepted level of reclamation.	N/A
Ensure post-closure physical and chemical stability.	5.1.1
Development of a monitoring program to assess the effectiveness of the restoration to be undertaken between the Proponent and Indian and Northern Affairs Canada.	9
Reclaimed areas should be returned to previous land use and aesthetics, to the extent possible.	Table 5.1
Include temporary closure and indefinite (long term) Preliminary Closure Plans.	0
Mine features should be closed in accordance with the guidelines provided in Tables 5.2 through Table 5.8 (Robertson and Kirsten 1992).	5
Inclusion of a fully developed closure cost estimate.	10
Re-vegetation where practical. Local arctic species and distributions should be considered.	5.2

Table B-6: Northwest Territories Water Board Guidelines

Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories (1990)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* Plan Report Section**
Evaluation of ML/ARD potential for open pit, waste rock stockpiles and disturbed areas.	5.2.1 & 5.2.2 (ongoing process)
Cover design for waste rock stockpiles, if required. Stockpiles should be designed and contoured to ensure stability.	5.2.2
Re-vegetation of disturbed areas, where practical.	5.2
Open pit closure preferably backfilling or flooding.	5.2.1
Stability of open pit should be investigated.	5.2.1
Quarries should be backfilled and contoured to match the surrounding topography.	5.2.3
Removal of fuel and chemical storage tanks and associated piping and plumbing if applicable.	5.2.7
Fuel contaminated soils should be remediated.	5.2.7 & 9.4
Chemical storage facilities should be removed from site.	7.1.5 & 7.2.5
Soils surrounding chemical facilities should be tested for contamination and where present be removed from site.	9.4
Culverts should be removed from site.	5.2.8
Airstrips should be left intact, unless deemed unsafe.	5.2.6

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Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories (1990)	
Key Mine Closure and Reclamation Plan Guidelines	***ICRP* Plan Report Section**
Natural drainage should be restored to the site. Roads that do not impede the natural drainage may remain intact.	5.2.6 & 5.2.8
Solid wastes should be dealt with in responsible manner.	5.2.7
Hazardous wastes are to be disposed at an approved facility.	5.2.7
Buildings and structures should be removed from the site.	5.2.4
Concrete foundations may be left in a safe condition.	5.2.4
The Preliminary Closure Plan should include a planned shutdown/temporary closure scenario.	7.1
The Preliminary Closure Plan should include a long term shutdown/Long-term Closure scenario.	0
The Preliminary Closure Plan should include a final abandonment/final closure scenario.	5
It is encouraged that site closure include phased plan development (progressive closure).	6
A monitoring program should be devised to measure the effectiveness of the site closure.	9
Financial security is required for the closure phase.	10

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Appendix C Site Photos of Current Site Condition (2017)

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Mary River Mine Site

(Aerial photos of existing site conditions, 2017)

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Milne Port

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Tote Road

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Steensby Camp

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Mid-Rail Camp

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Appendix D Reclamation Research Plans

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The following is an overview of the reclamation research plans that are proposed to reduce uncertainties associated with closure planning. Progress updates for these research programs will be provided in standalone reports that will be included within each following ICRP submission. In addition to the individual research program objectives, a summary of planned research tasks and timelines and findings from completed work to date are is included in this Appendix.

Research plans described below have been identified by BIM and/or stakeholders as key topics of uncertainty and/or risk with respect to closure. Research tasks may focus on confirming and/or refining initial predictions for residual effects, improving understanding on what achievable levels of reclamation success are to inform closure criteria, and developing site-specific closure techniques or other efforts needed to address notable gaps in advancing the ICRP to a final closure design.

Additional research plans may be included in future ICRPs as appropriate. New plans will be considered by BIM and project stakeholders as the project advances and uncertainties relating to closure arise. A primary role of the Mine Closure Working Group (MCWG) will be to evaluate the efficacy of any implemented reclamation research, where reclamation research has provided valuable information to update closure planning, and where deficiencies or unknowns exist that could be addressed by future reclamation plans. Baffinland implements a robust collection of monitoring programs, which include reporting components for stakeholder review and the opportunity to present questions/concerns related to closure. In particular, the NIRB Annual Monitoring Report is developed to assess the accuracy of predictions contained in the Project's environmental impact statements. This submission allows for comment by Project stakeholders and is followed closely by Baffinland's closure planning staff to identify environmental changes during mining that could impact the adequacy of the existing ICRP. Tracking and understanding of project impacts/effects is a focus of the MEWG and the TEWG, who will communicate findings/discussions with the MCWG. These regulatory reporting requirements and working groups provide a mechanism for identifying key uncertainties for closure and assessing the need for new research topics. Recommendations from the MEWG, TEWG and the various regulatory stakeholders will be assessed by the MCWG, which will provide final recommendations on the reclamation research programs.

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D.1 Reclamation Research Program - Open Pit Runoff Water Quality

Background

At the end of mining, the open pit will gradually fill with water from precipitation; time is estimated at 85 to 150 years, depending on annual precipitation, evaporation and other factors (Knight Piésold, 2008). Baffinland has since committed to reducing this time period using alternatives for enhanced flooding of the open pit(addressed under the "Open Pit Flooding Timeline" research program).

AMEC (2012c) developed water quality estimates for pit water for the final year of mining (Year 21), which were utilized as input in the water quality mass loading model under the assumption that, once the pit has filled, in each subsequent (post-closure) year all precipitation into the open pit will accumulate and that excess water will discharge via a spillway during the open water period according to the natural hydrograph.

The mass loading modelling indicated that Level I magnitude effects to water quality will occur under low flow conditions, with a calculated HQ between 1 and 10 for mercury, selenium and silver. It is noted that an HQ >10 was calculated for mercury within the F0 tributary, upstream of fish presence or habitat; however, since the assessment of water and sediment quality is based on fish as the receptor, the effects assessment considers the resultant water quality at fish habitat within the Mary River, where all parameters have an HQ value less than 10.

Based on pit water quality for Year 21 of mining, it is possible the water will have a pH of around 4.2, which is outside of the pH range of the MDMER (6.0 to 9.0) however the mass loading modelling carried out is based on conservative assumptions and Baffinland is continuing to study the geochemistry of waste rock and ore to further refine predictions and management plans.

Uncertainty

Due to the early stage of project development and the fact only conceptual geochemical modelling (mass loadings assessment) has been completed to date, there is uncertainty with respect to the Open Pit water quality predictions.

Inflows to the open pit include: direct precipitation, runoff, groundwater inflow, and any enhanced flooding flows. Outflows include evaporation/sublimation, groundwater seepage discharge, and overflow discharge (once fully flooded). Chemistry of water in the open pit will be influenced by both the chemistry of the inflows, as well as the pit walls, residues from the mining process (blasting, etc.), and seasonal or temporary stratification of the water column into waters of differing chemistry and temperature (such as a chemocline or thermocline) that may be affected by bathymetry, climactic conditions, quality and temperature of inflows, wind, influence of permafrost, ice over (formation) and ice off (melting).

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Research/Study Objective

This research plan aims to:

- improve predictions for water quality within the open pit during flooding operations and to inform decision making with respect to enhanced flooding alternatives, and
- to improve long-term water quality predictions for open pit (pit lake) effluent flows with respect to meeting applicable closure objectives and criteria in Post-Closure, and to assess the effectiveness of water treatment options in modifying Open Pit runoff water quality, if necessary.

Overview of Tasks and Project Research Schedule

The following are an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates.

Task 1 – Pit Lake Miromixis

Deep pit lakes are often subject to a stratification of the water column into waters of differing chemistry typically due to strong density gradients within the water due to salinity or temperature. While permeant stratification of the pit lake can result in the long-term storage of salts within the pit, a seasonal turnover of the lake could result in poor water quality conditions at certain times of the year.

Based on the predicted water quality within the lake and data collected from the site weather station, an assessment will be carried out to evaluate if the pit lake will likely be meromictic or if it will become seasonally stratified. In support to this evaluation, a focused review of scientific literature relating to meromictic pit lakes in cold regions should be carried out. Further, analyses of the temperature gradients, wind conditions, precipitation, groundwater inflows, and other conditions will be carried out as site conditions allow (i.e. presence of an open pit) to evaluate the likelihood of the pit lake becoming stratified and subsequently becoming mixed.

Task 2 – Water Monitoring and Comparison against Water Quality Predictions

The quality and flow of key inflows to the open pit should be monitored (or otherwise estimated) and compared against water quality predictions.

It is, however, not advised that runoff from the pit walls is used as an analogue for future water quality in the open pit. The chemistry of the pit wall runoff will differ from the longer-term pit wall runoff with respect to the proportions of various rock types that comprise the pit walls, the degree of weathering of those faces, and that samples will likely be impacted by other (potentially significantly larger) open pit inflows.

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Should the measured chemistry or flow of any of the key pit inflows deviate significantly from predicted values over a 5-year basis, the water quality prediction model will be updated in light of the results of water quality modelling, and updates to the mine plan or geochemical analyses.

Task 3 – Update Water Quality Predictions

As per above (Task 2), the predictive water quality model will be updated not later than 5 years prior to the planned cessation of mining operations. In addition to evaluating the long-term water quality of the flooded open pit (pit lake), the effects of mine flooding rates will be considered with regards to the short-term water quality of the pit lake (at initial discharge).

Task 4 – Water Treatment Options Analysis

Water treatment alternatives will be considered if it is found that the predicted water quality in the Pit Lake (at initial discharge, or long term) is not anticipated to meet effluent water quality.

Table D-1: Overview of Tasks for Reclamation Research - Open Pit Runoff Water Quality

Task	Reference Document	Status Anticipated Start and/or End Date
• Establish initial water quality predictions and review relevant baseline conditions	FEIS Volume 7, Section 3.4	Completed (2013)
• Conduct literature review and analyze long term predicted conditions to assess if permanent meromictic conditions are anticipated. o Should long term meromictic conditions be anticipated, this characteristic should be incorporated into the open pit predictive water quality model. o Should it be possible to create long term permanent meromictic conditions in the open pit, designs should be developed so that these measures could be incorporated into the ICRP if justified.	N/A	2019-2020
• Monitor water quality within the open pit, runoff to the open pit, groundwater surrounding the open pit, and other inflows to the open pit. Water quality data should be compared against the assumptions made in the initial water quality predictions. o The water quality predictive model should be assessed for updating on the basis of findings every 5-years, in the event that unexpected water quality conditions are encountered o Follow up investigation of unknown sources of contaminants may be required.	N/A	Onset of open pit dewatering activities to Life of Project

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Task	Reference Document	Status Anticipated Start and/or End Date
• Results and collected data are to be presented in the research program progress reports.		
• Not less than 5 years prior to the end of operations, the water quality predictive model will be updated and predicted water quality should be compared against the criteria set out in Table 5.1. o Modelling will include an assessment of the influence of filling time on open pit water chemistry. (*Reclamation Research Program: Open Pit Flooding Timeline*) o Should additional humidity cell data become available, the results of these analyses will be incorporated into the geochemical aspects of the water quality model.	N/A	Five years prior to Life of Project (duration 1 year)
• If required, suitable contingencies should be identified and assessed for addressing long term water quality.	N/A	One year prior to Life of Project (duration 1 year)

Findings of Research Completed

Research into meromictic pit lakes has not yet been completed. This work is scheduled to start in 2019.

Open Pit Water Quality Research Results

No results have been provided yet as the mine has not advanced into the open pit stage. Ore has, to date, been extracted from the hillslope, rather than the future open pit.

Linkages to Other Research/Studies

This research will be linked to the research being completed regarding pit flooding timelines. Findings of waste rock stockpile runoff water quality reclamation research will be considered. Updates on open pit prediction of runoff water quality will be provided in future updates of the ICRP.

Costs

TBD

References

AMEC. 2012a. Interim Waste Rock Stockpile Seepage Quality Model Report, Mary River Project. January 2012.

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Knight Piésold Ltd. 2015. 2014 Water and Sediment CREMP Monitoring Report. Ref. No. NB102 00181/34-6, Rev. A, dated February 24, 2015.

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D.2 Reclamation Research Program - Open Pit Flooding Timeline

Background

The mining plan and the ongoing waste rock characterization plan will inform the prediction modeling of the mine pit water quality at the end of mine life (addressed under the "Open Pit Runoff Water Quality" research program). The results of the Open Pit Runoff Water Quality research program will be summarized in the annual NIRB and NWB reports which will subsequently be reviewed and discussed by the Mine Closure Working Group.

Based on passive inflows alone (seepage into the pit, direct precipitation, and surface runoff), it is anticipated that the open pit will take an estimated 85 to 150 years to passively fill (Knight Piésold, 2008). The flooding of the open pit could be accelerated by pumping water from a nearby water source (i.e. accelerated flooding). At a conceptual level, four potential water sources have been identified: Sheardown Lake, Camp Lake, Mary Lake, and Mary River. It was estimated that withdrawal from these sources could reduce the flooding time to as little as 2 years (based on a total withdrawal of 10% of the annual volume, although this would require very specific and ideal conditions to achieve. Section 5.2.1.4 of this document presents some preliminary assumptions and calculations regarding the enhanced pit infilling alternative.

Uncertainty

With respect to natural flooding, the rate of groundwater inflow is the primary source of uncertainty with respect to open pit flooding time prediction.

With respect to the enhanced flooding schemes, the primary source of uncertainties are:

- the maximum rate of water taking from the water sources; and
- the practical limit of pumping water from those sources to the open pit (feasibility and financial viability).

Research/Study Objective

The goal of this program is to better assess the timelines for Open Pit flooding for both natural flooding and the enhanced pit infilling alternative and develop a flooding program that will meet closure objectives and criteria in Post-Closure within an appropriate timeline relative to the proposed monitoring.

Overview of Tasks and Project Research Schedule

The key tasks of the study are as follows:

- Updating the accuracy of the open pit flooding timeline under passive conditions.
- Assessing the potential water sources for enhanced pit infilled in greater detail, and increase the accuracy of the enhanced pit infilling timelines.

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- Enhancing the understanding of the impacts of the pit flooding time on the overall closure plan and monitoring timeline.

Task 1 - Pit Flooding Timeline Predictions (passive conditions)

To better understand the rate of natural flooding of the open pit, pit dewatering flows (monthly volumes) will be recorded throughout operations to provide an estimate of the overall net inflows to the open pit, including all inflows (groundwater inflow, direct precipitation, and runoff) and outflows (evaporation and seepage).

It was estimated in 2009 that natural flooding would take between 85 and 150 years. Using the open pit dewatering flows as a basis of calibration, this estimate can be refined at a later time.

To complete this task, pumping records and data from the site weather station will be recorded during operations. The pit flooding model will then be updated with acquired site data.

Task 2 - Assessment of potential water sources / enhanced flooding

Assisted pit filling is governed by two parameters – technical limitations that drive pumping costs, and water source locations/drawdown limits. Costs are driven by materials and equipment required for the operation (e.g., heat-traced piping, pumps, generators, and fuel requirements) as well as the construction and maintenance of the necessary roads and berms. Pumping water to the pit is uphill and therefore significant elevation head will provide technical challenges to any pumping design. Water source drawdown limits are designed to ensure that the volume of water extracted from a given source has minimal impact on the aquatic ecosystem. Key factors to consider when calculating maximum acceptable drawdown of a lake include issues such as the potential disturbance of spawning habitat, as well as the residency time of the water body.

In order to better understand alternatives for enhanced pit filling, the following steps are planned:

- A desktop review of regional hydrological and potential spawning habitat data will be conducted to support the development of a waterbody-specific assessments for the maximum allowable water taking rate;
- a feasibility level engineering assessment will be carried out for pumping water from each of the potential water sources to confirm the feasibility of each alternative; and
- the estimated flooding times will be updated for each enhanced flooding scenario.

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Task 3 – Enhancing the understanding of the impacts of the pit flooding time on the overall closure plan and monitoring timeline.

Following the completion of Tasks 1 & 2, the integrated schedule of closure activities would be reviewed in light of the updated natural and enhanced flooding scenarios and summarized for discussion with the Mine Closure Working Group. The flooding timeline would also impact post-closure monitoring durations at the Open Pit and down gradient areas.

Table D-2: Overview of Tasks for Reclamation Research - Open Pit Runoff Water Quality

Task		Reference Document	Status Anticipated Start and/or End Date
	Establish initial flooding time estimates.	KP 2008	Completed
Task 1	Monitor mine dewatering flow rates.		Ongoing (2013-Life of Project)
	Use mine dewatering flow rates to update mine flooding model to estimate passive (natural) flooding time.		5-years following onset of mine dewatering.
Task 2	Assess regional hydrology flows and retention times in each potential water source.		Should be completed during first 5 years of dewatering. Duration of task: 1 year
	Evaluate maximum allowable water taking with respect to protection of aquatic life.		
	Prefeasibility assessment of practicability of pumping from each water source.		
	Estimated flooding times from each water source to be updated using mine flooding model.		
Task 3	Review the impacts of enhanced open pit flooding on the mine closure activities and monitoring with Mine Closure Working Group.		Task to commence following completion of Task 2. Duration of task: 6 months

Findings of Research Completed

Initial predictions for filling times (natural and enhanced) have been previously estimated, as described in Section 5.2.1.4. Additional research that is to be carried out will be reported here.

Pit Flooding Timeline Predictions (passive conditions)

As no significant dewatering has taken place in the open pit to date, no update of the flooding model has been completed to date.

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Open pit dewatering flows will be recorded once active dewatering (pumping) starts.

Results to Date

TBD

Linkages to Other Research/Studies

This research will be linked to the research being conducted on open pit water quality.

Costs

TBD

References

Knight Piésold Ltd. 2008. Mine Site Infrastructure, Pit Overburden & Waste Dumps - 2007 Site Investigations and Foundation Recommendations Summary Report. Ref. No. NB102-00181/8-2, Rev. 1. North Bay: Knight Piésold Ltd. February 20, 2008.

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D.3 Reclamation Research Program - Waste Rock Stockpile Seepage/Runoff Water Quality

Background

Metal leaching and acid rock drainage (ML/ARD) characterization studies in support of the Life-of-Mine pit waste rock are provided in the report entitled "Mine Rock ML/ARD Characterization Report Deposit 1, Mary River Project", March 2014 as appended to the Life-of-Mine Waste Rock Management Plan.

The waste rock was subdivided based on broad geo-structural categories about the iron ore zone, mainly by hanging wall and footwall zones. A total of 776 waste rock samples were selected as representing the waste rock categories and broad spatial coverage of non-ore mine rock in the vicinity of the Life-of-Mine open pit development. All 776 waste rock samples were analyzed for modified Sobek acid base accounting (ABA), NAG pH and elemental content. Subsets of drillcore samples were also analyzed for downhole variability, NAG leachate, short-term metal leaching, whole rock elemental content, detailed mineralogical analysis, and long-term kinetic testing.

Results of ABA testing determined that waste rock is generally characterized as having low neutralization potentials (NP) and low acid potentials (AP). Data suggests that the waste rock is dominated by non-carbonate sources of NP (e.g. silicates) with lesser NP derived from carbonate sources. Sulphide was the primary form of sulphur. Approximately 85% of waste rock samples had neutralization potential ratios (NPR) greater than 2 and are classified as non-potentially acid generating (Non-PAG) and are unlikely to generate acidic drainage. Approximately 10% of the samples had NPR values of less than 1, and 5% of the samples were classified as having uncertain acid generating potential (1<NPR<2). Extrapolating these results to the project waste rock model, indicates that approximately 11% of the Life-of-Mine in-pit waste rock is expected to have NPR <2 and is considered potentially acid generating (PAG). Proximity to ore appears to correlate to increased PAG quantities (defined as NPR <2) with the hanging wall schist (HWS) and footwall schist (FWS) zones identified with the greatest proportion of PAG of the major waste units.

Analysis of a set of samples proximal to the proposed five-year pit indicates a lower sulphur and sulphide content is likely to be encountered in the shallower HWS and FWS rock of early development than at depth during later production. This lower sulphide content is expected to result in a lower percentage of PAG rock being encountered during early operations than would be predicted by extrapolating the overall (including deeper) HWS and FWS waste rock data to near surface.

For planning, 10% PAG rock plus allowances for expansion due to field screening limitations and dilution has been assumed.

Ten waste rock samples were run in humidity cells for 53 weeks in 2008 and 2009. A further 17 waste rock samples were initiated in humidity cell tests in May 2011 for between 109 and 120 weeks of reported data. Nine of these samples were standard humidity cells and eight were NP depleted humidity cells designed to assess drainage quality in the absence of carbonate NP. The pH of most cells was in the range

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of 5.5 to 7 throughout testing. Of the 17 cells in operation since 2011, three cells exhibited slowly declining pH throughout testing reaching a minimum measured weakly acidic pH between 4.5 and 5 after approximately two (2) years of operation (under laboratory conditions). Metal release rates from humidity cells were generally low. Kinetic testing results and cold climate conditions at site suggest the lag time to acid on-set in PAG rock with potentially increased metal release rates would be on the order of five years or longer.

Waste characterization, volume estimation, and monitoring of the Waste Rock ML/ARD is ongoing. The design of the waste rock facility will be updated periodically as necessary throughout the LOM.

The deposition strategy for the water rock area is to promote permafrost aggradation. Studies of waste rock in permafrost demonstrate that permafrost forms an effective long-term barrier to water and oxygen, thereby preventing significant oxidation of sulphidic waste rock located below the surficial active zone. The surficial “active” zone, which will be subject to seasonal freeze-thaw.

For this reason, the PAG, Non-PAG, and Overburden are handled as three separate streams and are placed in zones within the Waste Rock Facility. PAG material will effectively encapsulated in non-PAG material.

The “active” zone is not anticipated to extend into the PAG material through 50 m non-PAG shell in the long-term (within 200 years) under the influence of climate change (Intergovernmental Panel on Climate Change, 2007). Therefore, over the long term, seepage water quality which is influenced by contact water that flows through the active layer in the waste rock stockpile will not be affected. Following closure, generation of ML/ARD is not anticipated.

Seepage and drainage is anticipated to discharge from the active layer and from portions of the waste rock pile that have not yet aggraded of permafrost.

Uncertainty

Due to the early stage of project development and only conceptual modelling done to date, there is uncertainty in the final composition of the waste rock stockpile. In particular, the composition may vary with respect to the proportion of waste rock by lithology, geochemistry, and the associated seepage/drainage conditions. Climactic conditions may also heavily impact the volume and quality of seepage, as thermal conditions within the pile can affect the rate of chemical release and reactions, permafrost develop creating low permeability conditions in an otherwise free draining media, and wetting-up time may impact the period of time for precipitation to report as seepage.

As more information becomes available, the conceptual modelling completed as part of the FEIS will be updated.

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Research/ Study Objective

This research plan is designed to improve understanding of the expected performance of the waste rock stockpile closure concept in an effort to confidently characterize predicted waste rock effluent discharge quality and assess if waste rock stockpile seepage water quality can be expected to meet closure objectives and criteria (MDMER, CCME PAL) in Post-Closure.

Specific objectives include:

- Determination of quantity of waste rock stockpile seepage that can be expected post-closure.
- Determination of quality of waste rock stockpile seepage that can be expected post-closure.
- Greater understanding of the thermal evolution of the waste rock stockpile and permafrost development to determine impact on geochemical reactions and, therefore, seepage water quality.

Overview of Tasks and Project Research Schedule

The following are an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates.

Task 1 – Monitor Drainage from Waste Rock Stockpiles and Additional Humidity Cell Testing

Water quality should be monitored at selected locations around the waste rock stockpile. Where seepage can be reliably associated with a particular area of the waste rock stockpile, careful records should be kept of the schedule, volumes, and lithology of waste rock that is deposited in that area.

Waste rock samples should be collected regularly from each type of lithology of waste rock. A small number of representative samples should be set up as humidity cells and run continuously.

Tasks 2 and 3 – Field Test Pad Construction and Monitoring

In the absence of completed areas at the Waste Rock Stockpile representative of closure conditions, field Test pads should be constructed of known materials to support various assessments, most notably including estimating leachate volume. The volume of seepage will be affected by wetting up time and permafrost aggradation. Waste rock piles in many climates may take years to decades to accumulate sufficient water (wetting up) to have precipitation report as seepage. While it may not be practical to establish Test pads greater than 50 m high to simulate the design conditions, test pads should be significantly larger than the maximum depth of the active layer.

Tasks 3 – Geochemical Modelling

With regards to modelling, the test pads would serve as controlled scenarios, from which the behaviour of the wastes can be extrapolated to the overall Waste Rock Stockpile. As a first step, the test pads would

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be studied for basic hydrogeologic function, with an aim to resolve the effects of wetting-up time and advancement of permafrost (also Research Program: Waste Rock Thermal Modelling). Subsequently, seepage from the test pads could be investigated with respect to chemistry, making allowances for composition of the test pads (lithology, grain size, etc.), thermal conditions, and hydrogeologic function.

The functionality of the test pads should be modelled based on the available climactic conditions (based on site weather data), mine production data, and geochemical assays and humidity cells. The model will then be calibrated using the leachate from the test pads, and subsequently then expanded to encompass the monitored locations of the waste rock stockpile. Water quality predictions will then be compared against the criteria set out in Table 5.1.1.

Should additional studies be required, recommendations for these studies would be included within the Reclamation Research Progress Reports.

Table D-3: Overview of Tasks for Reclamation Research - Waste Rock Stockpile Water Quality

Task	Reference Document	Status Anticipated Start and/or End Date
• Monitor drainage water quality from waste rock stockpile. Conduct focused review of seepage quality monitoring results to predicted leachate values. o Set up additional humidity cells for each type of waste rock lithology.	N/A	Life of Project (as necessary)
• Confirm the feasibility of developing field test pads or equivalent area for instrumentation in a completed section of the Waste Rock Stockpile. o Development of study design for field test pads (some including application of cover material) at the site using selected waste rock material generated during early mine development. o Construct, operate and monitor test piles (if feasible) to inform the project about projected drainage quality and water quality modeling assumptions under site-specific cold climate conditions	Phase 1 Waste Rock Management Plan (BAF-PH1-830-P16-0029)	Designed/constructed in 2019. Monitored from 2019-Life of Project
• Modelling, interpretation and documentation of monitoring results (initially calibrating to field test pad data, and then extrapolating to the waste rock stockpile) to assess confidence if waste rock stockpile runoff water quality can be reasonably expected to meet closure objectives and criteria (MDMER, CCME PAL) in Post-Closure	N/A	Scheduled for 2024, then updated every 10 years

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Findings of Research Completed

Seepage from the Waste Rock Stockpile has been monitored as part of regular site operation. As reported by Golder in the Interim Waste Rock Management Plan (March 2018), in the summer of 2017, seepage conditions from the Waste Rock Stockpile pond were found to be more acidic than was anticipated. A water treatment facility has been installed in the interim to address short term issues with respect to water quality.

The cause of the acidic conditions is under investigation and should be resolved as part of this research program in conjunction with the Waste Rock Thermal Modelling research program. These ongoing efforts informing the updated Interim Waste Rock Management Plan will also identify if an area of the existing Waste Rock Stockpile can be instrumented, or seperate field trial pads should be constructed.

Linkages to Other Research/Studies

Predicted leaching rates for various waste rock lithologies will be shared between this study and of the Open Pit Runoff Water Quality research program.

Findings of natural re-vegetation reclamation research will be considered related to colonization of cover material.

Regular updates on waste rock characterization and prediction of runoff water quality will be provided in future updates of the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) and ICRP.

Costs

TBD

References

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Baffinland Iron Mines Corporation. 2013. Mary River Project – Addendum to the Final Environmental Impact Statement. June 2013.

Baffinland Iron Mines Corporation. 2014. Phase 1 Waste Rock Management Plan BAF-PH1-830-P16-0029, Rev 0. April 2014.

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D.4 Reclamation Research Program - Waste Rock Thermal Modelling

Background

Thermal analyses of the waste rock stockpile to predict the long-term distribution of permafrost within the dump will be required. The heat transfer processes can be simulated with available computer models; however, none of the models can confirm that permafrost will develop within the dump without more reliable input data regarding the method of placing the waste rock and the resulting properties of the waste rock in the dump. In addition, it will be important to compare the thermal analyses against existing case histories including the Nanisivik mine.

Uncertainty

It is unclear at what rate the waste rock stockpile will experience permafrost aggradation during operations and closure, and/or what the eventual active layer thickness will be.

In addition, a better understanding of the exothermic nature of the acid generating materials currently in the PAG pile is required to predict aggradation.

Research/Study Objective

Thermal monitoring and evaluation is required as part of the current LOM Waste Rock Management Plan and to support the prediction of aggradation rates and estimation of the active layer thickness.

The objective of the thermal modelling program is to monitor ground temperatures and confirm the aggradation of permafrost within the waste rock stockpile and active layer thickness in order to update long-term ground temperature predictions.

Overview of Tasks and Project Research Schedule

Task 1 – Thermistor Data Collection

Data from temperature sensors installed to monitor the ground temperatures will be collected on a regular basis and used to ensure that frozen conditions are maintained below the waste rock stockpile.

Task 2 – Thermal Model Development

Based on the results of the geochemical sampling program and the thermal instrumentation program a thermal model for the pile will be developed. If substantial heat generation from oxidation is expected based on geochemical results, the thermal model may incorporate heat generation from sulphide oxidation in the pile to model the impact of heat generation on the pile freeze-back process. Climate change will also be included to account for warming temperatures after closure.

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Table D-4: Overview of Tasks for Reclamation Research - Waste Rock Stockpile Thermal Modelling

Task	Reference Document	Status Anticipated Start and/or End Date
Task 1 – Thermistor Data Collection	N/A	Life of Project (as necessary)
Task 2 – Thermal Model Update	N/A	Following at least 5 years of data collection.

Findings of Research Completed

No tasks have been completed at this time, however installation of thermistors is scheduled for fall 2018 and winter 2019. Data from these installations will be used to update the Waste Rock Management Plans, but will also begin to address uncertainty regarding the closure strategy.

Linkages to Other Research/Studies

The thickness of the active layer will be considered in the development of the Waste Rock water quality predictions.

Costs

TBD

References

TBD

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D.5 Reclamation Research Program - Natural Re-Vegetation

Background

A review of baseline data collection results applicable to re-vegetation during reclamation was conducted based on the findings of the vegetation baseline studies associated with FEIS development (FEIS Appendix 6C – Vegetation Baseline Report). Findings indicated approximately 20 plots were established on the old road surface or adjacent to it, in sites disturbed in the past. These sites were surveyed to contribute to the knowledge of natural succession and the plant species that can become re-established without intervention. Observations from baseline work applicable to reclamation include:

- Natural re vegetation in this general environment is slow, but not as slow as expected. Based on observations on an old silver mine near the Doris North Project in the Kitikmeot Region, researchers expected little re-vegetation in the Mary River study area thirty years after use, but were surprised to find that considerable re-vegetation had occurred along the old tote road, particularly in damp areas. The difference is that much of the area traversed by the tote road is on sandy soils, whereas the Roberts Bay Silver Mine is located mostly on fractured gravels (Burt, 2003).
- Colonization of dry areas along the old roads, paths, and campsite areas is occurring slowly, so slowly as to be almost immeasurable in the time since the disturbance.
- Plant communities around the old mining camp near Sheardown Lake have been slightly affected by the addition of nutrients, and are, as expected, richer than normal, with more lush growth and more species of grasses and forbs.
- This colonization (around the old camp) may be on the wane, due to depletion of nutrients and lack of enrichment in the ensuing years.
- There are plenty of local species that can be utilized for reclamation; it is neither necessary nor advisable to obtain plant stocks for reclamation from elsewhere. Use local/regional plant stocks and seed sources for any active revegetation being done on the Mary River Project.

Uncertainty

Due to limited research conducted to date for mines in the Canadian Arctic, there is uncertainty in the rates of natural re-vegetation at disturbed areas Post-Closure. This research will focus on development of methods to promote accelerated recovery of a sustainable vegetation cover that also benefits the desired land use for the Project sites over these long expected timelines. These sites include gravel roads, gravel pads, waste rock stockpile, and other priority areas identified during closure planning.

It should be noted that vegetation is naturally sparse or nonexistent (e.g., waste rock stockpile footprint) over much of the Project Area, and therefore the potential for natural re-vegetation of disturbed Project areas is uncertain. Re-vegetation by reseeding or replanting is not currently being considered by the

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Project based on the current site conditions and the potential for success in areas not historically vegetated.

Research/Study Objective

The goal of this program is to identify methods to successfully promote natural re-vegetation in an effort to achieve a sustainable vegetation cover that meets the desired aesthetic conditions for the Project site post-closure in the shortest duration possible. Specific objectives may include:

- To assess which locally available substrates are most effective for plant establishment and growth.
- To assess which groups and individual native plant species may be able to establish and survive on a variety of substrates.
- To investigate the duration groups and individual native plant species are able to establish and survive on a variety of substrates.
- To assess the potential for native plant species to egress from site of introduction to adjacent areas.

Overview of Tasks and Project Research Schedule

Because it is too early to establish experimental reclamation plots within the Project footprint, Baffinland will, in 2019, conduct a detailed desktop study of reclamation efforts, successes and lessons learned in Arctic Canada. This will focus applicable objectives noted above, as well as the overall utility of reclamation practices establishing native vegetation in a reasonable time frame during progressive reclamation and post-closure. The review will include work completed at other Arctic sites, including mine, municipality, and contaminated site (e.g., DEW line site) reclamation and remediation.

The following are an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates.

Table D-5: Overview of Tasks for Reclamation Research - Natural Re-Vegetation

Task	Reference Document	Status Anticipated Start and/or End Date
• Review of baseline data collection results applicable to re-vegetation during reclamation	FEIS Appendix 6C – Vegetation Baseline Report	Completed in 2016
• Literature review of re-vegetation at disturbed areas in northern climates	N/A	Scheduled for 2019
• Establishment of representative test plots for Project candidate sites for re-vegetation: gravel roads, gravel pads, waste rock, stockpiles, and waste dumps	N/A	Scheduled for 2019
• Soil sampling and vegetation assessment	N/A	Scheduled for 2019-2024

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Task	Reference Document	Status Anticipated Start and/or End Date
• Interpretation and documentation of monitoring results assess confidence in developing re-vegetation procedure (Reclamation Research Summary Report issued)	N/A	Scheduled for 2025
• Identify any additional research that may be required and long-term monitoring	N/A	Scheduled for 2025
• Continued monitoring and analysis of re-vegetation research plots (if necessary)	N/A	2025-Life of Project (as necessary)
• Determine monitoring results applicability to closure and reclamation strategies and criteria	N/A	Scheduled for 2026

Findings of Research Completed

No research has been completed to date.

Linkages to Other Research/Studies

Findings of natural re-vegetation reclamation research will be considered related to colonization of cover material for waste rock stockpile. Updates on natural re-vegetation reclamation research will be provided in future updates of the ICRP.

Costs

TBD

References

Baffinland Iron Mines Corporation. 2012. Mary River Project – Final Environmental Impact Statement. February 2012.

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Burt, P. 2003. Miramar Hope Bay Ltd., Doris North Gold Project, Vegetation Baseline Studies, Report, Outcrop Ltd. 2003.

Environmental Dynamics Inc. 2013. Baffinland Field Guide to Exotic Plant Species Identification. Project No. 13-Y-0012. Prepared for Baffinland Iron Mines Corporation. Dated September 20, 2013

Environmental Dynamics Inc. 2014. Baffinland Mary River Project: DRAFT 2014 Annual Terrestrial Monitoring Report. Project No. 14-Y-0244. Prepared for Baffinland Iron Mines Corporation. Dated November 16, 2014.

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Appendix E Record of Engagement

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As the Project advances, Baffinland is committed to engagement with stakeholders regarding closure and reclamation issues. These issues include, but are not limited to:

- Appropriate closure and reclamation strategies and criteria based on desired end use of Project areas.
- Additional or modified reclamation research activities (Appendix D).
- Requirements to address identified uncertainties and determine the appropriateness of existing action levels (Appendix D and Appendix G).
- Whether there will be any interest in maintaining the bulk fuel storage facilities and/or sealift landing areas for use by the local community assuming responsibility for the operation and maintenance of the facilities would be transferred to the local interested party.
- Transfer of responsibility of the Tote Road water crossings to the local community and if the Tote Road will be left completely intact assuming road operation and maintenance responsibility would then be transferred to another party.
- Transfer of responsibility of airstrip (including airstrip lighting) to the local community assuming the airstrip is left intact and operation and maintenance responsibility would then be transferred to another party.
- Whether there will be any interest in transfer of salvageable materials and buildings for local community use assuming responsibility would be transferred to another party.

Baffinland anticipates to rely on the Mine Closure Working Group (Section 2.4) in order to best facilitate stakeholder engagement related to the Mary River Project and incorporate considerations for post-closure land use of the Project site. A mandate or Terms of Reference for the Mine Closure Working Group will be developed in consultation with the QIA prior to the initial first meeting of the Mine Closure Working Group. Baffinland expects an early priority for the Mine Closure Working Group will be to determine additional or modified reclamation research activities applicable to the Project to help address identified uncertainties and determine the appropriateness of existing action levels.

Baffinland is currently in the process of integrating 'StakeTracker' software into project monitoring and reporting initiatives which will facilitate a comprehensive coverage assessment of stakeholder engagement matters related specifically to closure and reclamation issues historically and moving forward over the life of the Project. Table E-3 provides a summary of comments received to date, together with associated responses and cross-references.

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Table E-3: Record of Engagement

Stakeholder Comment	Project Team Comment	Relevant Section from IRCP
This is not really concerning Baffinland, but refers to caribou. The infrastructure from the Nanisivik Mine was left behind. We tried to get the mine to clean it up but they didn't. There were fuel and diesel spills left behind. No one has cleaned it up. Seals have bad livers now because of what they were eating. Pond Inlet will need to worry about fuel and fuel clean up. The marine mammals can be affected because of this; we've seen the impacts in Arctic Bay from this. Just beware of all these promises the company makes.	The comment is noted. Baffinland is required to post securities for reclamation and closure through the water licensing process. Ongoing monitoring programs, environmental effects assessment, and the development of this interim closure plan will all safeguard against future environmental effects.	2.4; Appendix G
When they dig down the whole mountain what are we going to call it?	No response at this time.	n/a
Fuel drums were used in the early stage of exploration. Later on, they were using containers. The drums of fuel that were used are stockpiled at the dump now, corroding away. When I was a young man, these were used as fuel drums. It that going to be the same practice for you guys? Are you going to leave the drums there when you switch to containers?	Baffinland is required to post securities for reclamation efforts, as a condition of operating the Mary River Project through the water licensing process. The current practice is to remove the drums by backhauling empty drums, as well as any other waste that cannot be incinerated.	2.4; 5.1; 5.2
Three topics. I myself want the environment protected. Although the job opportunities are important, I also want the environment protected. While they are exploring, once they have done their exploration, we know they won't be making any money and they have to clean up the area. They have to close it and try to put it back the way it was before. Will they go back to Baffinland, or will they be surplus and given to QIA? If that were to happen, if they make money they would probably stay there. If they are going to drill deep down, what will they use to close them up (the drillholes)?	Baffinland is required to post securities for reclamation efforts, as a condition of operating the Mary River Project through the water licensing process. Baffinland will decide if camp and equipment will be sold to the community or brought to another project.	2.4; 5.1; 5.2

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Stakeholder Comment	Project Team Comment	Relevant Section from IRCP
You mention that the mine is going to operate for 100 years, can things start being cleaned up at the mine right now?	While the life of the mine could last 100 years, Baffinland is committed to progressive reclamation measures where appropriate.	5.1.3; 6.3

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Appendix F Lessons Learned from Other Projects

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Mine and port decommissioning, closure, and rehabilitation have been conducted at sites in the Canadian North for several decades. This time period has allowed the planning, permitting, closure, and post-closure performance to be evaluated. These include: Colomac Mine, Giant Mine, Diavik Mine, Ekati Mine, Faro Mine, Nanisivik Mine/Port. As part of its reclamation researched initiatives, Baffinland is committed to establishing the primary lessons learned from these examples and others, to help evaluate options related to, but not limited to: re-vegetation strategies; post closure property control and land use; stakeholder relationships and commitments; residual waste material management; post-closure maintenance (if required); water management (before, during, and after closure), and managing socio-economic impacts. A summary of lessons learned from these projects will be completed using a topic specific approach and findings will be incorporated into future versions of the ICRP.

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Appendix G Residual Effects

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G.1 Predicted Residual Effects

Residual effects refer to the remaining environmental effects identified for the Project, post-mitigation, at the expected closure period of the Project. As the Project is in the early stages of operations and no major changes to the initial mine plan have occurred, the predicted residual impacts from the Mary River Project FEIS are considered to be accurate. Based on the information presented in the Mary River Project FEIS, the Mary River Project as planned will have no significant adverse residual effects for the VECs identified within the biophysical environment. The Project is not expected to compromise the ecosystematic integrity of the Nunavut Settlement Area. In addition, no significant adverse residual effects are predicated to occur to VSECs identified within the socio-economic environment, and the Project is expected to have significant positive effects for most of the VSECs. This position is supported by comprehensive site-specific studies (baseline and modeling studies), IQ, extensive public consultation, and expert opinions.

An overview of the assessment methodology used to develop this residual effect position, as detailed in Volume 2 of the Mary River Project FEIS, is provided in Section G.2. A summary of the non-significant residual impacts identified for each VEC and VSEC as part of the Mary River Project FEIS is provided in Section G.3. Section G.5 includes the associated closure and post closure monitoring programs proposed to be implemented to appropriately monitor residual effects.

Further detail of the Project residual effects is presented in Volume 4 through 8 of the Mary River Project FEIS.

G.2 Residual Effects Assessment Methodology

G.2.1 Determining Significance of Residual Effects

Residual project effects refer to the environmental effects identified for the Project, post-mitigation. The significance of residual environmental effects was determined from the following criteria (NIRB 2009):

- Direction or nature of an effect (i.e., positive/beneficial versus negative/adverse).
- Magnitude and complexity of an effect.
- Extent of the effect, including such as the geographical area that will be affected, the size of the affected human populations, and/or the size of the affected wildlife populations and habitat.
- Frequency and duration of an effect.
- Reversibility or irreversibility of an effect.
- Probability of occurrence of the effect.
- Confidence in the effect prediction.
- Context of the effect.

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These criteria were adopted for this assessment, as specified in the Guidelines and because the criteria have precedence of use for other environmental assessments in the Canadian Arctic (NIRB 2007, 2009; Lawrence Environmental 2000, 2004; Wolfden Resources Inc. 2006; De Beers Canada Inc. 2004). In addition to the above attributes, NIRB (2009) directed Baffinland to consider additional qualifiers in its significance evaluation. Definitions and assessment criteria for each are identified in Table G-1, which lists the complete set of attributes (criteria and qualifiers), provides a definition and rationale as well as a summary of their relevance or context to the Mary River Project, and describes how the attribute was incorporated into the assessment.

Table G-1: Attributes Used to Evaluate Significance of Residual Effects

Attribute	Definition and Rationale	Role in Significance Determination[2]
Direction and Nature[1]	The ultimate long-term trend of an environmental effect - positive, neutral, or negative.	**Qualifier** Only negative effects are assessed for significance
Magnitude [1]	The amount or degree of change in a measurable parameter or variable relative to existing conditions (the exposed population)[3]. This attribute can also consider complexity - the number of interactions (Project phases and activities) contributing to a specific effect.	**Primary Criterion** High magnitude = high significance **Secondary Criterion** If magnitude and geographic extent are related, the higher the potential significance
Extent[1]	The geographic area over which the interaction will occur.	**Secondary Criterion** The larger the zone of influence, the higher the potential significance
Frequency[1]	The number of times during a project or a project phase that an interaction or environmental effect can be expected to occur.	**Secondary Criterion** Greater the frequency of occurrence, the higher the potential significance
Timing	The Project Phase within which the environmental effect will occur.	**Qualifier** Provides context
Duration[1]	The period over which the environmental effect will occur.	**Secondary Criterion** The longer the duration of an interaction the higher the potential significance
Reversibility[1]	The likelihood that a VEC/VSEC or Indicator will recover from an environmental effect, including consideration of active management techniques.	**Primary Criterion** The greater the potential to reverse an effect, the lower its potential significance

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Attribute	Definition and Rationale	Role in Significance Determination[2]
	Reversibility is considered for biological VECs at the population level. Therefore, although an effect like mortality is irreversible, the effect at the population level might be reversible.	
Probability[1]	The likelihood that an interaction and a consequent effect will, in fact occur.	**Qualifier** (considered only for potentially significant effects) The higher the probability of occurrence, the greater the significance
Certainty[1]	The level of confidence in the knowledge or analysis that supports the prediction, in particular with respect to limitations in overall understanding of the ecosystem, and limitations in the ability to foresee future events or conditions.	**Qualifier** (considered only for potentially significant effects) The lower the certainty of occurrence, the more conservative the approach to prediction of significance
Ecological/Socio-economic context/value[1]	The general characteristics of the area in which the Project is located, as indicated by existing levels of human activity and associated types of disturbance. Interpreted to mean the basis for assigning "value" to the particular VEC.	**Qualifier** VECs/ VSECs and Indicators have been identified as "valued"
Environmental Sensitivity[1]	Environmental sensitivity of the area likely to be potentially affected. Refers to areas of heightened sensitivity that will be identified where applicable in relation to the Project (i.e., areas sensitive to spills; caribou calving areas).	**Qualifier** The Magnitude of an effect within an area of environmental sensitivity will be greater; therefore environmental sensitivity is considered in the discussion and rating of the Magnitude attribute.
Historical, cultural, archaeological significance[1]	To be considered within the geographic area to be potentially affected	**Qualifier** (Extent - above) Historic, cultural and archaeological significance is evaluated within the archaeology effects assessment (Volume 4)
Human and wildlife populations, and the size of the affected wildlife populations and related habitat[1]	The size of the potentially affected human populations; and the size of the potentially affected wildlife populations and related habitat.	**Qualifier** (Extent - above)

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Attribute	Definition and Rationale	Role in Significance Determination[2]
The extent of the effects of the project on other regional human populations and wildlife populations, including the extent of the effects on Inuit harvesting activities[1]	The Project might have the potential to affect other human and wildlife population, if there are residual effects to marine wildlife or socio-economic benefits that extend outside Nunavut.	**Qualifier** Consider within the Transboundary Effects Assessment (FEIS Volume 9, Section 4)
The potential for cumulative adverse effects given past, present and future relevant events[1]	The Project might have the potential for cumulative effects where residual effects from the Project are expected to occur.	**Qualifier** Consider in the Cumulative Effects Assessment (FEIS Volume 9, Section 1)
Ecosystem function and integrity[1]	Ecosystem function and integrity is important to identified VECs and humans.	**Qualifier** Outcome of the significance determination
The effect on the capacity of resources to meet present and future needs (sustainability) [1]	The sustainability of this Project, and any major industrial project, is an important element to assess.	**Qualifier** Outcome of the significance determination
Value[1]	The value attached to the affected VEC or VSEC by those who identified them. An environmental or socio-economic component was identified as "valued" and was addressed in the EIS if it was found to have a high value to communities.	**Qualifier** Addressed as part of Issues Scoping where the "value" of each component is considered. The value attached to a VEC or VSEC is more or less equivalent to "Sensitivity" described above.

NOTES:

1. Specifically required by NIRB guidelines.
2. Criterion – directly contributes to the determination of significance. Primary criteria are given greater weight than secondary criteria. Qualifier – acts as a modifier to be considered when assigning values/rankings to assessment criteria.
3. In the majority of cases there is either a poor or no estimate available of the total population. However for the purpose of undertaking an environmental assessment, an effects prediction can be made by making reasonable assumptions. The most common approach is to take an area that is less than the full range of a population and, often on the basis of density estimates (or by using habitat as an indicator), a conservative prediction is possible, i.e. If the effect is calculated for a portion of the population and it results in a magnitude of effect that is beneath a defined threshold, then it is reasonable to predict the effect on the entire population, even in the absence of a total population estimate. This approach is not greatly different from that used by resource managers that have the mandate to manage wildlife populations, who are challenged to develop harvest quotas, even where they do not have an accurate or complete population estimate available to support these decisions.

Volumes 4 through 8 of the Mary River Project FEIS present the effects predictions for individual resource-specific component themes presented in each volume. Volume 9 of the Mary River Project FEIS presents the cumulative environmental effects assessment.

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G.2.2 Rating Criteria of Residual Biophysical Impacts

For the categories for criteria and qualifiers applied directly to the determination of significance for residual biophysical effects, with due consideration to the NIRB requirements cited above, see Table G-2.

Table G-2: Ratings for Evaluating Residual Biophysical Effects

Criteria	Classification	
Magnitude (Specific to the VEC and the impact)	Level I	An effect on the exposed indicator/VEC that results in a change that is not distinguishable from natural variation and is within regulated values
	Level II	An effect that results in some exceedance of regulated values and/or results in a change that is measurable but allows recovery within one to two generations
	Level III	An effect predicted to exceed regulated values and/or results in a reduced population size or other long-lasting effect on the subject of assessment
Extent The physical extent of the effect, relative to study area boundaries	Level I	Confined to the LSA
	Level II	Beyond the LSA and within the RSA
	Level III	Beyond the RSA
Frequency How often the effect occurs	Level I	Infrequent
	Level II	Intermittent
	Level III	Frequent or continuous
Duration The length of time over which a Project effect will occur	Level I	Short term (effect lasts up to four years)
	Level II	Medium term (up to 25 years, for the life of the Project)
	Level III	Long term (beyond the life of the Project) or permanent
Reversibility The likelihood of the VEC to recover from the effect	Level I	Fully reversible
	Level II	Reversible with cost/effort
	Level III	Irreversible
Qualifiers		
Certainty Limitations in the overall understanding of the ecosystem and ability to predict future conditions	High	Baseline data are comprehensive; predictions are based on quantitative data; effect relationship is well understood
	Medium	Intermediate degree of confidence between high and low
	Low	Baseline data are limited; predictions are based on qualitative data; effect relationship is not well understood
Probability The likelihood that the predicted impact/residual effect will occur	Unlikely	Less than 20% likelihood of occurrence
	Moderate	Between 20 and 60% likelihood of occurrence
	Likely	Over 60% likelihood of occurrence

Each of the five criteria contributes to the determination of significance. Criteria are categorized in three levels (Levels I, II, and III), where Level I is indicative of a negligible or limited potential to contribute to an overall significant environmental effect, and Level III is indicative of a high potential. Level II represents the intermediate condition.

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G.2.3 Rating Criteria for Residual Socio-Economic Impacts

Similar criteria were applied to the socio-economic effects assessment with some modification and additional criteria in consideration of the nature, complexity, and multiple perspectives associated with socio-economic issues. For the attributes (criteria and qualifiers) identified as the determinants of significance of socio-economic effects, see Table G-3.

Table G-3: Rating Criteria for Evaluating Residual Socio-Economic Impacts

Criteria	Classification
Direction	Positive
	Variable
	Negative
Geographic Extent	Description of the area and communities most affected
Social Extent	Demographic groups or social units identified as most affected
Magnitude Intensity of the effect	Low
	Moderate
	High
Frequency How often the effect occurs	Infrequent
	Intermittent
	Continuous
Duration Length of time over which a Project effect will occur	Short term (less than four years)
	Medium term (up to 25 years, life of the Project)
	Long term (beyond the life of the Project)
Reversibility Likelihood of recovery from effect	Reversible
	Partly reversible with cost/effort
	Irreversible

G.2.4 Overall Evaluation of Significance

NIRB (2009) stated that impact significance is based on comparing the predicted state of the environment with and without the Project, and expressing a judgment as to the importance of the changes identified. NIRB directed that the EIS shall present the residual effects assessment of the Project so that the reader can clearly understand the real consequences of the Project, the degree of mitigation of effects, and which effects cannot be mitigated.

NIRB also directed Baffinland to consider the dynamic change of ecosystems and their components in determining significance.

The overall significance of an effect is derived from the experience and professional judgment of the environmental practitioners who prepared the assessment, considering the rankings of the contributing attributes of significance. While substantially based on professional judgment, the following are general rules of thumb applied in determining significance:

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- If the magnitude of the effect is low, then the predicted effect is "not significant," recognizing that magnitude includes consideration of sensitive species, habitats or populations. If effects on measurable components such as air or water quality meet applicable performance criteria, standards or guidelines, then the magnitude of the effect is negligible to moderate, and therefore the prediction will be for an effect that is "not significant."
- If the geographic extent of the effect is confined to the PDA or LSA, then the predicted effect is likely to be "not significant."
- If the extent of a negative socio-economic effect is limited to individuals who also receive a corresponding positive benefit, then the predicted effect is likely to be "not significant."
- If the effect has a moderate to high reversibility, the predicted effect is likely to be "not significant."
- If the duration of the effect is short term (e.g., construction period only) then the effect prediction is also likely to be "not significant."
- NIRB (2009) also directed Baffinland to communicate with potentially affected communities and organizations to solicit input on the values placed on VECs and VSECs as well as significance of impacts:
- *The Proponent shall describe how it will ascertain that significance that different parties assigned to each impact, and how it will proceed if different parties ascribe varying significance to VECs, VSECs or the associated impacts. If it is impossible to attain a consensus on the significance of certain impacts, the Proponent shall present the range of viewpoints expressed and shall present and justify its preference, if any. Finally, the Proponent shall describe the significance it ascribes to each effect, and justify how the significance of the effect was determined, taking into consideration and avoiding duplication of, the information provided above. (NIRB 2009)*
- Finally, in its Pre-Hearing Conference Report, NIRB (2011) directed Baffinland to reconsider the significance of potential Project impacts where parties raised concerns with the significance determinations presented within the Draft Environmental Impact Statement (DEIS).
- To this end, Baffinland has attempted to assemble, synthesize and present feedback from the following sources:
- Records of public meetings from 2006 through the first part of 2011.
- Records from Inuit knowledge studies held to date (individual interviews and workshops).
- Kajjuqtikkut - A five-day workshop held in Arctic Bay March 10-14, 2008, attended by members of the five Inuit Knowledge Study working groups. The key themes of transportation (marine and rail), caribou, marine mammals, and socio-economic issues were discussed and minutes recorded.
- A five-day workshop jointly held by Baffinland and the QIA at Mary River the week of September 12-18, 2010, with community representatives selected by the QIA. The workshop focused on community perspectives on the significance of predicted impacts on caribou, marine mammals and land use.

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- Feedback of concerns raised with the significance determinations presented in the DEIS.
- Baffinland has integrated a summary of the significance determination within each of the individual effects assessments in Mary River Project FEIS Volume 4 through Volume 8 while Volume 9 presents the cumulative environmental effects assessment. The approach in this EIS was to present the evidence clearly and in the manner requested in the Guidelines (NIRB 2009).

G.3 Residual Effects Predicted at Planned Closure

Using the methodology presented in Section G.2, the predicted residual impacts were assessed and the associated consequences were evaluated for each impact to a VEC or VSEC. Although no significant adverse residual effects were predicted for the Project at planned closure, this section provides a summary of all predicted residual impacts that were expected to exist during closure and beyond the closure of the Project site for both VECs and VSECs.

Residual impact criteria (e.g., direction, magnitude, reversibility, etc.) noted in the following sub-sections are defined in Section G.2. Complete details including the environment consequence calculations, residual impact criteria classification, probability of occurrence and level of confidence all VECs and VSECs are presented in Volume 4 through 8 of the Mary River Project FEIS. The EIS was updated to account for the Early Revenue Phase.

G.3.1 Atmospheric Environment

Air Quality

Residual effects air quality effects are those that remain when all mitigation options have been incorporated into the Project design and operation. The criteria identified in Table G-4 were used to rate the effects on air quality of these residual effects from project activities. These criteria are consistent with but differ slightly from the assessment criteria defined in Section G.2, having been modified to account for the nature of air quality effects. The overall rating as presented in Table G-5 is a professional judgment based on consideration of the magnitude in relation to indicator thresholds, the geographic extent, the duration, the frequency, the reversibility of the effects, and the certainty and probability of the occurrence.

Table G-4: Residual Effect Rating Criteria Used for the Air Quality Assessment

Criteria	Rating Term	Definition
Magnitude	Level I	The expected emission, ambient concentration, or deposition is less than the background value; is less than 10 % of the indicator threshold; or the associated change is less than 5 %
	Level II	The expected emission, ambient concentration, or deposition is more than the background value; is less than the indicator threshold; or the associated change is greater than 10 %
	Level III	The expected emission, ambient concentration or deposition is predicted to exceed the indicator threshold
	Level I	The expected measurable changes are confined to the LSA

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Table G-4: Residual Effect Rating Criteria Used for the Air Quality Assessment

Criteria	Rating Term	Definition
Geographic Extent	Level II	The expected measurable changes extend beyond the LSA
Duration	Level I	The predicted effect persists briefly - no longer than several hours or several days per year
	Level II	The predicted effect persists for the duration of the project phase
	Level III	The predicted effect persists beyond the duration of the Project
Frequency	Level I	Predicted effects occur only a few hours a year due to variable exposures from meteorological variability
	Level II	Predicted effects occur during clearly defined seasons
	Level III	The predicted effect occurs continuously and/or is associated with annual averaging periods
Reversibility	Level I	The predicted effect is reversible after the activity ceases
	Level II	The predicted effect is reversible with cost/effort when the activity ceases
	Level III	The effect cannot be reversed
Qualifiers		
Certainty	High	Baseline data are comprehensive; predictions are based on quantitative data; effect relationship is well understood
	Medium	Intermediate degree of confidence between high and low
	Low	Baseline data are limited; predictions are based on qualitative data; effect relationship is not well understood
Probability	Unlikely	Less than 20 % likelihood of occurrence
	Moderate	Between 20 and 60 % likelihood of occurrence
	Likely	Over 60 % likelihood of occurrence

Table G-5: Effects Assessment Summary for Air Quality

Potential Effect			Evaluation Criteria				
Project Activity	**Direction and Nature of Interaction**	**Mitigation Measure(s)**	**Magnitude**	**Duration**	**Frequency**	**Extent**	**Reversibility**
Construction and Closure Phases	Negative: increased concentrations of CACs	Best practices to minimize air emissions	Level III for: TSP, metals, TSP deposition, PM_{10}, and $PM_{2.5}$	Level III for TSP Deposition Level II for all other parameters	Level III	Level I	Level III for TSP deposition Level I for all other parameters
			Level II for all other CACs and PAI	Level II	Level III	Level I	Level I
Post Closure Phase	Negative: increased concentrations of CACs	Best practices to minimize air emissions	Level I for: TSP, metals, TSP deposition, PM_{10}, and $PM_{2.5}$	Level III for TSP Deposition Level II for all other parameters	Level II	Level I	Level III for TSP deposition Level I for all other parameters

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Table G-5: Effects Assessment Summary for Air Quality

Potential Effect			Evaluation Criteria				
Project Activity	**Direction and Nature of Interaction**	**Mitigation Measure(s)**	**Magnitude**	**Duration**	**Frequency**	**Extent**	**Reversibility**
			Level I for all other CACs and PAI	Level II	Level II	Level I	Level I

NOTE(S):

1. CACs = CRITERIA AIR CONTAMINANTS [TSP, PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO].

The project residual effects to air quality can thus be summarized as: the ambient concentrations of the air quality parameters are at a Level I or II for all phases of the Project. Concentrations in excess of the thresholds are predicted to generally be confined to the LSA, and the effects are fully reversible. The residual air quality effects are predicted to be not significant.

For the Post-Closure phase, it is expected the primary sources of dust emissions will be eliminated (with the exception of monitoring site visits) and therefore the closure criteria for Air Quality related to dust deposition (e.g., Mean TSP concentrations less than 60 µg/m^3 annual and 120 µg/m^3 24 hr average or site-specific risk-based criteria) are expected to be met.

Noise and Vibration

Impacts from the significant noise and vibration producing activities such as on-site demolition activity, on-site equipment operation and air traffic are not expected to occur beyond the closure phase. During active closure of project facilities, including the Mine Site and ports, and transportation links such as roadways and the railway, may generate substantial amounts of noise that can affect human receptors and other VECs such as wildlife. However, the duration of these events is expected to be short-term, the frequency of effect is occasional and the effect is reversible. Based on this, the effect is anticipated to be not significant.

G.3.2 Terrestrial Environment

Landforms, Soils and Permafrost

Geotechnical investigations have been conducted across the PDA. Investigations and assessment has found construction and mining activities have the potential to create potential changes to sensitive landforms but the residual effect is not predicted to be significant. The residual effects related to sensitive landforms are assessed as:

- The magnitude of the effects is a change will not be distinguishable from natural variation and will be within regulated values (Level 1).
- The extent of the effects will be confined to the PDA (Level 1).

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- The frequency of how often the effect occurs will be negligible as the mitigative measures will ensure that no effects occur (negligible).
- The duration is the length of time over which a Project effect will occur which will be negligible as there is negligible frequency (negligible).
- The reversibility is the likelihood of the sensitive landforms to recover from the effect will be negligible as there is negligible frequency and duration (negligible).
- While soils will be disturbed and there will be residual effects, soils are important as a matrix for vegetation and wildlife habitat which are assessed later in this subsection.
- As changes are expected to be limited to within the PDA, the potential residual effect to permafrost is predicted to be not significant.

Vegetation

The assessment of the Project's effect on vegetation is based on three measurable parameters: vegetation abundance and diversity; culturally valued vegetation; and vegetation health. For the purpose of quantifying the effects of the Project at planned closure, three assumptions are made to simplify the assessment:

- New disturbance within the footprint of the Project will remove all vegetation within the entire PDA for the life of the Project.
- All land is terrestrial habitat and, therefore, is potentially vegetated; though much of the RSA is considered barren or sparsely vegetated.
- Regeneration of the disturbed area is a slow process and will not occur until beyond the life of the project.

Loss of vegetation within the PDA is a residual effect — it is not expected that disturbed areas will become re-vegetated until after closure of the mine. Some of the mine footprint may never return to baseline conditions. This includes blueberries which are considered culturally valued vegetation. However, since effects are expected to be limited to the PDA, any changes to vegetation abundance and diversity (including culturally valued vegetation) occurring outside of the PDA due to dust, NO_2 emission or N deposition are expected to occur at a small magnitude and extent. Consequently, there is high confidence that project related activities will have a not significant effect on vegetation abundance/diversity and culturally-valued vegetation at the scale of the RSA.

Regarding vegetation health, during project construction, operation, and closure activities, it is predicted that annual dust deposition could occur outside of the PDA beyond the 55 g TSP/m²/a threshold level, which may have an effect on the health of vegetation communities. It is estimated that those effects would be limited to a small portion of vegetated areas in the RSA (<0.01 %), and small proportion of each vegetation class (<0.01 %) relative to their individual availability in the RSA. The effects would be reversible

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when the dust-producing activities cease after project closure. When the air emissions and nitrogen deposition cease at project closure, the effects of nitrogen additions to the ecosystems will persist. This can result in long-term effects on plant community composition and individual species resilience. The prediction is that those effects will be limited to only small proportions (<0.1 %) of the more sensitive vegetation classes within the RSA. Metals contained in dust will likely accumulate to some degree in soils beyond the PDAs, although the affected area is expected to be relatively small in comparison to the RSA. Plant responses to metals in soil are extremely varied and dependant on the species in question, but are primarily determined by soil pH. Since soil and substrate pH were found to be in a neutral range of 6 to 7.5 (based on baseline results) within the Project study area, bioavailability of metals is expected to be maintained at low levels, thereby minimizing or preventing potential phyto toxic effects. The prediction is that any effects will be small in extent and could be minimized by several monitoring and mitigation measures. Based on this there is moderate confidence that project related activities will have a not significant effect on plant heath within the Regional Study Area.

It is noted the prediction confidence is moderate for the effects on vegetation health. Thresholds have not been developed for dust effects on plants, and the literature acknowledges a lack of data of effects of atmospheric emissions and its effects on Arctic vegetation. The effects levels are an estimate based solely on available literature, much of which is based on research, and little in Arctic communities. The potential effects of metals on plants either from aerial deposition or uptake from soils are highly dependent on site-specific conditions and the plant species themselves. Under near neutral pH soil conditions such as those found in baseline soil studies, a significant barrier to metal uptake typically exists that prevents metals from being bioavailable to plants. If metals in soil have limited bioavailability, then the potential for effects on plant health is greatly diminished. In an effort to further address this uncertainty, Baffinland in undertaking additional reclamation research on natural re-vegetation to ensure closure objectives and criteria can be met (Appendix D).

In addition, to confirm project related activities will have a not significant effect on vegetation abundance/diversity at the scale of the RSA, and to assist to further determine expected post closure conditions for vegetation adjacent the limits of the PDA, a vegetation and soil base metal monitoring program has been implemented to detect changes over time in metal concentrations of soil and vegetation (2015 NIRB Annual Report, Section 7.2.1.4 Dustfall Monitoring). The study design aligns with the dust fall monitoring program where reasonable, to include sample sites at varying distances from the PDA to compare metal concentrations in soil and vegetation between near (impacted) and far (control) sites. Based on the dust fall monitoring program, the study design for the vegetation and soil monitoring program considers three Project areas (Milne Port, Tote Road, Mine Site) at varying distances from the PDA (0–100 m; 100–1,000 m; > 1,000 m). Control site locations are those that are greater than 1000 m from the PDA. Distance categories were selected based on data from the dust fall monitoring program that indicates differences in dust fall within 100 m from the PDA and between 100-1.000 m from the PDA (EDI 2015). Beyond 1000 m, dust fall levels were generally below laboratory detection limits. Results from this study will provide further detail on the expected post closure conditions for vegetation adjacent the

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limits of the PDA. Refer to the 2017 Mary River Project Terrestrial Environment Annual Monitoring Report (EDI 2018), for further information on the vegetation and soil base metal monitoring program.

Migratory Birds and Habitat

Project-related activities could potentially alter bird behavior and cause displacement during during closure activities but activities will be confined to the Project footprint, which is relatively small in relation to the availability of suitable habitat nearby. Densities of bird key indicators (Peregrine Falcon, Snow Goose, Common and King Eider, Red-throated Loon, Thick-billed Murres, Lapland Longspur) are expected to decline within the footprint, and possibly within adjacent zones of influence. However, these changes are expected to be a result of displacement out of the affected areas and not a result of mortalities to the birds or their offspring.

Based on this, the residual effects of Project activities on bird key indicators at planned closure include habitat changes such as localized direct habitat loss and chronic disturbance; however, overall effects are not likely to have serious implications for any species' regional populations. Species abundance and habitat use will almost certainly be altered within the port footprints, and to some extent within a certain zone of influence around them as some individuals are forced out to less-disturbed neighboring areas but because of the vast amount of available suitable habitat nearby, the overall effect of the Project to the key indicators specifically, and to all bird species in general, is expected to be minimal and the effect is anticipated to be not significant.

Terrestrial Wildlife and Habitat

Closure activities have the potential to effect distribution and abundance of wildlife VECs in the RSA through planned closure. The key indicator of the Project's effects on the VEC "Terrestrial Wildlife" is caribou. During construction, operation, and closure of the Mary River Project, monitoring of caribou abundance is important for determining the effectiveness of mitigations and the precision of effect predictions. The current low population of caribou in the RSA makes it difficult to predict effects because there are so few receptors of any potential effects. Consequently, monitoring will be necessary to determine how the effects change as abundance increases. An adaptive wildlife management plan will be the key to reducing any effects of the mine on the terrestrial wildlife. Four measurable parameters were selected to allow prediction of the effects of the Project on caribou. These are: habitat, movement, mortality and health.

HABITAT

Loss of habitat within the PDA (footprint) of the project is a residual effect - Baffinland does not expect that habitat will be reclaimed (re-vegetated) within a generation of caribou or by planned closure. Sensory disturbances that reduce habitat effectiveness within a zone of influence can only be partially mitigated until post-closure. Caribou will find some project activities disturbing. It is uncertain to what degree caribou will adapt to those disturbances. However, over the entire range of the north Baffin Island caribou, habitat effectiveness is predicted to be reduced by 1.72 % during the calving season, 1.67 % during the

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growing (summer) season, and by 1.83 % during the winter season. This effect will last for the duration of the project's activities or until caribou adapt to the disturbances.

The loss of calving habitat will be entirely from disturbance (i.e. indirect effects of human presence and associated noise) associated with the mine and transportation system, and therefore is reversible at planned closure once these disturbances are removed. Of the calving areas identified from completed studies (collared females), only one calving area was identified within 1 km of the project (near the Southern Railway). Given the broad distribution of calving sites within the RSA, the assumed availability of alternative calving areas, and the minimal competition for calving areas, Baffinland is moderately confident that after mitigation the Project will have a not significant effect on calving caribou. How long the transition back to use of calving habitat close to mine infrastructure post closure is expected to be determined based on terrestrial wildlife monitoring work completed by Baffinland during Operations to further determine or confirm Project effects on caribou and their response to habitat disturbances. In 2015, terrestrial wildlife monitoring work included:

- Height-of-Land (HoL) caribou surveys
- Snow tracking surveys and snow bank height monitoring
- Incidental observations

Results from these ongoing studies will provide further detail on the transition period it would take for caribou to be re-habituated after habitat disturbances and identify any conditions to promote caribou habitat quality. Applicable findings will be incorporated into future revisions of the ICRP. Refer to the 2017 Mary River Project Terrestrial Environment Annual Monitoring Report (EDI 2018), for further information on the terrestrial wildlife monitoring program.

MOVEMENT

Alterations to the landscape that will remain post-closure are consistent with the surrounding environment and will be immeasurable features on the landscape given the rough terrain in the RSA. Transportation embankments and building foundations do not exceed the characteristics of the current landscape. The caribou population is expected to rebound and large numbers of migratory caribou, relative to current levels, are expected to return to the area. Trails that were altered because of transportation infrastructure will be re-established as caribou return to and start to move through the region again. The overall residual effect of the project on caribou movement may be that caribou travelling on five of 52 (9.6 %) known trails of may experience a barrier to their movement on those trails. This effect is expected to have a not significant effect on the movement of North Baffin caribou.

MORTALITY

There are no known features of the project that will remain post-closure that will reduce health to a level of increased mortality for the north Baffin Island caribou herd. There are no expected residual effects of

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the project on caribou mortality. Mortality, if it occurs, will be limited to individuals within the PDA. The effect of the Project on North Baffin caribou mortality is not significant.

HEALTH

No residual effects of the Project on caribou health are anticipated due to metal exposure from dustfall. Most dustfall will be associated with the Mine Site and the primary metals are relatively innocuous to caribou (FEIS, Volume 6, Section 5.2.4).

G.3.3 Freshwater Environment

Freshwater Quantity

The water component of "Freshwater quantity" refers to surface water (rivers, streams, lakes) and groundwater, however, groundwater quality is generally not considered to be at risk in the Project area because the extensive permafrost layer acts as an impermeable barrier eliminating/limiting potential migration of contaminants into the groundwater located below. Article 20 Inuit Water Rights of the Nunavut Land Claims Agreement (NLCA) formally recognizes the importance of water quantity and flow to the Inuit. Under the NLCA, Inuit require compensation if a project or activity will substantially affect the quantity of water flowing through Inuit-Owned Lands. Therefore, water quantity has been identified as a VEC with respect to hydrology. The water quantity VEC can be defined as the spatial and temporal variability of the volume of water within the RSA that may be subject to alteration by Project activities.

Potential residual effects of the Project on water quantity will be addressed under the following three (3) key issues: withdrawal, diversion, and discharge. Based on these (3) key issues related to freshwater quality, residual effect predictions results in the following:

- The Project will not have significant adverse residual effects on the under-ice water volume of water. All withdrawals meet DFO guidelines for the Regional Study Area.
- Withdrawal will not have significant adverse residual effects on the outflow of water from waterbodies. Magnitude threshold will be exceeded at only one location, 3 km Lake within the Steensby LSA, during June and September; however, the extent of the effect is minor relative to the entire LSA and will occur only while access is being established to ST347 Lake, the permanent water source for the Steensby Port. All withdrawals are within thresholds.
- The Project will not have significant adverse residual effects on water quantity resulting from water diversion. Magnitude threshold will be exceeded in several cases within the Mine Site and Steensby Port LSAs; however in all cases the extent of the effects is minor relative to the applicable LSA. The majority of these diversions do not alter total water quantity; they merely redistribute the water.
- The Project will not have significant adverse residual effects on water quantity resulting from effluent discharge. Magnitude threshold will be exceeded in several cases within the Mine Site LSA; however, in all cases the extent of the effects is minor relative to the applicable LSA. The majority of these discharges do not alter total water quantity; instead, they redistribute during it.

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- Based on this, the Project is not predicted to have significant adverse residual effects on Water Quantity resulting from combining the Key Issues of Water Withdrawal, Diversion and Discharge. In all cases the relative extent of the effects is minor as they redistribute rather than alter the total quantity. The Level of Confidence in all Water Quantity significance ratings is either moderate or high, based on an assessment of the quality of available information used to evaluate the residual effects for each watershed.

Water and Sediment Quality

For the same reason "Water Quantity" is important to Inuit values and selected as a VEC, so is "Water and Sediment Quality". Water and sediment quality is an essential component of the aquatic environment with the potential to affect the food chain, fish and fish habitat, and local residents. Project-related effects on sediment quality were primarily assessed qualitatively due to limited data availability, limited information on hydrodynamics, hydraulics, transport and conversion of potential contaminants, and limitations in accurately predicting future effects on sediment quality. In most instances, effects on sediment quality were assessed using surface water quality VEC as a proxy. Residual effects on water quality were considered likely to induce a similar residual effect on sediment quality.

Effects on the surface water and sediment quality VEC were assessed in accordance with the methodology outlined in Section G.2. VEC-specific modifications were made to the general methodology, which are highlighted below to determine residual effects:

- Regional and local study areas were determined
- VECs, Key Indicators and Thresholds were identified
- Project activities that could affect surface water and sediment quality were identified
- Project interactions with, and effects on, the surface water and sediment quality VEC were identified
- Linkage evaluations were performed outlining potential effects related to various phases of the Project (Construction, Operation, and Closure) and Project LSAs (Milne Port, Milne Inlet Tote Road, Mine Site, Railway Alignment, and Steensby Port)
- Mitigation measures were identified to avoid or reduce the potential effects during the various phases of the Project
- Residual effects and their relative significance were identified for the surface water and sediment quality VECs
- Long-term monitoring programs were identified to distinguish Project-related impacts from natural variability, in order to verify impact assessment predictions and to meet compliance/conformance criteria
- Based on this methodology, residual effects of Project infrastructure and activities were assessed with a focus on mine contact water that will be discharged into the freshwater environment at planned

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closure and 'other water discharges' that have potential residual impacts that may remain at planned closure

Mine Contact Water Discharges Post-Closure

Project-related emissions of mine contact water may result in impaired surface water and sediment quality in the Mine Site LSA. Management of storm water and process water that has been in contact with the iron ore (mine contact water) is required at the Mine Site. The following sources have been identified for inclusion in the aqueous point source emissions residual effect assessment because they involve mine contact water that will be discharged into the freshwater environment at planned closure:

- Waste Rock Stockpile runoff to Camp Lake and Tributaries
- Pit lake water and waste rock discharges to Mary River in post-closure

The rationale for the residual effects ratings for these two (2) mine contact water discharges is provided below. Given the variability in runoff flows, the ponds were sized to accommodate the two-year extreme event. Discharge is anticipated to be distributed evenly with the natural flows from approximately mid-June until September. Water quality modelling in the Life-of-Mine Waste Rock Management Plan (Appendix 4 and 5, BAF-PH1830-P16-0031) indicates that the waste rock stockpile and open pit area runoff water will not contain concentrations of metals in excess of discharge requirements based upon the MDMER. In addition, ammonia and nitrate in runoff are not expected to cause receiving water impacts or regulatory exceedances. However, in the event that ongoing water quality modelling or field monitoring shows a trend toward exceedance of discharge requirements, then water treatment facilities will be constructed. Details regarding theoretical treatment options are provided in the Life-of-Mine Waste Rock Management Plan (Section 3.6.4, BAF-PH1830-P16-0031) and were considered for both metal and ammonia/nitrate removal. Theoretical treatment options for metals removal included:

- Resins
- Polymer Addition
- Sodium Hydrosulfite Treatment
- Ozonation
- Biofilters-Sulphide Precipitation
- Activated Carbon
- Lime Precipitation

Theoretical treatment options for ammonia/nitrate removal include:

- Biological De-nitrification (for removal of both ammonia and nitrate)
- Ion Exchange

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- Electro-Chemical Ion Exchange
- Breakpoint Chlorination of Ammonia
- The main findings of the Life-of-Mine Waste Rock Management Plan suggest that, with sufficient storage and upstream control, any water quality issues that arise can be managed. See Life-of-Mine Waste Rock Management Plan (BAF-PH1830-P16-0031) for further discussion on theoretical treatment options (Section 3.6.4) and water quality modelling results for the waste rock pile and open pit area runoff water (Appendix 4 and 5).
- In addition to upstream controls such as water treatment which are outlined above, other upstream control methods such as diversion ditches (which can reduce water volumes and contact) and settling/buffer ponds are potential options to address water quality issues. If the only challenge with the water quality is TSS concentration, this will often be solved using retention time alone. With a buffer pond that has a sufficiently large retention time it is possible to allow particles to settle while discharging - either by gravity or pumping - in a continuous system.
- The PAG waste rock will be covered with a layer of non-PAG material up to 50 m thick. If water quality issues are observed, modifications to the design, components and thickness of this cover would also bean effective upstream control for limiting infiltration mass loadings from the PAG material.

All mine contact water (including that from the ore stockpiles) in the Milne Port and Steensby Port LSAs is discharged to the ocean; their potential effects are assessed as part of consideration of the Marine Environment (Section G.3.4).

Waste Rock Stockpile Runoff to Camp Lake and Tributaries

The mass balance modelling indicates that several parameters will have Level II magnitude effects to water quality under both mean and low flow conditions at the nearest downstream location inhabited by fish at L0, and in Camp Lake (Hazard Quotient - HQ of >1 and <10). An HQ >10 and <100 was applied for mercury using 90th percentile baseline concentrations. All other parameters are at Level I or lower. Each of the metals showing an HQ >1 (a Level I effect) or HQ >10 (a Level II effect) is identified in the humidity cell testing as having >50 % non-detects, and half the detection limits were assumed for non-detect results. Consequently, the derived source terms for these metals are substantially based on the analytical method detection limits (MDLs). Most of these same parameters (including arsenic, cadmium, chromium, mercury, selenium and silver, as well as other metals that do not trigger a Level I effect) have measured baseline concentrations that are mostly non-detect, and therefore the calculated mean or 90th percentile concentrations are substantially based on MDLs. On this basis, the assignment of a Level II magnitude rating for water and sediment quality effects arising from discharge of stormwater from the west waste rock pond to the Camp Lake tributaries and Camp Lake is considered to be highly conservative. Baffinland is exploring options for re-testing or additional testing to obtain a dataset of more precise measurements for these parameters.

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Discharge of mine contact water from the Waste Rock Stockpile into the lower reach of Camp Lake tributary L1 may be required during the Operation, Closure and post-closure phases of the Project and therefore a Level III duration rating was assigned. The frequency of the potential effect will be annual, limited to the period between June and September therefore a Level II frequency rating was assigned. The extent of the potential effect is expected to be limited to the Mine Site freshwater LSA and to reach negligible levels where Camp Lake discharges into Mary Lake therefore a Level I extent rating was assigned. The potential effects are anticipated to be partially reversible therefore a Level II reversibility rating was assigned. See Appendix H for freshwater quality predictions applicable to discharges of mine contact water from the Waste Rock Stockpile into the lower reach of Camp Lake in post-closure and how they relate to water quality standards based on FEIS and its Addendum, Volume 7, Section 3.4.

Based on these ratings, discharge of mine contact water from the Waste Rock Stockpile into the tributary of Camp Lake is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA.

Pit Lake Water and Waste Rock Discharges to Mary River in Post-Closure

At the end of mining, the open pit will gradually fill with water from precipitation; time is estimated at 85 to 147 years, depending on annual precipitation, evaporation and other factors (Knight Piésold, 2008). During the years that the pit is filling, runoff will continue to discharge to tributary F0 and the Mary River from the Waste Rock Stockpile. AMEC (2012) developed water quality estimates for pit water for the final year of mining (Year 21), which were applied in a water quality model under the assumption that, once the pit has filled, in each subsequent (post-closure) year all precipitation into the open pit will accumulate and spill over the southwest edge facing the Mary River, behaving like a spillway, and that water will be released during the open water period according to the natural hydrograph.

Mass loading modelling carried out indicates that Level I magnitude effects to water quality will occur under low flow conditions, with a calculated HQ between 1 and 10 for mercury, selenium and silver. It is noted that an HQ >10 was calculated for mercury within the F0 tributary, upstream of fish; however, since the assessment of water and sediment quality is based on fish as the receptor, the effects assessment considers the resultant water quality at fish habitat within the Mary River, where all parameters have an HQ value less than 10.

The effects associated with the discharge of pit water and waste rock runoff into the Mary River are permanent and therefore a Level III duration. The waste rock seepage may run off into the Mary River starting in the first year post-closure, whereas the pit water is not expected to discharge to the Mary River until the pit fills, after 80 years or more for natural infilling, and as short as two years if pumping infilling is used. It should be noted, that post-closure monitoring is only scheduled for the first fifteen (15) years after closure activities. In the event reclamation research and operational monitoring indicated that closure criteria related to pit water and waste rock runoff into the Mary River cannot be met in that timeframe, post-closure monitoring programs will be re-evaluated and updated.

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The frequency of the potential effect will be annual, limited to the period between June and September when exploration drilling is scheduled and therefore a Level II frequency rating was assigned. The extent of the potential effect is likely to be limited to the Mine Site freshwater LSA therefore a Level I extent rating was assigned. The effects associated with the discharge of pit water and waste rock runoff into the Mary River is partially reversible therefore a Level II reversibility rating was assigned. See Appendix H for freshwater quality predictions applicable to pit lake water and waste rock discharges to Mary River in post-closure and how they relate to water quality standards based on FEIS and its Addendum, Volume 7, Section 3.4.

Based on these ratings, discharge of pit water and stormwater from the Waste Rock Stockpile into the Mary River is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The Level of Confidence is Medium, due to the assumptions made in the mass loading models and the consequently highly conservative nature of the effect prediction.

It is noted Baffinland recognizes there is potential uncertainty with waste rock and open pit discharge predictions. In an effort to address this uncertainty, Baffinland in undertaking additional reclamation research on Waste Rock Stockpile and Open Pit discharges to ensure closure objectives and criteria can be met (Section 5.1.1).

In addition, based on pit water quality for Year 21 of mining, it is possible the water will have a pH of around 4.2, which is outside of the pH range of the MDMER (6.0 to 9.0). If required, adjustment of pH will be carried out periodically through closure using either batch lime treatment or in-line treatment, drawing down the pit lake periodically. The mass loading modelling carried out is based on conservative assumptions and Baffinland is continuing to study the geochemistry of waste rock and ore to further refine predictions and management plans. If reclamation research and operational monitoring of the geochemistry of waste rock indicate pit water quality is reasonably certain to have a pH range outside of the MDMER, then the ICRP will be updated to reflect proposed treatment approach. The most commonly used commercial process for treating metal contaminated mine drainage is lime precipitation where an aqueous solution of $CaCO_3$ precipitates metals as solid hydroxides which are then removed as a sludge. Although several other processes are also possible for metal removal, in this situation the simplicity of the system operation is a key requirement and as such lime treatment is the preferred technique as this is the simplest most reliable operation. See Life-of-Mine Waste Rock Management Plan (Section 3.6.4.1, BAF-PH1830-P16-0031) for further discussion on lime precipitation and proposed treatment options.

OTHER WATER DISCHARGES POST-CLOSURE

In addition to the aqueous point source emissions discharged into the freshwater environment at planned closure, there may be remaining infrastructure and activities that were widespread or had non-point source discharges that have potential residual impacts that may remain at planned closure. The effect of these non-point source emissions were assessed in a qualitative manner on a Project-wide basis rather than assessing residual effects for each individual water body. These activities included: ground preparation and earthworks, site water management, laydown areas, quarries and borrow areas,

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tunnelling and rock cuts, camps and fuel management, water use and management, and airstrips and airstrip use. Based on this approach, it was found project activities resulting in non-point source discharges may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs, however with appropriate use of mitigation measures, monitoring and adaptive management, this is not anticipated to result in significant adverse residual effects on water (freshwater) or sediment quality. This significant determination is generally based on the effect confined to the LSA, the effect being fully or partially reversible after activity is complete, and the effect is expected occur greater than threshold value(s) only rarely or is expected to occur intermittently or continuously within threshold values. See Appendix H for freshwater quality predictions applicable to other water discharges post-closure and how they relate to water quality standards based on FEIS and its Addendum, Volume 7, Section 3.4.

Freshwater Biota and Habitat

Closure activities have the potential to effect distribution and abundance of freshwater biota and habitat in the RSA. Arctic Char was identified as the key indicator for the "Freshwater Biota and Habitat" VEC. Potential linkages between the Project components/activities and Arctic Char fall into three key issues:

- Key Issue #1: Potential effects on the health and condition of Arctic Char
- Key Issue #2: Potential effects on their habitat
- Key Issue #3: Potential effects on their direct mortality.
- Based on these three (3) key issues, it was determined overall the Project will not have significant adverse residual effects on Arctic Char. The Project will cause residual effects across the five LSAs, but the effects will be confined to these areas or portions of these areas, the magnitude of residual effects is predicted to be Low or Medium, and effects are expected to be reversible. The specific characteristics that were considered related to the three (3) key issues are further descried briefly below. For further detailed discussion on potential effects on distribution and abundance of freshwater biota and habitat in the RSA, please refer to FEIS and Amendment No.1, Volume 7, Section 4.5.

Health and Condition

Potential effects on Arctic Char health and condition relate to changes in water quality, which may occur from the Construction through to the Closure phases in relation to aqueous discharges and due to dust deposition. The water and sediment quality assessment (FEIS and Amendment No.1, Section 3.4.2.3) indicates there will be residual effects due to introduction of dust to surface waters during the Construction, Operation, and Closure phases. The greatest deposition of TSP predicted in the air quality modeling (FEIS Amendment No.1, Figure 5-2.2, Volume 5) is predicted to occur in Catchment MI-02, which does not support Arctic char. Further, the greatest dust deposition would occur in drainages that report to Milne Inlet or the lower reach of Phillips Creek. Available information indicates limited (or possibly no) Arctic char usage of Phillips Creek and unsurveyed streams in the dust deposition area are expected to

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provide no habitat, or marginal habitat at best. The risk of exposure of Arctic char to dust-related effects on water quality is therefore limited.

In general, for the Milne Port LSA, waterbodies located within the dust deposition zone are largely devoid of Arctic char with the possible exceptions of Phillips Creek, Stream M2-1, the lower reaches of streams M3-3 and M11-1 (all potential habitat), and tributary streams west and east of Phillips Creek that have not been surveyed (FEIS Amendment No.1 Figure 7-4.2). Streams M3-4 through M4-7 draining into the west bank of Phillips Creek and streams M4-8 through M4-10 draining into the east bank of Phillips Creek have not been surveyed but a determination of Arctic char habitat potential was made based on air photo interpretation. Streams M3-4 through M3-6 are ephemeral streams with no potential habitat. The very downstream end of Stream M4-7 is just inside the predicted dust deposition zone. This stream drains several upstream lakes, at least one of which may be deep enough to support Arctic char overwintering. It is probably an intermittent stream, at least near its confluence with Phillips Creek, where it may provide seasonal juvenile rearing habitat. Overall, the stream likely provides only low quality habitat in its lowest reaches and is poorly connected to potential upstream lake habitat. Lake ML-23, the most downstream lake in the M4-7 drainage is outside of the predicted zone of dust deposition and is too shallow to provide overwintering or spawning habitat. Stream M4-8 is a small ephemeral stream and M4-9 and M4-10 are probably intermittent, at least in their lower reaches. Of these latter streams, neither is connected to upstream lakes with fish habitat potential. Both streams are poorly connected to Phillips Creek at their confluences and fish passage would likely be difficult or impossible except during periods of high flow. All of these streams are expected to provide no habitat or marginal habitat at best. Farther upstream, a larger unnamed tributary flows into the west bank of Phillips Creek, approximately 1 km downstream of the impassable falls on Phillips Creek. The lower portion of this stream falls within the predicted dust deposition zone from haul traffic along the Milne Inlet Tote Road. This stream has not been surveyed, as it contains small lakes within its watershed, examination of air photos suggests that it would support marginal habitat at best, due to poor connectivity between upstream habitat and Phillips Creek at all but high flows.

The lower reach of Stream M11-1 was identified as potential Arctic char habitat during the baseline studies, although no fish were captured. As the freight dock footprint will be placed on stream M11-1, the area has been considered to be lost and is not assessed further here.

Introduction of particulate dust to surface waters for the Milne Port LSA is predicted to cause negligible to small (within an order of magnitude of water quality thresholds) increases in TSS and metals associated with the ore dust. The water quality assessment (FEIS and Amendment No.1, Section 3.4.3.3) indicates that increases would occur largely during spring freshet and would therefore occur over a short period. No effects of dust on sediment quality are predicted in FEIS Amendment No.1 Section 3.4.3.3 due to the limited amount of settling predicted. Available information indicates limited (or possibly no) usage of Phillips Creek and streams M2-1, M3-3 and M11-1 by Arctic char, and unsurveyed streams in the dust deposition area are expected to provide no habitat or marginal habitat at best. The risk of exposure of

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Arctic char to dust-related effects on water quality is therefore limited. Overall, the residual effects of this pathway have been ranked as low magnitude (Level I), frequent (Level II), confined to the LSA (Level I), of medium term duration (Level II), partially reversible (Level II), and is predicted to be Not Significant.

For the Mine Site LSA, the greatest effects are predicted to occur within small tributaries to Camp and Sheardown lakes in relation to dust deposition and for Camp Lake Tributary 1, due to both dust deposition and discharge from the Waste Rock Stockpile. Water quality effects are also expected in Camp and Sheardown lakes, most notably near tributary mouths. Mary River may also experience exceedances in CCME PAL guidelines during Operation, Closure and Post-Closure due to dust deposition and the discharge of effluents and runoff. The magnitude of residual effects on Arctic Char health and condition will range from Low in Mary River to Medium in tributaries to Camp and Sheardown lakes due to cumulative effects of the Project on water quality. Effects will also vary over time, with the largest effects occurring in the Operation phase during spring freshets, when dust introduction will be greatest, and during periods of effluent discharge. Effects related to runoff from Waste Rock Stockpile and pit water release (after the pit has filled) will extend into the post-Closure period. These range from short-term (due to dust generation during active vehicle movement and infrastructure demolition) to long-term duration (although it is expected the major sources of dust emissions will be eliminated and closure criteria for Air Quality related to dust deposition are expected to be met, some dust sources may still exist post-closure). Effects are expected be confined to the LSA, and will be reversible with the use of reclamation approaches (e.g., natural re-vegetation). See FEIS and Amendment No.1, Section 4.5 for further discussion.

HABITAT

Potential effects on Arctic Char habitat include increased sedimentation rates, loss of habitat to Project footprints in waterbodies, water withdrawals, alterations in water levels and flows due to diversions that may reduce the amount of available habitat, and collectively, reduction of productive capacity in streams and lakes due to all of these effects pathways. Following mitigation, residual effects on Arctic Char habitat are expected to be a small to moderate reduction in the amount and productive capacity of habitat in LSA waterbodies, most notably in smaller tributaries to Camp and Sheardown lakes. Effects will be of moderate or long-term duration, limited to the LSA, and reversible.

MORTALITY

No residual effects on direct mortality of Arctic Char are predicted following mitigation.

G.3.4 Marine Environment

Sea Ice

During the scoping activities, sea ice and Project-related effects to sea ice were identified as being of utmost importance to Inuit as it relates to their culture, as well as to animals that rely on ice. Therefore, sea ice was identified as VEC. A number of pathways were identified through which construction, operation, and closure activities would interact with sea ice. These include:

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- Disruption of landfast ice at Steensby Port during construction activities, including on-ice construction activities.
- Treated wastewater discharge during construction and operation of the Project.
- Disruption of landfast ice at Steensby Port and Milne Port due to dust deposition on the ice surface.
- Disruption of pack ice through Hudson Strait and Foxe Basin by icebreaking ore carrier passage.

It is noted given the timing for shipping from Milne Port, the ERP will not involve any components that interact with Sea Ice or Landfast Ice. Consequently there will be no effects on this VEC.

Based on a residual effects assessment, annual icebreaking activity represents the residual effects on sea ice. There is potential for the physical alteration of a maximum cumulative annual total of 136 km^2 of landfast ice within Steensby Inlet. This represents 4.0 % of the landfast ice within the Inlet and less than 0.5 % of landfast ice within Foxe Basin and the RSA. This effect is an unavoidable result of shipping at Steensby Port. Effects on integrity of the landfast sea ice from shipping are predicted to be "not significant" because they will be small in magnitude, confined to within the LSA, long in duration, and fully reversible following Project closure. There is no predicted residual effect to sea ice in post-closure.

Water and Sediment Quality

For the same reasons "Water and Sediment Quantity" in the Freshwater Environment is important, so is "Water and Sediment Quantity" in the Marine Environment and therefore it was identified as VEC. A number of pathways were identified through which closure activities would interact with Water and Sediment Quantity in the marine environment. These include:

VESSEL TRAFFIC (ICE-FREE SEASON ONLY)

Vessel traffic during the closure phase is not anticipated effects to TSS, nutrient, or metal concentrations in the water or sediment due to resuspension of substrates from propeller currents as it is expected that the seafloor will have stabilized by planned closure. In addition, there are no anticipated increases in hydrocarbon concentrations in water or sediments assuming normal vessel operations. It is assumed all ships will comply with the Anti-Fouling Systems Convention and will not introduce tributyl-tin to the environment. Based on this, vessel traffic is expected to have negligible or no effect on water or sediment quality during the Closure Phase of the Project.

DISCHARGE OF BALLAST WATER

The environmental effect of the discharge of ballast water during planned closure includes potential localized temperature threshold exceedances and/or localized reduction in nutrient concentrations in water. However, mitigative measures require the ballast water to be exchanged in nutrient poor areas of the high seas (according to the Ballast Water Control and Management Regulations administered under the Canada Shipping Act), and is expected to be discharged over a large area (e.g., within protected waters). Based on this, the environmental effect of the discharge of ballast water during planned closure will be of low magnitude (Level 1), confined to areas within the LSA (Level 1), infrequent (Level 1) of short

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duration (Level 1) and fully reversible (Level 1). The environmental effect of the discharge of ballast water on water and sediment quality in Milne Inlet is predicted to be "Not Significant".

Wastewater and Site Water Discharge

The environmental effect of the discharge of wastewater and site runoff (oiled site water, and overland runoff) may cause potential increases in BOD and concentrations of TSS, nutrients, metals, and hydrocarbons in the water and nutrients, metals, and hydrocarbons concentrations in the sediment. However, all discharges of wastewater, oiled water, and contact water will be monitored to ensure they meet the respective guidelines prior to discharge. Although not expected, in the event respective guidelines are not met based on monitoring/testing results, the water will be treated prior to discharge similar to current operational practices. Following closure, discharges of wastewater, oiled water and contact water will cease.

Based on this, during closure and post-closure activities, the environmental effects of wastewater and site water discharges to Milne Inlet will be low magnitude (Level 1), confined to within the LSA (Level 1), frequent (Level 2), of short duration (Level 1), and reversible (Level 1). The environmental effect of wastewater and site water discharges to the Marine Environment is predicted to be "Not Significant".

Freshwater Biota And Habitat

Closure activities have the potential to effect distribution and abundance of marine biota and habitat in the RSA. Arctic Char was identified as the key indicator for the "Marine Biota and Habitat" VEC. Arctic char are seasonally abundant in marine coastal waters, and are of value as a cultural, subsistence and commercial resource.Potential linkages between the Project components/activities and Arctic Char fall into two key issues:

Marine Fish Habitat

During closure activities, potential effects on marine fish habitat relate to discharge of wastewater and site drainage (Increase TSS, alter sediment composition, alter productive capacity), barge and ship traffic (ice-free season only) (no change in TSS, sediment composition, or productive capacity), noise disturbance due to infrastructure removal and vessel activities (avoidance by fish), and ballast water discharge (water temperature and water-borne nutrient concentration change, decrease in benthic productivity). It is expected that the magnitude of these residual effects will be low (Level I). Project activities leading to residual effects on water quality (short-term water quality guideline exceedances) would be reversible and related effects on marine habitat (e.g., changes due to ballast water) are also expected to be reversible. Based on this, the Project will have no significant adverse residual effects on marine fish habitat.

Arctic Char Health and Condition

During closure activities potential effects on anadromous Arctic Char health and condition relate to habitat-related effects (including the loss of a negligible amount of habitat contained within infrastructure footprints), possible reduced benthic productivity due to ballast water discharge, and possible avoidance

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of a small area around the dock sites due to underwater noise. It is expected that these effects will be contained to within the respective LSAs, and would be of small consequence in the context of feeding habitat available within Milne and Steensby Inlets. These effects are expected to be reversible. Project activities are expected to cause no direct mortality (e.g., fishing by employees will not be permitted) or effect the size of anadromous Arctic char populations. Residual effects on water and sediment quality may result in low magnitude effects on char health and condition, but these effects are expected to be confined to within the Milne and Steensby Inlets LSAs. Project activities leading to residual effects on water quantity will be reversible and effects on Arctic char are also expected to be reversible. As such, the residual effects are predicted to be "not significant".

Marine Mammals

Based on issue scoping during development of the Mary River Project EIS, the following marine mammals were selected as an indicator species: ringed seal, bearded seal, walrus, beluga whale, narwhal, bowhead whale and polar bear. Scoping also indicated that the influences of noise on the behaviour, health, distribution and abundance of marine mammals in the LSA and RSA were of primary concern. The residual effects assessment therefore focuses on the potential effects of noise from various Project activities. Other Project activities such as the discharge of wastewater will interact with some marine mammals, but with mitigation measures in place residual effects are expected to be negligible to very minor. The approach for predicting how many marine mammals might be exposed to noise of sufficient level (and duration) that could elicit a behavioural response or cause hearing impairment is intended to provide guidance on the expected level of effect. Based on this assessment approach, the residual effects were determined as outlined below.

It should be noted there is a low level of certainty with the prediction of disturbance effects of vessels transiting marine waters on indicator species. The Marine Environmental Working Group (MEWG) will be functioning during the life of the Project to continually evaluate if there are any residual effects from Project activities on the marine environment at the Port(s). Based on current information that suggest effects on marine mammals is related to ship interaction, it is anticipated that there will be no significant residual effects at closure on the marine environment when ship interaction is removed. If operational monitoring indicates that the prediction of no significant residual effects at closure on the marine environment may be inaccurate, additional Closure and/or Post-Closure activities will be evaluated in the light of this new information. Baffinland's Marine Environmental Effects Monitoring Plan (BAF-PH1-830-P16-0046) outlines the approach for monitoring of marine mammals during Operations and results are reported back to the MEWG and reported annually to external stakeholders in via NIRB Annual Report. Monitoring results will provide input into the ongoing residual impact evaluation process as described in Section G.5.

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Ringed Seal

The Project is predicted to have no significant residual effects on ringed seals. Habitat change, disturbance, hearing impairment, masking, and mortality effects are predicted to be low magnitude and confined to the LSA.

Bearded Seals

The Project is predicted to have no significant residual effects on bearded seals. Habitat change, disturbance, hearing impairment and masking effects are predicted to be low magnitude and confined to the LSA.

Walrus

The Project is predicted to have no significant residual effects on walruses. Habitat change, disturbance, hearing impairment, and masking effects are predicted to be low magnitude and confined to the LSA. No mortality is expected.

Beluga Whale

The Project is predicted to have no significant residual effects on beluga whales. Habitat change, hearing impairment, and masking are predicted to be low magnitude and confined to the LSA. No mortality is expected. Disturbance effects are predicted to be low to medium magnitude and to occur within the LSA. There is a low level of certainty with the prediction of disturbance effects of ore carriers transiting Hudson Strait during the ice-cover period. There is also uncertainty with masking predictions. A monitoring program and an adaptive management plan will be undertaken to address these uncertainties and ensure that beluga whales do not incur significant effects.

Narwhal

The Project is predicted to have no significant residual effects on narwhals. Habitat change, hearing impairment, and masking are predicted to be low magnitude and confined to the LSA. No mortality is expected. Disturbance effects are predicted to be low to medium magnitude and to occur within the LSA. There is a low level of certainty with the prediction of disturbance effects of vessels transiting Eclipse Sound and Milne Inlet during the open-water period and with ore carriers transiting Hudson Strait during the ice-cover period. There is also uncertainty with masking predictions. A monitoring program and an adaptive management plan will be undertaken to address these uncertainties and ensure that narwhals do not incur significant effects.

Bowhead Whale

The Project is predicted to have no significant residual effects on bowhead whales. Habitat change, hearing impairment, and masking are predicted to be low magnitude and, with perhaps the exception of masking, confined to the LSA. No mortality is expected. Disturbance effects are predicted to be low to medium magnitude and to occur within the LSA. There is a low level of certainty with the prediction of disturbance effects of ore carriers transiting Hudson Strait during the ice-cover period. There is also uncertainty with masking predictions. A monitoring program and an adaptive management plan will be

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undertaken to address these uncertainties and ensure that bowhead whales do not incur significant effects.

POLAR BEAR

The Project is predicted to have no significant residual effects on polar bears. Habitat change and disturbance effects are predicted to be low magnitude and confined to the LSA. A minimal number of bears may be killed to protect humans but this would be taken out of the quota with compensation provided.

G.3.5 Human Environment

Population and Demographics

The Project will have multiple residual effects on the Population Demographics VSEC for some of the communities in the North Baffin LSA. These will affect individuals, families and communities, and may include positive as well as negative directions. Residual effects arising from in-migration and out-migration are expected to arise; however, these effects are not expected to be sufficient to cause adverse effects on demographic stability of the affected communities. Therefore these residual effects are assessed to be not significant although it is recognized that the dynamic nature of human and community interactions makes it difficult to predict the overall direction (positive or negative) and magnitude of such changes. Mitigation measures implemented by Baffinland aim to enhance the positive residual effects of the Project on this VSEC. Based on the best available understanding of the dynamics involved in these decisions, there is moderate confidence that negative residual effects will have no significant effect on Population Demographics.

Education and Training

The assessment of the Project's residual effects on life skills and on education and skills leads to a conclusion that the Project will have a significant positive effect on education and training. This is attributed to positive residual effects on life skills amongst young adults that are anticipated to arise from the Project through access to industrial work supported by pre-employment preparation and on-the-job training and beneficial residual effects on education and skills across the LSA. It is recognized that there is a potential that individuals may drop out of school or forego further education in order to work at the Project; however, the overall effect of the Project will be to increase the value of education and thereby the "opportunity cost" of dropping out of school.

This Project's residual effects on life skills and on education and skills are expected to be confined to the LSA and should have sustained benefits beyond panned closure. Given the mitigation measures that have been committed to, as described in the Human Resource Management Plan (HRMP, found in the FEIS, Volume 10F-3 December 2010 Rev 0), confidence in this assessment is high.

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Livelihood and Employment

The Project is assessed to have no significant adverse residual effects on the Livelihood and Employment VSEC. The Project will have a positive effect on wage employment in the North Baffin by introducing new job opportunities and assisting local residents to access these jobs while building capacity that will last past project closure. The Project will also have a positive effect on the ability of local residents to progress in their jobs and career choices. This effect will arise as a result of the new career paths that will be introduced to the region, from entry-level through step-by-step advancement to higher level jobs. Based on this, and with successful implementation of planned mitigation, it is assessed to have significant beneficial effects on this valued component.

Although no significant adverse residual effects on the Livelihood and Employment are predicted, it is noted stakeholders, including QIA and CIRNAC, have expressed concerns on Project effects on Inuit harvesting. In order to provide further context for this concern to make sure it is addressed appropriately in closure planning, the potential Project interactions with individuals, households, communities, and marine and terrestrial wildlife after completion of planned closure are summarized in Table G-6 below.

Table G-6: Summary of Project Interactions with Inuit Harvesting after Completion of Closure Activities

Socio-Economic Effects • Inter-community Inuit migration – This may lead to more Inuit becoming interested in hunting in a particular region (and a consequent reduction in hunting in some other region). This is predicted to be a low magnitude effect. • Improved life skills – Increased well-being associated with improved life skills could lead to a greater interest in rediscovering traditional Inuit values and activities, including perhaps a renewed interest in harvesting. This could lead to more hunting activities. • Increased household purchasing power – Those who gain income from the Project will have improved access to purchasing the gear, equipment, and supplies needed to support harvest activities of family and friends. They may or may not choose to apply their purchasing power to these ends however. If this does occur to a substantial degree, it is possible that hunting intensity may increase. Whether this leads to a change in harvesting patterns is not known—the baseline does not provide adequate insight into current harvest patterns in terms of the balance between “weekend hunters” and “intensive hunters.” • Wildlife harvesting by Inuit – Harvesting by Inuit was assessed based on the parameter of harvest quantity per level of effort, meaning the number of harvests by species, or total quantity (i.e., weight) of country food obtained, in relation to an estimated level of effort (amount of time spend hunting). Taking into consideration the results of the assessments on marine wildlife and arctic char the residual effects on harvesting were predicted to be negligible. The residual effects on caribou harvesting were predicted to be not significant because the measurable parameter was predicted to change by less than 1 % in magnitude.
Effects on Caribou • Sensory effect on wildlife – Effects includes noise and dust emissions that are limited to the zone of influence and are addressed under loss of habitat. • Caribou habitat – The Project will lead to small reductions in caribou habitat and habitat effectiveness. Assessment conclusion: We are moderately confident that Project related activities will have a “not significant” loss of habitat and a “not significant” reduction in the effectiveness of caribou habitat within the North Baffin caribou range.

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- Movement – The overall residual effect of the project on caribou movement may be that caribou travelling on five of 52 (9.6 %) known trails experience a barrier to their movement on those trails. Few caribou currently exist within the RSA, so few caribou will be affected by the mine infrastructure and activity. Assessment conclusion: We are moderately confident that Project related activities will have a "not significant" effect on traditional caribou migration on north Baffin Island.
- Mortality – There are no expected residual effects of the project on caribou mortality. Mortality, if it occurs, will be limited to individuals within the PDA. There are no expected indirect effects on the north Baffin Island caribou population as a result of hunter access.

Effects on Marine Mammals

- The small area of the dock footprints is a negligible part of nearshore habitat and therefore a "not significant" effect on marine mammal nearshore habitat in is predicted after completion of planned closure.
- As stated above, none of the Project interactions were considered to lead to significant impacts on any of the indicators related to harvesting. However, some agencies have asked how multiple "non-significant" residual effects might combine over the course of the Project. The possibility for such aggregations of residual effects is acknowledged, however, given what is known about Inuit land-use and harvesting practices the probability that any such combination would lead to a significant adverse effect on Inuit harvesting is considered to be unlikely. The following points provide a rationale in support of this conclusion:
- Households that gain access to better transportation and harvesting equipment directly or indirectly related to Project-derived income may improve their opportunity to harvest. This is important to intergenerational transfer of harvesting values, culture and knowledge to the younger generations.
- Contribution of the Project to trends related to "sharing" versus "commercialization" of harvested country food is considered to be complex and multi-directional. Some aspects of the Project may support the development of commercial harvesting activity, while others may serve to strengthen traditional sharing networks.
- To illustrate the previous point, the culture of sharing harvested food is difficult to maintain among families that are dependent on social assistance for their sustenance. The ability of members of these households to gain employment may, for some, present the ability to have enough income that groceries, money, hunting equipment, or the proceeds of harvesting can be shared beyond the immediate household. This sharing could serve to maintain and strengthen traditional sharing cultures by enabling a greater portion of the population to participate in sharing relationships.
- The Project may contribute to trends in the adoption of technology by harvesters. It will provide some households with the income they need to acquire and support this technology. This could lead to a divergence between those harvesters who have access to the technology and those who do not. However, current income differentials already exist amongst households in the LSA. Those with access to the largely public sector jobs have far more income than households who have no substantial wage income. Introduction of mine jobs may lead to improved wealth distribution in communities. Traditions of sharing equipment in exchange for country food should serve to further reduce the gap between technology "haves" and "have-nots."

The complexity of factors that are understood to affect trends in Inuit harvesting activities are highly inter-twinned with other factors affecting harvesting in the LSA. The potential for beneficial outcomes is equally or more highly anticipated than the potential for negative effects. Monitoring of specific Key Indicators that relate to Inuit harvesting—such as effects on wildlife habitat and populations and effects on employment—will be carried out as described in the Mary River FEIS. However, given the complex and

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indirect nature of many of these interactions—along with the concurrent influence of many other trends and interactions unrelated to the Project— these narrowly focused monitoring initiatives are not on their own expected to generate an integrated understanding of how Inuit harvesting may be affected from the combination and accumulation of these individual interactions. Baffinland will participate with Inuit and other agencies to support monitoring initiatives related to changes in Inuit land-use and harvesting, and associated culture and skills, by making available relevant data the Company generates.

Baffinland will also follow the outcome of socio-economic monitoring that is carried out by other agencies and companies. This will include reviewing the annual socio-economic monitoring reports to NIRB from projects such as the Meadowbank mine.

Economic Development and Self-Reliance

The overall direction of the effects of the Project on the Economic Development and Self-Reliance VSEC are assessed, with a high level of confidence, to be positive. Direct and indirect economic expansion associated with the Project will create new opportunities for employment and business across the RSA, and particularly within the LSA. The Project will enhance labour force capacity and may increase Inuit business capacity. The assessment of Project interactions on land and land use dimensions of this VSEC suggest that these effects will be multi-dimensional. No significant adverse effects on the underlying VECs are assessed. The integrated analysis of the combined effects of the Project does not lead to an assessment of adverse effects on harvesting. Considering the Project's interactions with these multiple dimensions related to Economic Development and Self-Reliance, the residual effects of the Project are assessed to be positive and significant.

It is noted at planned closure there will be a reduction of benefits flowing from the Project. Loss of employment will be partially off-set by workers' eligibility for employment insurance payments. At final closure, Project employment will cease and individuals will be eligible for Employment Insurance (EI). During their EI benefits period, former workers may seek work elsewhere, either in the local economy or in the broader job markets.

The effect of job loss on individuals and households will depend on personal circumstances. Those who take advantage of the opportunities to acquire education and improved technical skills should have better prospects for employment than those who do not. Personal money management decisions may also affect the effects of job loss. Maintaining savings, staying up-to-date on rent and utilities obligations, and other good personal finance practices will help to ease the effects of temporary or permanent term layoffs from the Project. The inclusion of money management as a component in the training and Employee and Family Assistance Program (EFAP) program is outlined in the Human Resource Management Plan.

Temporary closure and final closure will also affect local businesses that take on opportunities with the Project or serve the increased consumer demand. This is an inherent risk of business. Businesses that may be most affected will be those that develop specifically to supply the Project. Clearly, when Project

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demand ceases, these companies will either need to quickly seek out new customers, change their product or close.

Mitigation measures to enhance the capacity of entrepreneurs to make informed decisions related to risk and reward are addressed in the Human Resource Management Plan. In particular, Baffinland will support the QIA's efforts to enhance Inuit business capacity through its contribution to a business capacity and start-up fund.

Human Health and Well-Being

The positive residual effects of the Project on the Human Health and Well-being VSEC are assessed to be significant. Improved income is a major factor in this assessment, as it will improve the well-being of most children whose parents work at the mine. Some negative residual effects are expected to occur in relation to the well-being of some children arising from absence of workers from the community. These effects are not expected to reach levels that would cause significant adverse impacts on the VSEC, however, the Project will have positive and negative residual effects on substance abuse, but these are not assessed to be significant.

Community Infrastructure and Public Services

The assessment of the Project's residual effects on the Community Infrastructure and Public Services VSEC, combined with a consideration of the subjects of note, leads to a conclusion that the Project will have a significant positive impact this valued component. This conclusion is based on an assessment of no significant adverse residual effects on community infrastructure and services arising from competition for skilled workers, and on an assessment of significant labour force capacity development.

Contracting and Business Opportunities

The direction of the effects of the Project on the Contracting and Business Opportunities VSEC are assessed, with a high level of confidence, to be positive. Baffinland, through the IIBA, is committed to work closely with the QIA and will fund an initiative for capacity building that will be administered by the QIA. The company is also committed to an Inuit contracting policy adapted to the capacity of Inuit firms.

The successful implementation of these mitigation measures, and the active participation of individuals in these programs, will largely determine the significance of the Project's residual effects on contracting and business opportunities. In light of the mitigation measures adopted by Baffinland, the residual effects are assessed to be positive and significant.

Cultural Resources

The Project will involve the avoidance, protection and mitigation of archaeological sites in accordance with an Archaeological Mitigation Plan approved by CLEY, and a protection plan to reduce the potential for unintentional destruction of archaeological sites. With the implementation of both the mitigation and

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protection plans, the Project is expected to have negligible residual effect on the disturbance or removal of archaeological sites, and on the cultural resources VSEC.

Resources and Land-Use

The Project will interact with current land-use activities such as harvesting, travel and camping. Direct adverse residual effects on these activities are acknowledged. With planned mitigation described in the Key Indicator assessments these effects are predicted to be not significant. Concerns that Project effects on these Key Indicators along with other residual effects on relevant VECs and VSECs might combine to lead to adverse effects on Resources and Land-Use and on harvesting livelihoods were raised. The integrated analysis of the combined effects of the Project does not lead to an assessment of adverse effects on harvesting. The interactions are expected to be complex and highly inter-twinned with other factors affecting harvesting in the LSA. The potential for beneficial outcomes is equally or more highly anticipated than the potential for negative effects.

Cultural Well-Being

The Project will affect Inuit culture and its development through interactions with Inuit cultural values. To a large degree, these interactions will be positive. The opportunities for productive livelihoods based on self-reliance and sharing of resources, learning and sharing experience through supervisory and role-model functions and for monitoring the environment are all relevant and supportive of these values. This conclusion that productive employment is aligned with Inuit culture in the contemporary context is something that has also been expressed by Elders during community consultations.

It is acknowledged, however, that culture has many facets. Different perspectives on industrial development and its effects on culture have been heard during community engagement. Some individuals have deep concerns about the effect of ongoing economic development and expansion of the wage economy on Inuit culture. What may be a positive cultural effect for some-access to a job that enables one to provide for family and relatives-may be a negative cultural effect for someone else. For these reasons, Project effects on culture are considered to be diverse in their directions-neither positive nor negative. No significant impact is assessed.

Benefits, Royalty, and Taxation

After completion of planned closure, there will be a reduction of benefits flowing from the Project related to Benefits, Royalties, and Taxation VSEC, however though its contributions made under the IIBA, as well as payments of royalty, rents, and taxes, the Project will have a significant beneficial effect on the Benefits, Royalties, and Taxation VSEC that should last into post closure if managed appropriately. The Project is also expected to reduce social entitlement program expenditures while modestly increasing demands for discretionary social spending.

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Government and Leadership

The Project is considered to fit well with the strategic priorities identified for both the RSA and the communities of the North Baffin LSA. Through an effective governance regime in place with the signing of an IIBA and, through partnership with the Q-SEMC, Baffinland will contribute to socio-economic monitoring important to the region's leadership into closure and post-closure. Therefore, the Project is considered to have a positive and significant effect on the Government and Leadership VSEC and no significant negative impact is assessed.

G.4 Current Predicted Residual Impacts

At this time, the residual effect and impact assessment results from the Mary River EIS remain relevant as the Project is in the relatively early stages of operation and development has proceeded largely as proposed. Collection of information and data occurs on an annual basis under Baffinland's environmental monitoring program and is used to assess current site conditions for comparison to initial predictions and assumptions from the Mary River EIS. Results are reported annually to the NIRB and other relevant stakeholders (Section 2.5.2). Overall, based on environmental monitoring program results to date, Baffinland suggests the Project has provided net positive effects to the region. No significant adverse effects have been identified. It is noted however, monitoring programs are in their early stages of implementation and will provide more information after several years of operating and monitoring.

Revisions to existing predictions of residual impact assessments will be completed where significant variances are identified. Identification of significant variances includes the QA/QC; comparisons to the respective benchmark and to reference and/or baseline; and review of the data using various tools such as Exploratory Data Analysis (EDA) and Statistical Data Analysis (SDA), to determine if change is occurring. A change may be detected statistically or qualitatively, relative to benchmarks, baseline values and/or spatial or temporal trends. A change may be statistically significant, but professional judgement will also be applied using the various evaluation tools to detect a change qualitatively. If this analysis does not detect change, then no action is required. If a change is observed, then further evaluation of the data for that/those indicator(s) will be carried out to determine whether the observed change is Project-related. If the evaluation has indicated with some certainty that the measured change is Project-related, a determination of the action level associated with the observed monitoring results through comparisons to indicators or benchmarks will be conducted. As appropriate to the VEC in question, a determination of the action level associated with the observed monitoring results, and the appropriate response will align with:

- Section 5 of the Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039)
- Section 5 of the Shipping and Marine Wildlife Management Plan (BAF-PH1-830-P16-0024)
- Appendix B of Terrestrial Environment Mitigation and Monitoring (BAF-PH1-830-P16-0027)

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G.5 Ongoing Residual Impact Evaluation

In order to evaluate whether or not residual effect predictions are meeting expectations, Closure and Post-Closure monitoring and reporting will occur. Similar to Operations monitoring, Closure and Post-Closure monitoring will focus on the Project's potential effects on VECs and key indicators, and to apply the monitoring results to assess the Project`s environmental performance relative to the effects predictions.

The evaluation process involves several key steps, as follows:

- Identify the project activities that have the potential to affect a VEC/Key Indicator
- Identify the potential effects as identified in the FEIS or in subsequent environmental effects assessment processes
- Review monitoring results and conclusions to determine which predicted residual effects occurred (and other effects not predicted, if this occurred)
- Determine if the measured residual effect exceeded or differed from the predicted effect
- If the measured residual effect is different than predicted, identify adaptive management measures that can be implemented to eliminate or reduce the severity of the residual effect
- Determining whether or not ongoing monitoring is required, depending on:
    - The intended nature of the monitoring program - short- or long-term
    - Whether or not monitoring objectives have been required
    - Or if unexpected effects have required adaptive management - modifications to mitigation measures and/or monitoring programs

FIGURE G-1 provides a representation of this process ensure residual effect predictions are meeting expectations. TABLE G-7 provides a summary of the potential residual effects, by VEC and VSEC, currently identified for the Project and their associated closure and post closure monitoring programs. A review and re-evaluation of residual effect predictions, which help drive closure approach and criteria is conducted on an annual basis based on the most recent monitoring results and research available. The results of this process, are communicated to key stakeholders in the NIRB Annual Report and QIA/NWB Annual Report and applicable results are incorporated into future revisions of the ICRP. Post Closure Monitoring Programs expected to be executed in Post-Closure are detailed in Section 9.

- Short Term Temporary Care and Maintenance (Section 9.1)
- Geotechnical/Engineering Monitoring (Section 9.2)
- Closure and Post-Closure Aquatic Monitoring and Reporting (Section 9.5)
- Environmental Effects Monitoring (Section 3.1)

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- Environmental Site Assessment (Section 9.6)
- Post-Closure Fauna and Flora Monitoring (Section 9.5)
- Marine Environmental Monitoring (Section 9.6)
- Safety Compliance Inspections (Section 9.9)
- Socio-economic Reporting (Section 9.10)
- Air Quality Monitoring (Section 9.11)

The Post Closure Monitoring Programs referenced above are expected to be required based on current residual effect predictions. It is noted that additional detail regarding the study design for evaluating the residual impacts (e.g., scope and duration of performance monitoring programs, inspections, assessments, etc.) will be required in the future to support final approval of closure criteria.

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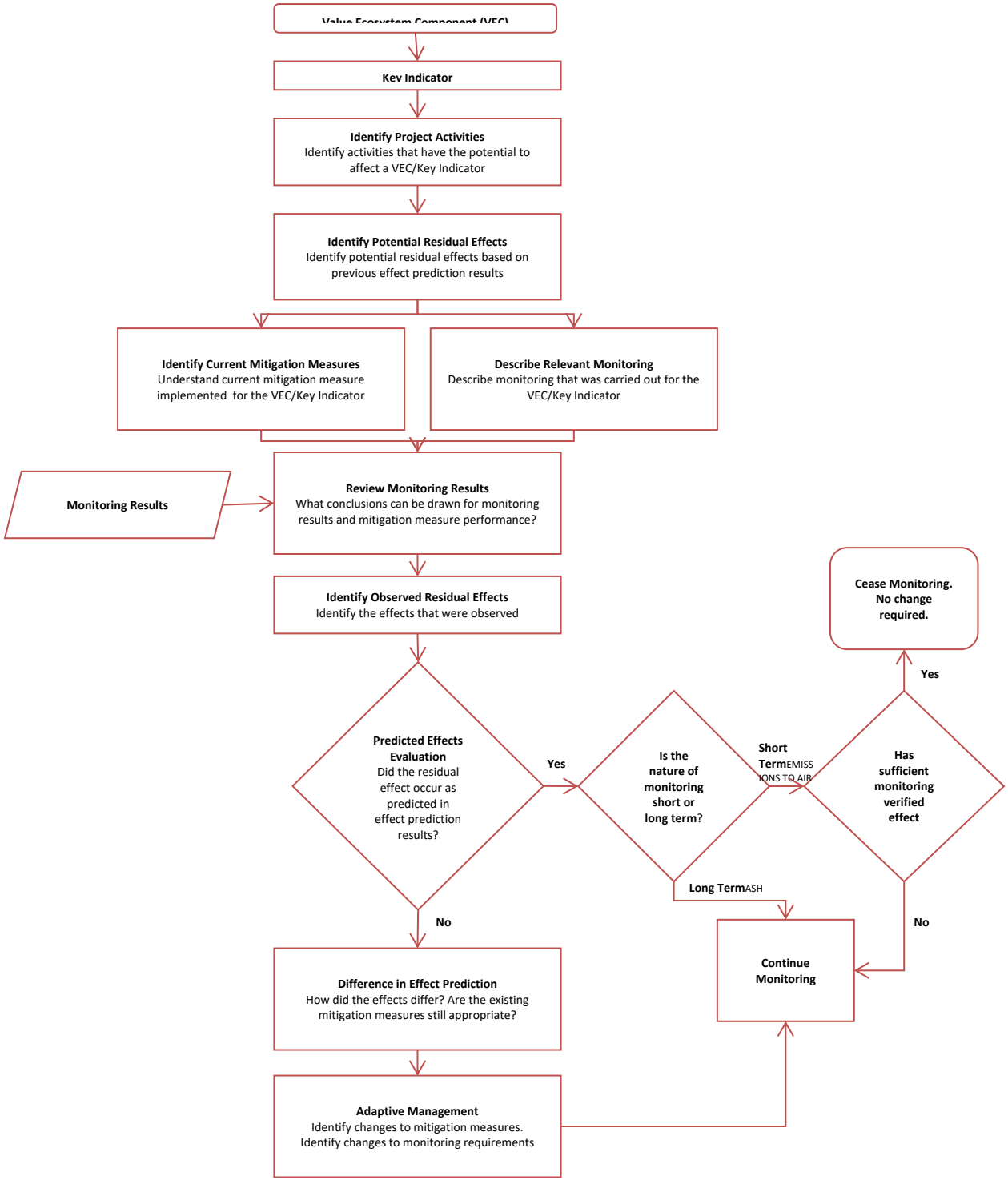


Figure G-1: Approach To Evaluating Effect

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Table G.7: FEIS Predicted Residual Impacts and Closure/Post-Closure Monitoring

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect (s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
ATMOSPHERIC ENVIRONMENT								
Climate change	Greenhouse Gases (GHG)	• Increased GHG emissions • Climate change	• Arctic grade diesel fuel • Rail transportation of ore	• Increased GHG emissions	• PC-mandated annual calculation of Project GHG emissions (NIRB Annual Report)	• Minimal GHG emissions generated post-closure (limited to site visits)	• None	• Not applicable; monitoring prescribed by PC and not required to confirm closure objectives met
Air quality	Air quality	• Increased concentrations of total suspended particulate (TSP), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO) • Increased deposition of dust, potential acid input (PAI)	• Apply best management practices for limiting air emissions • Use of low sulphur Arctic grade diesel fuel • Limit speed on roads • Ore crushing facilities are enclosed, vented and equipment with dust collection equipment • Apply dust suppressant as required in high traffic areas and stockpiles • Procurement policy on emissions from equipment (incinerator, generators, vehicles) • Waste segregation (incineration) • Where possible, use of granular material for road construction • Regular maintenance of equipment and vehicles	• Increased concentrations of TSP, SO_2, NO_2, CO • Increased deposition of dust and PAI	• TSP monitoring in Year 2 of active closure	• Negligible residual effects expected post-closure	• None	• Section 9.11
Noise and vibration	Noise and vibration levels	• Sensory impact on wildlife	• Procurement policy for noise for equipment and vehicles • Use of mufflers – regular maintenance of engines and equipment	• Sensory impact on wildlife (effect expected to be comparable to the construction phase)	• No monitoring proposed	• Negligible residual effects expected post-closure	• None	• Not applicable
TERRESTRIAL ENVIRONMENT								
Landforms, soil and permafrost	Sensitive landforms	• Soil contamination • Soil structure alteration • Soil destabilization and erosion • Thaw weakening and settlement • Creep settlement	• Sitting of facilities and alignment of roads and railway • Design foundations suitable for site conditions • Design stream crossing structures for extreme flood event • Ensure adequate drainage and prevent pooling of water	• No residual effect (disturbance of sensitive landforms) after mitigation	• Regular visual inspections • Geotechnical Inspection • Environmental site assessment and remediation of hydrocarbon contaminated soils	• Residual effects not expected to occur post-closure; if reclamation objectives have been met	• Post-closure geotechnical inspections at start and end of post-closure monitoring	• Active closure phase monitoring described in Section 9.2 • Post-closure monitoring described in Section 9.2
Vegetation	Vegetation	• Loss of vegetation abundance and diversity	• Limit physical footprint of facilities • Limit areas of access for vehicles • Progressive reclamation / closure	• Loss of vegetation limited to Project Development Areas (PDA)	• Invasive species monitoring (PC Condition 37) • Annual review of the TEMMP (PC Condition 38)	• Negligible adverse residual effects post-closure. Post-closure, the loss of vegetation will be reversed with natural revegetation. The risk of invasive plant species colonizing the area is negligible.	• None	• Closure and reclamation research will describe vegetation research projects, Appendix D

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
TERRESTRIAL ENVIRONMENT (CONT`D)								
Birds	Bird key indicators identified in the FEIS, including species at risk	• Destruction of nests • Habitat loss • Mortality • Influences on health • Sensory disturbance	• Mitigation measures identified in the Terrestrial Environment Management and Monitoring Plan (TEMMP), including: • Employee awareness / environmental induction program • Minimize footprint of facilities • Conduct nest search prior to start of activities • No hunting policy • Avoidance of areas of large concentrations of foraging or moulting birds • Avoidance of known nests or nesting areas • To the extent possible, enforce closure of a 500 m radius of the nest until fledging occurs • Nest-specific management plans • To the extent possible, develop appropriate aircraft approach and departure flight paths	• Habitat loss • Mortality • Influences on health	• No monitoring proposed during active closure • Baffinland will seek input from a Closure Working Group on actions that may enhance wildlife use of the area post-closure.	• Residual effects on bird species will gradually lessen with time as the project areas are naturally revegetated.	• Post-closure flora and fauna occupancy and use surveys in Years 5 and 7 (the second and fourth years of post-closure)	• Terrestrial Environment Monitoring and Reporting described in Section 9.5
Terrestrial wildlife and habitat	Caribou	• Habitat loss • Restriction of movement • Mortality	• Use of dust suppressant on Tote Road during growing season • Speed limits for trucks and trains which will provide more time for caribou to get off the road or rail, and will increase the chance of a truck being able to stop before a collision with a caribou. • The train is expected to operate 300 days per year, so seasonal stoppages are possible if large groups of migratory caribou return to the area. • Baffinland has a no hunting policy for all personnel while working on site. • Snow management that will grade snow banks along railway and roadway so that caribou are able to easily cross the transportation corridor without being blocked by steep snow banks. • The railway embankment will be constructed of finer fill material at the five identified trails for easier caribou movement across the railway embankment. The finer fill will replicate natural trail conditions. • Physical barriers from trains will be reduced by limiting train traffic to four passes per day.	• Habitat loss • Restriction of movement • Mortality	• Same as above	• Same as above	• Same as above	• Same as above

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
FRESHWATER AQUATIC ENVIRONMENT								
Water quantity	Water quantity	• Reductions in water quantity due to water withdrawals • Increases in water quantity due to effluent discharges • Redistribution of water flows in the natural environment due to diversions	• Permit required for water withdrawal • Measurement of withdrawal quantities as per Water License • Implement measures to reduce water consumption	• Residual effects predicted to occur during the operation phase will either remain or will be reduced through the removal of diversions and watercourse crossings	• Implementation of Closure and Post Closure Aquatic Monitoring • Stream gauging as identified in the Aquatic Effects Monitoring Plan (AEMP) • The Stream Diversion Monitoring Program, a targeted study of the AEMP, will likely have concluded	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 9.5
Surface water and sediment quality	Water and sediment quality	• Changes in water quality due to point-source, non point-source and airborne emissions • Changes in sediment quality due to point-source, non point-source and airborne emissions	• Siting of facilities/quarries at least 30 m from stream or water body • Install range of sediment and erosion control structures • Install diversion/collection channel or containment berms where appropriate • Routine inspection and maintenance • Ice and freshet management • Implementation of BMPs for surface water management • Sewage treatment • Wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Management of potentially acid generating rocks from waste rock pile, ore stockpiles, quarries and mine • Minimize footprint of stream crossing • Compensation plan for HADD • Appropriate design of stream/river crossing structures • Limit barrier to movement with site specific design of rocky ramps at culvert crossing (where required) • Channel enhancement where required • Maintain minimum flow in impacted streams where possible • Monitor low flow stream, fish salvage if necessary • Fish barrier for extremely low flow streams • Application of DFO guideline when using explosives near fish-bearing waterbodies • Prevent discharge of contaminants • Storage of fuel and other hazardous materials in secondary containment • Refuelling on impermeable surfaces and runoff contained • Emergency and Spill Response Plan	• Changes in water quality due to point-source, non point-source and airborne emissions • Changes in sediment quality due to point-source, non point-source and airborne emissions	• Implementation of Closure and Post Closure Aquatic Monitoring • Implementation of any remaining monitoring requirements of the closure phase AEMP	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Aquatic and AEMP monitoring until mine achieves “recognized closed mine” status from the Nunavut Water Board • Implementation of Closure and Post Closure Aquatic Monitoring • As a component study of the AEMP, a final Environmental Effects Monitoring (EEM) study will be conducted as prescribed in the Metal and Diamond Mining Effluent Regulations (MDMER), to seek “recognized closed mine” status from Environment Canada under the MDMER, anticipate sampling in year 4 and 6 post closure.	• Closure and Post-closure Aquatic monitoring described in Section 9.5

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
FRESHWATER AQUATIC ENVIRONMENT (CONT'D)								
Freshwater fish, fish habitat, and other aquatic organisms	Arctic char	• Effects on Arctic char health • Effects on Arctic char movement • Effects on Arctic char habitat quality • Arctic char mortality	• Siting of facilities/quarries at least 30 m from stream or water body • Install range of sediment and erosion control structures • Install diversion/collection channel or containment berms where appropriate • Routine inspection and maintenance • Ice and freshet management • Implementation of BMPs for surface water management • Sewage treatment • Wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Management of potentially acid generating rocks from waste rock pile, ore stockpiles, quarries and mine • Minimize footprint of stream crossing • Compensation plan for HADD • Appropriate design of stream/river crossing structures (culvert, bridges, etc.) • Limit barrier to movement with site specific design of rocky ramps at culvert crossing (where required) • Channel enhancement where required • Maintain minimum flow in impacted streams where possible • Monitor low flow stream, fish salvage if necessary • Fish barrier for extremely low flow streams • Use of explosives in or near streams/water bodies as per DFO Guidelines • Prevent discharge of contaminants • All hazardous materials stored on impermeable surface/secondary containment • Tank farm and large storage tanks placed in secondary containment structures (lined and impermeable) • Smaller tank – double wall ISO-containers • Refuelling on impermeable surfaces and runoff contained • Emergency and Spill Response Plan	• Effects on Arctic char health • Effects on Arctic char movement • Effects on Arctic char habitat quality	• Fisheries monitoring of in-water works during the removal of bridges, culverts and outfalls, as per DFO Fisheries Authorization and Water Licence • Implementation of any remaining monitoring requirements of the closure phase AEMP • Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Fish and fish habitat monitoring as outlined in the AEMP until the mine achieves "recognized closed mine" status from the Nunavut Water Board • As a component study of the AEMP, a final Environmental Effects Monitoring (EEM) study will be conducted as prescribed in the Metal and Diamond Mining Effluent Regulations (MDMER), to seek "recognized closed mine" status from Environment Canada under the MDMER. Monitoring in year 4 and 8. • Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 9.5

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
MARINE ENVIRONMENT								
Marine water and sediment quality	Marine water and sediment quality	• Changes in water and sediment quality in Steensby and Milne Inlets • Accident and malfunction (e.g. oil spill)	• Site runoff water management as per management plan • Hazardous substances contained within impermeable areas as per Waste Management Plan • Sewage treatment and wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Emergency and Spill Response Plan, Milne Port OPEP and Steensby Port OPEP; SOPEP for all ships • Ship on-board waste management - no discharge at sea	• Changes in water and sediment quality in Steensby and Milne Inlets • Accident and Malfunction	• Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 9.5
Marine mammals	Ringed seals Bearded Seals Walruses Beluga whales Narwhals Bowhead Whales	• Disturbance caused by airborne and/or underwater noise from construction, shipping, and aircraft • Hearing impairment and/or damage caused by noise from construction activities • Masking of environmental sounds caused by vessel and construction noise	• Dock structures were designed to minimize the footprints in the marine environment • Schedule dock construction activity during period of low mammal occurrence – April to June (blasting, pile driving, dredging) • Use proven mitigation measures to reduce noise and noise propagation during construction (DFO's guideline overpressure limit, bubble curtain system for blasting) • Discourage marine mammals from the blast area with potential use of acoustic deterrent device • Vessels will maintain a constant course and speed whenever possible - reduce vessel speed in Milne Inlet • Vessels will minimize idling of engines when docked at Milne and Steensby ports • Aircraft will be operated at a minimum altitude of 450 m over marine areas, when weather conditions allow • Aircraft will be prohibited from flying low over marine mammals for sightseeing or photography	• Disturbance caused by noise from construction, shipping, and aircraft overflights • Masking caused by shipping noise	Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic monitoring described in Section 9.5
	Polar bears	• Habitat change resulting from icebreaking and/or ice management • Disturbance caused by noise from construction, shipping, and aircraft • Mortality from human-bear interactions	• Primary use of Mary River airstrip during the Operation Phase • Educate workers about bear safety • Work areas kept clean of food scraps, garbage, and toxic materials • Use of bear monitor at camp sites • Use of bear deterrent devices	• Habitat change from icebreaking and/or ice management • Disturbance caused by noise from construction, shipping, and aircraft overflights • Mortality if a bear is killed in defense of human life	• Implementation of Closure and Post Closure Aquatic Monitoring • Baffinland will seek input from a Closure Working Group on actions that may enhance wildlife use of the area post-closure.	• None	• Implementation of Closure and Post Closure Aquatic Monitoring • Post-closure flora and fauna occupancy and use surveys in Years 5 and 7 (the second and fourth years of post-closure)	• Closure and Post-closure Aquatic monitoring described in Section 9.5 • Terrestrial Environment Monitoring and Reporting described in Section 9.5 9.6.

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
HUMAN ENVIRONMENT								
Population demographics	Demographic stability	• In-migration of a small number of workers from south will have effect on the demographic make-up of communities • Migration of non-Inuit Project employees into the North Baffin LSA • Migration of non-Inuit into North Baffin for indirect jobs • Inter-community Inuit migration • Out-migration from the North Baffin	• Designation of North Baffin communities as "Point of Hire" (Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet) • Iqaluit and a southern hub are also designated "Point of Hire" • Free transportation from "Point of Hire" to Mine Site	• In-migration of a small number of workers from south or other Nunavut communities will have effect on the demographic make-up of communities • Inter-community Inuit migration seeking alternate employment	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Inter-community Inuit migration seeking alternate employment	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Education and training	Life skills	• Improved life skills amongst young adults	• Work readiness training • Supportive work environment • Employee and family assistance program • "No drug, no alcohol" policy	• Improved life skills amongst many LSA residents	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Improved life skills amongst LSA employees and families	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Education and Skills	• Incentives related to school attendance and success • Opportunities to gain skills	• Minimum age of 18 yrs for Project employment • Career planning • Priority hiring for Inuit • Upgrading opportunities • Summer experience • Career counselling • Training	• Transferable skills for LSA employees • Incentives related to school attendance and success	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Transfer of skills to alternate employment	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Livelihood and Employment	Wage Employment	• Creation of jobs in the LSA • Employment of LSA residents	• LSA points of hire • Recruitment strategy • Inuit hiring policy • Management commitment	• Ongoing employment of LSA residents for closure roles • Development of banking and money management skills	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Development of money management skills	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Job Progression and Career Advancement	• New career paths	• Individual career support • Inuit hiring / promotions policy • Management commitment	• Expanded employment options based on acquired skills and experience • Resume and other employment documents	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Expanded employment options based on acquired skills and experience	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
				to support future employment				
Economic Development and Self-reliance	Land	• Increased pressure on the land • Changes to human engagement in land-based economy	• Lease agreement • VEC-related measures • Resources and Land Use measures (VSEC)	• Increased employment capacity and general well-being	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Transferable employment and life skills • Improved education and training • Increased wealth • Increased capacity to engage in procurement processes/provide services on alternate projects, industries and government contracts	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	People	• Increased opportunities for youth • Improved education and training • Increased wealth and well-being	• Inuit recruitment strategy • Education and training program • Community support fund • Employee and family assistance program	• Improved ability to achieve strategic community development objectives	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased local businesses • Increased capacity to engage in procurement processes/provide services on alternate projects and industries and government contracts	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Community Economy	• Increased wealth in community • Rotational absence of residents • Increased local business opportunities	• Money management orientation • Community Fund • Monitoring to support decision-making	• Growth in the economy and related job creation and business expansion	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased local businesses • Increased capacity to engage in procurement processes/provide services on alternate projects and industries and government contracts	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Territorial Economy	• Expanded economic activity (GDP) • Increased diversity of territorial economy	• Direct and indirect investment in the economy • Payment of taxes • Payment of resource royalties	• Positive – increase awareness for LSA employees, focus on health and safety, employee assistance and counselling • Negative - increased ability to afford substances will have effects on substance abuse	• “No drug and alcohol” policy remains in place consistent during active closure in addition to medical checks in relation to new employees on site	• Positive – increase awareness for LSA employees, focus on health and safety • Negative - increased ability to afford substances will have effects on substance abuse	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
Human health and well-being	Substance abuse	• Transport of substances through Project sites • Affordability of substances • Attitudes towards substances and addictions	• "No drug – no alcohol" policy • Measures to prevent transportation through sites • Employee and Family Assistance Program	• Improved well-being of children • Access to Employee and Family Assistance Program	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased life skills for parents and young adults of LSA employees	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Well-being of children	• Changes in parenting • Increased household income and food security • Overall effects on children	• Orientation and training related to fly-in/fly-out adaptation, health, well-being • Employee and Family Assistance Program • Money management training • Community support fund	• Absence of residents while they are working at Project • Moving off of rotation, families will have to readjust to potential full time living/working arrangements	• Ongoing monitoring of exit interviews and grievance procedure to understand impact of rotation on employees • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Moving off of rotation, families will have to readjust to potential full time living/working arrangements	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Community social stability	• Absence from community during work rotation	• Orientation and training related to fly-in/fly-out adaptation • Short rotation (two week in / two week out)	• Competition for skilled workers may lead to temporary effects on municipal services. • Long term improvement in labour force capacity	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Competition for skilled workers	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Community infrastructure and public service	Recruitment and Retention of Hamlet	• Competition for skilled workers • Labour force capacity	• Early start for skills training • Ongoing training • Employment experience	• Expanded market — business services to Project • Expanded market — consumer goods and services • Increased entrepreneurial capacity	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased entrepreneurial capacity • Increased ability to participate in procurement processes	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Contracting and business opportunities	Opportunities For Business	• Expanded market - business services to Project • Expanded market - consumer goods and services • Increased entrepreneurial capacity	• Inuit contracting strategy • Cooperation with QIA to build Inuit capacity • Establish a fund to support and build capacity • Management assistance to Inuit designated firms • Opportunities for local entrepreneurs to work with Project	• Chance of unmitigated archaeological sites subject to accidental or deliberate partial or complete destruction is minimal • Potential for chance finds • Increased traffic at Steensby Inlet could affect archaeological resources	• Ongoing procedures for archeological finds on site	• Potential for chance finds	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
Cultural resources	Archaeological Sites	• Disturbance or removal of archaeological sites • Unauthorized removal of artefacts • Potential loss of regionally significant sites through approved mitigation	• Pre-development archaeological surveys to support avoidance and protections of sites, mitigation by SDR prior to construction, implementation of a chance finds procedure • Training, flagging and exclusion zones, implementation of government-approved mitigation plans, involvement of local people, management plans, implementation of chance finds procedure	• Changes in caribou harvesting • Changes in marine mammal harvesting • Changes in fish harvesting	• Ongoing implementation of Article 13.4 NLCA Inuit Rights of Travel and Access • Ongoing implementation of Hunting and Weapons Policy on site	•	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Resources and land use	Inuit harvesting of wildlife	• Changes in caribou harvesting • Changes in marine mammal harvesting • Changes in fish harvesting	• Prohibition of harvesting by employees • Measures to mitigate VEC effects (VEC assessments)	• Safe travel around Eclipse Sound and Pond Inlet • Safe travel through Milne Port • Emissions and noise disruption • Sensory disturbance and safety along Milne Inlet Tote Road • Detour around Mine Site • HTO cabin closure • Difficulty and safety relating to railway crossings • Detour around Steensby Port • Restrictions on camping locations around Steensby Port	• Ongoing implementation of Article 13.4 NLCA Inuit Rights of Travel and Access • Ongoing implementation of Hunting and Weapons Policy on site during active closure	• Safety protocols developed as necessary for post closure including detours as necessary	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Resources and land use	Travel and camps	• Safe travel around Eclipse Sound and Pond Inlet • Safe travel through Milne Port • Emissions and noise disruption • Sensory disturbance and safety along Milne Inlet Tote Road • Detour around Mine Site • HTO cabin closure • Difficulty and safety relating to railway crossings • Detour around Steensby Port	• Road Management Plan • Mine Closure Plan • Safety Plan • IIBA Agreement with QIA • Designated railway crossing locations	• • Ongoing cultural awareness training for all staff and visitors on site • Increased awareness from cross-cultural training	• Ongoing monitoring of exit interviews and grievance procedure	• Increased awareness from cross-cultural training	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
		• Restrictions on camping locations around Steensby Port						
Cultural Well-Being	Cultural Well-Being	• Pijitsirnjiq – serving and providing for… • Pilnimmaksarniq – passing on of knowledge and skills • Avatittinnik Kamattiarniq – environmental stewardship	• Measures to support Inuit culture on site, including Inuktitut language plan • Inuit priority for employment • Inuit involvement in environmental monitoring	• Payments of payroll and corporate taxes to territorial government	• None	• None	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Benefits, taxes and royalties	Territorial own-source revenues	• Increased taxes and revenues from indirect and induced growth • Payments of payroll and corporate taxes to territorial government	• None	• IIBA agreement with QIA • Development of leadership skills	• Ongoing documentation of any supervisory skills training in place	• Increased leadership and team working skills	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Governance and leadership	Governance and leadership	• IIBA Agreement with QIA • Development of leadership skills	• Participation in initiatives to identify indicators of relevance to regional monitoring programs, share data generated by activities related to the Project, and discuss the interpretation of this data with others involved in these initiatives • Fit well with the strategic priorities identified for both the RSA	• In-migration of a small number of workers from south or other Nunavut communities will have effect on the demographic make-up of communities • Inter-community Inuit migration seeking alternate employment	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Inter-community Inuit migration seeking alternate employment	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

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Appendix H FEIS Freshwater Quality Predictions (Based on FEIS and its Addendum, Volume 7, Section 3.4)

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Water and Sediment Quality

Effects on the surface water and sediment quality VEC were assessed in accordance with the methodology outlined in FEIS Volume 2, Section 3.0. VEC-specific modifications were made to the general methodology, which are highlighted below.

Assessment Methods and Criteria

The following basic EA steps were undertaken during the assessment:

- Regional and local study areas were determined.
- VECs, Key Indicators and Thresholds were identified.
- Project activities that could affect surface water and sediment quality were identified.
- Project interactions with, and effects on, the surface water and sediment quality VEC were identified.
- Linkage evaluations were performed outlining potential effects related to various phases of the Project (Construction, Operation, and Closure) and Project LSAs (Milne Port, Milne Inlet Tote Road, Mine Site, Railway Alignment, and Steensby Port.
- Mitigation measures were identified to avoid or reduce the potential effects during the various phases of the Project.
- Residual effects and their relative significance were identified for the surface water and sediment quality VECs.
- Long-term monitoring programs were identified to distinguish Project-related impacts from natural variability, in order to verify impact assessment predictions and to meet compliance/conformance criteria.

Key Indicators and Thresholds

For the assessment of potential effects on the surface water and sediment quality VEC a list of key indicators that were considered to be the most relevant and important elements of the VEC was assembled. The key indicators fall into four categories:

1) General Parameters
2) Metals
3) Nutrients
4) Petroleum Hydrocarbons

Thresholds were identified representing a level of change where adverse effects may be expected to occur. In the case of water and sediment quality, it is important to note that the thresholds do not relate to water or sediment quality in itself, but rather to known effects on aquatic receptors that rely on water and sediment to exist.

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The thresholds used in this assessment were derived from the following sources, which are relevant in the context of this environmental effects assessment:

- Schedule 4 of the Metal and Diamond Mining Effluent Regulation under the Federal *Fisheries Act*.
- CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (PAL) (2003).
- Interim Sediment Quality Guidelines (ISQG) and Probable Effects Level (PEL) identified in the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (2003).

The CCME PAL thresholds are typically the most stringent; hence these values were generally selected for application.

Local waters around the Project sites have not historically been used for drinking, although the Project uses and will use local waters for potable water supply, and it is conceivable that Inuit travelling over the land could also drink any of the local water. Therefore, Health Canada's Canadian Drinking Water Guidelines (2004) have been used for comparison purposes.

To fill gaps for those key indicators that have no thresholds identified in the sources listed above, two secondary sources were adopted:

- BC Ministry of Environment (MOE) Approved and Working Water Quality Guidelines and Alert Levels.
- Criteria Continuous Concentration (Chronic) National Recommended Water Quality Criteria, USEPA (2006).

The relationships between potential surface water and sediment quality effects, key indicators and thresholds are summarized in Table H.1.

Table H.1: Key Indicators and Thresholds for Water and Sediment Quality

Potential Effect	Key Indicator	Thresholds (Magnitude and Extent)			
		MMER[1]	CWQG (PAL)[2]	CDWQG[3]	NWB[4]
Water Quality from Mine Contact Water and Site Runoff	TSS (mg/L)	15	+5		35
	pH (pH unit)	6.0 - 9.5	6.5 - 9.0	6.5 - 8.5[11]	6.0 - 9.5
	Hardness $CaCO_3$ (mg/L)				
	Alkalinity $CaCO_3$ (mg/L)				
	Chloride (mg/L)		640 (Short-term) 120 (Long-term)	250[12]	
	Sulphate SO4 (mg/L)			500[12]	
	Ammonia N (total) (mg/L)		Varies[5]		
	Ammonia N (un-ionized) (mg/L)		0.019		
	Nitrate N (mg/L)		13	10	
	Nitrite N (mg/L)		0.06	3.2	
	Total P (mg/L)		see Table 7-3.4 (FEIS Volume 7)		
	Total Aluminum (mg/L)		0.005 - 0.1[6] (0.94)[7]	0.1	

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Potential Effect	Key Indicator	Thresholds (Magnitude and Extent)			
		MMER[1]	CWQG (PAL)[2]	CDWQG[3]	NWB[4]
	Total Antimony (mg/L)			0.006	
	Total Arsenic (mg/L)	0.5	0.005	0.01	
	Total Barium (mg/L)			1	
	Total Beryllium (mg/L)		0.0053[8]		
	Total Boron (mg/L)		29 (Short-term) 1.50 (Long-term)		
	Total Cadmium (mg/L)		0.000029[8]	0.005	
	Total Chromium (mg/L)		0.0047[7]	0.05	
	Trivalent Chromium (mg/L)		0.001		
	Hexavalent Chromium (mg/L)		0.0089		
	Total Cobalt (mg/L)				
	Total Copper (mg/L)	0.3	0.00467[7]	1.0[12]	
	Total Cyanide (mg/L)	1.0	0.005 (as free CN)	0.2	
	Total Iron (mg/L)		1.2[7]	0.3[12]	
	Total Lead (mg/L)	0.2	0.001[9]	0.01	
	Total Manganese (mg/L)			0.05[12]	
	Total Mercury (mg/L)		0.000026	0.001	
	Total Molybdenum (mg/L)		0.073		
	Total Nickel (mg/L)	0.5	0.083[10]		
	Total Selenium (mg/L)		0.001	0.01	
	Total Silver (mg/L)		0.0001		
	Total Thallium (mg/L)		0.0008		
	Total Uranium (mg/L)		0.015	0.02	
	Total Vanadium (mg/L)		0.006[11]		
	Total Zinc (mg/L)	0.5	0.03	5.0	
	1-2 Propylene Glycol		500 (interim)		
Water Quality from Fuel Contact	Benzene (µg/L)		370		
	Toluene (µg/L)		2		
	Ethyl benzene (µg/L)		90		
	Lead (µg/L)		1		
	Oil and Grease (µg/L)		15,000		
Water Quality from Discharge of Sewage	BOD_5 (mg/L)				30
	Fecal Coliform (CFU/100mL)				1,000
Potential Effect	**Key Indicator**	**Thresholds (Magnitude and Extent)**			
		ISQG[14]	PEL[14]		
Sediment Quality	Arsenic (mg/kg)	5.9	17		
	Cadmium (mg/kg)	0.6	3.5		
	Chromium (mg/kg)	37.3	90		
	Copper (mg/kg)	35.7	197		
	Lead (mg/kg)	35.0	91.3		
	Mercury (mg/kg)	1.7	4.86		
	Zinc (mg/kg)	123	315		

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Potential Effect	Key Indicator	Thresholds (Magnitude and Extent)			
		MMER[1]	CWQG (PAL)[2]	CDWQG[3]	NWB[4]

NOTE(S):

1. MEAN MONTHLY MAXIMUM AVERAGES IN SCHEDULE 4 OF THE METAL AND DIAMOND MINING EFFLUENT REGULATION UNDER THE FEDERAL *FISHERIES ACT*.
2. CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME) CANADIAN WATER QUALITY GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE (PAL) (2011).
3. HEALTH CANADA GUIDELINES FOR CANADIAN DRINKING WATER QUALITY SUMMARY TABLE (2010).
4. NUNAVUT WATER BOARD WASTEWATER CRITERIA.
5. VARIES WITH TEMPERATURE AND PH.
6. VARIES WITH PH; AT PH <6.5 CRITERION IS 0.005 MG/L; AT PH >6.5 CRITERION IS 0.1 MG/L.
7. SITE SPECIFIC CRITERION DEVELOPED FOR THE MARY RIVER MINE SITE AREA (KNIGHT PIÉSOLD, 2011)
8. VARIES WITH HARDNESS [Cd] = $10^{0.86[\log10(\text{hardness})]-3.2}$ $\mu g/L$. BASED ON MEAN HARDNESS IN MARY RIVER OF 84 MG/L, THE CADMIUM CRITERION WOULD BE 0.000029 MG/L.
9. VARIES WITH HARDNESS. [Pb] = $e^{1.273[\ln(\underline{\text{hardness}})]-4.705}$ $\mu g/L$. BASED ON MEAN HARDNESS IN MARY RIVER OF 84 MG/L, THE LEAD CRITERION WOULD BE 0.00255 MG/L.
10. VARIES WITH HARDNESS. [Ni] = $e^{1.273[\ln(\underline{\text{hardness}})]-4.705}$ $\mu g/L$. BASED ON MEAN HARDNESS IN MARY RIVER OF 84 MG/L, THE NICKEL CRITERION WOULD BE 0.083 MG/L.
11. BC MOE APPROVED AND WORKING WATER QUALITY GUIDELINES.
12. AESTHETIC OBJECTIVE.
13. PROPOSED GUIDELINE.
14. INTERIM SEDIMENT QUALITY GUIDELINES (ISQG) AND PROBABLE EFFECTS LEVEL (PEL) IDENTIFIED IN THE CCME CANADIAN SEDIMENT QUALITY GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE (2003).

The thresholds identified in Table H.1 were applied in the effects assessment in the following manner:

- MDMER Schedule 4 thresholds were applied as 'end of pipe' criteria for mine contact water discharge.
- CCME PAL (or site-specific water quality objectives) were applied as receiving environment criteria for all sources.
- NWB were applied as 'end of pipe' criteria for wastewater (sewage effluent) discharge.

A number of key parameters are naturally elevated in surface waters around the Mine Site, and as such, site specific water quality objectives (SSWQOs) were developed for the following parameters using CCME (1993) background concentration procedure (Knight Piésold, 2011):

- Aluminum
- Chromium
- Copper
- Iron

The developed SSWQOs are summarized in Table H.1 above. It was not appropriate to develop site specific criteria for Uranium or Selenium as explained in FEIS Appendix 7B-2.

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Key Issues and Pathways

Key issues which were assessed for the surface water and sediment quality VEC included:

- Pit water quality from the Mine Site LSA
- Surface runoff from Project roads in the five freshwater LSAs
- Discharges from Project WWTFs from the five freshwater LSAs
- Acid Rock Drainage (ARD) and Metal Leaching (ML) resulting from waste rock piles, ore stockpiles, open pit dewatering, construction fills, embankment of roads and railway, and open quarries in the five freshwater LSAs
- Nutrient input from blasting activities and chemical leaching from rail sleeper coatings in the five freshwater LSAs
- Suspended sediment due to construction of mine facilities, Milne Inlet Tote Road, the railway and associated water crossings
- Runoff at fuel storage facilities, including fuel spills and malfunctions from the five freshwater LSAs
- Effects from waste management activities including storage, handling and landfilling of waste, landfarming of contaminated ice/snow/soil, the management of historically contaminated material, and sewage effluent discharges in the five freshwater LSAs
- Effects from construction and operation of camps in the five freshwater LSAs
- Effects from erosion and sediment transport due to vegetation removal, cuts/fills and other disturbances in the five freshwater LSAs
- Effects from dust deposition in the five freshwater LSAs
- Effects from drilling water withdrawals and returns in the Mine Site LSA

An account of key issues, indicators, and Project locations and phases that were incorporated in the effects assessment is provided in Table H.2.

Table H.2: Key Issues for Water And Sediment Quality

Key Issue	Indicators	Project Location (LSA)	Project Phase
Ground Preparation, Earthworks, Road and Railway construction	pH, TSS, Metals and Nutrients	All	Construction and Closure
Site Water Management	pH, TSS, Metals, Nutrients and Petroleum Hydrocarbons	Milne Inlet Tote Road LSA Mine Site LSA Rail Alignment LSA	Construction, Operation and Closure

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Key Issue	Indicators	Project Location (LSA)	Project Phase
Laydown Areas	pH, TSS, and Metals	All	Construction and Closure
Airstrips and Airstrip Use	TSS and Petroleum Hydrocarbons	All	Construction, Operation, Closure
Mine Contact Water - Waste Rock Stockpile	pH, TSS, Metals and Nutrients	Mine Site LSA	Operation, Closure and Post Closure
Mine Contact Water - Open Pit and Run of Mine Stockpile	pH, TSS, Metals and Nutrients	Mine Site LSA	Operation, Closure and Post Closure

Residual Effects Rating Criteria

Residual effects are those effects that persist after mitigation has been applied to potential effects. Each Project-related residual effect was rated using the standard criteria described in FEIS Volume 2.0 and the VEC-specific criteria identified in Table H.3.

Table H.3: Significance Ratings for Evaluating Residual Water and Sediment Quality Effects

Criteria	Classification	
Magnitude	Negligible	Concentrations of indicator(s) predicted to be less than threshold value(s)
	Level I	Concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s) (1 to 10x the threshold)
	Level II	Concentrations of Indicators predicted to be exceed threshold value(s) by an order of magnitude or greater (10 to 100x the threshold)
	Level III	Concentrations of Indicators predicted to be exceed threshold value(s) by more than two orders of magnitude (greater than 100x the threshold)
Extent The physical extent of the effect, relative to study area boundaries	Level I	Confined to the LSA
	Level II	Beyond the LSA and within the RSA
	Level III	Beyond the RSA
Duration The length of time over which a Project effect will occur	Level I	Short term (effect lasts for up to 4 years)
	Level II	Medium term (up to 25 years, for the life of the Project)
	Level III	Long term (beyond the life of the Project) or permanent
Frequency How often the effect occurs	Level I	Infrequent – rarely occurring
	Level II	Intermittent – occasionally occurring
	Level III	Continuous
Reversibility The likelihood of the VEC to recover from the effect	Level I	Fully reversible after activity is complete
	Level II	Partially reversible after activity is complete
	Level III	Non-reversible after activity is complete

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Of the five rating criteria used in rating residual effects, magnitude is heavily weighted when determining the significance of the residual effect and is also the criterion that requires the most interpretation. Since the main receptor affected by changes in water quality is aquatic life, magnitude ratings were established based on aquatics-related thresholds, as summarized in Table H.1.

Receiving water quality objectives (WQOs) have been established for the Protection of Freshwater Aquatic Life (CCME PAL). If receiving waters meet the selected Water Quality Objectives (CCME PAL or SSWQOs) with a discharge, this is deemed a Negligible effect to freshwater biota and hence to water and sediment quality. Level I, II and III magnitude effects are related to the relative level of exceedance of any WQOs.

The potential effects associated with discharge of mine contact water into the natural environment are well understood and have led to the enactment of the MDMER under the *Fisheries Act*. The following parameters, identified in Schedule 4 of the MDMER, are regulated by point-of-discharge concentrations:

- Arsenic
- Copper
- Cyanide
- Lead
- Nickel
- Zinc
- TSS
- Radium

These parameters have been regulated due to potential deleterious effects on fish and other biota in the receiving environment. Mine contact waters may be authorized for discharge under the MDMER of the *Fisheries Act*, provided the effluents at the point of discharge meet the MDMER Schedule 4 criteria and pass regular testing for acute lethality and chronic toxicity.

Baseline Characterization

Using the baseline data as a frame of reference, the following methods were applied to aqueous non-point source emissions, aqueous point source emissions and airborne emissions.

Aqueous Non-Point Source Emissions

Infrastructure and activities that were widespread or had non-point source emissions, were assessed in a qualitative manner on a Project-wide basis rather than assessing residual effects for each individual water body. To identify potential sensitivity to the particular indicators and to add context to the rating, general water quality parameters determined for the Sample Group and/or the LSA were considered. The

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description of the general water quality characteristics for Sample Groups (rivers/streams and lakes) is provided in FEIS, Volume 7, Tables 7-3.5 and 7-3.7.

Given the uncertainty regarding the potential contaminant source, distribution, and location that would be required to complete a quantitative assessment, a qualitative assessment was undertaken applying conservative assumptions. Examples of residual effects associated with aqueous non-point source emissions included increased TSS due to erosion and sediment transport, ML/ARD from various earth materials, nutrient additions from blasting, and petroleum hydrocarbon constituents from accidental spills.

The majority of meltwater and precipitation in the Project area occurs between June and September, the open-water period for streams and rivers. Consequently, erosion and sediment transport, nutrient and metals transport, and petroleum hydrocarbon mobilization are likely to occur in this period, when receiving waterbodies are at their maximum flows and have increased capacity to buffer these inputs.

Where residual effects were considered likely and there was a lack of reliable data available to quantify the contaminant source, a conservative approach was employed by assuming that the concentration of the key indicator(s) for that particular effect would exceed the respective threshold(s) (Table 7-3.8, FEIS, Volume 7), resulting in a Level II magnitude effect. For these cases, it was further assumed that the magnitude could be maintained below a Level III effect (i.e., less than an order of magnitude greater than the threshold) by identifying the occurrence of the effect through environmental monitoring and responding appropriately under an adaptive management framework.

A conservative approach was also applied to assumptions regarding the effectiveness of mitigation measures, in recognition that there may be limitations associated with implementation and effectiveness, given the extreme climatic conditions in the Project area. Following that logic, where qualitative assessment was employed, a magnitude of Level I was only attributed to a residual effect when there was a high Level of Certainty that mitigation would be fully implemented and effective. All instances where the effectiveness of the mitigation was in question resulted in a magnitude rating of Level II.

Aqueous Point Source Emissions

For Project infrastructure and activities that generate point-source emissions with the potential to affect a specific receiving waterbody, the residual effects assessment focused on those particular locations, where adequate baseline data were available.

For point source mine contact water discharges, source terms of runoff water quality were obtained from geochemical testing (AMEC, 2012b) to compare effluent water quality to MDMER criteria, and to evaluate the resultant water quality in receiving waters compared to CCME PAL Guidelines. As a mitigation measure to maximize mixing, and to minimize changes in the natural flow regimes, discharges of mine contact waters will be carried out following the natural hydrograph. The Camp Lake tributary at MR-12 and the

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Mary River are gauged during the open water season, which will allow for real-time monitoring of flows and regulation of releases.

A mass balance approach was used, mixing annualized discharge flows with the annualized receiving flow at the nearest downstream location inhabited by fish. The mass balance model is shown below:

$$C_{Res} = \frac{(C_D \times Q_D) + (C_R \times Q_R)}{Q_{Res}}$$

Where:

C_D = indicator concentration in discharge (mg/L)
Q_D = volume of effluent discharged annually (m^3/year)
C_R = indicator concentration in receiving waterbody (mg/L)
Q_R = volume of water in the receiving waterbody annually (m^3/year)
C_{Res} = resulting (mixed) indicator concentration (mg/L)
Q_{Res} = volume of resulting (mixed) waterbody annually (m^3/year)

The model assumes near-instantaneous mixing in riverine environments due to the discharge to receiving flow ratio, and no modification of indicators due to precipitation, speciation, attenuation or degradation.

Modelling was carried out using both mean and 90th percentile baseline concentrations, and under both mean and low flow (7Q10) conditions.

Mixing Assumptions

While the water quality model used above assumes instantaneous mixing, in reality Initial Dilution Zones (IDZs) will exist at each discharge. The specifics for each discharge location are discussed below.

- West Waste Rock Stormwater Pond – Stormwater will be discharged to a natural drainage (L1) that is fishless until about 100 m before the drainage discharges into a main tributary of Camp Lake (tributary L0). The receiving water is the lower reach of L0 below the falls that provide the fish barrier. Stormwater will be mixed with the natural waters in the drainage L1, and although discharge flows are greater than natural flows, it is expected that this mixing will effectively occur over the approximate 1.5 km length to where the water flows over the falls and subsequently into tributary L0, receiving further dilution.
- East Waste Rock Stormwater Pond – Stormwater will be discharged to a natural drainage (F0) that is fishless until the F0 drainage discharges into the Mary River. Stormwater will be mixed with the natural waters in the drainage F0, and although discharge flows are similar to the natural flows, it is expected that this mixing will effectively occur over the approximate 2,500 m section to where the water flows over the falls. F0 then discharges into the Mary River at a point where the flows are highly turbulent, and therefore further mixing is expected to be nearly instantaneous.
- ROM Stockpile Stormwater Pond and Ore Stockpile Stormwater Pond –These discharges will be directly to the Mary River, but at distinct locations separated by approximately 1,500 m of river. IDZs

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will exist downstream of each discharge. Because of the volume and turbulent nature of flows in the Mary River, the IDZs will be confined to 20 to 30 m in length.

Source Terms – Waste Rock

Mine contact water from the Waste Rock Stockpiles at the Mine Site will be collected in stormwater ponds prior to discharge. Stormwater runoff water quality (source terms) from Waste Rock Stockpiles were derived by preparing a mass loading model using laboratory derived reaction data and the anticipated site conditions. The ponds will be designed with holding capacities that act to moderate water quality. During mining, when the waste rock pile is under development, stormwater will require retention to settle out solids. The water quality modelling by AMEC (2012a) suggests that if suspended solids are properly managed, the quality of discharge will meet MDMER requirements. While water treatment is not expected to be required, treatment options will be available as a contingency measure. As a conservative measure, maximum waste rock runoff quality estimates were used in the assessment.

For a number of parameters sampled in the humidity cell tests, metals were measured at or below the analytical method detection limit (MDL) for a large proportion of samples. Generally the MDLs are high relative to the selected water quality objectives (CCME PAL or SSWQOs). For these parameters, the values assigned were set at one-half the MDL (AMEC, 2012a). The 90th percentile calculated source term was influenced by predicted water quality results based largely on the non-detect results in the humidity cells for the following metals: mercury (Hg), selenium (Se), copper (Cu), arsenic (As), cadmium (Cd), chromium (Cr), silver (Ag) and thallium (Tl). Consequently, the modelled water quality for these parameters is highly conservative.

A similar issue with detection limits was identified in the baseline water quality dataset. The majority of sample results for several metals were reported as non-detect (measured below the MDL). In the baseline dataset, non-detect samples were conservatively set at the MDL. This contributed to overly conservative modelling results; i.e., when the majority of results were reported at the detection limit, the calculated values were close to or even exceeded the Water Quality Objective (WQO).

Two notable parameters, mercury and selenium, were calculated to exceed the respective WQO because of the high proportion of non-detects in both the baseline receiving waters and in the humidity cell testing.

	Mercury	Selenium
WQO (CCME PAL) (mg/L)	0.000026	0.001
90th Percentile Baseline Concentration (mg/L)	0.0001	0.0001
% of Detects in Baseline (Measured above MDL)	2 %	2 %
Calculated Source Term (mg/L) (west discharge / east discharge)	0.004 / 0.003	0.047 / 0.038
Humidity cell testing MDL (mgl/L)	0.001	0.001

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As a consequence mercury and selenium are predicted to reach Level II magnitude in the assessments.

During the technical review of the DEIS, the Qikiqtani Inuit Association expressed concern over the potential for nitrates to be elevated in the waste rock stormwater runoff, due to the quantities of ammonium nitrate fuel oil (ANFO) explosives that will be used in mining.

Ammonia releases have been associated with the use of certain explosives at mining and quarrying operations. The use of ammonium nitrate and fuel oil (ANFO) explosive could cause elevated nitrates in waste rock and mine run-off. Ammonia can occur as un-ionized (NH_3) or ionized (NH^{4+}) ammonium ion species. Total ammonia is a measure of both un-ionized and ammonium ion species. The un-ionized is more toxic to aquatic life than the ionized species. Consequently, mining companies have taken a number of initiatives to address this issue. For example, Diavik Diamond Mines Inc has investigated the use, loss and mitigation measures to address nitrate losses, and as a result, has developed and implemented at its site several iterations of an Ammonia Management Plan (Diavik Diamond Mines: Ammonia Management Plan).

Annual explosive use for blasting waste rock and ore is estimated to range from 15,700 tonnes to 18,200 tonnes per annum depending on the year. FEIS Volume 3, Appendix 3B, Attachment 8, Section 2.6 states that the emulsion:AN ratio used for the Project is 70:30. The use of emulsion improves the bulk strength of the explosive and allows efficient rock breakage. The emulsion product also reduces ANFO solubility. Modeling by other companies concludes that ammonia releases can be reduced if proper controls are not implemented. The Explosives Management Plan (FEIS Volume 3, Appendix 3B, attachment 8) and FEIS Volume 10 Section 4.3.3 outline the mitigation measures that will be taken to control the nitrate concentrations entering the receiving environment.

Commercial ammonia reduction technologies, if required, include biological treatment, air stripping, ion exchange, reverse osmosis and breakpoint chlorination. Non-commercial technologies that may have future applications include aerated lagoons, constructed wetlands, land treatment and natural treatment in ponds. (Table 5, Annex C of the Diavik Diamond Mines Ammonia Management Plans), describes for each technology an ammonia reduction estimate, the environmental effect, an evaluation of technology feasibility, capital cost and operating time frames.

Source Terms –Pit Water Quality

Preliminary estimates of pit water quality were made using a similar mass loading approach to that for the waste rock drainage quality (AMEC 2012b). Equilibrated estimates of pit water quality are presented in Table H.4. It is expected that the effluent quality during mine operations will meet MDMER requirements for metals. It is possible that, during the latter portion of the mine, pH may decrease below the lower limit of the MDMER (pH 6.0). The estimated water quality derived for the pit drainage includes allowance for acidic drainage from exposed potentially acid generating (PAG) rock toward the end of mine life. The quantity of this exposed rock and the data used in deriving this drainage quality is the subject of additional study.

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It has therefore been assumed that pH adjustment of the pit water will be required in the second half of mine life and into post-Closure. During Operations, pH adjustment will most likely be carried out inside the pit before the water is pumped to the East Waste Rock Pond. Again, humidity cell testing is expected to over-estimate the runoff quality. These modelling results are very conservative and will be reviewed once data are available from recently initiated neutralizing potential-depleted humidity cell testing. This will improve confidence in drainage water quality and pH.

Although the pit water quality source term for the latter part of mine life is beyond the MDMER range for pH and may require minor pH adjustment, the source terms (assuming no treatment) have been applied in the water quality modelling as a conservative measure.

The EEM program under MDMER is specifically designed for this type of situation and is a well designed monitoring tool. It is a tiered program, meaning that the results of monitoring are used in the design of subsequent monitoring, and results also serve to identify the need for corrective action (Dumaresq *et al*. 2002).

Source Terms – Ore Runoff

Mine contact water from the ROM stockpile and the main ore stockpile at the Mine Site will be collected in stormwater ponds prior to discharge to the Mary River. Source terms were derived by calculating the 90th percentile concentrations from sampling carried out by Baffinland in 2010 from lysimeters installed in an ore stockpile generated at the site during the bulk sampling program in 2008. No runoff has been collected since then due to especially dry conditions during the 2011 field season. The runoff data, while limited, are considered conservative in that they represent runoff collected after the stockpile had been sitting dormant for two years; in reality the turnover in the ore stockpiles will be rapid and therefore the contact time between water and the ore will be limited. It has also been identified that non-representative manganese-rich ore may be a component of the lysimeter samples, since this ore was used in construction of the crusher pads where the lysimeters were located. Therefore, lysimeter results may be influenced by drainage from atypical ore.

Runoff from the ore stockpiles is not expected to require treatment beyond settlement of suspended solids in the stormwater pond. Nevertheless, treatment has been identified as a potential contingency measure that can be implemented if monitoring program results indicate that the water quality does not meet discharge criteria. More detail on contingency treatment options for mine contact water is provided in Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031).

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Table H.4: Predicted Pit Water Quality

Parameters	MDMER Limits	Year 6	Year 10	Year 15	Year 21
pH	6 – 9.5	6.5	6.5	5.1	4.2
Sulphate (mg/L)		77	80	88	158
Arsenic (mg/L)	0.5	0.006	0.006	0.006	0.007
Copper (mg/L)	0.3	0.007	0.008	0.016	0.074
Lead (mg/L)	0.2	0.0005	0.0005	0.0007	0.0022
Nickel (mg/L)	0.5	0.004	0.005	0.018	0.11
Zinc (mg/L)	0.5	0.030	0.031	0.035	0.062
Aluminum (mg/L)		0.24	0.24	0.77	4.2
Antimony (mg/L)		0.007	0.007	0.007	0.008
Boron (mg/L)		0.060	0.062	0.067	0.11
Cadmium (mg/L)		0.00005	0.00005	0.00006	0.00016
Chromium (mg/L)		0.007	0.007	0.008	0.019
Cobalt (mg/L)		0.002	0.002	0.008	0.053
Iron (mg/L)		<0.002	<0.002	0.031	0.22
Manganese (mg/L)		0.0001	0.0001	0.10	0.57
Mercury (mg/L)		0.0013	0.0014	0.0014	0.0016
Molybdenum (mg/L)		0.023	0.024	0.024	0.027
Selenium (mg/L)		0.015	0.016	0.016	0.022
Silver (mg/L)		0.0002	0.0002	0.0002	0.0008
Thallium (mg/L)		0.0007	0.0007	0.0007	0.0009
Vanadium (mg/L)		0.0024	0.0025	0.0025	0.0029
Barium (mg/L)		0.022	0.023	0.024	0.034
Sodium (mg/L)		1.0	1.0	1.1	1.8
Potassium (mg/L)		29.2	30.1	30.2	34.9
Calcium (mg/L)		36.0	37.2	37.4	43.4
Magnesium (mg/L)		20.2	20.8	22.9	40.0

Notes:

1. Equilibrated concentrations, which assume equilibrium with amorphous $Al(OH)_3$, ferrihydrite and manganite where estimated concentrations exceed saturation indices for those phases.

Significance Determination

The potential to result in significant adverse environmental effects was determined for each residual effect, based on professional judgment of the combination of residual effect ratings for each potential effect and taking into account the environmental context and the Level of Confidence associated with each rating.

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Residual Effects Assessment

This Section presents potential effects, mitigation measures and the residual effects assessment for two categories:

- Aqueous Non-Point Source Emissions;
- Aqueous Point Source Emissions.

Aqueous Non-Point Source Emissions

Potential effects on surface water and sediment quality associated with aqueous non-point source emissions (key issues) identified in Table H.2 are described below. These emissions are common where activities take place near water bodies and may affect watercourses throughout the Project area. Locations of infrastructure and activities are described for each LSA.

Table H.5 summarizes the ratings assigned to the significance criteria of residual effects associated with each effect discussed below.

Prediction Confidence

The significance rating and confidence level assigned to the predictions of significance for aqueous non-point source discharge effects to water and sediment quality are summarized in Table H.5.

Ground Preparation and Earthworks - Impact Statement SWSQ-1

Impact Statement SWSQ-1: Project-related ground preparation and earthworks may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Ground preparation and earthworks are essential prerequisites during the Construction and Closure phase in all five freshwater LSAs. The areas requiring earthworks notably include the following:

- Developing each of the key areas (Milne Port, Mine Site and Steensby Port) including the construction and reclamation of buildings, laydown areas, access roads and other site infrastructure;
- Minor improvements to the roadbed of the Milne Inlet Tote Road; and
- Railway construction, including the construction access road.

Typical ground preparation activities include vegetation removal and stripping, resulting in ground surface conditions that are prone to potential erosion and liberation of potential contaminants of concern; this may have an effect on surface water quality through changes in pH or the introduction of TSS, petroleum hydrocarbons and/or nutrients. Left unmitigated, direct effects may be observed in surface water quality. By implementing standard best management practices (BMPs) during ground preparation activities, water quality effects can be avoided or reduced to the point where only incidental, minor to moderate adverse short-term effects are anticipated. As required, the following mitigation measures will be applied:

- Minimize the footprint of disturbance;

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- Schedule ground preparation to maintain adequate ground cover during periods of expected rainfall;
- Install and maintain water management features, designed to segregate and prevent co-mingling of offsite water and onsite water;
- Install and maintain adequately designed erosion control features;
- Install and maintain adequately designed sediment transport control features;
- Capture and treat potentially contaminated site run-off to applicable water quality standards prior to discharging to the receiving environment; and
- Erosion control measures.

Following the ground preparation activities, earthworks (earth moving, excavation, grading, cut/fill and backfilling) are required for development of components during Construction and reclamation of components during Closure.

The disturbance, exposure, transportation and relocation of earth materials can potentially affect surface water quality in receiving bodies adjacent to these work areas. Left unmitigated, direct effects may be observed in surface water quality including changes in pH, introduction of TSS, petroleum hydrocarbons, and/or nutrients. By implementing standard BMPs described above, water quality impacts can be avoided or reduced to the point where only minor to moderate short-term adverse effects are anticipated.

In the event that existing contamination is suspected or encountered during earthwork activities, the Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011) will be used as a guideline for containment, testing, removal, treatment and disposal of contaminated media.

Soil spoils will be re-used nearby as general fill (if suitable), stored for reclamation purposes and/or disposed of in roadside borrows. Borrows will be contoured to provide stable side slopes and restore natural drainage.

Temporary roads will be decommissioned and restored through scarification as soon as practical to reduce the risk of potential effects of erosion and sediment transport. Culverts and bridges will be removed to restore pre-disturbance drainage patterns.

The railway alignment and train-related infrastructure are described and illustrated in FEIS Volume 3. Completion of the rail line will incorporate ground preparation and earthworks, a temporary access road, rail bed construction and rail sleeper installation. The entire rail line consists of new construction through previously unaltered landscape; therefore, potential effects on water and sediment quality are anticipated.

Rail line construction activities with the potential to affect surface water and sediment quality include culvert installation, bridge construction, infilling of right-of-way through watercourses (encroachment), rail bed construction, grading, and water management.

Standard BMPs will be employed to address potential effects during Construction and Closure. The rail bed, rail line and associated features will be designed and installed so as to avoid contamination of surface waters.

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Specifically, all structures will be designed, constructed and operated in compliance with *Fisheries Act* authorizations designed to protect water quality as an integral component of fish habitat. Adherence to the conditions of the *Fisheries Act* Authorizations and standard BMPs are anticipated to result in minor adverse residual effects.

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Table H.5: Effects Assessment Summary - Aqueous Non-Point Source Emissions

Effect		Residual Effect Evaluation Criteria					Significance
Effect	**Direction & Nature of Effect**	**Magnitude / Complexity**	**Geographical Extent**	**Frequency**	**Duration**	**Reversibility**	**Rated Significance of Residual Effect**
SWSQ-1 Ground preparation & earthworks	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level II:** will occur for the operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-2 Site Water Management	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level I:** will occur mainly during the construction phase	**Level II:** effect is partially reversible with cost/effort	Not Significant
SWSQ-3 Laydown Areas	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level I:** will occur mainly during the construction phase	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-4 Explosives	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level II:** will occur for the operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-5 Quarries and Borrow Areas	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level I:** will occur mainly during the construction phase	**Level I:** effect is reversible after activity is complete	Not Significant

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Effect		Residual Effect Evaluation Criteria					Significance
Effect	**Direction & Nature of Effect**	**Magnitude / Complexity**	**Geographical Extent**	**Frequency**	**Duration**	**Reversibility**	**Rated Significance of Residual Effect**
SWSQ-7 Camps and Fuel Management	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level II:** will occur intermittently	**Level II:** will occur for the operation phase (life of the Project)	**Level II:** effect is partially reversible with cost/effort	Not Significant
SWSQ-8 Water Use and Management	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level III:** continuous	**Level II:** will occur for the operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-9 Airstrips and Airstrip Use	**Negative** TSS and Petroleum Hydrocarbons	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level III:** will occur beyond the life of the Project	**Level I:** effect is reversible after activity is complete	Not Significant

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Table H.6: Significance of Residual Effects from Non-Point Source Discharges

Key Issue	Significance of Predicted Residual Environmental Effect		Likelihood (1)	
	Significance Rating	Level of Confidence	Probability	Certainty
SWSQ-1: Project-related ground preparation and earthworks, including road and railway construction/closure	N	2	N/A	N/A
SWSQ-2: Project-related site water management	N	2	N/A	N/A
SWSQ-3: Project-related laydown areas	N	1	N/A	N/A
SWSQ-4: Project-related explosives manufacture, storage, and use	N	2	N/A	N/A
SWSQ-5: Quarries and borrow sources	N	2	N/A	N/A
SWSQ-7: Camps, fuel storage and waste management	N	2	N/A	N/A
SWSQ-8: Water use and management	N	2	N/A	N/A
SWSQ-9: Airstrips and airstrip use	N	2	N/A	N/A

KEY:
Significance Rating: S= Significant, N = Not Significant, P = Positive
Level of Confidence : 1= Low; 2= Medium; 3=High
(1) Likelihood - only applicable to significant effects
Probability: 1= Unlikely; 2= Moderate; 3=Likely
Certainty: : 1= Low; 2= Medium; 3=High

Materials from borrow sources have undergone representative geochemical testing, which has indicated that non-reactive material is available throughout the alignment for rail bed construction. The use of non-reactive rock avoids the potential for acid generation and metals leaching that could affect surface water and sediment quality. Imported materials used in rail bed construction will be screened for other obvious contaminants that could affect nearby watercourses. In the event that existing contamination is suspected or encountered during earthwork activities, the Project's Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011) will be used as a guideline for containment, testing, removal, treatment and disposal of contaminated media.

The rail sleepers will be hewn from raw wood and will not have any preservatives such as creosote or zinc chloride. One of the factors in the selection of raw wood for rail sleepers was to remove the potential for adverse water quality effects. No negative adverse effects are expected from materials leaching from the raw wood rail sleepers.

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Residual Effects Rating

Magnitude

Based on a qualitative assessment, there is a potential for minor to moderate water quality effects associated with ground preparation and earthworks activities, including road and railway construction and reclamation. Generally, the mitigation measures described above are expected to prevent contact of sediment-laden water with natural surface waterbodies in the LSA. Mitigation measures may, however, have limitations, especially considering the extreme climatic conditions: the effectiveness of the installation and performance of sediment transport mitigation (e.g. silt fences) in frozen ground conditions, challenges in providing adequate ground cover, and challenges in completing earthworks in areas of permafrost.

Given the potential limitations of mitigation measures, it is anticipated that TSS loading could occasionally exceed the CCME threshold of +5 mg/L relative to baseline conditions. These effects are most likely to coincide with freshet conditions, which in themselves result in elevated TSS and have the potential to mitigate the magnitude of the potential effect through added capacity to buffer these inputs. Environmental construction monitoring is expected to be successful in identifying potential effects as they arise, and adaptive management will improve the performance of mitigation measures and thereby avoid exceedance of the CCME PAL guidelines.

In the event that existing (pre-Project) contaminated media are identified on any of the Project sites, appropriate measures will be taken to collect, treat and dispose of the material without increasing the footprint of the contamination and/or creating new pathways for contaminant transport. Currently, there are no known instances of existing contamination located in the Project area. Negligible to minor effects may be anticipated with any existing contaminated media identified during ground preparation and earthworks activities.

Based on the potential for water quality to occasionally exceed the identified thresholds, the effect was rated at Level II.

Environmental monitoring, ongoing water quality monitoring and adaptive management are expected to limit the magnitude of potential TSS related effects.

Extent

The extent of residual water and sediment quality effects associated with ground preparation and earthworks will be limited to the LSA where the infrastructure is located. Environmental construction monitoring will identify effects and where necessary, mitigation will limit the extent of the effect. The extent is rated as Level I.

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Frequency

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, it is anticipated that these effects will be limited to summer months when construction activities are scheduled and when freshet and the majority of rain events occur. Frequency is rated as Level I.

Duration

While ground disturbance and road and railway construction will be concentrated in the Construction phase, these facilities will require ongoing maintenance throughout the duration of the Project. The duration has been rated as Level II.

Reversibility

The potential effects are anticipated to be fully reversible, once the roads have been decommissioned and rehabilitated and natural drainage has been restored. The effect is rated as Level I.

Significance – SWSQ-1 – Project-related ground preparation and earthworks, including road and railway construction/reclamation

Based on the ratings described above, ground disturbance and earthworks activities are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence associated with the significance ranking is Medium due to the combined qualitative and semi-quantitative nature of the assessment (Table H.6).

Site Water Management – Impact Statement SWSQ-2

Impact Statement SWSQ-2: Project-related site water management may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Management of storm water, process water and site runoff from engineered surfaces will be required throughout the five freshwater LSAs during all Project phases. The areas requiring site water management are identified in FEIS Table 3.2.1, Major Project Components, Volume 3. The approach to site water management is provided in the Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026).

All stormwater sources have the potential to affect surface water quality through the alteration of Ph and/ or introduction of TSS, petroleum hydrocarbons, metals and nutrients. By implementing standard BMPs such as the Land Development Guidelines for the Protection of Aquatic Habitat (DFO, 1993), adverse effects can be avoided or reduced. The following mitigation measures will be used to manage the effects of water management on surface water quality:

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- Minimize the footprint of disturbance;
- Install and maintain water management features, designed to segregate and prevent co-mingling of offsite water and onsite water.
- Install and maintain adequately designed erosion control features;
- Install and maintain adequately designed sediment transport control features;
- Where required, locate infrastructure on competent bedrock or provide ground conditions that limit permeability and transport into the active layer; and
- Capture and treat contaminated site run-off prior to discharging to the receiving environment.

Residual Effects Rating

Magnitude

Preliminary site observations coupled with experience gained from existing operations in the Project area indicate that untreated site water can typically be managed in a way that prevents contact with natural surface waterbodies and water contained in the active layer. The underlying bedrock and permafrost conditions will act as a relatively impermeable barrier to migration of potential contaminants into groundwater.

All potentially affected stormwater sources will be collected, contained and treated to applicable water quality criteria prior to discharge. Environmental construction monitoring will focus on receiving waterbodies that have relatively soft water, i.e., sensitive to increased metal toxicity (upstream of the deposits, Mary Lake and tributaries, Camp Lake, Sheardown Lake, Ravn River and Cockburn Lake) and watercourses that are sensitive to nutrient inputs.

Based on the anticipated success of controlling stormwater and treating it to applicable discharge standards, only minor to moderate water effects are anticipated. The magnitude is rated as Level II.

Extent

Based on the scale of the surface areas where site water is being collected, the extent of residual water and sediment quality effects associated with Project-related site water management may extend beyond the LSA where the source is located, but is not anticipated to extend to the RSA scale. Environmental construction monitoring will identify residual water and sediment quality effects and where necessary, mitigation efforts will limit the extent of the effect. A Level I extent rating was assigned.

Frequency

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, it is anticipated that these effects occur during summer months when construction activities are scheduled. A Level I frequency rating was assigned.

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Duration

Residual water and sediment quality effects associated with site water management are expected during the Construction and Operation phases of the Project and are anticipated to coincide with the timing of freshet, when any potential effect would be expected to be diluted by high flow conditions resulting in key indicator concentrations indistinguishable from baseline. A Level I duration rating was assigned.

Reversibility

Residual surface water and sediment quality effects associated with site water management are anticipated to be partially reversible. The majority of Project areas where site water management is required will be returned to the pre-disturbed state during Closure phase. Following rehabilitation, key indicators are generally expected to return to baseline conditions through removal of the contaminant source. A Level II reversibility rating was assigned.

Significance – SWSQ-2 – Project-related Site Water Management

Based on these ratings, site water management infrastructure and site water discharge are not expected to result in significant adverse environmental effects on the water and sediment quality VEC in the five freshwater LSAs. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence associated with the significance ranking is Medium (Table H.6). While the assessment is qualitative, there is a high Level of Confidence in the effectiveness of mitigation measures.

<u>Laydown Areas - Impact Statement SWSQ-3</u>

Impact Statement SWSQ-3: Project-related laydown areas may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Laydown areas are temporary sites used for the storage of equipment and construction materials during the Construction and Closure phase. Requirements are dictated by equipment needs, the sequence of construction/closure activities, and the timing of material shipments. These factors will be optimized to reduce the number of anticipated laydown areas, and to minimize their anticipated footprints. The two main considerations are sediment and erosion control, and introduction of hazardous substances, leading to discharge of sediment-laden or contaminated water into the receiving environment.

Left unmitigated, direct effects may be observed through the introduction of TSS and metals. By implementing standard BMPs during development and use, water quality effects can be avoided or minimized to the point where only minor to moderate adverse effects are anticipated. In addition to the mitigation measures described in the ground preparation section, the following mitigation measures will be employed in laydown areas, as required:

- Siting of laydown areas over competent bedrock or impermeable ground layers;

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- Placement and grading of clean, free draining material to promote a workable lay down area environment;
- Installation of adequate storm water management infrastructure to restrict runoff from overland flow or seepage through the active layer into receiving waterbodies; and
- Appropriate handling and storage of hazardous materials.

Residual Effects Rating

Magnitude

Based on a qualitative assessment, that minor to moderate water quality effects may be associated with Project-related laydown areas and activities. The mitigation measures described above, while they are expected to prevent contact of sediment-laden or contaminated water with natural surface waterbodies may have limitations associated with their implementation and effectiveness.

Given these limitations, TSS loading could occasionally exceed the CCME threshold of +5 mg/L relative to baseline conditions. These effects are most likely to coincide with freshet conditions, which have the potential to mitigate the magnitude of the potential effect through added capacity to buffer these inputs. Environmental construction monitoring will identify potential effects as they arise and adaptive management will reduce the risk of exceeding the CCME PAL guidelines.

Potentially hazardous materials will be stored in appropriate containment in designated locations away from water bodies, to reduce the potential for loss of hazardous materials to the aquatic environment.

Based on the potential for changes in water quality occasionally to exceed the identified thresholds, a Level II magnitude rating was assigned.

Extent

The extent of residual water and sediment quality effects associated with Project-related laydown areas will be limited to the LSA in which they are located. Environmental construction monitoring will identify effects and, where necessary, mitigation efforts preclude or limit the extent of the effect. A Level I extent rating was assigned.

Frequency

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects that these effects would be limited to summer months when construction activities are scheduled and when freshet and the majority of rain events in the Project area occur. A Level I frequency rating was assigned.

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Duration

Residual water and sediment quality effects associated with laydown areas are only expected to occur during Construction and Closure. Potential effects are anticipated to coincide with the timing of freshet, when any potential effect would be expected to be diluted by high flow conditions resulting in key indicator concentrations indistinguishable from baseline. A Level I duration rating was assigned.

Reversibility

Residual surface water and sediment quality effects associated with Project-related laydown areas are anticipated to be fully reversible. Following the closure and rehabilitation, key indicators are generally expected to return to baseline conditions through removal of the contaminant source. A Level I reversibility rating was assigned.

Significance – SWSQ-3 – Project-related Laydown Areas

Based on these ratings, laydown areas are not expected to result in significant adverse environmental effects on the water and sediment quality VEC in the five freshwater LSAs. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Low due to the qualitative nature of the assessment and potential limitations related to mitigation measures (Table H.6).

Explosives Manufacture, Explosives Magazine, and Explosives Use - Impact Statement SWSQ-4

Impact Statement SWSQ-4: Project-related explosives manufacture, magazine, and use may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs. Explosives transportation, storage and handling have the potential to affect surface water quality in receiving environments during the Construction, Operation and Closure phases.

Explosives will be used throughout the Project footprint area during Closure to operate quarries, make rock cuts and access aggregate. During early construction and late closure, packaged explosives and ANFO will be delivered to specific areas of use. Packaged explosives will be stored in magazine areas, which will comply with the set-back requirements of NRCan.

Permanent bulk explosives factories will be established at the Mine Site and Steensby Port as early as possible to manufacture explosives from ammonium nitrate. These will be used if possible during early closure.

Explosives (primarily ANFO) manufacture, transportation, storage and handling may result in the introduction of nitrogenous and petroleum hydrocarbon based components into surface water. Certain nitrogenous compounds can be toxic to aquatic life, depending on the form (e.g. nitrate, nitrite, or ammonia) and relative concentration. Elevated nitrogen concentrations can also result in the eutrophication of receiving waters where phosphorus is not limiting.

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The following mitigation will be used to manage potential effects on surface water and sediment quality:

- Explosives will be stored in explosives magazines positioned in accordance with the *Nunavut Mine Health and Safety Act* and Regulations. Detonators and explosives will be stored in separate magazines, and inventory will be strictly controlled by designated supervisors.
- Prefabricated magazines will be positioned and appropriately bermed to store explosives between unloading and distribution.
- If bulk mixing plants are available, ammonia nitrate (AN) will be delivered in bulk and transported by truck to the permanent storage facilities.

By implementing standard BMPs identified for explosives transportation, storage, and handling, water quality effects can be avoided or reduced to the point where only minor adverse effects are anticipated.

The mining pit will be mostly dry throughout the year; consequently ammonia or residual nitrogen is not expected to escape to the aquatic environment. During the freshet and summer months, any residual explosives washed away by precipitation will report to the waste rock pile; runoff will be channelled to a sedimentation pond, and discharge will be monitored for compliance with MDMER water quality limits.

The interaction between explosives use and water quality can be a challenge. The primary forms of mitigation to avoid contamination by nitrogen and petroleum hydrocarbons include use of appropriate weights of explosives to achieve desired blasting results, use of blast guards to prevent 'fly-away', and adequate water management features that will prevent co-mingling of contact and noncontact water. The primary area of use of explosives during Construction and Closure are quarries and borrow sources for aggregate production and are generally sited in competent ground conditions, away from sensitive receiving waterbodies, to minimize the potential for adverse effects. As an additional measure, collection sumps can be constructed to capture and treat potentially contaminated contact water prior to discharge.

Residual Effects Rating

Magnitude

Based on a qualitative assessment, minor to moderate water quality effects may be associated with explosives manufacture, transportation, magazine and use. Due to the potentially serious nature of health and safety effects, mitigation will be tightly controlled and intently managed. The permanent bulk explosives factories, ANFO mixing plants, ammonium nitrate storage facilities, and truck wash facilities will be constructed to contain any solid explosives and contact water for appropriate treatment. It is not anticipated that nitrogenous and petroleum hydrocarbon residues originating from these sources will exceed applicable CCME thresholds. Residual effects on water quality and sediment quality are expected to be negligible to minor.

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The majority of blasting during the Operation phase will be confined to the open pit where water containing elevated levels of nitrogenous and petroleum hydrocarbon residues can be collected and treated prior to discharge (described in Section 3.4.1.6).

During Construction and Closure, nitrogenous and petroleum hydrocarbon residues are likely to be released due to blasting and wastage (minimal with pre-packaged ANFO) at quarry locations and other required sites. For these other scenarios, restricting blasting during freshet, volatilization by sunlight and attenuation by vegetation and soil and containment of contact water (where possible) are expected to limit potential effects. Even with the implementation of mitigation measures, it is possible that ammonia, nitrates, nitrites and petroleum hydrocarbon residues originating from blasting activities in less confined locations may occasionally exceed their respective CCME thresholds. These effects would likely coincide with the snow melt when accumulated nitrogen and petroleum hydrocarbon residues are released during the thaw and freshet conditions. High flow conditions will moderate the magnitude of the potential effect.

Nutrient characteristics of the receiving streams and lakes are summarized in FEIS Tables 7-3.5 and 7-3.7. The findings indicate that all of the freshwater receiving environments are relatively sensitive to nutrient inputs; therefore, environmental monitoring coupled with adaptive management will limit the magnitude of residual effects.

A Level II magnitude rating was assigned.

Extent

The extent of residual water and sediment quality effects associated with Project-related explosives manufacture, transportation, magazine and use will be limited to the LSA in which it is located. Environmental monitoring will identify residual water and sediment quality effects and where necessary, mitigation efforts will limit the extent of the effect. A Level I extent rating was assigned.

Frequency

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, it is anticipated that these effects would occur during summer months when construction activities are scheduled and when freshet and the majority of rain events occur. A Level I frequency rating was assigned.

Duration

Explosives manufacture, transportation, storage and use will be required during the Construction, Operation and Closure phases. Considering that the most likely uncontrolled contribution of nitrogen to the aquatic environment would come from blasting in unconfined areas along the Milne Inlet Tote Road or Railway Alignment, it is likely the source would not persist beyond the Construction phase. Nitrogen introduced in the form of ammonium would likely be assimilated into biomass rapidly, resulting in a relatively short

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duration of effect. Since the nitrogen source will be removed after Construction, and given the anticipated rapid assimilation of ammonium, a Level II duration rating was assigned.

Reversibility

The potential effects are anticipated to be fully reversible once blasting activities have ceased. This assumes that residual nutrient levels will be attenuated through nitrification/denitrification and that the conclusion of blasting activities will terminate the nitrogen source. A Level I reversibility rating was assigned.

Significance – SWSQ-4 – Explosives Manufacture, Storage and Use

Based on the ratings described above, explosives manufacture, storage and use are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). Despite the qualitative nature of the assessment, there is a High Level of Confidence in the effectiveness of the identified mitigation measures.

Quarries and Borrow Sources - Impact Statement SWSQ-5

Impact Statement SWSQ-5: Project-related quarries and borrow sources may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Quarries and borrow sources required for rock, fill and aggregate during construction and closure are identified on FEIS Figures 3.2.1 through 3.2.9 in Volume 3. The primary concern is the potential for ML/ARD and sediment generated at these locations to affect water quality when released into the natural environment.

As a mitigation measure, materials from identified quarries and borrow sources have undergone representative geochemical testing, which has indicated that the material is non-reactive (FEIS Volume 6). Additional testing will be completed to ensure that sources used during Construction and Closure consist of non-reactive material.

Quarries and borrow sources are generally sited in competent ground conditions away from sensitive receiving waterbodies to avoid the potential for adverse effects. As an additional measure, collection sumps will capture and treat affected contact water to applicable water quality standards prior to discharge. As stated in the Borrow Pit and Quarry Management Plan (BAF-PH1-830-P16-0004) Baffinland will strive to avoid quarry site that have the potential for ML/ARD. A detailed ML/ARD testing protocol for potential quarry sites is presented in the Borrow Pit and Quarry Management Plan. Based on the results of the representative geochemical testing, it is not anticipated that treatment will be required to address ML/ARD issues.

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Residual Effects Rating

Magnitude

A semi-quantitative assessment of magnitude was based on representative geochemical testing of materials from quarries and borrows sources, which indicated that the sampled materials are non-reactive (FEIS, Volume 6). The use of non-reactive materials makes it likely that run-off from quarries and borrow sources will meet the CCME thresholds for pH and metals (ML/ARD). FEIS Tables 7-3.5 and 7-3.7, which summarize acid sensitivity of the receiving streams and lakes, indicate that none of the streams or lakes is particularly sensitive to acidic inputs.

Nitrogenous and petroleum hydrocarbon residues originating from blasting activities, as well as sediment-laden water, will be confined to the water management infrastructure within each quarry and borrow site. While mitigation measures will prevent contact of storm water with natural surface waterbodies, they may have limitations associated with their implementation and effectiveness. Given these limitations, it is anticipated that uncontrolled discharges of water from quarries and borrow sources may occasionally exceed applicable CCME thresholds. These exceedances would likely coincide with freshet conditions during snow melt; this will mitigate the potential effect through dilution.

Environmental construction monitoring will be comprehensive, with an emphasis on those receiving bodies that have relatively soft water quality, a condition that can result in increased susceptibility to metals uptake.

A Level II magnitude rating was assigned.

Extent

The extent of residual water and sediment quality effects associated with quarry or borrow sources will be limited to the LSA in which they are located. The relative insensitivity of watercourses to acidic inputs suggests a relatively high potential to buffer through elevated levels of calcium carbonates that are present. Environmental monitoring will identify effects and, where necessary, mitigation efforts will limit their extent. A Level I extent rating was assigned.

Frequency

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, these effects will be limited to summer months when construction/closure activities are scheduled and when freshet and the majority of rain events occur. A Level I frequency rating was assigned.

Duration

Quarries and borrow sources will be required during the Construction and Closure phase. Potential effects are anticipated to coincide with the timing of freshet, when any potential effect will be diluted by high flow

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conditions, resulting in key indicator concentrations indistinguishable from baseline. A Level I duration rating was assigned.

Reversibility

The potential effects associated with quarry or borrow sources are anticipated to be fully reversible once blasting is completed and these locations have been closed and rehabilitated. A Level I reversibility rating was assigned.

Significance – SWSQ-5 – Quarries and Borrow Sources

Based on the ratings described above, the residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence associated with the significance ranking is Medium due to the semi-quantitative nature of the assessment (Table H.6).

Camps, Fuel Storage and Waste Management – Impact Statement SWSQ-7

Impact Statement SWSQ-7: Project-related camps, fuel storage and waste management may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Temporary and permanent camps will be located throughout the Project area as described and illustrated in FEIS Volume 3. The potential effects include changes in water and sediment quality due to withdrawal, waste management, fuel storage, and discharge of sewage.

In order to protect water quality, the following management actions have been adopted at waste management facilities:

- Incineration of non-hazardous combustible wastes;
- Landfilling of inert non-combustible wastes;
- Temporary storage and off-site shipping of hazardous and recyclable waste materials; and
- On-site treatment for hydrocarbon-impacted materials (soil, water, ice, and snow).

Diesel, gasoline and aviation fuel will be delivered to temporary camp locations via tanker trucks and will be stored in double-walled fuel tanks located on foundations equipped with impermeable bermed liners and bedding materials. The storage site will be far enough removed from receiving watercourses to reduce the potential for water quality effects.

Fuel will be delivered to the camps at Milne Port, the Mine Site and Steensby Port via marine vessels and tanker trucks and will be stored in large volume double-walled tanks located on foundations equipped with impermeable bermed liners and bedding materials. Within the bermed fuel storage areas, any fuel-contact water will be collected in engineered drainage and sumps, treated to applicable water quality standards, and then discharged if it does not exceed the CCME thresholds for TSS, oil and grease, or petroleum hydrocarbons.

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Residual Effects Rating

Magnitude

Effects associated with fuel storage and use and waste management were all assessed qualitatively. Mitigation measures described above will prevent the discharge of fuel contact water that exceeds CCME thresholds for TSS, oil and grease, or petroleum hydrocarbons.

Waste management mitigation as described above will limit any potentially adverse effects to a negligible to minor magnitude.

A Level I magnitude rating was assigned.

Extent

The extent of the potential effect is likely to be limited to watercourses located in the LSA in which a camp is situated. A Level I extent rating was assigned.

Frequency

The frequency of potential effects will be periodic and limited to summer months when the majority of precipitation falls in the Project Area. A Level II frequency rating was assigned.

Duration

Camps, fuel storage and waste management will be required during Construction and Operation; therefore, a Level II duration rating was assigned.

Reversibility

The potential effects are anticipated to be partially reversible once this infrastructure is decommissioned and rehabilitated. A Level II reversibility rating was assigned.

Significance – SWSQ-7 – Camps, Fuel Storage and Waste Management

Based on these ratings, construction and operation of camps, fuel storage and waste management are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). While the assessment is qualitative in nature, there is a High Level of Confidence in the effectiveness of mitigation measures.

Water Use and Management - Impact Statement SWSQ-8

Impact Statement SWSQ-8: Project-related water use and management may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

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Water withdrawal will support a number of Project-related activities (FEIS Tables 7-2.5, 7-2.6, 7-2.9 and 7-2.10). Withdrawal from these sources has the potential for indirect effects on surface water quality by reducing the total volume of water in the system at that location.

Various Project-related water uses have the potential to affect water and sediment quality when process water is released back into the freshwater environment, including:

- Aggregate washing;
- Concrete manufacture;
- Concrete curing;
- Truck wash; and
- Equipment/floor wash-down.

Water for aggregate washing will be pumped from the potable water source and stored in a designated washing area. The main consideration with aggregate wash water is the potential for it to contain a high TSS concentration. Wash water will be reused and recycled to the extent possible, and solids will be settled out prior to discharge.

Water used for concrete manufacture and curing will be pumped from the potable water source and stored at the batch plant. Volumetric trucks will be used for remote concrete pours, and standard BMPs will be put in place to ensure that untreated contact water is not discharged. The main consideration with concrete contact water is the potential to contain elevated TSS and pH, which may affect water quality in the environment. Concrete contact water will be treated through settlement and with pH adjustment (e.g. carbon dioxide sparging) prior to discharge.

Truck wash facilities will be constructed with water management features designed to segregate and prevent co-mingling of offsite and onsite water. A drain system and sump will capture and treat potentially contaminated water to applicable quality standards prior to discharge.

Snow, ice, soil or water that has been contaminated by petroleum hydrocarbons has the potential to impair water quality. Any such materials will be transported to lined, bermed treatment landfarm facilities, and materials that have been in contact with oil will be transported to the same locations for treatment in oil/water treatment facilities in the maintenance shops. Contaminated snow will be placed into cells in the landfarms; after thawing it will be treated and discharged. Discharges will not be directed into the freshwater environment; therefore, only minor adverse effects are anticipated from incidental occurrences.

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Residual Effects Rating

Magnitude

Negligible to minor magnitude residual water quality effects may be associated with water abstraction (FEIS Tables 7-2.5, 7-2.6, 7-2.9 and 7-2.10). Water used for other activities (e.g., aggregate washing, concrete manufacture, concrete curing, and dust suppression for the quarry crusher) will be managed to ensure the discharges meet applicable CCME water quality guidelines. Negligible to minor water and sediment quality effects are anticipated.

Potential effects of contaminated by petroleum hydrocarbons were assessed qualitatively. Based on the mitigation described above, it is anticipated that treated contact water discharges will meet applicable CCME water quality guidelines and only negligible to minor adverse effects are expected.

A Level I magnitude rating was assigned.

Extent

The extent of the potential effect is likely to be limited to watercourses from which the abstraction or water use is occurring. A Level I extent rating was assigned.

Frequency

The frequency of the potential effect will be year round, while seasonal discharge of treated contact water will occur during freshet. A Level III frequency rating was assigned.

Duration

Effects are anticipated to last through the Construction, Operation and Closure phases; therefore, a Level II duration rating was assigned.

Reversibility

The potential effects are anticipated to be fully reversible, once water withdrawal and treated contact water discharge are discontinued. A Level I reversibility rating was assigned.

Significance – SWSQ-8 – Water Use and Management

Based on these ratings, water use and management are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). While aspects of the assessment are qualitative, there is a High Level of Confidence in the effectiveness of mitigation measures.

Airstrips and Airstrip Use - Impact Statement SWSQ-9

Impact Statement SWSQ-9: Project-related airstrips and airstrip use may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

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The airstrip and related infrastructure are described in FEIS Volume 3. Its construction, operation and closure have the potential to affect surface water quality in adjacent water bodies. The primary concern during Closure stems from erosion and sediment transport during ground preparation and earthworks. Mitigation measures are summarized in the sections above.

The primary concern stems from the possibility of contaminating nearby water bodies with runoff from the surface of the airstrip, including de-icing agents such as propylene glycol. De-icing by a portable discharge unit will be carried out in a defined area to the side of the runway using propylene glycol. A synthetic organic polymer (EK 35) will be used as a dust suppressant on the airstrips as needed.

Water management features will be installed and maintained to prevent co-mingling of offsite water with potentially affected onsite water. Any potentially contaminated water will be treated to applicable quality standards prior their discharge.

Residual Effects Rating

Magnitude

As a result of the crowned configuration of the airstrip, surface run-off will be directed to drainage collection structures around the perimeter. Mitigation measures will prevent contact of sediment-laden water with natural surface waterbodies; however, mitigation measures may have limitations associated with their implementation and effectiveness. Given these limitations, it is anticipated that TSS loading could occasionally exceed the CCME threshold of +5 mg/L relative to baseline conditions. These exceedances would likely coincide with freshet conditions during snow melt, which is likely to dilute and mitigate any potential effects.

Use of propylene glycol is anticipated to result in negligible to minor water quality effects as collection and treatment will to ensure that the CCME interim guideline is not exceeded.

The synthetic organic polymer EK 35 is not an identified substance under CCME PAL; therefore, it is recommended that potential effects be assessed through routine water quality monitoring.

Based on the potential for infrequent exceedances of applicable CCME thresholds, a Level II magnitude rating was assigned.

Extent

The extent of the potential effect is likely to be limited to waterbodies adjacent to the airstrips. A Level I extent rating was assigned.

Frequency

The frequency of potential effects will be limited to summer months, when the majority of precipitation falls in the Project Area. A Level I frequency rating was assigned.

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Duration

Airstrips and airstrip use will be required during Construction, Operations and Closure. Potential effects are anticipated to coincide with the timing of freshet, when high flows will act to reduce concentrations and render them indistinguishable from baseline. A Level III duration rating was assigned.

Reversibility

The potential effects are anticipated to be fully reversible once the infrastructure is decommissioned and rehabilitated and de-icing and dust suppression ceases. A Level I reversibility rating was assigned.

Significance – SWSQ-9 – Airstrips and Airstrip Use

Based on these ratings, airstrips and airstrip use are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). While the assessment is qualitative, there is a high Level of Confidence in the effectiveness of the identified mitigation measures.

Aqueous Point Source Emissions

Potential effects on surface water and sediment quality associated with aqueous point source emissions (key issues) identified in Table H.2 are described below. These emissions are from a single, identifiable, localized source and affect a specific receiving waterbody. Locations of infrastructure and activities involving each aqueous point source emission are presented by LSA.

Table H.7 summarizes the ratings assigned to the significance criteria of residual effects associated with each effect discussed below.

Prediction Confidence

The confidence level assigned to the predictions of significance for aqueous non-point source discharge effects to water and sediment quality are summarized in Table H.8.

Milne Port LSA

All aqueous point source emissions from the Milne Port LSA are directed into Milne Inlet (marine environment) via surface release through a combination of constructed/natural drainage to areas that have no identified sensitive receptors (i.e., fish and/or fish habitat). Due to the absence of sensitive secondary receptors, an assessment of freshwater effects was not completed. The assessment of residual effects associated with emissions into the marine environment, where secondary receptors are located, is addressed in FEIS Volume 8.

Milne Inlet Tote Road LSA

No aqueous point source emissions into the freshwater receiving environment are located in the Milne Inlet Tote Road LSA.

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Table H.7: Effects Assessment Summary - Aqueous Point-Source Discharges

Effect		Residual Effect Evaluation Criteria					Significance
Effect	**Direction & Nature of Effect**	**Magnitude / Complexity**	**Geographical Extent**	**Frequency**	**Duration**	**Reversibility**	**Rated Significance of Residual Effect**
SWSQ-10 West Waste Rock Stormwater Discharge to Camp Lake and Tributaries	**Negative** Water quality (pH, TSS, metals, ammonia, nitrite)	**Level II**: Concentrations of indicator(s) predicted to exceed threshold value(s) by an order of magnitude or greater	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level III:** long-term/permanent	**Level II:** effect is partially reversible (water treatment, if required)	Not Significant
SWSQ-11 Waste Rock and Ore Stormwater Discharge to Mary River	**Negative** Water quality (pH, TSS, metals, ammonia, nitrite)	**Level I**: concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s)	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level II:** effect is partially reversible (water treatment, if required)	Not Significant
SWSQ-12 Exploration Drilling Runoff to Mary River	**Negative** Water quality (pH, TSS, chlorides)	**Level I**: concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s)	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-13 Pit Lake and Waste Rock Discharges to Mary River in Post-closure	**Negative** Water quality (pH, TSS, metals)	**Level I**: concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s)	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level III:** long-term/permanent	**Level II:** effect is partially reversible (water treatment, if required)	Not Significant

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Effect		Residual Effect Evaluation Criteria					Significance
Effect	**Direction & Nature of Effect**	**Magnitude / Complexity**	**Geographical Extent**	**Frequency**	**Duration**	**Reversibility**	**Rated Significance of Residual Effect**
SWSQ-14 Exploration Camp WWTF Effluent Discharge to Sheardown Lake	**Negative** Water quality (pH, TSS, BOD, nutrients, ammonia)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-15 Mine Site WWTF Effluent Discharge to Mary River	**Negative** Water quality (pH, TSS, BOD, nutrients, ammonia)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant

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Table H.8 Significance of Residual Effects from Point Source Discharges

Key Issue	Significance of Predicted Residual Environmental Effect		Likelihood (1)	
	Significance Rating	Level of Confidence	Probability	Certainty
SWSQ-10 West Waste Rock Stormwater Discharge to Camp Lake and Tributaries	N	3	N/A	N/A
SWSQ-11 Waste Rock and Ore Stormwater Discharge to Mary River	N	3	N/A	N/A
SWSQ-12 Exploration Drilling Runoff to Mary River	N	2	N/A	N/A
SWSQ-13 Pit Lake and Waste Rock Discharges to Mary River in Post-closure	N	2	N/A	N/A
SWSQ-14 Exploration Camp WWTF Effluent Discharge to Sheardown Lake	N	2	N/A	N/A
SWSQ-15 Mine Site Camp WWTF Effluent Discharge to Mary River	N	2	N/A	N/A
KEY: Significance Rating: S= Significant, N = Not Significant, P = Positive Level of Confidence : 1= Low; 2= Medium; 3=High (1) Likelihood - only applicable to significant effects Probability: 1= Unlikely; 2= Moderate; 3=Likely Certainty: : 1= Low; 2= Medium; 3=High				

Mine Site LSA

Impact Statements SWSQ-10 to SWSQ-13: Project-related discharges of mine contact water may result in impaired surface water and sediment quality in the Mine Site LSA.

Management of storm water and process water that has been in contact with the iron ore (mine contact water) is required at the Mine Site. Plans and drawings illustrating proposed site water management infrastructure for mine contact water are provided in the Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026). The following sources have been identified for inclusion in the aqueous point source emissions assessment because they involve mine contact water that will be discharged into the freshwater environment:

- Waste Rock Stockpile runoff to Camp Lake and Tributaries (SWSQ-10);
- Waste rock and ore stockpile runoff to Mary River (SWSQ-11);
- Exploration drilling runoff (SWSQ-12); and

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- Pit lake water and waste rock discharges to Mary River in post-closure (SWSQ-13).

The development of source terms (runoff water quality estimates) for waste rock, ore and pit water is described above.

Given the variability in runoff flows, the ponds were sized to accommodate the two-year extreme event. Discharge is anticipated to be distributed evenly with the natural flows from approximately mid-June until September.

Details regarding theoretical treatment options are provided in the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031). The main findings suggest that, with sufficient storage and upstream control, any water quality issues that arise can be managed. If the only challenge with the water quality is TSS concentration, this will often be solved using retention time alone. With a buffer pond that has a sufficiently large retention time it is possible to allow particles to settle while discharging - either by gravity or pumping - in a continuous system.

All mine contact water (including that from the ore stockpiles) in the Milne Port and Steensby Port LSAs is discharged to the ocean; their potential effects are assessed in FEIS Volume 8.

Residual effects ratings for the various mine contact water discharges are provided below.

Waste Rock Stormwater Discharge to Camp Lake and Tributaries - Impact Statement SWSQ-10

Runoff discharged from the West Waste Rock Stockpile Pond (Pond 1) has the potential to adversely affect water quality in the tributary of Camp Lake to which stormwater will be discharged, and downstream into Camp Lake.

Contact water (runoff) from the Waste Rock Stockpile will be settled in the west pond (Pond 1) prior to discharge to tributary L1, which in turn reports to tributary L0 and subsequently to Camp Lake. The arrangement of the stockpile, the sedimentation pond and the receiving environment are illustrated in Life-of-Mine Waste Rock Management Plan. It is predicted, based on waste rock seepage modelling, that runoff from the stockpile will meet MDMER requirements (Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031)).

Background water quality was measured in the open-water seasons (June to September) of 2006, 2007, 2008 and 2011. Open-water season means were calculated for key water quality parameters at sampling locations L0-01, L1-02 and L1-08. Water quality sampling included analysis of routine water quality parameters identified in the Baseline Water and Sediment Quality Report in FEIS Appendix 7B-1. Background mean and 90th percentile baseline concentrations were applied to the modelling.

Mean and low flow rates (or annual volumes) were obtained from hydrological surveys conducted over five years (2006, 2007, 2008, 2010 and 2011).

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A mass balance approach was applied using the methodology described above to estimate water quality in the receiving waters under mean flow conditions and by discharging runoff following the natural hydrograph. Resultant water quality in Camp Lake tributary L1 (at the location of falls which prevent the upstream passage of fish), downstream where L1 reports to tributary L0 and then at Camp Lake is presented in Table H.9. The same analysis during the 10-year dry year is presented in Table H.10.

Residual Effects Rating

Magnitude

The mass balance modelling indicates that several parameters will have Level II magnitude effects to water quality under both mean and low flow conditions at the nearest downstream location inhabited by fish at L0, and in Camp Lake (Hazard Quotient - HQ of >1 and <10). An HQ >10 and <100 was applied for mercury using 90th percentile baseline concentrations. All other parameters are at Level I or lower.

As mentioned above, each of the metals showing an HQ >1 (a Level I effect) or HQ >10 (a Level II effect) is identified in the humidity cell testing as having >50 % non-detects, and half the detection limits were assumed for non-detect results. Consequently, the derived source terms for these metals are substantially based on the MDLs. Most of these same parameters (including arsenic, cadmium, chromium, mercury, selenium and silver, as well as other metals that do not trigger a Level I effect) have measured baseline concentrations that are mostly non-detect, and therefore the calculated mean or 90th percentile concentrations are substantially based on MDLs. On this basis, the assignment of a Level II magnitude rating for water and sediment quality effects arising from discharge of stormwater from the west waste rock pond to the Camp Lake tributaries and Camp Lake is considered to be highly conservative. Baffinland is exploring options for re-testing or additional testing to obtain a dataset of more precise measurements for these parameters.

Aquatic Effects Monitoring, Environmental Effects Monitoring and routine water quality monitoring are expected to identify potential effects as they arise, and adaptive management will reduce the risk of exceeding the predicted effects level.

Duration

Discharge of mine contact water from the West Waste Rock Pond into the lower reach of Camp Lake tributary L1 will be required during the Operation, Closure and post-closure phases of the Project; a Level III duration rating was assigned.

Frequency

The frequency of the potential effect will be annual, limited to the period between June and September. A Level II frequency rating was assigned.

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Extent

The extent of the potential effect is expected to be limited to the Mine Site freshwater LSA and to reach negligible levels where Camp Lake discharges into Mary Lake. A Level I extent rating was assigned.

Reversibility

The potential effects are anticipated to be partially reversible. A Level II reversibility rating was assigned.

Significance – SWSQ-10 – West Waste Rock Stormwater Discharge to Camp Lake and Tributaries

Based on these ratings, discharge of mine contact water from the West Waste Rock Sedimentation Pond into the tributary of Camp Lake is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The residual effect is ranked as *Not Significant* (Table H.7). The Level of Confidence (Table H.8) is High due to the quantitative nature and conservative assumptions of the assessment. Additionally the EEM requirements of MDMER provide assurance that effects will be detected and necessary corrective actions implemented.

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Table H.9: Predicted Water Quality in Camp Lake Tributaries and Camp Lake Under Mean Flow Conditions

Parameter	Units	Baseline Water Quality (L0-01, L1-02, L1-08)			Baseline Water Quality Camp Lake	Receiving Water Quality Objectives (Note 5)	Discharge Scenario		WATER QUALITY IN THE RECEIVING WATERS									
									CAMP LAKE TRIB L1 BEFORE DISCHARGE TO TRIB L0				MOUTH OF TRIB L0 AT OUTLET TO CAMP LAKE				CAMP LAKE	
							Flows Used		Discharge Equalized to Mean Summer Flow Discharge Volume = 843,000 m^3/yr Mean Baseline Flows in L1 = 790,807 m^3/yr				Discharge Equalized to Summer Flow - Additional Dilution in L0 Discharge Flows = 1,633,807 m^3/yr Mean Baseline Flows in L0 (MR-10) at outlet to lake = 976,453 m^3/yr				Assume Instantaneous Mixing within lake = 27,511,100 m^3 Discharge Flows into Camp Lake (MR-10 Outlet Flows + Discharge Volume) = 2,610,260 m^3/yr	
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration		Baseline Concentrations		Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ	Mean (Lake) 90th Percentile (Streams)	HQ
							MDMER	West Waste Rock Pile Source Terms										
pH		7.84	8.38		7.61	6.5 - 9.0	-	6.9	7.35	-	7.62	-	7.54	-	7.90	-	7.64	-
Hardness	mg/L $CaCO_3$	74.11	121.00		57.69	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.0190	0.0390	82%	0.0095	0.94	-	0.12	0.071	0.1	0.081	0.1	0.052	0.05	0.065	0.07	0.0143	0.02
Antimony	mg/L	-	0.0004	0%	0.00010	-	-	0.0031	-	-	0.0018	-	-	-	0.0013	-	0.00020	-
Arsenic	mg/L	-	0.0050	6%	0.00018	0.005	0.50	0.0025	-	-	0.0037	0.7	-	-	0.0042	0.8	0.00053	0.1
Barium	mg/L	0.0093	0.0119	59%	0.00565	-	-	0.064	0.038	-	0.039	-	0.027	-	0.029	-	0.0076	-
Beryllium	mg/L	-	0.0050	0%	0.00050	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.0320	10%	0.01000	1.5	-	0.025	-	-	0.028	0.02	-	-	0.030	0.02	0.012	0.01
Cadmium	mg/L	-	0.00010	10%	0.000023	0.000029	-	0.000020	-	-	0.00006	2.0	-	-	0.00007	2.6	0.00003	0.9
Chromium	mg/L	-	0.0010	10%	0.00055	0.0047	-	0.0029	-	-	0.0020	0.4	-	-	0.0016	0.3	0.00064	0.1
Cobalt	mg/L	-	0.0003	4%	0.00011	-	-	0.00079	-	-	0.00055	-	-	-	0.00046	-	0.00014	-
Copper	mg/L	0.0015	0.0020	94%	0.00207	0.0047	0.30	0.0031	0.0023	0.5	0.0026	0.5	0.0020	0.4	0.0024	0.5	0.0021	0.4
Iron	mg/L	0.0471	0.0610	67%	0.03152	1.2	-	<0.002	0.023	0.02	0.030	0.03	0.032	0.03	0.042	0.03	0.032	0.03
Lead	mg/L	0.0002	0.0007	18%	0.000171	0.001	0.20	0.00020	0.0002	0.2	0.00044	0.4	0.0002	0.2	0.001	0.5	0.0002	0.2
Manganese	mg/L	0.0063	0.0100	51%	0.002289	-	-	0.00004	0.0031	-	0.0049	-	0.004	-	0.0068	-	0.002678	-
Mercury	mg/L	-	0.00010	2%	0.000040	0.000026	-	0.00057	-	-	0.00034	13	-	-	0.00025	9.7	0.000058	2.2
Molybdenum	mg/L	0.0027	0.0050	46%	0.000620	0.073	-	0.010	0.0065	0.1	0.0076	0.1	0.0051	0.07	0.0066	0.09	0.0011	0.02
Nickel	mg/L	0.0030	0.0050	32%	0.00109	0.083	0.50	0.0019	0.0024	0.03	0.0034	0.04	0.0026	0.03	0.0040	0.05	0.0013	0.02
Selenium	mg/L	-	0.0050	2%	0.00100	0.001	-	0.0077	-	-	0.0064	6	-	-	0.0059	5.87	0.0014	1.4
Silver	mg/L	-	0.0001	4%	0.000017	0.0001	-	0.000064	-	-	0.00008	0.8	-	-	0.00009	0.9	0.000023	0.2
Thallium	mg/L	-	0.0002	0%	0.00010	0.0008	-	0.00029	-	-	0.00025	0.3	-	-	0.00023	0.3	0.00011	0.1
Uranium	mg/L	0.0016	0.0027	100%	0.000402	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.0010	2%	0.00100	0.006	-	0.0010	-	-	0.0010	0.2	-	-	0.0010	0.2	0.0010	0.2
Zinc	mg/L	0.0020	0.0030	25%	0.00247	0.03	0.50	0.013	0.008	0.3	0.008	0.3	0.006	0.2	0.006	0.2	0.00280	0.1

NOTES:

1. MODEL ASSUMES COMPLETE NEAR INSTANTANEOUS MIXING OF EFFLUENT AND RECEIVING WATER.
2. NO MEAN CONCENTRATION CALCULATED WHERE THE MAJORITY OF SAMPLING RESULTS WERE BELOW THE METHOD DETECTION LIMIT
3. EFFLUENT SOURCE TERMS PROVIDED BY AMEC (JANUARY, 2012).

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Parameter	Units	Baseline Water Quality (L0-01, L1-02, L1-08)			Baseline Water Quality Camp Lake	Receiving Water Quality Objectives (Note 5)	Discharge Scenario		WATER QUALITY IN THE RECEIVING WATERS: CAMP LAKE TRIB L1 BEFORE DISCHARGE TO TRIB L0				MOUTH OF TRIB L0 AT OUTLET TO CAMP LAKE				CAMP LAKE	
							Flows Used		Discharge Equalized to Mean Summer Flow Discharge Volume = 843,000 m^3/yr Mean Baseline Flows in L1 = 790,807 m^3/yr				Discharge Equalized to Summer Flow - Additional Dilution in L0 Discharge Flows = 1,633,807 m^3/yr Mean Baseline Flows in L0 (MR-10) at outlet to lake = 976,453 m^3/yr				Assume Instantaneous Mixing within lake = 27,511,100 m^3 Discharge Flows into Camp Lake (MR-10 Outlet Flows + Discharge Volume) = 2,610,260 m^3/yr	
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration		Baseline Concentrations		Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ	Mean (Lake) 90th Percentile (Streams)	HQ
							MDMER	West Waste Rock Pile Source Terms										

4. EFFLUENT SOURCE TERM OF 0.001 USED IN CALCULATIONS FOR IRON
5. RECEIVING WATER QUALITY OBJECTIVES OBTAINED FROM CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME) CANADIAN WATER QUALITY GUIDELINES FOR THE PROECTION OF AQUATIC LIFE (PAL) (2003), CONTINUOUS CONCENTRATION (CHRONIC) NATIONAL RECOMMENDED WATER QUALITY CRITERIA (UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (2006)), BRITISH COLUMBIA MINISTRY OF ENVIRONMENT APPROVED AND WORKING WATER QUALITY GUIDELINES OR SUTER THRESHOLDS, AS APPLICABLE.
6. IN ORDER TO ESTIMATE EFFLUENT SOURCE TERMS, HALF THE METHOD DETECTION LIMIT OF A PARAMETER WAS ADOPTED WHERE MORE THAN HALF OF THE RESULTS FOR THAT PARAMETER WERE NON-DETECT (I.E. LESS THAN THE MDL). THESE EFFLUENT SOURCE TERMS ARE HIGHLIGHTED IN BLUE.
7. RESULTS WITH AN HQ GREATER THAN 1 ARE HIGHLIGHTED IN ORANGE, TO FOCUS DISCUSSION IN THE EFFECTS ASSESSMENT.

Table H.10: Predicted Water Quality in Camp Lake Tributaries and Camp Lake In A Dry Year

Parameter	Units	Baseline Water Quality (L0-01, L1-02, L1-08)			Baseline Water Quality Camp Lake	Receiving Water Quality Objectives (Note 5)	Discharge Scenario		WATER QUALITY IN THE RECEIVING WATERS: CAMP LAKE TRIB L1 BEFORE DISCHARGE TO TRIB L0				MOUTH OF TRIB L0 AT OUTLET TO CAMP LAKE				CAMP LAKE	
							Flows Used		Discharge Equalized to 10-Year Low Flow Discharge Volume = 354,060 m^3/yr 10-Year Low Baseline Flows in L1 = 332,139 m^3/yr				Discharge Equalized to 10-Year Low Flow - Additional Dilution in L0 Discharge Flows = 686,199 m^3/yr 10-Year Low Baseline Flows in L0 (MR-10) at outlet to lake = 410,110 m^3/yr				Assume Instantaneous Mixing within lake = 27,511,100 m^3 Discharge Flows into Camp Lake (MR-10 Outlet Flows + Discharge Volume) = 1,096,309 m^3/yr	
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration		Baseline Concentrations		Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ	Mean (Lake) 90th Percentile (Streams)	HQ
							MDMER	West Waste Rock Pile Source Terms										
pH		7.84	8.38		7.61	6.5 - 9.0	-	6.9	7.35	-	7.62	-	7.54	-	7.90	-	7.62	-
Hardness	mg/L $CaCO_3$	74.11	121.00		57.69	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.0190	0.0390	82%	0.0095	0.94	-	0.286	0.157	0.2	0.166	0.2	0.105	0.11	0.119	0.13	0.0137	0.01
Antimony	mg/L	-	0.0004	0%	0.00010	-	-	0.007	-	-	0.004	-	-	-	0.003	-	0.0002	-
Arsenic	mg/L	-	0.0050	6%	0.00018	0.005	0.50	0.006	-	-	0.0055	1.1	-	-	0.0053	1.06	0.00038	0.08
Barium	mg/L	0.0093	0.0119	59%	0.00565	-	-	0.152	0.083	-	0.084	-	0.056	-	0.057	-	0.0076	-
Beryllium	mg/L	-	0.0050	0%	0.00050	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.0320	10%	0.01000	1.5	-	0.060	-	-	0.046	0.03	-	-	0.041	0.03	0.0112	0.01
Cadmium	mg/L	-	0.00010	10%	0.000023	0.000029	-	0.00005	-	-	0.00007	2.5	-	-	0.00008	2.9	0.00003	0.87
Chromium	mg/L	-	0.0010	10%	0.00055	0.0047	-	0.007	-	-	0.0040	0.9	-	-	0.0029	0.62	0.00064	0.14

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Parameter	Units	Baseline Water Quality (L0-01, L1-02, L1-08)			Baseline Water Quality Camp Lake	Receiving Water Quality Objectives (Note 5)	Discharge Scenario		WATER QUALITY IN THE RECEIVING WATERS									
							Flows Used		CAMP LAKE TRIB L1 BEFORE DISCHARGE TO TRIB L0 Discharge Equalized to 10-Year Low Flow Discharge Volume = 354,060 m^3/yr 10-Year Low Baseline Flows in L1 = 332,139 m^3/yr				MOUTH OF TRIB L0 AT OUTLET TO CAMP LAKE Discharge Equalized to 10-Year Low Flow - Additional Dilution in L0 Discharge Flows = 686,199 m^3/yr 10-Year Low Baseline Flows in L0 (MR-10) at outlet to lake = 410,110 m^3/yr				CAMP LAKE Assume Instantaneous Mixing within lake = 27,511,100 m^3 Discharge Flows into Camp Lake (MR-10 Outlet Flows + Discharge Volume) = 1,096,309 m^3/yr	
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration		Baseline Concentrations		Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ	Mean (Lake) 90th Percentile (Streams)	HQ
							MDMER	West Waste Rock Pile Source Terms										
Cobalt	mg/L	-	0.0003	4%	0.00011	-	-	0.0019	-	-	0.0011	-	-	-	0.0008	-	0.00014	-
Copper	mg/L	0.0015	0.0020	94%	0.00207	0.0047	0.30	0.007	0.0045	1.0	0.0048	1.0	0.0034	0.7	0.0037	0.8	0.00213	0.5
Iron	mg/L	0.0471	0.0610	67%	0.03152	1.2	-	0.002	0.024	0.02	0.031	0.03	0.033	0.03	0.042	0.0351	0.032	0.03
Lead	mg/L	0.0002	0.0007	18%	0.000171	0.001	0.20	0.0005	0.0003	0.3	0.0006	0.6	0.0003	0.3	0.0006	0.6	0.00019	0.2
Manganese	mg/L	0.0063	0.0100	51%	0.002289	-	-	0.00010	0.0031	-	0.0049	-	0.0043	-	0.0068	-	0.0025	-
Mercury	mg/L	-	0.00010	2%	0.000040	0.000026	-	0.001	-	-	0.00075	29	-	-	0.00051	19.46	0.000058	2.23
Molybdenum	mg/L	0.0027	0.0050	46%	0.000620	0.073	-	0.024	0.014	0.2	0.015	0.2	0.010	0.13	0.011	0.15	0.0010	0.01
Nickel	mg/L	0.0030	0.0050	32%	0.00109	0.083	0.50	0.005	0.004	0.05	0.005	0.06	0.003	0.04	0.005	0.06	0.00123	0.01
Selenium	mg/L	-	0.0050	2%	0.00100	0.001	-	0.018	-	-	0.0119	12	-	-	0.0093	9.31	0.0013	1.32
Silver	mg/L	-	0.0001	4%	0.000017	0.0001	-	0.0002	-	-	0.00013	1.3	-	-	0.00012	1.2	0.00002	0.21
Thallium	mg/L	-	0.0002	0%	0.00010	0.0008	-	0.001	-	-	0.00045	0.6	-	-	0.00036	0.448	0.00011	0.14
Uranium	mg/L	0.0016	0.0027	100%	0.000402	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.0010	2%	0.00100	0.006	-	0.002	-	-	0.0017	0.3	-	-	0.0014	0.24	0.0010	0.17
Zinc	mg/L	0.0020	0.0030	25%	0.00247	0.03	0.50	0.031	0.017	0.6	0.017	0.6	0.011	0.4	0.012	0.4	0.0028	0.1

NOTES:

1. MODEL ASSUMES COMPLETE NEAR INSTANTANEOUS MIXING OF EFFLUENT AND RECEIVING WATER.
2. NO MEAN CONCENTRATION CALCULATED WHERE THE MAJORITY OF SAMPLING RESULTS WERE BELOW THE METHOD DETECTION LIMIT.
3. EFFLUENT SOURCE TERMS PROVIDED BY AMEC (JANUARY, 2012).
4. EFFLUENT SOURCE TERM OF 0.001 USED IN CALCULATIONS FOR IRON.
5. RECEIVING WATER QUALITY OBJECTIVES OBTAINED FROM CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME) CANADIAN WATER QUALITY GUIDELINES FOR THE PROECTION OF AQUATIC LIFE (PAL) (2003), CONTINUOUS CONCENTRATION (CHRONIC) NATIONAL RECOMMENDED WATER QUALITY CRITERIA (UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (2006)), BRITISH COLUMBIA MINISTRY OF ENVIRONMENT APPROVED AND WORKING WATER QUALITY GUIDELINES OR SUTER THRESHOLDS, AS APPLICABLE.
6. IN ORDER TO ESTIMATE EFFLUENT SOURCE TERMS, HALF THE METHOD DETECTION LIMIT OF A PARAMETER WAS ADOPTED WHERE MORE THAN HALF OF THE RESULTS FOR THAT PARAMETER WERE NON-DETECT (I.E. LESS THAN THE MDL). THESE EFFLUENT SOURCE TERMS ARE HIGHLIGHTED IN BLUE.
7. RESULTS WITH AN HQ GREATER THAN 1 ARE HIGHLIGHTED IN ORANGE, TO FOCUS DISCUSSION IN THE EFFECTS ASSESSMENT.

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Waste Rock and Ore Stormwater Discharge to the Mary River - Impact Statement SWSQ-11

Runoff discharged from the East Pond (Pond 2), containing both Waste Rock Stockpile runoff and pit water, has the potential to adversely affect water quality in the Mary River.

A mass balance approach similar to that used for the West Waste Rock Pond (SWSQ-10) was applied using the methodology described above to estimate water quality in the receiving waters under mean flow conditions and by discharging effluent following the natural hydrograph. Resultant water quality in the Mary River following discharge of the East Pond is presented in Table H.11, and the same analysis during the 10-year dry year is presented in Table H.12.

Residual Effects Rating

Magnitude

The mass balance modelling indicates that Level I magnitude effects to water quality will occur under both mean and low flow conditions (all indicator parameters <10x the applicable WQO) in the Mary River at each of the locations modelled:

- In the Mary River at MR-12 where tributary F0 containing the east pond discharge reports to the Mary River, under mean flow conditions (Table H.11) and the 10-year dry condition (Table H.12); and
- At the point of mixing of the discharge of stormwater from the main ore stockpiles, including the ROM stormwater discharge, under mean flow conditions (Table H.13) and the 10-year dry condition (Table H.14).

Fish habitat is present at the outlet of MR-12 (tributary F0), for which the resultant water quality in Mary River is shown on the far right of Tables H.11 and H.12. At this location, Level I water quality effects may be experienced based on an HQ >1 for mercury, selenium and silver (under mean flow conditions). Copper and chromium are added under the dry year condition. As discussed in the assessment of discharges from East Waste Rock Pond, the calculated baseline concentrations and source terms used in the modelling are from datasets where these parameters were predominantly non-detect. As such, a Level I magnitude rating is highly conservative.

Farther downstream, the ROM and main ore stockpiles will discharge into the Mary River. The resultant water quality in the Mary River considering these discharges as well as the east waste rock pond discharge discussed above is presented in Tables H.13 and H.14. Mercury, selenium and silver (under mean flow and low flow conditions), have a calculated HQ >1, suggesting a Level I magnitude effect with the same qualifiers as described above.

The resultant water quality downstream in Mary Lake was approximated considering discharges from the west stormwater pond via Camp Lake and the multiple discharges to Mary River, which also report to Mary Lake. Based on the average lake volume of 169,000,000 m^3, HQs of 4, 1 and 1 were calculated for mercury,

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selenium and silver, respectively. Given that the modelling inputs (both baseline and source terms) for each of these parameters are based on MDLs, it is anticipated that the HQ values will be below 1, achieving a negligible effect on water quality in Mary Lake.

Duration

While the temporary ore stockpiles will to discharge stormwater during the Operations phase only, a Level II duration rating is assigned to this effect. The east waste rock pond and pit will continue to discharge runoff in the long term; however the post-closure effects of this is assessed separately in SWSQ-13.

Frequency

The frequency of the potential effect will be annual, limited to the period between June and September when discharge is proposed. A Level II frequency rating was assigned.

Extent

The extent of the potential effect is expected to reach negligible levels where the Mary River discharges into Mary Lake, so, given that the effect is expected to be limited to the Mine Site freshwater LSA, a Level I extent rating was assigned.

Reversibility

The potential effects associated with the discharge of mine contact water from the Waste Rock Stockpile into the Mary River system are anticipated to be partially reversible. A Level II reversibility rating was assigned.

Significance – SWSQ-11 – Waste Rock and Ore Stormwater Discharge to the Mary River

Based on these ratings, discharge of mine contact water from the Waste Rock Stockpile, ROM stockpile and Main Ore Stockpile into the Mary River is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The residual effect is ranked as *Not Significant* (Table H.7). The Level of Confidence is High due to the quantitative and conservative nature of the assessment.

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Table H.11: Predicted Water Quality in the Mary River Under Mean Flow Conditions (East Discharge)

Parameter	Units	Baseline Water Quality in Trib F0 (F0-01, F0-05)			Baseline Water Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN THE RECEIVING WATERS							
									Flows Used			Mean Volume of Effluent from East Pond = 370,138 m^3/yr Mean Volume of Effluent from Open Pit = 224,978 m^3/yr	WATER QUALITY IN TRIB F0 - CATCHMENT MR-12 (U/S OF FISH HABITAT) Mean Volume of Effluent Discharged from East Pond and Open Pit = 595,116 m^3/yr Mean Volume to mix at MR-12 = 4,152,146 m^3/yr				WATER QUALITY IN MARY RIVER AT MR-12 OUTLET (FISH HABITAT) Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects		Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
									MDMER	Pit Water Source Terms (Year 21)	East Waste Rock Source Terms									
pH		8.01	8.31		7.83	8.20		6.5 - 9.0	-	4.20	6.9	5.88	7.74	-	8.01	-	7.83	-	8.19	-
Hardness	mg/L $CaCO_3$	84	133		58	105		-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.020	0.042	81%	0.191	0.394	100%	0.94	-	4.2	0.095	1.65	0.22	0.2	0.24	0.3	0.19	0.2	0.39	0.4
Antimony	mg/L	-	0.0004	0%	-	0.0001	2%	-	-	0.008	0.0025	0.0046	-	-	0.001	-	-	-	0.00015	-
Arsenic	mg/L	-	0.0010	4%	-	0.0010	8%	0.005	0.50	0.007	0.0020	0.0039	-	-	0.001	0.3	-	-	0.00102	0.2
Barium	mg/L	0.00945	0.01068	47%	0.01011	0.01319	57%	-	-	0.0340	0.051	0.045	0.014	-	0.015	-	0.010	-	0.013	-
Beryllium	mg/L	-	0.0050	0%	-	0.0005	0%	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	-	0.010	6%	1.5	-	0.11	0.020	0.054	-	-	0.016	0.01	-	-	0.010	0.01
Cadmium	mg/L	-	0.0000200	0%	-	0.00002	8%	0.000029	-	0.00016	0.000016	0.00007	-	-	0.000026	0.9	-	-	0.000020	0.7
Chromium	mg/L	0.0010	0.0010	8%	0.0018	0.0020	27%	0.0047	-	0.019	0.0023	0.0086	0.0020	0.4	0.0020	0.4	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0003	4%	0.0002	0.0002	20%	-	-	0.053	0.00063	0.020	0.0027	-	0.0028	-	0.00035	-	0.00035	-
Copper	mg/L	-	0.0009	38%	0.0012	0.0018	64%	0.0047	0.30	0.074	0.0025	0.030	-	-	0.0045	1.0	-	-	0.0020	0.4
Iron	mg/L	0.04	0.05	19%	0.18	0.36	86%	1.2	-	0.22	<0.002	0.084	0.045	0.04	0.054	0.05	0.17	0.1	0.34	0.3
Lead	mg/L	0.00016	0.00020	13%	0.00029	0.00087	35%	0.001	0.20	0.0022	0.00016	0.0009	0.00026	0.3	0.00029	0.3	0.00029	0.3	0.00084	0.8
Manganese	mg/L	0.00260	0.01000	32%	0.00386	0.01000	48%	-	-	0.57	0.00004	0.22	0.029	-	0.036	-	0.0053	-	0.011	-
Mercury	mg/L	-	0.00010	0%	-	0.00010	2%	0.000026	-	0.0016	0.00045	0.0009	-	-	0.00020	8	-	-	0.00011	4.1
Molybdenum	mg/L	0.00306	0.00500	38%	0.00288	0.00500	46%	0.073	-	0.027	0.0078	0.015	0.0046	0.06	0.0063	0.09	0.0030	0.04	0.0051	0.07
Nickel	mg/L	0.0032	0.0050	10%	0.0031	0.0050	92%	0.083	0.50	0.11	0.0015	0.043	0.0081	0.1	0.010	0.1	0.0034	0.04	0.0053	0.06
Selenium	mg/L	-	0.001	0%	-	0.001	0%	0.001	-	0.022	0.0051	0.011	-	-	0.0023	2.3	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	-	0.00010	10%	0.0001	-	0.0008	0.000051	0.00033	-	-	0.00013	1.3	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	-	0.0001	0%	0.0008	-	0.0009	0.00023	0.00048	-	-	0.00015	0.185	-	-	0.00010	0.1
Uranium	mg/L	0.00213	0.00299	100%	0.00252	0.00468	98%	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.001	0%	0.001	0.001	11%	0.006	-	0.0029	0.00083	0.0016	-	-	0.0011	0.179	-	-	0.0010	0.2
Zinc	mg/L	-	0.009	8%	0.003	0.006	25%	0.03	0.50	0.062	0.010	0.030	-	-	0.012	0.386	-	-	0.0063	0.2

NOTES:
1. MODEL ASSUMES COMPLETE NEAR INSTANTANEOUS MIXING OF EFFLUENT AND RECEIVING WATER.
2. NO MEAN CONCENTRATION CALCULATED WHERE THE MAJORITY OF SAMPLING RESULTS WERE BELOW THE METHOD DETECTION LIMIT.
3. EFFLUENT SOURCE TERMS PROVIDED BY AMEC (JANUARY, 2012).
4. EFFLUENT SOURCE TERM OF 0.001 USED IN CALCULATIONS FOR IRON.

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Parameter	Units	Baseline Water Quality in Trib F0 (F0-01, F0-05)			Baseline Water Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN THE RECEIVING WATERS							
													WATER QUALITY IN TRIB F0 - CATCHMENT MR-12 (U/S OF FISH HABITAT)				WATER QUALITY IN MARY RIVER AT MR-12 OUTLET (FISH HABITAT)			
									Flows Used			Mean Volume of Effluent from East Pond = 370,138 m^3/yr Mean Volume of Effluent from Open Pit = 224,978 m^3/yr	Mean Volume of Effluent Discharged from East Pond and Open Pit = 595,116 m^3/yr Mean Volume to mix at MR-12 = 4,152,146 m^3/yr				Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects		Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
									MDMER	Pit Water Source Terms (Year 21)	East Waste Rock Source Terms									
5. RECEIVING WATER QUALITY OBJECTIVES OBTAINED FROM CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME) CANADIAN WATER QUALITY GUIDELINES FOR THE PROECTION OF AQUATIC LIFE (PAL) (2003), CONTINUOUS CONCENTRATION (CHRONIC) NATIONAL RECOMMENDED WATER QUALITY CRITERIA (UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (2006)), BRITISH COLUMBIA MINISTRY OF ENVIRONMENT APPROVED AND WORKING WATER QUALITY GUIDELINES OR SUTER THRESHOLDS, AS APPLICABLE. 6. IN ORDER TO ESTIMATE EFFLUENT SOURCE TERMS, HALF THE METHOD DETECTION LIMIT OF A PARAMETER WAS ADOPTED WHERE MORE THAN HALF OF THE RESULTS FOR THAT PARAMETER WERE NON-DETECT (I.E. LESS THAN THE MDL). THESE EFFLUENT SOURCE TERMS ARE HIGHLIGHTED IN BLUE. 7. RESULTS WITH AN HQ GREATER THAN 1 ARE HIGHLIGHTED IN ORANGE, TO FOCUS DISCUSSION IN THE EFFECTS ASSESSMENT.																			

Table H.12: Predicted Water Quality in the Mary River Under 10-Year Dry Conditions (East Discharge)

Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario		COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
													WATER QUALITY IN TRIB F0 - CATCHMENT MR-12 (U/S OF FISH HABITAT)				WATER QUALITY IN MARY RIVER AT MR-12 OUTLET (FISH HABITAT)			
										Flows Used		10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr -10-Year Low Flow Volume of Effluent from Open Pit = 148,485 m^3/yr	10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 392,777 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr				10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Terms									
pH	0	8.01	8.31		7.83	8.20		6.5 - 9.0	-	4.20	6.9	5.88	7.74	-	8.01	-	7.83	-	8.19	-
Hardness	mg/L $CaCO_3$	84	133		58	105		-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.020	0.042	81%	0.191	0.394	100%	0.94	-	6.4	0.144	2.50	0.33	0.4	0.35	0.4	0.20	0.2	0.39	0.4
Antimony	mg/L	-	0.0004	0%	-	0.0001	2%	-	-	0.012	0.004	0.01	-	-	0.0012	-	-	-	0.00016	-
Arsenic	mg/L	-	0.0010	4%	-	0.0010	8%	0.005	0.50	0.011	0.003	0.006	-	-	0.002	0.3	-	-	0.001	0.2
Barium	mg/L	0.00945	0.01068	47%	0.01011	0.01319	57%	-	-	0.0515	0.077	0.07	0.01673	-	0.018	-	0.010	-	0.013	-
Beryllium	mg/L	-	0.0050	0%	-	0.0005	0%	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	-	0.010	6%	1.5	-	0.17	0.030	0.082	-	-	0.019	0.01	-	-	0.011	0.01
Cadmium	mg/L	-	0.0000200	0%	-	0.00002	8%	0.000029	-	0.00024	0.00002	0.0001	-	-	0.00003	1.1	-	-	0.00002	0.7

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Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario		COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
										Flows Used		10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr -10-Year Low Flow Volume of Effluent from Open Pit = 148,485 m^3/yr	WATER QUALITY IN TRIB F0 - CATCHMENT MR-12 (U/S OF FISH HABITAT)				WATER QUALITY IN MARY RIVER AT MR-12 OUTLET (FISH HABITAT)			
													10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 392,777 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr					10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Terms									
Chromium	mg/L	0.0010	0.0010	8%	0.0018	0.0020	27%	0.0047	-	0.029	0.003	0.013	0.003	0.5	0.003	0.5	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0003	4%	0.0002	0.0002	20%	-	-	0.080	0.0010	0.031	0.004	-	0.004	-	0.0004	-	0.0004	-
Copper	mg/L	-	0.0009	38%	0.0012	0.0018	64%	0.0047	0.30	0.112	0.004	0.045	-	-	0.006	1.4	-	-	0.0021	0.4
Iron	mg/L	0.04	0.05	19%	0.18	0.36	86%	1.2	-	0.33	0.002	0.13	0.051	0.04	0.060	0.05	0.17	0.1	0.34	0.3
Lead	mg/L	0.00016	0.00020	13%	0.00029	0.00087	35%	0.001	0.20	0.0033	0.0002	0.001	0.0003	0.3	0.0004	0.4	0.00029	0.3	0.00084	0.8
Manganese	mg/L	0.00260	0.01000	32%	0.00386	0.01000	48%	-	-	0.86	0.00006	0.33	0.043	-	0.050	-	0.006	-	0.01221	-
Mercury	mg/L	-	0.00010	0%	-	0.00010	2%	0.000026	-	0.0024	0.001	0.001	-	-	0.0003	9.8	-	-	0.00011	4.2
Molybdenum	mg/L	0.00306	0.00500	38%	0.00288	0.00500	46%	0.073	-	0.041	0.012	0.023	0.006	0.08	0.007	0.1	0.0030	0.04	0.0051	0.07
Nickel	mg/L	0.0032	0.0050	10%	0.0031	0.0050	92%	0.083	0.50	0.17	0.002	0.064	0.011	0.1	0.012	0.1	0.004	0.04	0.0054	0.07
Selenium	mg/L	-	0.001	0%	-	0.001	0%	0.001	-	0.033	0.008	0.02	-	-	0.003	3.1	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	-	0.00010	10%	0.0001	-	0.0012	0.0001	0.001	-	-	0.0002	1.5	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	-	0.0001	0%	0.0008	-	0.0014	0.0003	0.001	-	-	0.0002	0.2	-	-	0.00010	0.1
Uranium	mg/L	0.00213	0.00299	100%	0.00252	0.00468	98%	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.001	0%	0.001	0.001	11%	0.006	-	0.0044	0.001	0.002	-	-	0.001	0.2	-	-	0.0010	0.2
Zinc	mg/L	-	0.009	8%	0.003	0.006	25%	0.03	0.50	0.094	0.015	0.045	-	-	0.014	0.5	-	-	0.0064	0.2

NOTES

1. MODEL ASSUMES COMPLETE NEAR INSTANTANEOUS MIXING OF EFFLUENT AND RECEIVING WATER.
2. NO MEAN CONCENTRATION CALCULATED WHERE THE MAJORITY OF SAMPLING RESULTS WERE BELOW THE METHOD DETECTION LIMIT.
3. EFFLUENT SOURCE TERMS PROVIDED BY AMEC (JANUARY, 2012).
4. EFFLUENT SOURCE TERM OF 0.001 USED IN CALCULATIONS FOR IRON.
5. RECEIVING WATER QUALITY OBJECTIVES OBTAINED FROM CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME) CANADIAN WATER QUALITY GUIDELINES FOR THE PROECTION OF AQUATIC LIFE (PAL) (2003), CONTINUOUS CONCENTRATION (CHRONIC) NATIONAL RECOMMENDED WATER QUALITY CRITERIA (UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (2006)), BRITISH COLUMBIA MINISTRY OF ENVIRONMENT APPROVED AND WORKING WATER QUALITY GUIDELINES OR SUTER THRESHOLDS, AS APPLICABLE.
6. IN ORDER TO ESTIMATE EFFLUENT SOURCE TERMS, HALF THE METHOD DETECTION LIMIT OF A PARAMETER WAS ADOPTED WHERE MORE THAN HALF OF THE RESULTS FOR THAT PARAMETER WERE NON-DETECT (I.E. LESS THAN THE MDL). THESE EFFLUENT SOURCE TERMS ARE HIGHLIGHTED IN BLUE.
7. RESULTS WITH AN HQ GREATER THAN 1 ARE HIGHLIGHTED IN ORANGE, TO FOCUS DISCUSSION IN THE EFFECTS ASSESSMENT

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Table H.13: Predicted Water Quality in the Mary River Under Mean Flow Conditions (All Discharges)

Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (FROM TABLE 7-3.18)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m3/yr		Mean Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 82,932,940 m^3/yr Mean Volume of ROM Pond = 18,203 m^3/yr Mean Volume of Effluent from Main Ore Stockpiles = 143,489 m^3/yr Total Ore Effluent = 161,692 m^3/yr Additional Dilution in Mary River = 5,333,330 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	Mean Ore Stockpile Source Terms	95th Percentile Ore Stockpile Source Terms						
pH	0	7.83	8.20		6.– - 9.0	-	5.76	5.93	6.68	6.48	6.21	6.65	7.8	8.2	7.8	-	8.2	-
Hardness	mg/L $CaCO_3$	58	105		-	-												
Aluminum	mg/L	0.191	0.394	81%	0.94	-	0.127	<0.015	<0.02	<0.06	0.044	0.112	0.19	0.39	0.19	0.2	0.39	0.4
Antimony	mg/L	-	0.0001	0%	-	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.001	-	0.00015	-	-	0.00015	-
Arsenic	mg/L	-	0.0010	4%	0.005	0.50	<0.0005	<0.0005	<0.002	<0.002	0.001	0.001	-	0.0010	-	-	0.0010	0.2
Barium	mg/L	0.01011	0.01319	47%	-	-	0.0236	0.0251	0.0213	0.0115	0.020	0.025	0.010	0.013	0.010	-	0.013	-
Beryllium	mg/L	-	0.0005	0%	0.0053	-	<0.0025	<0.0025	<0.01	<0.01	0.003	0.005	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	1.5	-	0.16	0.16	0.21	0.31	0.210	0.295	-	0.010	-	-	0.011	0.007
Cadmium	mg/L	0.00003	0.00010	0%	0.000029	-	0.000203	0.000198	<0.0002	0.00057	0.00027	0.00051	-	0.00002	-	-	0.00003	0.9
Chromium	mg/L	0.0018	0.0020	8%	0.0047	-	<0.0025	<0.0025	<0.01	<0.01	0.003	0.0050	0.0018	0.0020	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0002	4%	-	-	0.09740	0.1080	0.0462	0.1400	0.098	0.1352	0.0003	0.0004	0.00058	-	0.00059	-
Copper	mg/L	0.0012	0.0018	38%	0.0047	0.30	0.00183	<0.0025	<0.002	<0.01	0.002	0.0045	-	0.0020	-	-	0.0019	0.4
Iron	mg/L	0.18	0.36	19%	1.2	-	0.825	0.031	0.041	0.082	0.24	0.714	0.17	0.34	0.17	0.1	0.34	0.3
Lead	mg/L	0.00029	0.00087	13%	0.001	0.20	<0.0003	0.001	<0.001	<0.001	0.0005	0.0009	0.00029	0.00084	0.00029	0.3	0.00084	0.8
Manganese	mg/L	0.00386	0.01000	32%	-	-	18.4	21.5	65.5	112	54.4	105.0	0.005	0.01147	0.197	-	0.203	-
Mercury	mg/L	-	0.00010	0%	0.000026	-	<0.00001	0.00004	<0.00001	<0.00001	0.00001	0.00003	-	0.00011	-	-	0.00011	4.0
Molybdenum	mg/L	0.00288	0.00500	38%	0.073	-	<0.00025	<0.00025	<0.001	0.0012	0.0005	0.001	0.0030	0.0051	0.0030	0.04	0.0051	0.1
Nickel	mg/L	0.0031	0.0050	10%	0.083	0.50	0.0977	0.107	0.035	0.113	0.088	0.112	0.0034	0.0053	0.0036	0.04	0.005	0.1
Selenium	mg/L	-	**0.001**	0%	0.001	-	<0.005	0.0051	<0.02	<0.02	0.007	0.010	-	0.0011	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	0.0001	-	<0.00005	<0.00005	<0.0002	<0.0002	0.00006	0.00010	-	0.00010	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	0.0008	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.001	-	0.00010	-	-	0.00010	0.1
Uranium	mg/L	0.00252	0.00468	100%	0.015	-	0.00010	<0.00005	<0.0002	<0.0002	0.00008	0.00010	-	-	-	-	-	-
Vanadium	mg/L	0.001	0.001	0%	0.006	-	<0.005	<0.005	<0.02	<0.02	0.006	0.010	-	0.0010	-	-	0.0010	0.2
Zinc	mg/L	0.003	0.006	8%	0.03	0.50	<0.005	<0.015	<0.02	<0.06	0.013	0.027	-	0.0063	-	-	0.0063	0.2

NOTES
1. MODEL ASSUMES COMPLETE NEAR INSTANTANEOUS MIXING OF EFFLUENT AND RECEIVING WATER

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Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (FROM TABLE 7-3.18)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m3/yr		Mean Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 82,932,940 m^3/yr Mean Volume of ROM Pond = 18,203 m^3/yr Mean Volume of Effluent from Main Ore Stockpiles = 143,489 m^3/yr Total Ore Effluent = 161,692 m^3/yr Additional Dilution in Mary River = 5,333,330 m^3/yr			
		Mean Concentration	^{90}th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	^{90}th Percentile Baseline	Mean Baseline	HQ	^{90}th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	Mean Ore Stockpile Source Terms	^{95}th Percentile Ore Stockpile Source Terms						

2. NO MEAN CONCENTRATION CALCULATED WHERE THE MAJORITY OF SAMPLING RESULTS WERE BELOW THE METHOD DETECTION LIMIT
3. EFFLUENT SOURCE TERMS PROVIDED BY AMEC (JANUARY, 2012).
4. EFFLUENT SOURCE TERM OF 0.001 USED IN CALCULATIONS FOR IRON.
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6. DETECT (I.E. LESS THAN THE MDL). THESE EFFLUENT SOURCE TERMS ARE HIGHLIGHTED IN BLUE
7. RESULTS WITH AN HQ GREATER THAN 1 ARE HIGHLIGHTED IN ORANGE, TO FOCUS DISCUSSION IN THE EFFECTS ASSESSMENT

Table H.14: Predicted Water Quality in the Mary River Under 10-Year Dry Conditions (All Discharges)

Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (TABLE 7-3.19)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m3/yr		10-Year Low Flow Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 56,299,454 m^3/yr 10-Year Low Flow Volume of ROM Pond = 12,378 m^3/yr 10-Year Low Flow Volume of Effluent from Main Ore Stockpiles = 97,573 m^3/yr Total Ore Effluent = 109,951 m^3/yr Additional Dilution in Mary River = 3,626,664 m^3/yr			
		Mean Concentration	^{90}th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	^{90}th Percentile Baseline	Mean Baseline	HQ	^{90}th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	^{95}th Percentile Ore Stockpile For Mean Flows Source Terms	Ore Stockpile Source Terms (Dry Year)						
pH	0	7.83	8.20		6.– - 9.0	-	5.76	5.93	6.68	6.48	6.65	6.65	7.83	8.01	7.82	-	8.0	-
Hardness	mg/L $CaCO_3$	58	105		-	-												
Aluminum	mg/L	0.191	0.394	81%	0.94	-	0.127	<0.015	<0.02	<0.06	0.112	0.170	0.20	0.39	0.20	0.2	0.39	0.4
Antimony	mg/L	-	0.0001	0%	-	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.002	-	0.000162	-	-	0.00016	-

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Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (TABLE 7-3.19)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m3/yr		10-Year Low Flow Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 56,299,454 m^3/yr 10-Year Low Flow Volume of ROM Pond = 12,378 m^3/yr 10-Year Low Flow Volume of Effluent from Main Ore Stockpiles = 97,573 m^3/yr Total Ore Effluent = 109,951 m^3/yr Additional Dilution in Mary River = 3,626,664 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	95th Percentile Ore Stockpile For Mean Flows Source Terms	Ore Stockpile Source Terms (Dry Year)						
Arsenic	mg/L	-	0.0010	4%	0.005	0.50	<0.0005	<0.0005	<0.002	<0.002	0.001	0.002	-	0.00103	-	-	0.00103	0.2
Barium	mg/L	0.01011	0.01319	47%	-	-	0.0236	0.0251	0.0213	0.0115	0.025	0.038	0.010	0.013	0.011	-	0.013	-
Beryllium	mg/L	-	0.0005	0%	0.0053	-	<0.0025	<0.0025	<0.01	<0.01	0.005	0.008	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	1.5	-	0.16	0.16	0.21	0.31	0.295	0.447	-	0.011	-	-	0.011	0.008
Cadmium	mg/L	0.00003	0.00010	0%	0.000029	-	0.000203	0.000198	<0.0002	0.00057	0.00051	0.00078	-	0.000021	-	-	0.000027	0.9
Chromium	mg/L	0.0018	0.0020	8%	0.0047	-	<0.0025	<0.0025	<0.01	<0.01	0.0050	0.008	0.0018	0.0020	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0002	4%	-	-	0.09740	0.1080	0.0462	0.1400	0.1352	0.205	0.0004	0.0004	0.0008	-	0.0008	-
Copper	mg/L	0.0012	0.0018	38%	0.0047	0.30	0.00183	<0.0025	<0.002	<0.01	0.0045	0.007	-	0.0021	-	-	0.0020	0.4
Iron	mg/L	0.18	0.36	19%	1.2	-	0.825	0.031	0.041	0.082	0.714	1.08	0.17	0.34	0.17	0.1	0.35	0.3
Lead	mg/L	0.00029	0.00087	13%	0.001	0.20	<0.0003	0.001	<0.001	<0.001	0.0009	0.001	0.00029	0.00084	0.0003	0.3	0.00084	0.8
Manganese	mg/L	0.00386	0.01000	32%	-	-	18.4	21.5	65.5	112	105.0	159.1	0.006	0.012	0.30	-	0.30	-
Mercury	mg/L	-	0.00010	0%	0.000026	-	<0.00001	0.00004	<0.00001	<0.00001	0.00003	0.00005	-	0.00011	-	-	0.00011	4.2
Molybdenum	mg/L	0.00288	0.00500	38%	0.073	-	<0.00025	<0.00025	<0.001	0.0012	0.001	0.0017	0.0030	0.0051	0.0030	0.04	0.0051	0.1
Nickel	mg/L	0.0031	0.0050	10%	0.083	0.50	0.0977	0.107	0.035	0.113	0.112	0.170	0.004	0.0054	0.0038	0.05	0.0057	0.1
Selenium	mg/L	-	**0.001**	0%	0.001	-	<0.005	0.0051	<0.02	<0.02	0.010	0.015	-	0.0011	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	0.0001	-	<0.00005	<0.00005	<0.0002	<0.0002	0.0001	0.0002	-	0.00010	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	0.0008	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.002	-	0.00010	-	-	0.00011	0.1
Uranium	mg/L	0.00252	0.00468	100%	0.015	-	0.00010	<0.00005	<0.0002	<0.0002	0.0001	0.0002	-	-	-	-	-	-
Vanadium	mg/L	0.001	0.001	0%	0.006	-	<0.005	<0.005	<0.02	<0.02	0.010	0.015	-	0.0010	-	-	0.0010	0.2
Zinc	mg/L	0.003	0.006	8%	0.03	0.50	<0.005	<0.015	<0.02	<0.06	0.027	0.041	-	0.0064	-	-	0.0065	0.2

NOTES:
1. MODEL ASSUMES COMPLETE NEAR INSTANTANEOUS MIXING OF EFFLUENT AND RECEIVING WATER.
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6. IN ORDER TO ESTIMATE EFFLUENT SOURCE TERMS, HALF THE METHOD DETECTION LIMIT OF A PARAMETER WAS ADOPTED WHERE MORE THAN HALF OF THE RESULTS FOR THAT PARAMETER WERE NON-DETECT (I.E. LESS THAN THE MDL). THESE EFFLUENT SOURCE TERMS ARE HIGHLIGHTED IN BLUE.

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Pit Lake Water and Waste Rock Discharges to Mary River in Post-Closure – Impact Statement SWSQ-13

At the end of mining, the open pit will gradually fill with water from precipitation; time is estimated at 85 to 147 years, depending on annual precipitation, evaporation and other factors (Knight Piésold, 2008).

During the years that the pit is filling, runoff will continue to discharge to tributary F0 and the Mary River from the East Waste Rock Pond.

AMEC (2012b) developed water quality estimates for pit water for the final year of mining (Year 21), which were applied in a water quality model under the assumption that, once the pit has filled, in each subsequent (post-Closure) year all precipitation into the open pit will accumulate and spill over the southern edge facing the Mary River, behaving like a spillway, and that water will be released during the open water period according to the natural hydrograph.

Based on pit water quality for Year 21 of mining, it is possible the water will have A pH of around 4.2, which is outside of thE pH range of the MDMER (6.0 to 9.0). Adjustment oF pH will be carried out periodically through post-closure using either batch lime treatment or in-line treatment, drawing down the pit lake periodically. As mentioned in above, the mass loading modelling carried out is based on conservative assumptions and Baffinland is continuing to study the geochemistry of waste rock and ore to further refine predictions, management plans, and post-closure strategies.

Residual Effects Ratings

Magnitude

The estimated water quality in the Mary River from pit water and waste rock stormwater discharges, assuming no treatment to adjusT pH of pit water, is presented in Table H.15. The mass balance modelling indicates that Level I magnitude effects to water quality will occur under low flow conditions, with a calculated HQ between 1 and 10 for mercury, selenium and silver. It is noted that an HQ >10 was calculated for mercury within the F0 tributary, upstream of fish; however, since the assessment of water and sediment quality is based on fish as the receptor, the effects assessment considers the resultant water quality at fish habitat within the Mary River, where all parameters have an HQ value less than 10.

Duration

The effects associated with the discharge of pit water and waste rock runoff into the Mary River are permanent; Level III duration. The waste rock seepage will run off into the Mary River starting in the first year post-closure, whereas the pit water is not expected to discharge to the Mary River until the pit fills, after 80 years or more.

Frequency

The frequency of the potential effect will be annual, limited to the period between June and September when discharge is proposed. A Level II frequency rating was assigned.

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Extent

The extent of the potential effect is likely to be limited to the Mine Site freshwater LSA; a Level I extent rating was assigned.

Reversibility

The effects associated with the discharge of pit water and waste rock runoff into the Mary River is partially reversible. A Level II reversibility rating was assigned.

Significance – SWSQ-13 – Pit Lake Water and Waste Rock Discharges to Mary River in Post-Closure

Based on these ratings, discharge of pit water and stormwater from the East Waste Rock Sedimentation Pond into the Mary River is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The residual effect is ranked as *Not Significant* (Table H.7). The Level of Confidence (Table H.8) is Medium, due to the assumptions made in the mass loading models and the consequently highly conservative nature of the effect prediction.

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Table H.15: Predicted Water Quality in the Mary River During Post-Closure Due to Discharges of Pit Water and Waste Rock Stormwater Under 10-Year Low Flow Conditions

Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
														WATER QUALITY IN TRIB MR-12 (U/S OF FISH HABITAT)				WATER QUALITY IN MARY RIVER AT MR-12 (FISH HABITAT)			
										Flows Used			10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr 10-Year Low Flow Volume of Effluent from Open Pit = 296,971 m^3/yr	10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 541,262 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr				10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond & Open Pit = 3,281,679 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Term (Mean Flows)	East Waste Rock Source Terms (Dry Year)									
pH	0	8.01	8.31		7.83	8.20		6.5 - 9.0	-	4.20	6.9	6.9	5.42	7.58	-	7.83	-	7.82	-	8.18	-
Hardness	mg/L $CaCO_3$	84	133		58	105		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	5.7	18.6		8.3	17.0		120	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids	mg/L	-	2		3	6		15	15.00	-	-	-	-	-	-	-	-	-	-	-	-
Total Alkalinity	mg/L $CaCO_3$	74	108		47	81		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia	mg/L	0.06	0.11		0.05	0.07		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate	mg/L	0.1	0.1		-	0.1		13	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite	mg/L	0.011	0.017		0.010	0.014		0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	2	4		3	5		-	-	239	26	39	149	26	-	28	-	4	-	6	-
Total Phosphorous	mg/L	0.013	0.030		0.013	0.026		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.020	0.042	81%	0.191	0.394	100%	0.94	-	6.4	0.095	0.144	3.56	0.60	0.6	0.62	0.7	0.21	0.229	0.41	0.4
Antimony	mg/L	-	0.0004	0%	-	0.0001	2%	-	-	0.012	0.003	0.004	0.01	-	-	0.0017	-	-	-	0.00019	-
Arsenic	mg/L	-	0.0010	4%	-	0.0010	8%	0.005	0.50	0.011	0.002	0.003	0.007	-	-	0.0020	0.4	-	-	0.00106	0.2
Barium	mg/L	0.00945	0.01068	47%	0.01011	0.01319	57%	-	-	0.0515	0.051	0.077	0.06	0.01831	-	0.019	-	0.011	-	0.014	-
Beryllium	mg/L	-	0.0050	0%	-	0.0005	0%	0.0053	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	-	0.010	6%	1.5	-	0.17	0.020	0.030	0.105	-	-	0.026	0.02	-	-	0.011	0.01
Cadmium	mg/L	-	0.0000200	0%	-	0.00002	8%	0.000029	-	0.00024	0.00002	0.00002	0.0001	-	-	0.000040	1.4	-	-	0.000021	0.7
Chromium	mg/L	0.0010	0.0010	8%	0.0018	0.0020	27%	0.0047	-	0.029	0.002	0.003	0.017	0.004	0.8	0.0037	0.8	0.0019	0.406	0.0021	0.4
Cobalt	mg/L	0.0002	0.0003	4%	0.0002	0.0002	20%	-	-	0.080	0.0006	0.0010	0.044	0.008	-	0.0076	-	0.0006	-	0.00063	-
Copper	mg/L	-	0.0009	38%	0.0012	0.0018	64%	0.0047	0.30	0.112	0.003	0.004	0.063	-	-	0.011	2.4	-	-	0.0023	0.5
Iron	mg/L	0.04	0.05	19%	0.18	0.36	86%	1.2	-	0.33	0.001	0.002	0.18	0.064	0.1	0.072	0.06	0.17	0.144	0.34	0.3
Lead	mg/L	0.00016	0.00020	13%	0.00029	0.00087	35%	0.001	0.20	0.0033	0.0002	0.0002	0.002	0.0005	0.5	0.00049	0.5	0.00030	0.299	0.00085	0.8
Manganese	mg/L	0.00260	0.01000	32%	0.00386	0.01000	48%	-	-	0.86	0.00004	0.00006	0.47	0.080	-	0.087	-	0.008	-	0.01445	-

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Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
														WATER QUALITY IN TRIB MR-12 (U/S OF FISH HABITAT)				WATER QUALITY IN MARY RIVER AT MR-12 (FISH HABITAT)			
										Flows Used			10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr 10-Year Low Flow Volume of Effluent from Open Pit = 296,971 m^3/yr	10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 541,262 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr				10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond & Open Pit = 3,281,679 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Term (Mean Flows)	East Waste Rock Source Terms (Dry Year)									
Mercury	mg/L	-	0.00010	0%	-	0.00010	2%	0.000026	-	0.0024	0.00045	0.00068	0.002	-	-	0.00035	13.6	-	-	0.00011	4.4
Molybdenum	mg/L	0.00306	0.00500	38%	0.00288	0.00500	46%	0.073	-	0.041	0.008	0.012	0.028	0.007	0.1	0.0088	0.12	0.0031	0.043	0.0052	0.07
Nickel	mg/L	0.0032	0.0050	10%	0.0031	0.0050	92%	0.083	0.50	0.17	0.002	0.002	0.092	0.018	0.2	0.019	0.2	0.004	0.048	0.0058	0.07
Selenium	mg/L	-	0.001	0%	-	0.001	0%	0.001	-	0.033	0.005	0.008	0.02	-	-	0.0044	4.4	-	-	0.0012	1.2
Silver	mg/L	-	0.00010	4%	-	0.00010	10%	0.0001	-	0.0012	0.0001	0.0001	0.001	-	-	0.00020	2.0	-	-	0.00011	1.1
Thallium	mg/L	-	0.0001	0%	-	0.0001	0%	0.0008	-	0.0014	0.0002	0.0003	0.001	-	-	0.00023	0.3	-	-	0.00011	0.1
Uranium	mg/L	0.00213	0.00299	100%	0.00252	0.00468	98%	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.001	0%	0.001	0.001	11%	0.006	-	0.0044	0.001	0.001	0.003	-	-	0.0013	0.2	-	-	0.0010	0.2
Zinc	mg/L	-	0.009	8%	0.003	0.006	25%	0.03	0.50	0.094	0.010	0.015	0.058	-	-	0.017	0.6	-	-	0.0066	0.2

NOTES:
1. MODEL ASSUMES COMPLETE NEAR INSTANTANEOUS MIXING OF EFFLUENT AND RECEIVING WATER.
2. NO MEAN CONCENTRATION CALCULATED WHERE THE MAJORITY OF SAMPLING RESULTS WERE BELOW THE METHOD DETECTION LIMIT.
3. EFFLUENT SOURCE TERMS PROVIDED BY AMEC (JANUARY, 2012).
4. EFFLUENT SOURCE TERM OF 0.001 USED IN CALCULATIONS FOR IRON.
5. RECEIVING WATER QUALITY OBJECTIVES OBTAINED FROM CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME) CANADIAN WATER QUALITY GUIDELINES FOR THE PROECTION OF AQUATIC LIFE (PAL) (2003), CONTINUOUS CONCENTRATION (CHRONIC) NATIONAL RECOMMENDED WATER QUALITY CRITERIA (UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (2006)), BRITISH COLUMBIA MINISTRY OF ENVIRONMENT APPROVED AND WORKING WATER QUALITY GUIDELINES OR SUTER THRESHOLDS, AS APPLICABLE.
6. IN ORDER TO ESTIMATE EFFLUENT SOURCE TERMS, HALF THE METHOD DETECTION LIMIT OF A PARAMETER WAS ADOPTED WHERE MORE THAN HALF OF THE RESULTS FOR THAT PARAMETER WERE NON-DETECT (I.E. LESS THAN THE MDL). THESE EFFLUENT SOURCE TERMS ARE HIGHLIGHTED IN BLUE.
7. RESULTS WITH AN HQ GREATER THAN 1 ARE HIGHLIGHTED IN ORANGE, TO FOCUS DISCUSSION IN THE EFFECTS ASSESSMENT.

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References

1. AMEC 2012c. Interim Mine Rock ML/ARD Report, Mary River Project, January 2012.
2. AMEC. 2012a. Interim Waste Rock Stockpile Seepage Quality Model Report, Mary River Project. January 2012.
3. AMEC. 2012b. Interim Open Pit Water Quality Model Technical Memorandum, Mary River Project. January 2012.

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Appendix D:

Emergency Response Plan (BAF-PH1-840-P16-0002)

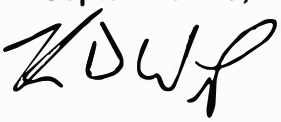
Baffinland Iron Mines Corporation

Emergency Response Plan

BAF-PH1-840-P16-0002

Rev 4

Prepared by: Keith Winship
Department: Health and Safety
Title: Health and Safety Superintendent
Date: September 25, 2018
Signature:



Approved by: Tim Sewell
Department: Health and Safety
Title: Head of Health, Safety and Environment
Date: September 25, 2018
Signature:



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DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
03/03/15	0	GH	EM	Use
03/03/16	1	SP	EM	USE: updated roles and responsibilities, contact information, titles and maps
31/03/17	2	TN	TB	USE: update of contacts and telephone numbers
30/03/17	3	KDW	TRS	USE: updated roles and responsibilities, contact information and titles, added sections on evacuation and loss of critical infrastructure
25/09/18	4	KDW KDW	TS	USE: Updated Glossary of Terms, Acronyms, Contacts, Distribution List, Document References

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TABLE OF CONTENTS

1 INTRODUCTION 9

1.1 Purpose and Scope 9

1.2 Guiding Principles 9

1.3 Regulatory Framework 9

1.4 Update of this Management Plan 10

1.5 Glossary of Terms 10

1.6 Acronyms 11

2 ORGANIZATION 12

2.1 Level of Emergency 12

2.2 Response Plans 14

2.2.1 Spill Contingency Plan 14

2.2.2 Polar Bear Safety Plan 14

2.2.3 Oil Pollution Emergency Plan 15

2.2.4 Spill at Sea Response Plan 15

2.2.5 Aerodrome Operations Manual 16

2.3 Incident Control Centre 16

2.3.1 Incident Control Centre Equipment/Supplies 17

3 ROLES AND RESPONSIBILITIES 18

3.1 Emergency Management Team Lead 18

3.2 Incident Commander 19

3.3 Health and Safety Coordinator 20

3.4 Environmental Coordinator 21

3.5 Security 21

3.6 Emergency Management Team 22

3.7 Environmental Superintendent/Manager 22

3.8 Health and Safety Superintendent 23

3.9 Front-Line Supervisor 23

3.10 Medic Personnel 23

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3.11 Muster Station Coordinator 24

3.12 IT Support Technicians 24

3.13 Employees 25

4 EMERGENCY RESPONSE 26

4.1 Notification and Communication 26

4.1.1 Code 1 Notification 26

4.1.2 Communication 26

4.2 Probable Emergencies and Response Actions 27

4.2.1 Serious Injury 27

4.2.2 Fatality 28

4.2.3 Missing Employee 29

4.2.4 Missing Member of the Public 30

4.2.5 Person Overboard 30

4.2.6 Extreme Weather Condition 31

4.2.7 Fires and Explosions 31

4.2.8 Ground Instability 32

4.2.9 Vehicle Incidents 32

4.2.10 Airplane/Helicopter Incidents 33

4.2.11 Bomb Threat 33

4.2.12 Fuel and Other Chemical Spills 34

4.2.13 Site or Camp Evacuation 35

4.2.14 Major Power Failure 35

4.3 End of Emergency 36

5 CONTACTS LIST 37

5.1 Internal Contacts 37

5.2 External Contacts 38

6 EMERGENCY RESPONSE TRAINING 41

6.1 Emergency Rescue Team 41

6.2 Qualifications 41

6.3 Training Content 41

6.4 Drills and Exercises 42

6.4.1 Preparations 43

6.4.2 Debrief 43

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7 RESOURCES 44

7.1 Emergency Response Equipment 44

7.1.1 Medical Response 44

7.1.2 Fire Response Equipment 44

7.1.3 Ambulatory Equipment 44

7.2 Spill Response Equipment 44

8 REPORTING 45

8.1 Mines Health and Safety Reportable Incidents 45

8.2 Spill Reporting 45

Level I (Low) 55

Level II (Medium) 55

Level III (High) 55

List of Tables

Table 2-1 - Levels of Emergency Response Chart 13

List of Appendices

Appendix A - Concordance Table and Regulatory Framework

Appendix B - Mine Site and Milne Port Layouts

Appendix C - Emergency Response Activation Flowchart

Appendix D - Protocol for Baffinland-Provided Evacuation to GN Health Services

Appendix E - Protocol for GN-provided Medevac (Air Ambulance Medical Evacuation)

Appendix F - Flowchart for External Requests for Search and Rescue and Emergency Services

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Foreword

The Emergency Response Plan is the overarching emergency plan which is supported by and references more detailed and specific response plans including:

Spill Contingency Plan;

Polar Bear Safety Plan;

Oil Pollution Emergency Plan (OPEP);

Spill at Sea Response Plan (SSRP); and,

Aerodrome Operations Manual (Appendix – Emergency Response Plan)

In addition to Baffinland's plans, Canadian regulations require every vessel transiting in Canadian waters to have Transport Canada approved Shipboard Oil Pollution Emergency Plan (SOPEP). SOPEPs are proprietary documents specific to each vessel. For Canadian flagged vessels, SOPEPs are reviewed and approved by Transport Canada.

For the external distribution list of this Plan, refer to Table A. Internal distribution is provided in Table B. Additional copies of this Plan may be obtained from:

Baffinland Iron Mines Corporation

2275 Upper Middle Road East, Suite 300

Oakville, Ontario L6H 0C3

Tel: (416) 364-8820 Fax: (416) 364-0193

Future revisions to the Emergency Response Plan will include references to the Railway Emergency Plan.

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Table A: External Distribution List for the Emergency Response Plan

Department of Environment - Environmental Protection Division PO Box 1000 Station 1300 Iqaluit, NU, Canada X0A 0H0 Tel: (867) 975-7700, 1-866-222-9063 Fax: (867) 975-7742	**Department of Fisheries and Oceans** - Central and Arctic Region 520 Exmouth Street Sarnia, ON N7T 8B1 Tel: (519) 383-1813, (866) 290-3731 Fax: (519) 464-5128
Qikiqtani Inuit Association Igluvut Building, 2nd floor PO Box 1340 Iqaluit, NU X0A 0H0 Tel: (867) 975-8400, 1-800-667-2742 Fax: (867) 979-3238	**Crown-Indigenous Relations and Northern Affairs Canada** – Field Operations Division Qimugjuk Building PO Box 2200 Iqaluit, NU X0A 0H0 Tel: (867) 975-4295 (Director, Lands and Field Operations: Erik Allain) Fax: (867) 979-6445
Crown-Indigenous Relations and Northern Affairs Canada - Water Resources Division Building 918 PO Box 100 Iqaluit, NU X0A 0H0 Tel: (867) 222-9278 (Manager, Water Resources: Ian Parsons) Fax: (867) 975-4585	**Mittimatalik Hunters and Trappers Organization** PO Box 189 Pond Inlet, NU, Canada X0A 0S0 Tel: (867) 899-8856 Fax: (867) 899-8095
Nunavut Impact Review Board PO Box 1360 Cambridge Bay, NU, Canada X0B 0C0 Tel: (867) 983-2574, 1-866-233-3033 Fax: (867) 983-2594	**Nunavut Water Board** PO Box 119 Gjoa Haven, NU, Canada X0B 1J0 Tel: (867) 360-6338 Fax: (867) 360-6369
Mine Safety – Prevention Services Workers Safety & Compensations Services (WSCC) Northwest Territories & Nunavut Box 669 Iqaluit, Nunavut X0A 0H0 Tel: 1-800-661-0792Fax: 867-979-8501	**Royal Canadian Mounted Police** Pond Inlet Detachment PO Box 210 Pond Inlet, Nunavut Tel: 867-899-1111 Fax: 867-899-8832
Hamlet of Pond Inlet (867) 899-8934	**Hamlet of Hall Beach** (867) 928-8829 ext 211

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Hamlet of Cape Dorset (867) 897-8943	**Hamlet of Arctic Bay** (867) 439-9917
Hamlet of Igloolik (867) 934-8940	**Hamlet of Clyde River** (867) 924-6220
Hamlet of Kimmirut (867) 939-2247	

Table B: Internal Distribution List for the Emergency Response Plan

Copy #	Recipient	Copy #	Recipient
01	Brian Penney	22	Brenda Roberts
02	Michael Anderson	23	Steve Janknegt
03	Sylvain Proulx	24	Vanessa Bryan
04	Stephanie Anderson	25	David Soares
05	Todd Burlingame	26	JP Provencher
06	Richard Matthews	27	Andrew Esak
07	Tim Butler	28	Al Wertz
08	Gerald Rogers	29	Deon Pope
09	Francois Gaudreau	30	Michael Sullivan
10	Lee Dixon	31	Drew Blais
11	Tim Sewell	32	Ray Poulin
12	Rodney Fagan	33	Shawn Parry
13	Lyle Hemmerling	34	Remi Pelletier
14	Gordon Mudryk	35	Jeff Bush
15	William Bowden	36	James Martin
16	Keith Winship	37	D. Demers
17	Ted Bajno	38	Cody Gagne
18	Connor Devereaux	39	Rinaldo Stefan
19	Steve Dew	40	
20	Shawn Stevens	41	
21	Harold Audet	42	

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This Emergency Response Plan identifies potential environmental, health and safety emergencies that could arise during the construction and operational phases of Baffinland's Mary River Project (the Project). This Plan establishes the framework for responding to these situations and applies to all aspects of the operation. All Baffinland employees and contractors are required to comply with the requirements of the Emergency Response Plan.

1.2 GUIDING PRINCIPLES

Emergency events or situations are characterized by immediate threat to life, health, safety, environment, and/or property. The Emergency Response Plan and its supporting Plans are designed to address these characteristics using the following principles:

- Ensure safety and well-being of personnel, the environment, and/or property;
- The potential for asset loss is mitigated;
- Identify the types of emergencies that may occur and the procedures to respond, intervene, stop, or limit the emergency situation;
- Ensure effective communication between personnel and the Emergency Response Team;
- Ensure that personnel responding to emergencies are trained and have appropriate resources for the response; and,
- Business continuity and recovery are assured.

The information contained in this document has been prepared to act as a guide only and may require some additional actions and responses, depending on the circumstances of the emergency situation.

1.3 REGULATORY FRAMEWORK

The Plan, herein, also addresses specific terms and conditions of:

- Baffinland Iron Mines Corporation,
- Baffinland HSE Policy and Procedure,
- Sustainable Development Policy,
- Project Certificate No. 005 (Amended No. 1),
- Type A Water Licence 2AM-MRY1325 (Amendment No. 1),
- Commercial Lease signed with the Qikiqtani Inuit Association, and
- Federal and Territorial Government Legislation

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1.4 Update of this Management Plan

Reviews of the ERP and all supporting documents will occur annually, and/or:

- Whenever enhancements have been identified during the normal course of business;
- Following a Baffinland incident/issue, to incorporate any lessons learnt;
- Whenever any lessons have been learnt from other sources (i.e. mock emergencies or internal training exercises);
- After an employee change which would have a significant effect on an emergency-related team's capability;
- Whenever details on stakeholder contact lists change; and
- After an organizational restructure.

1.5 Glossary of Terms

Incident:	An unplanned event that can or does result in ill health, injury, property damage or loss, adverse environmental impact, or business interruption.
Emergency:	A sudden, urgent, usually unexpected occurrence or occasion requiring immediate action.
Crisis:	A sudden event or set of circumstances that could significantly impact Baffinland's ability to carry out our business, damages our reputation and/or threatens the environment, the health, safety and well-being of employees, neighbouring communities or the public at large.
Code 1:	A "Code 1" announcement signifies an emergency situation requiring activation of the Emergency Response Team.
Incident Control Centre (ICC):	Designated location where the emergency response management team gathers to coordinate and support the response to the emergency.
Incident Commander (IC):	Person responsible for the management of incident activities at the site of the emergency. This role is filled by the Emergency Rescue Coordinator or in his/her absence on site the Mine Rescue Captain and reports to the emergency management team leader (EMTL) at the Incident Control Centre.
Emergency Management Team Lead (EMTL):	Person responsible for the overall coordination and support for the emergency response activities at the operation. This role is filled by the on-site senior manager or designated senior manager for Operations.

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Emergency Response Team (ERT):	A group of employees trained in mine rescue and emergency response that provide the field response activities to an emergency.
Emergency Management Team (EMT):	A group consisting of department managers and/or supervisors that provide internal resources (people, equipment, materials) to support the emergency response activities.
Corporate Emergency Management Team (CEMT):	Senior corporate management group responsible for providing corporate coordination and support during a crisis or emergency.
Crisis Management Plan (CMP):	A plan that defines the roles and responsibilities of the EMT and CEMT in the event of a crisis.
Muster Station:	A designated gathering area for the purpose of identifying and recording all occupants/evacuees present during an emergency and ensuring their safety until the emergency has ended
Muster Station Coordinator:	A designated individual appointed by the EMTL to direct occupants/evacuees to the Muster Station and to coordinate identification of any missing personnel to the Incident Command.

1.6 ACRONYMS

CEMT	Corporate Emergency Management Team
CMP	Crisis Management Plan (BAF-PH1-830-P16-001)
EMTL	Emergency Management Team Lead
EMT	Emergency Management Team
ERT	Emergency Response Team
ER	Emergency Response
IC	Incident Commander
ICC	Incident Control Centre
MSC	Mine Site Complex
OPEP	Oil Pollution Emergency Plan (BAF-PH1-830-P16-0013)
PSC	Port Site Complex
SCP	Spill Contingency Plan (BAF-PH1-830-P16-0036)
SSRP	Spill at Sea Response Plan (BAF-PH1-830-P16-0042)

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2 ORGANIZATION

2.1 LEVEL OF EMERGENCY

In order to effectively manage emergency response, Baffinland has adopted a classification system that includes three levels of emergencies. Each level of emergency, based on the significance of the event, requires varying degrees of response, effort and support. The impact on normal business operations will also differ as will the requirements for investigation and reporting.

Refer to Appendix C and Table 2.1 below for the process and flowchart used at the Project to determine which emergency response(s) will need to be activated in the case of an emergency.

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TABLE 2-1 - LEVELS OF EMERGENCY RESPONSE CHART

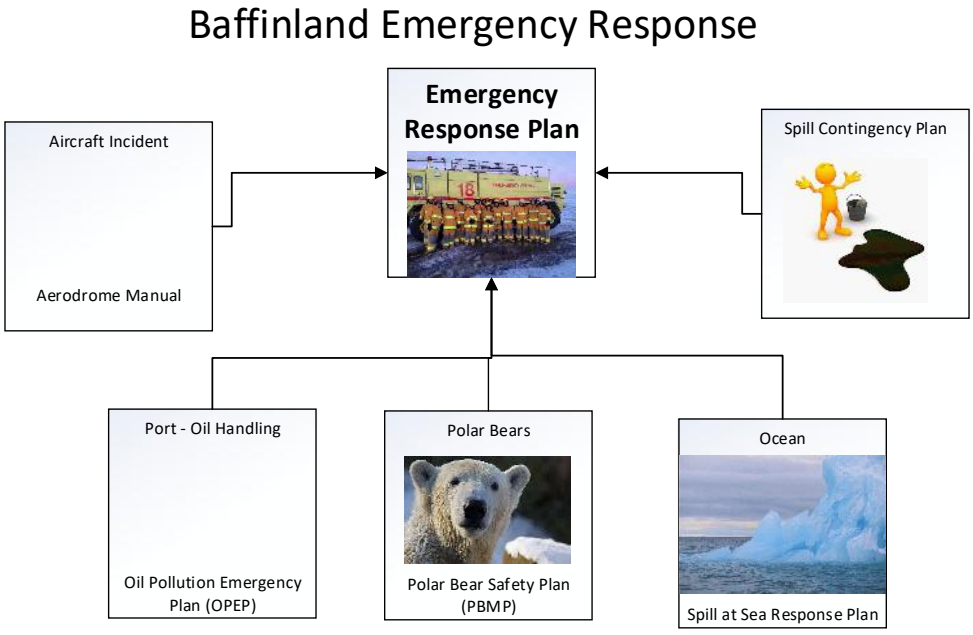
Level	Personnel	Asset Damage Downtime	Environmental Impact	Company Reputation	Management Impact	NOTIFICATION AND ACTIVATION REQUIRED
Level III	Single or Multiple Fatalities	Uncontrolled Hazard Major Fire	Uncontrolled hazard Polar Bear or wolf in camp or work area	Adverse media campaign. Investigation from external authorities. National or International impact on reputation.	Requires significant senior management attention	The Emergency Management Team and Crisis Management Team Are Activated The situation is not under control.
Level II	Serious or Multiple Injuries	Fire in a facility or uncontrolled fire involving equipment	Major reversible environmental impact. No threat to land tenure. Polar Bear or wolf within 1.5 km of camp or work area	Local/regional media interest/coverage Local impact on reputation	Can be managed by targeted senior management attention.	Activation of the ICC required by the EMTL
Level I	Medical Treatment Injury that may require Medivac	Minor fire that is not growing in size or has been controlled Loss of Generators (Less than 4) or power	Extreme weather conditions force shutdown of activities Minor accidental spill or release Wildlife interaction with minor risk, aggressive fox, Polar Bear within 8km of camp/worksite	Short term (1 media cycle) negative media articles or internet activity resulting in minor changes in key stakeholder perceptions.	Can be managed by targeted management attention. Impact of event can be absorbed into normal activities.	The Emergency Response Team and Emergency Management Team at the site and may be required to respond Emergency Management Team meets to review plans and procedures for events that could cause the emergency Level to increase Emergency Response may be required with notification of line management.

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2.2 Response Plans

The Emergency Response Plan is the overarching document to describe the organization, roles, responsibilities and resources for responding to emergencies at the Project. However, in some cases specific regulatory requirements require separate emergency response plans. Baffinland has prepared the following supporting response plans which layout specific actions to be followed in the event of specific emergency situations at the Project:



2.2.1 Spill Contingency Plan

Land-based environmental emergencies that may occur are addressed by the Spill Contingency Plan (SCP). Credible spill scenarios are identified and protocols and procedures for effectively dealing with these emergencies are in place at the Project. A specific plan for preventing, responding to, and recovering from an environmental emergency involving hazardous substances is provided in the SCP.

2.2.2 Polar Bear Safety Plan

Baffinland's Polar Bear Safety Plan (PBSP) has been developed to provide specific procedures to ensure the safety and well-being of Baffinland personnel, the environment, and property during polar bear encounters at or near work or accommodation areas. The PBSP provides information pertaining to polar bear behavior and the types of polar bear emergencies that may occur at the Project.

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The PBSP also provides specific procedures for the effective communication between personnel and the Emergency Response Team. The PBSP also ensures that personnel responding to emergencies are trained and have appropriate resources to respond, intervene, stop, or limit a polar bear encounter.

2.2.3 Oil Pollution Emergency Plan

The Canada Shipping Act and Oil Handling Facilities Regulations stipulates that operators of designated Oil Handling Facilities must have an onsite Oil Pollution Emergency Plan (OPEP – standards, TP12402 applies). As such, Baffinland has developed the Oil Pollution Emergency Plan (OPEP) for Milne Port to meet the requirements of TP12402.

The OPEP provides instructions to guide all personnel in emergency spill response situations, the related exercise and evaluation program, and the mechanism for regular updates to the Plan. The OPEP addresses all environmental emergencies associated with the oil handling facility at Milne Port, as well as environmental emergencies resulting in marine fuel spills of less than 7,000 L (7 m^3) of fuel.

2.2.4 Spill at Sea Response Plan

Baffinland has developed the following three tiered approach for spill response at sea:

Tier	Risk	Action
1	Moderate	Response will rest with the ship operator. The ship itself is the primary responder for any incident occurring at sea in which the ship is involved. This is the purpose of the Shipboard Oil Pollution Emergency Plan which outlines the sequence of actions and procedures to be implemented should the ship be responsible for a fuel spill. Refer to Section 4 and 5 of the SSRP for specifics related to Tier 1 response.
2	Serious	Baffinland's Emergency Response Team will support the ship operator and their Shipboard Oil Pollution Emergency response activities. Spill response equipment located at Milne Port would be made available for the response. Refer to Section 4 and 5 of the SSRP for specifics related to Tier 2 response.
3	Major	Baffinland will call (see the SSRP for contact information) upon the services of Oil Spill Response Limited (OSRL) an industry-owned cooperative which exists to respond effectively to fuel spills wherever in the world they may occur. OSRL membership consists of over 160 corporations which are mostly oil majors, national / independent oil companies, and energy-related companies operating in the oil supply/transportation chain. The services provided by OSRL include technical advisory,

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		provision of specialist personnel, equipment hire and maintenance, and training. As an associate member of the OSRL cooperative, Baffinland can draw on OSRL's expertise for spill response preparedness and response for spills which go beyond the ship operator and Baffinland's response capability. Refer to Section 4 and 5 of the SSRP for specifics related to Tier 3 response.

The Spill at Sea Response Plan requires the deployment of specialized services, close cooperation with the Canadian Coast Guard, and the involvement of multiple organizations. Therefore, the stand-alone response plan was developed early in 2015 in consultation with the Canadian Coast Guard, Transport Canada and Environment Canada.

2.2.5 Aerodrome Operations Manual

The Aerodrome Operation Manual sets out the standards that are met, and the services that are provided by the aerodrome operations. Included in this manual is an emergency response plan for aerodrome operations. The possible scenarios identified included an overdue and/or missing aircraft; precautionary and forced landings; and an aircraft crash. In the event of an aircraft incident, the Emergency Response Plan within the Aerodrome Operations Manual would be consulted to guide emergency response and notification requirements.

2.3 Incident Control Centre

The Incident Control Centre (ICC) functions to provide a place for the coordination and direction of response efforts during an emergency. In the event of no senior operations managers being available at the Project site experiencing the emergency, the location of the senior operations manager will host the ICC.

The conference room at the main office in the Mine Site Complex (MSC) is the primary ICC for incidents occurring at the Mine Site. The conference room is also used for ICC activities at the Port Site Complex (PSC). Both ICCs may be activated during a crisis emergency, or in response to an emergency along the Tote Road where both ERT would respond. In this case, the Mine Site ICC will be the primary centre unless changed by the direction of the EMTL. Alternative ICCs are properly stocked and available should the primary location be unavailable due to the emergency. The secondary ICC is the maintenance garage boardroom for both sites. For incidents where the ICC must be established in the Corporate Office, Mary River Conference Room shall be designated for use.

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2.3.1 Incident Control Centre Equipment/Supplies

The ICC has all the necessary tools for organizing response to an emergency - dispatching internal/external emergency services, directing strategic deployment of emergency resources and equipment, monitoring response efforts and establishing critical communications with the Baffinland Corporate Office.

The ICC contains:

- The most current version of the Emergency Response Plan along with supporting response plans,
- Log book,
- Stationary,
- Emergency site maps and current site plans (Appendix C),
- Emergency contact information (ERP),
- 2-way radio communication (base station or handheld),
- Satellite phone system,
- VOIP phone system, and
- Network connections.

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3 ROLES AND RESPONSIBILITIES

The initial stage of any emergency is critical. An effective and timely response is essential to prevent an emergency situation from escalating to a higher level. Therefore, all personnel must be fully aware of their individual duties and responsibilities as presented in this Plan.

The objectives of the Baffinland Emergency Management Team are to:

- Protect Baffinland's employees, assets and the environment;
- Enable Baffinland's ERT to conduct response and recovery;
- Support Baffinland's community;
- Protect Baffinland's reputation; and
- Keep Baffinland's employees and contractors informed and updated on the emergency situation.

Specific responsibilities and duties inherent to personnel involved in emergency response are outlined below.

3.1 EMERGENCY MANAGEMENT TEAM LEAD

The Emergency Management Team Lead (EMTL) will be the most senior operations manager present at the site where the emergency is declared. When both sites ERT resources are utilized, both command centres shall be established, with control given to the most senior operations manager (EMTL). During a Level I Code 1, a trained management representative may assume the role of the EMTL.

Duties during an Emergency

- The EMTL will ensure coordination of ERT support systems from the ICC.
- Upon being notified of a Code 1 or a Level II or III emergency by the IC or Security, the EMTL will initiate activities in the ICC and assess the situation based on current information from the IC.
- Activate the ICC system and escalate according to severity of incident.
- Coordinate all activities in the ICC. In the event the EMTL leaves the ICC, the EMTL will designate an individual to coordinate the ICC, notifying the IC.
- Ensure that the appropriate area manager(s) has been notified.
- Appoint a Muster Station Coordinator to conduct a roll call of all evacuated personnel.
- Advise the IC of the number of missing personnel and the room number or area of their last known location.
- Dispatch the medical personnel when requested by the IC.
- Provide internal notification as applicable based on the level of emergency.
- Advise IC on aspects of internal/external support as they are received.
- Notify the Corporate Emergency Management Team (CEMT) representative for level II or III emergencies.

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- Provide regular updates to the CEMT throughout the response effort, up to and including external agencies (RCMP, Government agencies, etc.) coming to site to perform investigations related to the incident.
- Provide instruction to ensure that appropriate External Resources are notified.
- Receive information from the IC and ensure appropriate resources are made available.
- Ensure at least one Log Keeper, preferably two, is or are present in the ICC at all times to maintain a log of all events, actions and outcomes.

Duties Post Emergency

- Notify site personnel and CEMT of the "all clear".
- Ensure the coordination and establishment of an emergency debriefing session.
- Review ICC incident log and post-response incident report.
- Post-incident debrief with IC.
- Provide necessary information to Corporate Affairs for a media statement release if required.
- Coordinate a report on the events surrounding the incident.
- Coordinate collection of all incident notes, reports, statements and log of events.
- Ensure the responsible department completes an investigation into the event.

3.2 INCIDENT COMMANDER

The Emergency Rescue Coordinator is the site lead administrator for the ERT, responsible for ensuring the necessary emergency response equipment is available and on scene and that ERT members have received an appropriate level of training. The Emergency Rescue Coordinator directs the Emergency Response Team (ERT) at the scene, however the Emergency Rescue Coordinator reports to the EMTL at the ICC. In the absence of the Emergency Rescue Coordinator, the Emergency Rescue Captain will be designated as the IC. The following duties are performed by the IC at an emergency scene:

Duties during an emergency

Upon being notified of an emergency, the IC will:

- Will respond to the scene of the incident and direct responding ERT members in regards to the equipment and personnel required to respond.
- Take charge of the scene.
- Evaluate the details of the emergency as presented by the first person on-scene. Assess the immediate situation, confirm the level of emergency and notify the Emergency Management Team Lead (EMTL) via radio.
- Maintain contact with the EMTL and provide support in coordination of the response.
- Request internal/external resources from the EMTL as required.

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- Obtain results of muster station head counts and direct the ERT accordingly to ensure full evacuation.

Duties Post Emergency

- Account for all ERT members.
- Announce the 'all clear' to the EMTL when the emergency has ended.
- Inform external resources that the emergency has ended (if external resources were mobilized during the emergency).
- Lead the emergency debriefing session.
- Ensure that all ERT equipment is returned to original order and/or replaced to ensure future rapid response.
- Ensure that the ERT Garage and equipment response ready.
- Develop a written log of events indicating instructions given, action taken and outcomes achieved.
- Provide assistance with ongoing investigation.
- Prepare a written report on response activities.

3.3 Health and Safety Coordinator

Duties during an Emergency

- Respond to the ICC and assist with duties as assigned by the EMTL.
- At the direction of the EMTL, respond to the scene and make contact with the IC.
- Establish perimeters around the area of the emergency and direct appropriate resource personnel responsible for traffic flow.
- Assist with identifying and assessment of potential hazards of the ERT response and notify the IC
- Carries out field safety duties as assigned by the IC, including surveillance of activities such as general field activities, identification of health safety equipment needs, etc.
- Ensure appropriate personal protective equipment for involved non ERT personnel.
- Note pertinent information that may be relative to the investigation.

Duties Post Emergency

- Secure the area with red "DANGER" tape and sufficient tags. Post guards if necessary.
- Participate in post-emergency debriefing.
- Assist in the accident/incident investigation report.

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3.4 Environmental Coordinator

In the event of an environmental incident involving accidental release of a hazardous substance, the Environmental Coordinator shall liaise with IC to direct environmental response efforts once the scene has been assessed by the IC and all medical and/or fire emergencies are under control.

Duties during an Emergency

- Proceed to the scene of the incident as directed by the EMTL or IC
- Coordinate internal resources during spill clean-up.
- Request additional resources through the IC as necessary.
- Maintain a log of events, actions, and outcomes.

Duties Post Emergency

- Secure the area with red "DANGER" tape and sufficient tags. Post guards if necessary.
- Participate in post-emergency debriefing.
- Assist in the accident/incident investigation report.

3.5 Security

Security personnel or their designate are key in an emergency response in that they will receive an initial notification of an emergency and provide first communications to essential personnel.

Duties during an Emergency

- Receive initial emergency call and document vital information used to plan response. All logged information will be given to the IC.
- Provide appropriate notification of the employees and emergency responding group (including management) through the use of the radio system and Code 1 announcement.
- If evacuation is necessary, notify all PSC or MSC personnel of emergency evacuation.
- Assist in controlling access to the emergency area.
- Maintain open radio communication (via radio or telephone intercom system).
- Keep a written record of events throughout incident.
- Assist in the coordination of support and internal services as directed by the EMTL and IC.
- Document all actions, decisions and communications.

Duties Post Emergency

- Relay notification of ‘all clear” order when directed by EMTL
- Provide a summary of all documentation to the IC and EMTL.
- Maintain Security of the scene as directed by the IC or EMTL.

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- Direct all off-site inquiries regarding the emergency to the EMTL or designate.
- Participate in a debriefing session for the emergency response.

3.6 Emergency Management Team

Duties during an Emergency

- Upon notification of a Level II or III emergency, report to the ICC.
- Work closely with the EMTL to determine appropriate response strategy for their respective work area.
- Provide supplies and resources as requested by the EMTL.
- Contact departmental resources via radio as required during the emergency response.
- Confirm that effective evacuation of the work area occurred.
- Confirm that the shift supervisor has contacted the IC.
- If trained management representation is low at one site of an emergency, the other sites management team will activate the ICC for support.

Duties Post Emergency

- Participate in an emergency debriefing session.
- Review recommendations from the accident/incident investigation.
- Ensures follow up on remedial action to prevent or mitigate possibility of reoccurrence of emergency.

3.7 Environmental Superintendent/Manager

Duties during an Emergency

- For Level II and III emergencies report to the ICC.
- At the direction of the EMTL, notify the required external agencies.
- Provide additional supplies and resources as requested by the EMTL
- Contact departmental resources via radio as required during the emergency response.
- Document all actions and decisions.

Duties Post Emergency

- Participate in post-emergency debriefing.
- Assist in the accident/incident investigation process.
- Complete Government and Stakeholder Agencies notification process.

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3.8 Health and Safety Superintendent

Duties during an Emergency

- Report to the ICC for Level I emergencies and act as the EMTL
- For Level II and III emergencies report to the ICC.
- At the order of the EMTL, notify the required external agencies.
- Provide additional supplies and resources as requested by the EMTL
- Contact departmental resources via radio as required during the emergency response.
- Document all actions and decisions.

Duties Post Emergency

- Participate in post-emergency debriefing.
- Assist in the accident/incident investigation process.
- Complete government agencies notification process.

3.9 Front-Line Supervisor

Duties during an Emergency

- Pre-investigate alarms if in work structure without harm to self, activate “Code 1”
- Ensure evacuation or stand down of their work area.
- Assist to ensure accountability of evacuees at muster station.
- Report to supervisor and identify self and location, acting as a direct resource to the EMT as requested.
- Ensure restricted access allowing only authorized personnel.
- Direct the isolation, de-energizing and lock-out of systems if required.

Duties Post Emergency

- Confirm that work area is safe to return to after an “all clear” has been called by the IC.
- Ensure that area of incident is secure until all investigations are completed.
- Participate in an emergency debriefing session.
- Ensure witness statements are completed by any personnel involved in the incident
- Ensure that the incident investigation is completed.

3.10 Medic Personnel

Medical personnel will consist of the physician assistant provided by the contracted medical services provider. Responsibilities in the event of an emergency include:

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Duties during an Emergency

- Respond to Code 1's as directed by the IC.
- Responsible for all decisions of medical-related situations on site.
- Assess, administer and delegate emergency medical care.
- Advise the IC of the number and condition of ill/injured personnel.
- Advise the EMTL of off-site resources that may be required, contact their Medical Director for direction, and if agreed contact these off-site resources (e.g. Medi-vac, Iqaluit hospital, etc.)
- Maintain a log of events, actions and outcomes.

Duties Post Emergency

- Participate in an emergency debriefing session.

3.11 Muster Station Coordinator

During an evacuation of any area that is designated to evacuate, the EMTL will designate a person responsible to assume the role of Muster Station Coordinator.

Duties during an Emergency

- Provide direction (traffic control) for workers and visitors to find the muster station
- Direct supervisors in the muster station to document the names of employees reporting to them and located in the muster station
- Documents the names of workers and visitors with no supervisor in the muster station
- Relay missing person's name, room number, or work area to EMTL
- Log time of events at muster station.

Duties Post Emergency

- Notify evacuees once the "all clear" has been called by the EMTL and instruct employees to return to work or accommodations.

3.12 IT Support Technicians

IT technicians are responsible to aiding the EMT in ensuring that communication lines do not fail during an emergency.

Duties during and Emergency

- Limiting internet and phone access to the ICC in the event of a level II or III emergency.
- Repairing or assisting with internet and phone issues during an emergency.
- Assisting with radio issue troubleshooting as needed.

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Duties Post Emergency

- Once instructed by the EMTL, restore internet and phone lines.
- If requested by the EMTL, participate in the debriefing session.

3.13 EMPLOYEES

Employees perform an integral part of emergency response because often times they are the first to witness an incident and provide initial reporting that an emergency has occurred.

Any person involved in, or witnessing an incident should follow the emergency notification procedure and immediately initiate a required emergency response.

- As first person on the scene and after notifying that an incident has occurred, attempt to provide as much information as possible to assist in the initial response (e.g. type of incident, number of people injured and location).
- Assess and attempt to control the scene only without causing self-harm or harm to others.
- Upon hearing a site fire alarm, proceed to the designated muster area and await instruction from security personnel.
- Cooperate with instruction and assist only when requested.
- Once the all clear has been called, make yourself known to Safety and complete a witness statement for the investigation.

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4 EMERGENCY RESPONSE

4.1 NOTIFICATION AND COMMUNICATION

4.1.1 CODE 1 NOTIFICATION

In order for an emergency response to occur, notification has to reach the Emergency Response Team. This initial notification should occur quickly and provide essential information. Most often, the First Person On-Scene is the individual that provides this information.

An individual involved in, or witnessing, as First Person On-Scene, shall make every effort to quickly initiate the emergency "Code 1" notification procedure as follows:

1. Employ the site radio or call site Security at extension 6911 (MSC) or 4911 (PSC) and announce:

   "Code 1, Code 1, Code 1"

   Nature of the emergency (Fire/Rescue, Medical, Environmental)

   Location of the emergency

   Your name

   Pause and repeat

   - Remain calm and in a safe location
   - Stay on channel/phone
   - Give all requested information
   - Follow instructions given by Security personnel

2. The site security department will initiate their Code 1 protocol, announcing Code 1 on the main radio channels and calling out the ERT and EMT.

4.1.2 COMMUNICATION

Effective communication systems are critical to the success of emergency responses. Personnel involved, from first person on scene to the IC and EMTL rely on the ability to quickly relay accurate information.

During an emergency, the primary communications link between all emergency response personnel is through radio communication. ERT members are issued radios. Additionally, other individuals involved in emergency response will also carry hand-held radios as part of their regular work requirement.

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During an emergency, radio communications should be kept to a minimum. If radio silence is requested on other channels, Security personnel, upon receiving instruction by the EMTL or IC will announce this. This ensures open and free communications among personnel involved in the actual response. For example, if resources have to be requested on any channel other than the designated emergency channel, then this request will be unaffected by other unnecessary conversation.

Additionally, only authorized persons are permitted to release the following information:

- Names of third parties who may have been involved in the incident.
- Identification of fatalities or injured personnel.
- Cause of the incident and liability; and
- Statements that may infer negligence.

During an emergency, other site radio channels may be used to:

- Locate ERT personnel.
- Obtain additional internal resources.
- Emergency notification.
- Evacuation of employees from work areas.
- Maintain communications with aircraft/marine vessels.

During an emergency, telephone communications will be used to:

- Notify internal personnel and resources.
- Notify external personnel and resources.

To supplement radio communications, the site telephone system may be used to alert site personnel during an emergency response. Communications links with the Corporate Emergency Management Team (CEMT) will also be required during some emergency situations. Constant communications links will be established by telephone where offsite assistance is required.

4.2 Probable Emergencies and Response Actions

4.2.1 Serious Injury

In the event of an incident involving personal injury, the degree of treatment and response will depend on the severity of the occurrence. However, in the event of an emergency involving personal injury, the following general actions will be initiated.

- Assessment of the emergency situation. Ensure personal safety and the safety of people near emergency location.
- Identify yourself to the injured person(s) and attempt first aid only if safe to do so.
- Activate a Code 1 yourself, or designate it to a bystander, stating your Name, Nature and Location of the incident.

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- Obtain names of all witnesses to the incident and any pertinent information required for investigation purposes.
- All material and equipment involved in the incident is to remain untouched until cleared for use by the IC or EMTL.
- Provide all pertinent information to the IC once they arrive on scene

In the event of medical or related emergencies, any person who discovers someone injured will implement initial response and identify back-up assistance, preferably the dedicated onsite medical professionals or the ERT will respond.

The onsite medical professionals will implement their protocols to address medical emergencies, providing further care, coordinating uninjured personnel to assist in the response, and arrange transfer to other health care facilities in adjacent hamlets or Iqaluit as necessary.

If the victim(s) will require facilities and services beyond that which can be given onsite, the victim(s) could be evacuated from site to receive further medical treatment in adjacent hamlets or Iqaluit as per agreement. A fixed-wing aircraft will be available at Mine for non-emergency medical evacuation. Where emergency medical evacuation is required or where the on-site aircrafts are unavailable for evacuation, the Government of Nunavut (GN) medical evacuation will be implemented. Appendix D describes the protocol for notification for Baffinland provided medical evacuations to GN medical facilities while Appendix E provides the protocol of GN Air Ambulance medical evacuations.

4.2.2 FATALITY

In case of a fatal incident, the following procedures will be carried out:

- Assessment of the emergency situation. Ensure personal safety and the safety of people near emergency location.
- Shut down/turn off any equipment/machinery that may cause additional safety hazard.
- The first person on-scene activate a Code 1, stating your Name, Nature and Location of the incident.
- Once identified as a scene of a fatal accident/incident, the ERT will secure all material and equipment involved at the scene to preserve evidence until required investigations are complete and cleared by all regulatory agencies.
- Internet and telephone services to be limited by the authority of the EMTL.
- External services such as the Pond Inlet RCMP detachment and the hospital shall be contacted as required by the EMTL.
- The WSCC Mines Inspector shall be immediately contacted in the event of a work related fatality incident.
- The EMTL will be responsible for subsequent communication to the CEMT and initiation of the CMP.

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- Any reporting to the public or media regarding Emergency Response events or actions will be made directly by or on authority of the CEMT.
- Notification to next-of-kin shall be conducted under the direction of the CEMT.
- Only the RCMP is permitted to release the victim's name. This shall be done only after the employee's next-of-kin have been notified.

In the event of a fatality at a work site, Baffinland will exercise discretion for, offer counselling to, and consult with family and/or community members as well as meet all regulatory requirements for notification and scene preservation. Critical incident stress management services will be organized.

4.2.3 Missing Employee

The remoteness of the project site, and sometimes-unfavourable weather conditions, necessitates that a person's whereabouts should be known at all times while on the site during their work rotation. However, there may be instances where workers may inadvertently wander from the project area without properly notifying security personnel, fellow workers or supervisors.

If an individual does not report to work on their next scheduled work shift, the supervisor responsible for the worker shall contact Security personnel to conduct a preliminary search of their personal accommodations area, and the area surrounding. A person may be declared missing if they cannot be accounted for by their supervisor or fellow workers, and cannot be located in other areas of the PSC or MSC by Security personnel.

Once a person is declared missing, Security personnel will notify the IC and subsequently the EMTL. The IC will assess the situation, and initiate and assign responsibility for the following actions, where required:

- Mobilize the ERT and security personnel to conduct a property-wide search.
- The IC shall determine the requirement to conduct a ground search outside of the property footprint.
- The Pond Inlet RCMP shall be notified as instructed by the EMTL.
- The ERT shall formulate search patterns and assign priority areas based on information obtained from Security personnel.
- When the EMTL deems that local efforts to locate a missing person are unsuccessful or not possible, outside assistance will be requested through the RCMP.

To reduce the potential for missing persons, personnel will check-in regularly and execute proper remote work practices. Resources such as personnel, equipment, land vehicles, and aircraft will be mobilized to aid search and rescue operations. Additional resources and services from local communities will be drawn upon as needed and if available access external Search and Rescue (SAR).

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4.2.4 Missing Member of the Public

Baffinland recognizes the moral and ethical responsibility to support SAR activities in the event of a missing member of the public. This responsibility is balanced against the abilities of Baffinland to provide support without risking the safety of Baffinland personnel or ability to respond should an emergency occur at the operation. The decision flowchart for external SAR requests is depicted in Appendix F and summarized below:

- Requests for SAR assistance must originate from the responsible government agency leading the SAR. This is necessary to ensure Baffinland response is properly coordinated with the government resources.
- In the event of a Good Samaritan request, not originating from SAR authorities, Baffinland will direct the person to the appropriate authorizing agency to contact Baffinland for SAR resources if required.
- Should a formal request for SAR assistance be made by the authorizing agency the EMTL will contact the CEMTL for authorization to provide support. A formal request should be accompanied by a warrant number for invoicing purposes. The Vice President of Sustainable Development will be notified of the request and CEMTL response.
- The EMTL will lead the coordination of support resources with SAR. The use of fixed wing aircraft or helicopter resources are resources that have been applied in past SAR requests. Prior to mobilizing resources an assessment of risks associated with the response will be performed and reasonable mitigating controls implemented.
- Upon completion of the SAR activities the EMTL shall notify the CEMTL. The cost for SAR services provided by Baffinland will be determined by the EMTL and provided to Baffinland Accounts Payable to invoice the SAR authorizing agency.

4.2.5 Person Overboard

Work in and around the marine environment could potentially result in a person overboard situation. Upon initial notification of a person overboard by a first person on-scene, primary response will involve an attempt to retrieve the victim using locally available water rescue equipment. Areas that involve work in or near water will be equipped with life rings, and adequate rescue rope. Additionally, if workers are required to work on or near water they will be required to wear a personal flotation device.

For emergency situations the ERT will have access to an emergency response boat or zodiac boats designated for both water rescue and environmental emergency response. Rescue equipment available includes dry suits, life jackets, life-rings and throw ropes.

For emergency situations involving equipment submersion in water, additional resources may be required including heavy equipment such as dozers and excavators used for retrieval of submersed unit and diving services to establish secure attachment points for equipment retrieval.

Additional resources may be required at the discretion of the IC and the EMTL.

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4.2.6 Extreme Weather Condition

Baffin Island experiences extreme weather conditions nearly year-round and snow is possible during any month of the year. This, by necessity, requires the operation to develop health and safety plans tailored to these conditions. These extreme weather conditions will be considered emergencies when prolonged and affecting the safety of employees, equipment or facilities.

When prolonged extreme weather conditions such as cold or poor visibility presents health and safety concerns, risk will be assessed and activities will be curtailed or modified, as appropriate. If white-out conditions persist, communications with the EMTL or designate might be necessary to decide the course of action and if travel or rescue is necessary. Work activities that are affected by severe winds, such as aircraft departures/arrivals and work at height, will be curtailed as appropriate.

Individuals travelling by vehicles between camps during the months of October and May are required to follow the directives provided in the Tote Road Safety Travel Procedure.

Further response will involve moving personnel to other onsite facilities or evacuation to offsite facilities.

4.2.7 Fires and Explosions

A fire/explosion emergency is “any uncontained fire that requires an on-site response greater than an individual using a hand-held portable extinguisher”. In providing initial response to a fire/explosion emergency, the cause of the fire and remedial action necessary must be immediately identified and controlled by on-site personnel to prevent escalation of the hazard level, including the possibility of further injury and/or damage to the environment, structures or equipment.

The emulsion plant is an area of the Mine site that does present potential concern for fire or explosion. This plant is managed in accordance with the Explosives Management Plan. Should an emergency situation occur, the contractor of this facility shall enact an emergency evacuation and response plan as primary response to ensure the safety of the facility workers. Notification and response of the ERT shall occur for emergencies in this area.

In the event of a fire or explosion, the emergency response will involve:

- Assessing the situation and determining emergency response needs.
- Directing and ensuring evacuation, and accountability of personnel.
- Identifying the requirement for additional internal resources such as heavy equipment, water truck, and others.
- Securing area to prevent unauthorized access and protecting equipment, facilities and records; and
- Taking other actions as required and controlling the emergency situation.

The office/accommodation complex at the Mine (MSC) and Port (PSC) are critical support infrastructure and the most frequently occupied buildings at each site. These facilities are equipped with a fire alarm

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system including automatic smoke and heat detectors, sprinkler system, fire hoses and manual fire pull stations. Security personnel upon activation of a fire alarm shall adhere to the following chronological procedures:

- Activate the full fire alarm for the accommodations complex to activate the evacuation and muster of accommodations personnel.
- Call a Code 1 to alert the ERT via radio that an alarm has sounded.
- Verify from the annunciation panel, the location of the alarm and provide that information to the ERT.
- Announce the fire emergency on all radio channels to all personnel.
- Assist with evacuation if necessary.
- Contact the muster station to ensure the roll call is being conducted.
- Inform IC of persons not accounted for at Muster Station and when all employees have been accounted for.
- Once the "all clear" has been issued by the EMTL, relay the message to the muster station.

Any scheduled burning onsite, such as incineration, will follow regulatory requirements and control procedures. Fire extinguishers will be stationed at work areas including shops, fuel farms and dispensing areas, kitchens, incinerators, generators, etc. Personnel will be evacuated from site if a fire cannot be immediately controlled or impacts necessities of life or personnel issues. Trained onsite personnel will respond to fires using onsite equipment and notify regulatory authorities as needed. All on-site personnel will be trained in the use of fire extinguishers.

4.2.8 Ground Instability

Incidents relating to ground instability could involve road embankment, pit wall, waste rock or ore stockpile embankment, leading to injuries or damage to equipment or facilities. There will be a focus on incorporating geo-technical knowledge, adequate design and quality installation into all project facilities. If a qualified professional feel there is a risk of geotechnical failure proactive preventative measures will be taken to address the problem and ensure geotechnical stability of the area in question. In such emergencies, the EMTL or designate will be notified so that necessary response action can be implemented. A qualified professional will inspect the suspected area of failure and will ensure that the area is properly secured and isolated. The incident will be documented and appropriate mitigation and preventative programs developed to limit or minimize subsequent incidents and risks. In the event of an incident pre-existing preventative measures will be revaluated and updated/adjusted to ensure similar.

4.2.9 Vehicle Incidents

Potential for vehicle incidents at the project site exist with activities such as:

- Passenger vehicle movement carrying people and freight throughout the project site.
- Ore haul from the mine site to the port site.
- Ore/waste load-haul-dump operations; and

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- Heavy equipment travel and transport on access roads throughout the project site.

The potential risk of vehicle incident varies according to changing conditions. These conditions may include:

- Road conditions (including dust, loose roadbed or unstable road shoulders, ice/snow cover);
- Mechanical failure in vehicle systems; and/or
- Operator error.

Where vehicle upset presents risk of injury, environmental spill, preservation of life and health will be first priority.

If the operator is not injured, but the vehicle is causing a spill, it is unstable or resting in a waterway, request the ERT to assist with protecting the environment and stabilizing the vehicle.

In case of an incident involving vehicle and operator, the following steps will be taken after the emergency notification procedure has been initiated:

- ERT will secure the scene.
- Assess the situation and determine if the vehicle is stable.
- If fuels are apparent (signs of leaks or odor) eliminate any ignition sources by turning off engines.
- If the vehicle is stable determine if personnel can be immediately extricated from the vehicle without injury or immediate first aid requirements.
- If the vehicle is unstable the ERT must secure it with blocking for stability if required.
- If medical condition is unknown or serious, the ERT will extricate the individual.
- Attempt to secure any leak or spill of hazardous substance that may be leaking from the vehicle (internal storage systems or cargo) and contain any spilled substance if possible.
- Once the vehicle has been stabilized and person(s) extricated, begin spill recovery of accidentally released substances.

Incidents involving vehicles and other equipment will be reported to a supervisor as soon as possible to initiate the Emergency Response Plan. If a fuel spill has occurred, the underlying Spill Contingency Plan will be initiated.

4.2.10 Airplane/Helicopter Incidents

Contracted commercial air carriers will be equipped with standard operating procedures to address specific response actions to be taken in airplane emergency situations. Baffinland has developed emergency response procedures for aircraft incidents occurring on the airstrip. In the event of an incident the actions/procedures outlined in the Mary River Aerodrome Operations Manual shall be followed.

4.2.11 Bomb Threat

A bomb threat is always considered an emergency situation and cannot be regarded as false until proven otherwise. During operations there will be a requirement to store large amounts of petroleum products,

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explosives, and hazardous chemicals. Any bomb threat will be considered real until gathered information confirms otherwise. If a bomb threat is received, primary responsibility for further action and investigation will rest with the RCMP. Since the Pond Inlet RCMP detachment is nearest the project site, notification and request for support during the initial stages of the response will be directed there. Until RCMP officers are available to offer on-site support, site personnel will strictly follow the following procedures.

Threat Received

When receiving a bomb threat, the person in receipt of the initial call or notification should adhere to the following protocol:

- Listen.
- Be calm and courteous.
- Do not interrupt the caller.
- Concentrate on recording the exact wording of the message.
- Obtain as much information as possible.

When Caller Hangs Up

- Report all details of threat to immediate Supervisor.
- Unless ordered to evacuate immediately, provide as many details as possible that may aid in further determining the origin/realism of the threat.

Roles and Responsibilities

Responsibilities during receipt of a bomb threat will focus on securing the safety of workers and minimizing potential damage to infrastructure. The conduct of site search and surveillance shall be the responsibility of the RCMP and their supporting resources that have been highly trained in responses of this nature. Prior to site arrival of external resources, the primary action plan for the site would focus on minimizing risk of injury to site workers and damage to existing infrastructure.

- Notify all site personnel to cease activity and report to the muster station. If the location of the bomb threat is known, immediately remove all personnel from the area.
- Secure fuel systems, equipment and other infrastructure that may have the potential to cause additional safety hazards.
- Maintain contact with the RCMP, providing period updates of site status. Ensure all instruction from the RCMP are communicated and followed.

4.2.12 Fuel and Other Chemical Spills

A Spill Contingency Plan has been developed specifically to address fuel and hazardous materials land-based spills, and releases or discharges to freshwater sources. The Spill Contingency Plan provides possible spill situations and the methods and resources to be employed in response to the spill. While

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the Spill Contingency Plan provides the methodology for spill response and cleanup, the overall response to the emergency, including the IC, EMTL and ICC, will follow the procedures outlined in the Emergency Response Plan.

Baffinland has also developed an OPEP (BAF-PH1-830-P16-0013) for marine spills that result from fuel offloading activities at Milne Port and a Spill at Sea Response Plan (BAF-PH1-830-P16-0042) for marine spills that result from Project shipping activities. Transport Canada and Environment and Climate Change Canada were consulted during the development these plans.

4.2.13 Site or Camp Evacuation

In an event requiring partial or total evacuation of a site, several options are available and must be considered depending on the time of year and the availability of transportation. With the exception of medical aid incidents, site evacuations (including evacuation arrangements and external resources) will be authorized by the General Manager or his designate. Options for evacuation include road or air transportation, depending on the time of year and reason for the evacuation. Transportation is dependent on weather and availability of aircraft. Early communication with airlines is critical for the preparation of staff and aircraft. Accurate weather assessment by flight operations from site is critical to incoming aircraft.

- Transportation by bus to the unaffected camp or area for all non-essential employees
- Transportation by air – Arrangements made by the Surface Works Superintendent for transportation of all non-essential personnel to safe havens, such as local communities, Iqaluit, southern cities that can assist with an influx of 300+ people

4.2.14 Major Power Failure

In the event of a major power failure affecting any portion of the operating facilities at Baffinland, the employees within the working areas need to be aware of the hazards of unexpected loss of power and safely retreat to the nearest control room, lunch room or office to be accounted for by their supervisor.

Supervisor of the area of concern shall notify Health and Safety at onset of power outage.

Electrical supervisor needs to be contacted as soon as reasonably possible to assess the reason for the outage, provide alternate power if able. There are several satellite phones available for this reason.

Minimizing radio traffic is essential during a Power failure so the bulk of communication related to accountability should be done face to face.

Supervisors will attempt to locate and account for all workers under their control and be available to report the accountability check to EMTL

When weather permits, fire hall doors shall be manually opened by ERT personnel.

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Muster Station Coordinator will make contact with area supervisor to confirm accountability of the respective workers.

Any missing or identified as injured workers will require search and rescue efforts. This would require initiation of Code 1.

Once all personnel are accounted for and it has been confirmed that there is no risk to life by the power outage, operating supervisors will be advised and work can continue or reassigned depending on the job and the location of power failure.

Once the power has been restored safe start up procedures must be followed and all work must be directed by the supervisor in charge of the affected areas.

4.3 End of Emergency

Activation of the ERT occurs when an emergency has been declared through the announcement of a Code 1, as indicated in the emergency response activation procedure. However, declaring a stand-down and denoting the end of an emergency is left to the discretion of the IC in consultation with the EMTL. In determining when an emergency has ended consideration will be given for the following:

- Stability of the affected area.
- Requirement for further action by the ERT or assisting external resources; and
- Potential risk of further injury or damage to people, property or the environment.

Through detailed assessment of the emergency response efforts, the area affected, and affected people and/or property the EMTL and IC may determine that there are no existing circumstances that present potential risk for further injury or property damage if the normal course of activities resume. The EMTL will direct Security to announce the Code 1 has been stood down.

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5 CONTACTS LIST

5.1 INTERNAL CONTACTS

Position	Name	Phone*
Chief Executive Officer	Brian Penney	5038 416-427-6907
Chief Operating Officer	Sylvain Proulx	6091 416-970-6983
Chief Technology Officer	Michael Anderson	6030 416 526 0004
Executive Vice President Corporate Development	Stephanie Anderson	5001 416-200-6744
Executive Vice President, General Counsel	Mark O'Brien	5114 416-364-8820
Vice President, Sustainable Development and HR	Grant Goddard	5104 416-996-5523
Vice President, Technical Services	Richard (Dick) Matthews	5172 647-938-8147
General Manager	Gerald Rogers	6114 416-886-7348
General Manager	Francios Gaudreau	6072 418-297-0736
Mine Manager	Simon Fleury	6099 289-937-9699
Mine Superintendent	Trevor Brisco	6064 647-253-0596
Site Services Manager	Gordon Mudryk	6065 416-557-7843
Chief Procurement Officer	Sandeep Kumar	5181 416-919-4377
Logistics Superintendent – Mine Site	Deon Pope Al Wertz	6009 905-483-0261 647-709-4029
Logistics Superintendent – Port Site	Michael Sullivan Andrew Esak	4115 289-834-0930 647-456-1131
Maintenance Manager	Lee Dixon	6038 416 526 7785
Primary Control Centre – Mine Site		6078 6074
Primary Control Centre – Port Site		4902 4905
Secondary Control Centre – Mine Site		6119 6146
Secondary Control Centre – Port Site		4904 4906
Ore Handling Manager	Sangjin Yun-ore	5181 647-278-4842

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Ore Handling Superintendent	Lyle Hemmerling J-P Provencher	6105 289 795 8689 418-455-9789
Road Maintenance Manager Road Maintenance Superintendent	Shawn Parry Remi Pelletier	6057 416-209-6444 406-919-1735
HR Manager	Brenda Roberts	6027 437-344-7342
Human Resources Advisor	Vanessa Bryan	4505
Environment Superintendent	William Bowden Connor Devereaux	6016
Head of Health, Safety and Environment	Tim Sewell	6054 647-828-3432
Health and Safety Superintendent	Shawn Stevens Keith Winship	6006 647-710-5974
Health and Safety Coordinator - PORT	Darryl Finlay Wayne LeDrew	4122
Health and Safety Coordinator - MINE	Mario Vottero Blaine Taylor	6052
Emergency Rescue Team Trainer I/C	Steve Janknegt Vacant	4145
Medic – Mine	Michel Gagnon Claudine Daigle	6008
Medic - Milne	Sylvie Seward Charles Briggins	4107

* To reach an extension dial 416-364-8820 followed by the extension

5.2 EXTERNAL CONTACTS

Y – Required	N – Not Required						M – More information required to determine reporting – refer to notes	
	Serious Injury	**Fatality**	**Fire**	**SAR**	**Dangerous Occurrence**	**Spill – Reportable**	**Spill - Ocean**	**Telephone/Fax Numbers**
Workplace Safety and Compensation Commission (WSCC)								
24 – hour phone line Mines Inspector Chief Mines Inspector	Y	Y	Y	N	Y	N	N	(800) 661-0792 (24hr) (867) 979-8527 (867) 669-4430
Royal Canadian Mounted Police								
Iqaluit – Headquarters Iqaluit Arctic Bay	N	Y	Y	Y	N	M[1]	M	(867) 975-4409 (867) 979-0123 (867) 439-0123

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Y – Required	N – Not Required						M – More information required to determine reporting – refer to notes	
	Serious Injury	**Fatality**	**Fire**	**SAR**	**Dangerous Occurrence**	**Spill – Reportable**	**Spill - Ocean**	**Telephone/Fax Numbers**
Clyde River								(867) 924-0123
Hall Beach								(867) 928-0123
Pond Inlet								(867) 899-0123
Igloolik								(867) 934-0123
Spill Reporting								
Qikiqtani Inuit Association (QIA)	Y	Y	Y	Y	M	Y	Y	(867) 975-8422
NT-NU 24-hour Spill Report Line	N	N	N	N	N	Y	Y	(867) 920-8130
AANDC Water Resources Officer	N	N	N	N	N	Y	Y	(867) 975-4555
AANDC-Field Operations								(867) 975-4289 Cell (867) 222-8462
DFO-Iqaluit	N	N	N	N	N	Y	Y	(613) 925-2865 Ext. 131
Environment Canada - Iqaluit								(867) 975-4644
GN- DOE								(867) 975-5907
Nunavut Emergency Services						M[1]	M	1-800-693-1666
Canadian Coast Guard (Arctic region)							Y	1-800-265-0237 (24-hr)
Medical Services								
Medical Director – Advanced Medical Solutions (Dr. Rahul Khosla)	Y	Y	N	N	N	N	N	(867)-445-7225
VP Medical Operations – Kara Livy	M	M						(867)-446-2000
Qikiqtani General Hospital – Iqaluit Emergency Room	Y[2]							(867) 975-8600 ext. 1539

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Y – Required	N – Not Required						M – More information required to determine reporting – refer to notes	
	Serious Injury	Fatality	Fire	SAR	Dangerous Occurrence	Spill – Reportable	Spill - Ocean	Telephone/Fax Numbers
Pond Inlet Health Clinic								(867) 899-7500 (867) 899-7538 (fax)
Iqaluit								(867) 975-4800 (867) 975-4830 (fax)
Igloolik								(867) 934-2100 (867) 934-2149 (fax)
Hall Beach								(867) 928-8827 (867) 928-8847 (fax)
Arctic Bay								(867) 439-8816 (867)439-8315 (fax)
Clyde River								(867) 924-6377 (867) 924-6244 (fax)
Transport Canada								
National 24 hour number – Duty officer Canadian Transportation Emergency Centre								(613) 996-6666 (24hr) (613) 954-5101 (fax) (613) 996-9439 (fax)
Search and Rescue								
Nunavut Emergency Services								1 800 693-1666 (24hr) (867) 975-5403
RCMP								(867) 979-1111
Joint Rescue Coordination Centre (CFB Trenton)								1 800 267-7270 (24hr) (613) 965-3870

1. In the event of a spill of hazardous materials (exceeding the quantities listed in Part 8.1 (1) of the TDGR) during transport, the shipping company will immediately report the incident to the RCMP and the Nunavut Emergency Services. The immediate report must include as much of the information listed in Part 8.2, TDGR, as is known at the time of the report. A follow-up report must be made, in writing, to the Director General within 30 days after the occurrence of the accidental release, the "dangerous goods accident" or the "dangerous goods incident". The follow-up report must include the information listed in Part 8.3, TDGR

2. In the event of an injury requiring Baffinland provided evacuation to Government of Nunavut (GN) Health Services or GN provided Medevac (air ambulance medical evacuation) the on-site medical professional shall contact the Emergency Department at the Qikiqtani General Hospital in Iqaluit. The protocols provided in Appendix D and E shall be used in communicating with the GN.

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6 EMERGENCY RESPONSE TRAINING

The Emergency Rescue Coordinator will identify training needs and resources needed to provide the necessary skills to those personnel tasked with various duties in emergency response at Baffinland. This responsibility includes development of training materials and implementation of training is to ensure training:

- meets or exceeds the requirements of NWT/Nunavut Mines Health and Safety Regulations;
- Follows the WSCC NT NU Mine Rescue Training Standards
- enables ERT and EMT members to competently operate the equipment employed for emergency response purposes; and
- includes practices, drills and full scale exercises for responding to the types of emergencies that are reasonably predictable for the operation.

6.1 EMERGENCY RESCUE TEAM

The Emergency Response Team (ERT) is comprised of volunteers from the on-site employees and contractors. With different work schedules, it is necessary to have enough team members to maintain sufficient numbers of responders at site at all times.

6.2 QUALIFICATIONS

All active ERT members must have:

- been certified within the last 12 months, by a physician or by a nurse in charge of a nursing station, to be fit to work in breathing apparatus under arduous conditions;
- a valid mine rescue certificate issued by the chief inspector;
- a valid standard first aid certificate; and
- taken part in the practice sessions as identified in the WSCC NT NU Mine Rescue Training Standards

The Emergency Rescue Coordinator will establish and maintain a process to submit to WSCC proof of qualification for each ERT Member. The Emergency Rescue Coordinator will maintain the training records and the WSCC mine rescue certificate issued for each team member.

6.3 TRAINING CONTENT

Emergency response personnel, as members of the ERT, have response requirements which may include administering first aid, firefighting, performing work at height or in confined spaces, handling and transferring hazardous/controlled substances, working in/around water. Each of these demands must be supported with adequate training that will allow members to safety and effectively conduct their tasks.

Additional training requirements may be provided for specific roles within the emergency response plan and for specific functions to be performed during response including:

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- Aircraft Rescue Fire Fighting (ARFF) training
- Incident command training
- Cold water rescue and Small vessel operators proficiency (SVOP) Certificate.
- Boom Deployment
- High Angle Rescue

Ongoing ERT training shall be scheduled as necessary to accommodate ERT members with different work rotations. Training time shall be a minimum of five – 11 hour refresher training sessions yearly. Training content will include:

- Mine rescue organization
- Care and use of respiratory protective equipment
- The properties of normal air and gases encountered in a contaminated mine atmosphere
- Oxygen therapy
- Gas detection methods and use of gas detection equipment
- Rope rescue
- Environmental conditions
- Electrical hazards
- Rescue tools
- Fire
- Mine operations
- Operation skills

6.4 Drills and Exercises

While drills and exercises can be used for training purposes, their primary function for this plan is to provide the means of testing the adequacy of the plans provisions and the level of readiness of response personnel.

The Emergency Rescue Coordinator is responsible for coordinating the development of and assisting in conducting drills and exercises. The following types of drills and exercises are to be used:

- Tabletop Exercises involve presenting to key emergency personnel a simulated emergency situation in an informal setting to elicit constructive discussion as the participants examine and resolve problems based on the plan. These exercises will be routinely performed during the ERT training throughout the year.
- Functional Drills are practical exercises designed to test the capability of personnel to perform a specific function (i.e. communications, first aid, and rescue). Functional drills will be performed at least annually with both shift rotations.
- Full-Scale Exercises are intended to evaluate the operational capability of Baffinland's emergency organization and the adequacy of this Plan. Full-Scale Exercises are to be conducted annually with sufficient notice to allow the correct exercise preparation.

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6.4.1 PREPARATIONS

Preparations for a drill or exercise will vary depending on the type and scope involved, however the planning should include:

- Plan review and identification of possible problem areas.
- Establishing objectives.
- Identifying resources to be involved including personnel.
- Develop exercise scenarios, a major sequence of events list, and expected action checklists.
- Assigning and training controllers and evacuators.

The scenarios used will be realistic and based upon current operating conditions. The primary event (fire, spill, etc.) is to be determined based on the objective of the exercise, and in accordance with regulatory requirements.

6.4.2 DEBRIEF

Results of drills, exercises and emergency response activations are to be reviewed by the participants, evaluators and the IC and EMTL to identify problem areas such as deficiencies in the plan, training, personnel or equipment. Debriefing will commence immediately after the incident or drill / exercise has been resolved.

The IC will prepare a report which will include the following:

- A summary of the exercise, including a review of the purpose, objectives and scenario used or summary of the emergency;
- A summary of the major discrepancies/deficiencies.
- Recommendations and corrective measures.
- A proposed schedule for the completion of these corrective measures.

These reports and recommendations will then be evaluated by the Health and Safety Superintendent for a decision on the merits of all recommendations.

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7 RESOURCES

7.1 EMERGENCY RESPONSE EQUIPMENT

7.1.1 MEDICAL RESPONSE

Baffinland has equipped the Mine and Port sites with medical clinics capable of providing advanced life support (ALS) support in the event of a medical emergency. The clinics are resourced by physician assistants (PAs) working under the direction the Medical Director (physician) of our contracted medical services contractor. The PAs are able to provide advanced cardiac life support, basic trauma life support, administration of pain medication and narcotics, prescribe antibiotics, cardiac defibrillation and monitoring, intubation, cast application, and audiometry testing.

7.1.2 FIRE RESPONSE EQUIPMENT

Located at the Port is an Oshkosh TI3000 Aircraft Rescue Fire Fighting (ARFF) truck with 3000 Gallon water tank, 420 Gallon foam tank, 450 lb dry chemical tank and ARFF snozzle. At the Mine is the Oshkosh T1500 ARFF with 1500-gallon water tank, 750 litre foam capacity, 450 lb dry chemical tank with an ARFF snozzle.

The ERT is equipped with Avon Deltair 4500, Scott Air Pack 75 SCBA and associated turn-out gear for responding to emergencies and fires. Equipment is also available to support vehicle accidents such as hydraulic cutters, spreaders and rams, reciprocating saws, high pressure air lifting bags.

7.1.3 AMBULATORY EQUIPMENT

In the event of a medical emergency at the Port or the requirement to move an injured person to the Mine, an ambulance is stationed at both facilities. Each of these ambulances are 4x4 Wheeled Coach models fitted with equipment to facilitate emergency medical care while in transit. A third ambulance is also available for backup purposes.

7.2 SPILL RESPONSE EQUIPMENT

The ERT is equipped and trained to respond to spills using the following equipment:

- Rescue and spill response truck at both the Mine Site and Milne Port;
- Pumps and containment structures;
- Floating booms, spill pads and containers;
- Diking and damming supplies;
- Spill kits; and,
- Safety equipment for working on or near water and/or specific hazardous materials.

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8 REPORTING

8.1 MINES HEALTH AND SAFETY REPORTABLE INCIDENTS

Under Section 16.02(1) in the event of a fatality or serious injury (reportable incident) the corporate crisis management team will be initiated and the CEMT shall without delay notify a WSCC inspector and OHC Committee co-chairs. Reporting to WSCC shall be directly to the mines inspector (867-979-8527), chief mines inspector (867-669-4412), or to the 24-hour reporting phone line (800) 661-0792. A written report must be provided to the inspector within 72-hours of the occurrence.

8.2 SPILL REPORTING

Quantities of hazardous substances spilled that require reporting are listed in Schedule B of the Nunavut Spill Contingency and Reporting Regulation. After the initial field emergency response to the spill event, a spill report is filled out and reported to the 24-hour Spill Report Line:

24-Hour Spill Report Line
spills@gov.nt.ca
Tel. (867) 920-8130 or
Fax (867) 873-6924

Failure to report a spill can lead to fines. The Qikiqtani Inuit Association (QIA) Lands Administrator will also be promptly notified at (867) 975-8422 or via e-mail. Similarly, the CIRNAC Water Resources Officer will be promptly notified of the spill event at (867) 975-4295 or via e-mail. In the event of a spill on the ocean, the incident will be reported to the Canadian Coast Guard (Arctic region) 1-800-265-0237 (24 hour).

It is the responsibility of the Environmental Superintendent on behalf of the Operations Manager to prepare the proper reports and transmit them to regulatory authorities. The Environmental Superintendent will determine on a spill by spill basis whom in addition to those above, should be contacted.

QIA requests that Baffinland produce a site map(s) listing the location in UTM coordinates, date, amount, and nature of the substance spilled. The map(s) should be updated annually and will be provided along with annual report requirements. The map(s) will also detail major project components and relevant water-bodies.

In the event of a spill involving the marine carrier delivering bulk fuel, Baffinland will notify the subcontractor that a spill report must be made under its responsibility.

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APPENDIX A

Concordance Table and Regulatory Framework

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Appendix A.1: Project Certificate Terms and Conditions Applicable to Emergency Response

Accidents and Malfunctions

No.	Term and Condition	Comments	Reference
173	The Proponent shall employ full containment booms during all ship-to-shore and other marine-based fuel transfer events.		Please refer to Appendix D of the OPEP (BAF-PH1-830-P16-0013).
174	The Proponent and the Canadian Coast Guard are required to provide spill response equipment and annual training to Nunavut communities along the shipping route to potentially improve response times in the event of a spill.		Please refer to the OPEP (BAF-PH1-830-P16-0013).

Appendix A to NIRB Decision Report

No.	Subject	Commitment	Action	Reference
8	Fuel Transport (Overwintering of Fuel Vessel)	As part of standard operation procedures, Baffinland is committed to avoiding ship-to-shore transfer of fuel during freeze-up or break-up periods.	This will be applicable for refuelling of tug boats at Milne Port.	
9	Fuel Transfer	Baffinland is committed to undertaking fuel transfer from vessels to shore under good weather conditions. Once the ore dock is constructed at Steensby, fuel transfer will be carried out at the freight dock.	Not applicable until Steensby Port is constructed.	Refer to the OPEP (BAF-PH1-830-P16-0013).
10	Fuel (Spill / Leak Detection)	Baffinland is committed to installing leak detection instrumentation on the overwintering fuel vessel and to conduct ongoing monitoring in the vicinity of the vessel, in accordance with relevant guidelines and regulations. Baffinland is committed to using best management practices to reduce the possibility of spills.	Not applicable until construction at Steensby Port becomes underway.	Not applicable.
11	Spill Contingency Planning	Baffinland is committed to maintaining an up to date Spill Contingency Plan and will distribute copies of the Plan to stakeholders.	Completed regularly to ensure SCP reflects current operations.	Refer to Spill Contingency Plan (BAF-PH1-830-P16-0036).
12	Disaster Management Plan	Baffinland is committed to developing and implementing a Security Plan in accordance with regulatory requirements.		The Emergency Response Plan and Crisis Management Plans provides for response to emergency and disaster (crisis) events.

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No.	Subject	Commitment	Action	Reference
26	Marine (Safety Officer)	Baffinland is committed to appointing one of its personnel to act as a Marine Safety Officer during the construction, operation, and closure phases of the Mary River Project.	Marine Safety Officer needs to be Identified	Refer to the OPEP (BAF-PH1-830-P16-0013).
57	Management Plans	Baffinland is committed to updating its management plans to reflect new information, new practices and changes to operating conditions.		Management plans, including the Emergency Response Plan are updated to reflect new information, practices and conditions.
99	Medical Facilities (Design)	Baffinland is committed to working with the Government of Nunavut to provide details on the design of medical facilities for the Mary River Project during the regulatory phase of the project.		Medical facilities are described in Section 7.1.1 of the Emergency Response Plan. In addition a MOA was signed with the GN that included a medical plan by our medical contractor.
100	Medical Facilities (Staffing)	Baffinland is committed having an on-site medical facility staffed by a registered nurse or certified paramedic in order to attend to any injury that workers might experience on-site, and is further committed to providing medi-vac services as may be required from the mine site to Iqaluit.		Refer to Sections 3.10, 4.2.1. and 7.1.1. of the Emergency Response Plan.
106	Emergency Response Plans	Baffinland is committed to seeking and utilizing external expertise to assist them with the development of emergency response planning and to provide formal training specific to accidents and emergency response for the Emergency Response Team, which will be stationed at site at all times. This training would include responding to Railway specific emergencies.		Refer to the OPEP (BAF-PH1-830-P16-0013).
107	Spill Training/Spill Exercises	Baffinland is committed to conducting routine training exercises and strategically placing resources and equipment on site for spill response.		Refer to Section 6.3 of the Emergency Response Plan.
108	Spill Training/Spill Exercises	Baffinland is committed, during operations, to conducting regular and annual spill response exercises and training in known and effective techniques for responding to spills and invite the relevant communities		Refer to Section 6.3 of the Emergency Response Plan as well as Section 9 of the OPEP (BAF-PH1-830-P16-0013).

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No.	Subject	Commitment	Action	Reference
		of the North Baffin Region to participate.		
109	Emergency Response	Baffinland is committed to meeting on a regular basis with the emergency response and preparedness working group to review emergency preparedness.		Refer to the OPEP (BAF-PH1-830-P16-0013).
110	Emergency/Spill Response Planning	Baffinland is committed to ensuring that adequate resources are allocated to the development and deployment of emergency and spill response capabilities.		Refer to Section 6 of the Emergency Response Plan as well as the OPEP (BAF-PH1-830-P16-0013).
111	Marine Regulatory (Spill Prevention Plans)	Baffinland is committed to requiring that all project vessels have Shipboard Oil Pollution Emergency Plans (SOPEPs) in place which meets or exceeds the international standards set out in the Port State Control Memorandum of Understanding, as well as trained personnel on board to respond to spills. Baffinland will be self-sufficient for spill response and will contract the services of an established Response Organization to enable the Company to escalate response capabilities to deal with spills of up to 10,000 tonnes. This Response Organization will have expertise in recovery and cleanup of spills along coast line and involving wildlife.		Refer to the Spill at Sea Response Plan (BAF-PH1-830-P16-0042).
112	Spills (Fuel)	Baffinland is committed to ensuring that all spills are reported in accordance with the relevant spill contingency planning and reporting regulations and guidelines.		Refer to Section 8.0 of the Emergency Response Plan as well as the OPEP (BAF-PH1-830-P16-0013).
113	Spills (Fuel)	Baffinland is committed to exploring and implementing measures designed to recover residual fuel from spills under the surface of sea ice.		Refer to the OPEP (BAF-PH1-830-P16-0013).

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Appendix A.2: Regulatory Framework

The regulatory and government documents that constitute an integral part of this Plan are listed below:

General

- Environmental Emergency Regulations (E2 Regulations) under the Canadian Environmental Protection Act, 1999 (CEPA 1999).
- Environmental Code of Practice for Aboveground and Underground Storage Tanks Systems Containing Petroleum and Allied Petroleum Products, 2003, CCME.
- National Fire Code 2016
- Territorial Lands Act 1985.
- Territorial Land Use Regulations 1524.
- Canada Oil and Gas Operations Act 1985.
- Canadian Environmental Protection Act 1991.
- Fisheries Act 1986.
- Transportation of Dangerous Goods Act and Regulations.
- Storage Tanks Systems for Petroleum Products and Allied Petroleum Products Regulation 2008.
- TP12402 – Oil Handling Facilities Standards, 1995, Transport Canada.
- Canadian Building Code 2016

Shipping

- Canada Shipping Act Response Organizations and Oil Handling Facilities Regulations.
- Arctic Waters Pollution Prevention Act.
- Marine Liability Act.
- Environmental Protection Act.
- Spill Contingency Planning and Reporting Regulations, 1993.
- Mine Site Reclamation Policy for Nunavut.

Territorial Acts and Regulations

- Nunavut Waters and Nunavut Surface Rights Tribunal Act 2002.
- Nunavut Environmental Protection Act.
- Nunavut Spill Contingency Planning and Reporting Regulations.
- Nunavut Mine Health and Safety Act and Regulations.
- Nunavut Coroners Act.

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Site Specific

- Canada National Parks Act 2000.
- Canada Wildlife Act 1985.
- Migratory Birds Convention Act 1994.

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APPENDIX B

Mine Site and Milne Port Layouts

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SAVED: I:\1\02\00181\44\A\Acad\FIGS\B02 R0, 3/22/2018 2:48:14 PM , MDEMERS PRINTED: 3/22/2018 2:49:21 PM, Layout1, MDEMERS
XREF FILE(S): x-C-TOPO-MILN-INDEX, MILNE SITE LAYOUT, x-B-SI---MOIN-LOCA-2015, X-N-TOPO-BASE-LAND-USE--CLAS IMAGE FILE(S): GIS Baffinland Logo mine_inlet_wd3745_wv2_wv3_aug2016_tile01

502 500 E
503 000 E
503 500 E
504 000 E
504 500 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
SEALIFT BARGE LANDING AREA
EXISTING HTO CABIN
SETTLING POND
EFFLUENT DISCHARGE LOCATION
FUEL TANK FARM
MP-06
MP-05
MP-C-H
MP-C-E
MP-C-F
MP-HWB-1
MP-03
MP-02
RAMP TO BEACH
LAYDOWN AREA
FUEL CONTAINMENT BERM
ORE STOCKPILE
PWSP-No. 1
MP-01a
MP-01
MP-HWB-3
MP-HWB-4
MP-HWB-2
POWER GENERATORS
POLISHING WASTE STABILIZATION POND
HAZARDOUS WASTE BERM
PORT SITE WEATHERHAVEN
SERVICE AREA PAD SITE FACILITIES, INCLUDING:
- MAINTENANCE/WAREHOUSE BUILDING
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING
CAMP SITE INFRASTRUCTURE PAD SITE FACILITIES, INCLUDING:
- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE / GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY
MP-C-B
MP-C-B01
LAND FARM
MP-04
SNOW DUMP
MP-04a
LAND FARM MP-04
MAINTENANCE BUILDING
POTABLE WATER INTAKE LOCATION
MP-MRY-2
MOBILE REFUELING MODULE TEMPORARY CONTAINMENT BERM
50 PERSON CAMP (FROM STEENSBY PORT)
MP-Q1-02
MP-Q1-01
APPROXIMATE EXTENT OF QUARRY Q1 DEVELOPMENT
CAMP PAD (CONSTRUCTED IN 2017)
TOTE ROAD(NEW ALIGNMENT)
PERMITTED OPEN BURN PIT AREA
BORROW SOURCE NO.1
BORROW PITS
MARINE MANIFOLD BUILDING
WELDING SHOP
SHIPPING CONTAINERS
ACCOMMODATION COMPLEX
WASTE MANAGEMENT BUILDING
WASTE MANAGEMENT FACILITY
TOTE ROAD (OLD ALIGNMENT)

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 10 METRES.

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

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	22MAR'18	ISSUED WITH 2017 QIA AND NWB ANNUAL REPORT	AV	MMD	AK

Baffinland

MARY RIVER PROJECT

MILNE PORT SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS

Knight Piésold CONSULTING

P/A NO. NB102-181/44 | REF NO. NB18-00172 | REV 0

Figure 1

HATCH BUILDING
ACCOMMODATION COMPLEX
EMERGENCY RESPONSE OFFICE
WELDING SHOP
MAINTENANCE BUILDING
MS-03
FUEL TANK FARM
MS-01
MS-C-F
TRUCK WASH BUILDING
TOROMONT SHOP
POWER HOUSE
MS-C-C
WATER BUILDING
SEWAGE TRUCK BUILDING
TRUCK WEIGH SCALE
LUMPS STOCKPILE
MS-08
RUN OF MINE
FINE STOCKPILE
CRUSHER AND ORE LOADING PAD
KM 97 BORROW LOCATIONS
WASTE MANAGEMENT FACILITY
EXISTING LAYDOWN AREA
SITE SERVICES GARAGE
RAW WATER INTAKE
RAW WATER PUMP HOUSE
MS-MRY-1
MS-HWB-1
MS-HWB-2
MS-HWB-4
MS-HWB-5
MS-HWB-6
MS-HWB-3
MS-MRY-6
MS-MRY-4
MS-MRY-4a
PWSP No. 2
PWSP No. 3
PWSP No. 1
BULK FUEL STORAGE FACILITY (BLADDER FARM)
AERODROME APRON
MQ-C-A
QUARRY QMR2
MQ-C-D
NEW ROAD ALIGNMENT
CONSTRUCTION LAYDOWN AREA
MQ-C-B
EXPLORATION CAMP FACILITIES
WASTE WATER TREATMENT FACILITY
HELIPAD
POLISHING WASTE STABILIZATION PONDS (PWSPs)
CAMP INFRASTRUCTURE
MS-C-E
MS-C-D
AERODROME RUNWAY
POLISHING WASTE STABILIZATION PONDS TREATED WATER DISCHARGE POINT
NEW ACCOMMODATIONS CAMP
NEW ACCOMMODATIONS CAMP PAD
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

7 914 500 N
7 913 000 N
7 911 500 N
560 000 E
561 500 E
563 000 E
564 500 E
N

WASTE ROCK SEDIMENTATION POND
WASTE ROCK FACILITY (ERP)
DEPOSIT NO.1 MINING LEASE 2484
MS-08
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION (RAIL PHASE)
PROPOSED FINAL OPEN PIT OUTLINE
110 KM LAYDOWN AREA
MINE HAUL ROAD
QUARRY D1Q1
OPEN PIT DEVELOPMENT
QUARRY D1Q2
TRUCK WEIGH SCALE
ORE CRUSHING AND LOADING
MINE OPERATIONS OFFICE
MQ-C-E
ORE CRUSHING SEDIMENTATION POND
EXPLOSIVE MAGAZINE
EXISTING LANDFILL ROAD
MS-MRY-13b
MS-MRY-13a
EXISTING LANDFILL
MS-C-H
MS-C-G
EMULSION PLANT
EFFLUENT DISCHARGE POINT
MS-C-C
MS-C-A
MS-03
MS-01
MS-C-B
MS-C-F

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
- QIA 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.

SCALE A: 300 150 0 500 1000 1500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	22MAR'18	ISSUED WITH 2017 QIA AND NWB ANNUAL REPORT	AV	MMD	AK

SAVED: (1/10/2018 9:16:44 AM by dwpFIGS\803 R0, 3/22/2018 4:18:03 PM, MDEMERS, PRINTED: 3/22/2018 4:30:21 PM, Layout1, MDEMERS
DATA FILES: Contours = 5m intervals.dwg, Mine Site_20JUL16_1.dwg, MINE SITE_LAYOUT.xlsx, MONITOR LOCATIONS.xlsx, LAYOUT PLAN.dwg, LAYOUT - CLAE IMAGE FILE.tif, GIS Baffinland Logo

Baffinland

MARY RIVER PROJECT

MINE SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS

Knight Piésold CONSULTING

PIA NO. NB102-181/44 | REF NO. NB18-00172

Figure 2 | REV 0

APPENDIX C

Emergency Response Activation Flowchart

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LEVEL I (LOW)

A Level I emergency is defined as an incident where any or all of the following has occurred:

- Minor personal injury
- Minor fire that is not growing in size or has been controlled
- Minor accidental release of a deleterious substance with:
  - No threat to public safety; and/or
  - Negligible environmental impact
- Wildlife interaction with minor risk
- Polar Bear within 8 km of a camp or worksite
- Wolf within 8 km of a camp or worksite
- Fox with unusually aggressive behaviours
- Extreme weather conditions force shutdown of work activity in an area
- No impact on reputation
- Loss of generators (less than four (4) operable generators at powerhouse)
- Report to government after the fact

Activation of ICC at the discretion of the Emergency Management Team Lead (EMTL).

LEVEL II (MEDIUM)

A Level II emergency is defined as an incident where any or all of the following has occurred:

- Serious injury
- Major accidental release of a deleterious substance with:
  - Some threat to public safety; and/or
  - Moderate environmental impact.
- Fire to a facility or uncontrolled fire involving equipment
- Wildlife interaction with potential risk to employees / contractors
- Polar bear within 1.5 km of the accommodation complex or worksite
- Wolf within 1.5 km of the accommodation complex or worksite
- Extreme weather conditions or malfunctions threaten life safety systems such as building heat
- Protesters approaching with the threat of occupation or attack
- Local impact on reputation.
- Local/regional media interest/coverage.
- Government involvement.

Activation of ICC required by Emergency Management Team Lead (EMTL).

LEVEL III (HIGH)

A Level III emergency is defined as an incident where any or all of the following has occurred:

- Uncontrolled release of a deleterious substance which:

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- Jeopardizes personnel safety; and/or
- Jeopardizes public safety; and/or
- Significant environmental impacts.

- Single or multiple fatalities
- Major fire to a Production, Accommodations complex, waste storage or multiple pieces of equipment
- Wildlife interaction with serious risk to employees or contractors
- Polar bear in a camp or worksite
- Wolf in a camp or worksite
- Weather conditions or malfunctions result in loss of life safety systems such as building heat
- Uncontrolled explosion
- Attack or occupation by protesters
- Negative impact on reputation
- National/international media

Activation of ICC and Corporate Emergency Management Team required by the EMTL.

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APPENDIX D

Protocol for Baffinland-Provided Evacuation to GN Health Services

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D.1 Protocol for Baffinland-Provided Evacuation to GN Health Services

STEP 1:

The on-site Medical Professional will contact his or her on-call Medical Director for direction regarding the need to evacuate the patient to a higher level of care.

STEP 2:

If the Medical Director determines that the patient requires evacuation to the Qikiqtani General Hospital (QGH) and can be safely transported using BIMC contracted transportation, the on-site Medical Professional will contact the on-call Physician of the Emergency Department at the QGH in Iqaluit. The contact phone number is:

(867) 975 – 8600, Ext. 1539

BIMC's on-site Medical Professional and the QGH on-call Physician will discuss the patient assessment, clinical management and the need to refer the patient to a higher level of care. The on-call Physician may speak to the Medical Director if he or she determines Physician-to-Physician consultation is required.

For 3-way consultation between BIMC's on-site Medical Professional, the Medical Director and QGH's on-call Physician, the following dedicated telephone conference number can be used:

Step 1: Dial your Access Number 1-866-251-3220

Step 2: Enter your participant PIN - 96399876#

STEP 3:

The BIMC on-site Medical Professional will provide the following information to the on-call Physician at the QGH:

1. Name of person calling and the phone number
2. Patient's Name
3. Sex of the Patient
4. Date of birth
5. Health care number
6. Allergies
7. Relevant Medical History
8. Language spoken
9. Diagnosis

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STEP 4:

BIMC will arrange for transportation of the patient to the Emergency Department at the QGH. This will include making all arrangements and paying for the patient's transportation from the Iqaluit Airport to the QGH.

Upon discharge from the QGH, BIMC will arrange and pay for any further required transportation and accommodation for the patient, including transportation back to the work site or to the patient's home community.

Exceptions:

In a small number of cases, there may be reason for a patient to be transported to the Pond Inlet Health Centre instead of being treated on-site or in the patient's home community or at the QGH.

In such cases, BIMC's on-site Medical Professional will call the on-call Physician at QGH before contacting the Pond Inlet Health Centre. If there is agreement that evacuation to the Pond Inlet Health Centre is required, BIMC should contact the Nurse-in-Charge at the Pond Inlet Health Centre to discuss the patient transfer.

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APPENDIX E

Protocol for GN-provided Medevac

(Air Ambulance Medical Evacuation)

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E.1 Protocol for GN-provided Medevac (Air Ambulance Medical Evacuation)

STEP 1:

The on-site Medical Professional will contact his or her on-call Medical Director for direction regarding the need to medevac the patient to a higher level of care.

STEP 2:

If the Medical Director agrees that a medevac is required, the Medical Professional will contact the on-call Physician of the Emergency Department at the Qikiqtani General Hospital (QGH) in Iqaluit. The contact phone number is:

(867) 975 – 8600, Ext. 1539

BIMC's Medical Professional and the QGH on-call Physician will discuss the need to medevac the patient to a higher level of care. The on-call Physician may speak to the Medical Director if he or she determines Physician-to-Physician consultation is required.

For 3-way consultation between BIMC's on-site Medical Professional, the Medical Director and QGH's on-call Physician, the following dedicated telephone conference number can be used:

Step 1: Dial your Access Number 1-866-251-3220

Step 2: Enter your participant PIN - 96399876#

If the QGH on-call Physician agrees that a medevac is necessary, he or she will initiate QGH's normal medevac process.

STEP 3:

BIMC's on-site Medical Professional or Medical Director must provide the following information to the on-call Physician at the QGH:

1. Name of person calling and the phone number
2. Patient's Name
3. Sex of the Patient
4. Date of birth
5. Health care number
6. Allergies
7. Relevant Medical History
8. Language spoken
9. Diagnosis

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10. Patient's Location (coordinates - latitude and longitude)

STEP 4:

Once the Medevac Provider receives the warrant for transport from QGH, the medevac provider will contact BIMC's on-site Medical Professional in order to provide an expected time of arrival.

Any changes in the patient's condition must be communicated to both the medevac provider and the accepting Physician at the medevac's destination hospital.

STEP 5:

DH will invoice BIMC for all costs related to the medevac including, but not limited to, charter costs, medical transportation crew, standby fees, ground transportation, physician consultation fees and administration fees.

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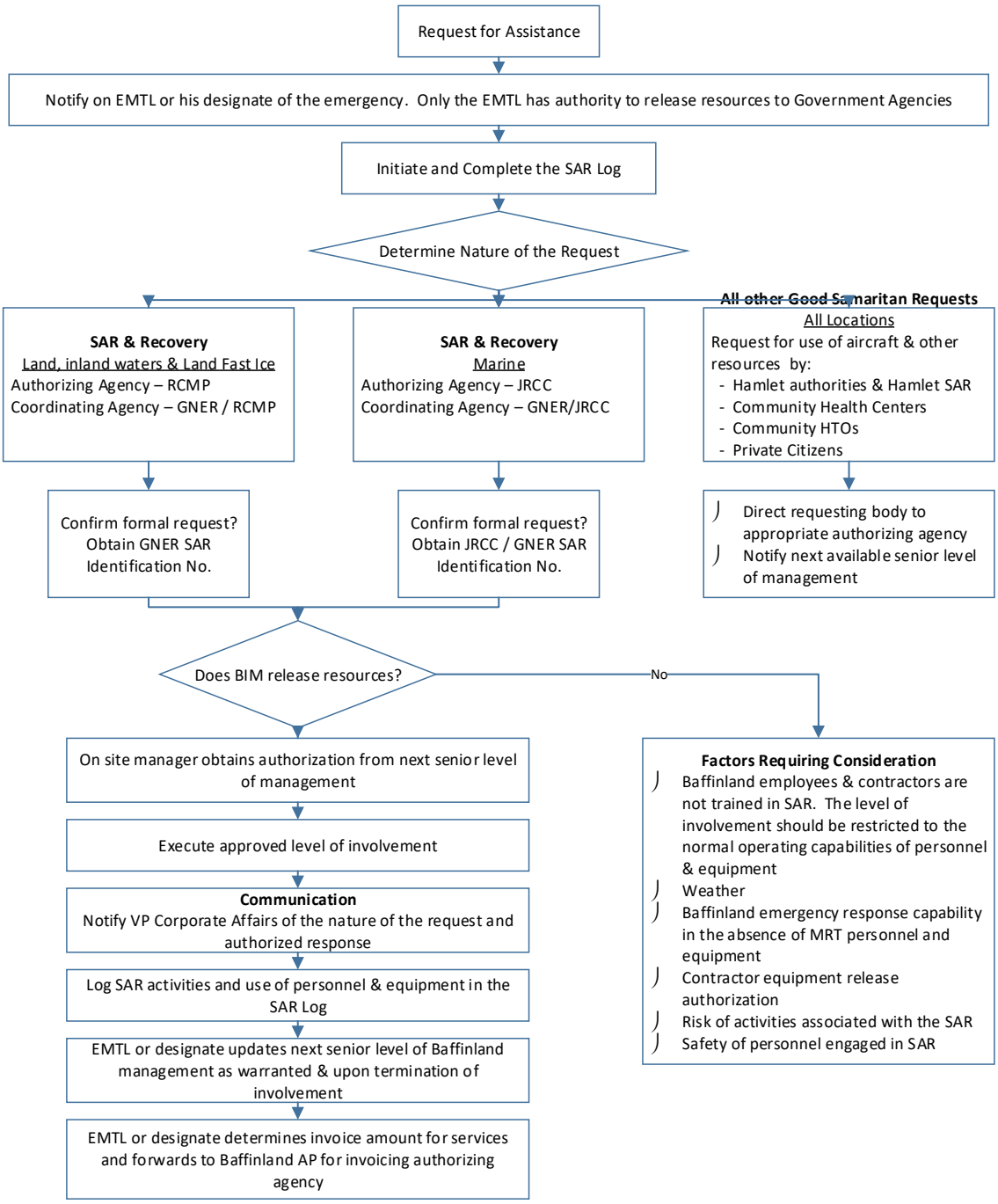
APPENDIX F

Flowchart for External Requests for Search and Rescue and Emergency Services

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FLOWCHART FOR EXTERNAL REQUESTS FOR SAR AND EMERGENCY SERVICES



Contacts – 24 hrs

GNER – Government of Nunavut Emergency Response	(800) 693-1666
RCMP – Royal Canadian Mounted Police	(867) 979-1111
JRCC – Joint Rescue Coordination Centre (CFB Trenton)	(800) 267-7270

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Appendix E:

Spill Contingency Plan (BAF-PH1-830-P16-0036)

Baffinland Iron Mines Corporation

SPILL CONTINGENCY PLAN

BAF-PH1-830-P16-0036

Rev 4

Prepared By: Andrew Vermeer
Department: Sustainable Development
Title: Regulatory Reporting Specialist
Date: September 25, 2018
Signature:

Approved By: Tim Sewell
Department: Health, Safety and Environment
Title: Head of Health, Safety and Environment
Date: September 25, 2018
Signature:

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DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
03/31/2008	1	N/A	DC	Approved for Use
03/31/2009	2	N/A	JM	Approved for Use
03/31/2010	3	N/A	JM	Approved for Use
03/31/2011	4	N/A	JM	Approved for Use
03/31/2012	D/5	AG	JM	New Document – Approved for Use
07/31/2012	6	AG	JM	Approved for Use
03/31/2013	0	AG	JM	Approved for Use (Old #)
03/31/2014	0	JM	EM	Issued for Use – BIM Number
03/16/2015	1	LW	JM	Issued for Use
03/07/2016	2	LW	JM	Issued for Use
03/30/2017	3	KB	WM	Issued for Use
09/25/2018	4	AV	TS	Issued for Use

Index of Major Changes/Modifications in Revision 4

Item No.	Description of Change	Relevant Section
1	Updated to reflect the increased fuel storage capacity at Milne Port and the operation of a 15 ML fuel tank at the Milne Port Fuel Storage Facility.	Section 7.0

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TABLE OF CONTENTS

1 INTRODUCTION 6

1.1 Purpose and Scope 6

1.2 Approach to Spill Response 6

2 BAFFINLAND POLICIES 8

2.1 Health, Safety, and Environment Policy 8

2.2 Sustainable Development Policy 9

3 LEVELS OF EMERGENCY SPILL RESPONSE 11

4 EMERGENCY SPILL RESPONSES PROCEDURES 13

4.1 Spills on Land 13

4.2 Spills on Freshwater 13

4.3 Spills on Snow and Ice 14

4.4 Wildlife Protection Procedures 15

5 DISPOSAL OF CONTAMINATED MATERIAL 17

5.1 Milne Port Soil Landfarm and Contaminated Snow Containment Facility 17

6 TRAINING REQUIREMENTS 18

6.1 Qualifications 18

6.2 Training Content 18

6.3 Drills and Exercises 19

6.3.1 Tabletop Exercises 19

6.3.2 Functional Drills 19

6.3.3 Full-Scale Exercises 19

6.4 Preparation 20

7 POTENTIAL SPILL ANALYSIS 21

7.1 Fuel Spills on Land 21

7.1.1 Potential Fuel Spill Scenarios 22

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7.2 Explosives Transport and Storage 26
7.2.1 Ammonium Nitrate Storage and Handling 26
7.2.2 Emulsion Storage and Handling 26
7.2.3 Potential Spill Scenarios Related to Explosives 27

7.3 Untreated Sewage 30
7.3.1 Potential Spills Scenarios Related to Sewage 30

7.4 Lubricants and Oils 31
7.4.1 Potential Spill Scenarios Related to Lubricants and Oils 32

8 REPORTING REQUIREMENTS 36

List of Tables

Table A: External Distribution List for the Spill Contingency Plan 5
Table 4-1: Emergency Contacts in Case of Spills Affecting Wildlife 16
Table 7-1: Maximum Fuel Storage Capacities for Permanent Fuel 21
Table 7-2: Maximum Cumulative Quantities of Explosives and Ammonium Nitrate at Project Sites 26
Table 8-1: General Spill Reporting and Clean-up Requirements 36

List of Figures

Figure 3-1 – Emergency Spill Response Levels 12

List of Appendices

Appendix A – Site Layouts – Milne Port and Mine Site

Appendix B – Emergency Spill Kit Supplies and Locations and Emergency Response Truck Inventory

Appendix C – MSDS Inventory

Appendix D – NT-NU Spill Report

Appendix E – Dyno Nobel Baffin Island Inc. – Emergency Assistance Response Plan

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This Plan is required for use in conjunction with Baffinland's Emergency Response Plan (BAF-PH1-830-P16-0007). Table A provides a list of external contacts to which this Plan shall be distributed. Additional copies of this Plan may be obtained from:

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3
Tel: (416) 364-8820
Fax: (416) 364-0193

Table A: External Distribution List for the Spill Contingency Plan

Department of Environment - Environmental Protection Division PO Box 1000 Station 200 Iqaluit, Nunavut X0A 0H0 Tel : (877) 212-6638, (867) 975-6000 Fax : (867) 975-6099	**Department of Fisheries and Oceans** Central and Arctic Region 520 Exmouth Street Sarnia, Ontario N7T 8B1 Tel : (519) 383-1813, 1-866-290-3731 Fax : (519) 464-5128
Qikiqtani Inuit Association Igluvut Building, 2nd Floor PO Box 1340 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-8400, 1-800-667-2742 Fax : (867) 979-3238	**Crown-Indigenous Relations and Northern Affairs Canada** – Field Operations Division Qimugjuk Building PO Box 2200 Iqaluit, NU X0A 0H0 Tel: (867) 975-4295 (Director, Lands and Field Operations: Erik Allain) Fax: (867) 979-6445
Crown-Indigenous Relations and Northern Affairs Canada - Water Resources Division Building 918 PO Box 100 Iqaluit, NU X0A 0H0 Tel: (867) 222-9278 (Manager, Water Resources: Ian Parsons) Fax: (867) 975-4585	**Mittimatalik Hunters and Trappers Organization** PO Box 189 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8856 Fax : (867) 899-8095
Nunavut Impact Review Board 29 Mitik Street PO Box 1360 Cambridge Bay, Nunavut X0B 0C0 Tel : 1-866-233-3033 Fax : (867) 983-2594, (867) 983-2574	**Nunavut Water Board** PO Box 119 Gjoa Haven, Nunavut X0B 1J) Tel : (867) 360-6338 Fax : (867) 360-6369
Hamlet of Pond Inlet PO Box 180 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8934, (867) 899-8935 Fax : (867) 899-8940	

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

As required by Baffinland Iron Mines Corporation's (Baffinland) Type 'A' Water Licence No. 2AM-MRY1325 Amendment No. 1 (Type 'A' Water Licence) for the Mary River Project (Project), a review of Project Environmental Management and Monitoring Plans (EEMPs) was completed. This Spill Contingency Plan (Plan) was updated to meet the requirements of the Type 'A' Water Licence.

Further and continual modifications and revisions to this Plan shall be completed based on future work scope modifications, emergency and spill response procedures, and associated approvals. Updates to this Plan shall be completed in accordance to the terms and conditions of Baffinland's Type 'A' Water Licence, Commercial Lease with the QIA (Commercial Lease), Project Certificate No. 005 – Amendment No. 1 (Project Certificate), and any subsequent requirements which may be issued.

The purpose of this Plan is to identify the potential for an accidental release (spill) of a hazardous material to the environment (land, ice, or freshwater) throughout the lifecycle of the Project. This Plan provides spill scenarios and identifies protocols for their prevention, response to, and recovery and is required for use in conjunction with Baffinland's Emergency Response Plan (ERP; BAF-PH1-840-P16-0002).

Baffinland's ERP identifies potential environmental, health, and safety emergencies that could arise during the construction and operational phases of the Project. The ERP establishes the framework for responding to these situations and applies to all aspects of the Project. All Baffinland employees and contractors are required to comply with the requirements of the ERP.

The ERP also defines Baffinland's organizational roles and responsibilities, internal and external contact information, training, resources, and reporting requirements, to which all site personnel are directed.

1.2 APPROACH TO SPILL RESPONSE

A spill is defined as the release of a hazardous product out of its containment and into the environment. Such releases result in potential hazards to humans, vegetation, water resources, fish and wildlife which vary in severity, depending on several factors including the nature of the material, quantity spilled, location and season. Diesel and Jet Fuel (Arctic Diesel/P50 and Jet A) are the primary products at risk for potential releases to the environment due to its abundance and frequency of use. As a result, additional levels of spill response have been developed for these products. Other products with the potential for release include sewage water, anti-freeze, methanol, lubricants, oils, and ammonium nitrate (AN).

Baffinland requires all site personnel to be trained on the specific procedures required for spill response initiation and reporting. All site personnel must comply with the following procedure upon initiation of a spill involving a regulated substance:

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1. Immediately warn other personnel working near the spill area;
2. Evacuate the area if the health and safety of personnel is threatened;
3. In the absence of danger, and before the spill response team arrives at the scene, take any safe and reasonable measure to stop, contain and identify the nature of the spill; and
4. Notify the Environmental Supervisor, who will initiate spill response operations.

Upon initiation of spill response, as determined by the Environmental Supervisor, the following procedure shall be completed by the spill response team:

Source Control – If safe to do so, reduce or stop the flow of product. This may include simple actions such as turning off a pump, closing a valve, or sealing a puncture with something nearby (e.g., a rag, piece of wood, tape), raising a leaking or discharging hose to a level higher than the product level inside the tank, or transferring the product from leaking containers.

Contain and Control the Free Product – If safe to do so, prevent or minimize the spread of the spilled product. Accumulate/concentrate spilled product in an area to facilitate recovery. Barriers positioned down-gradient of the spill will slow or stop the progression of the spill. Barriers can consist of absorbent booms, dykes, berms, or trenches (dug in the ground or in snow/ice).

Protection – Evaluate the risk of the impacted area to the surrounding environment. Protect sensitive ecosystems and natural resources at risk by isolating the area and/or diverting the spilled material away from sensitive receptors. Protection may be achieved by the effective use of various types of barriers.

Spill Clean-up – Recover and contain as much free product as possible.

Report the Spill – Provide basic information such as date and time of the spill, type and amount of product discharged, photographic records, location and approximate size of the spill, actions already taken to stop and contain the spill, meteorological conditions and any perceived threat to human health or the environment. Reports shall be completed as per Baffinland's Incident Investigation Form (BAF-PH1-810-FOR-0005).

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2 BAFFINLAND POLICIES

2.1 HEALTH, SAFETY, AND ENVIRONMENT POLICY

This Baffinland Iron Mines Corporation Policy on Health, Safety and Environment is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goals.

We implement this Policy through the following commitments:

- Continual improvement of safety, occupational health and environmental performance
- Meeting or exceeding the requirements of regulations and company policies
- Integrating sustainable development principles into our decision-making processes
- Maintaining an effective Health, Safety and Environmental Management System
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- Reclamation of lands to a condition acceptable to stakeholders.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- As evidenced by our motto “Safety First, Always” and our actions Health and Safety of personnel and protection of the environment are values not priorities.
- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution through courageous leadership is essential for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake.

The health and safety of all people working at our operation and responsible management of the environment are core values to Baffinland. In ensuring our overall profitability and business success every Baffinland and business partner employee working at our work sites is required to adhere to this Policy.



Brian Penney
Chief Executive Officer
April 2018

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2.2 SUSTAINABLE DEVELOPMENT POLICY

At Baffinland Iron Mines Corporation (Baffinland), we are committed to conducting all aspects of our business in accordance with the principles of sustainable development & corporate responsibility and always with the needs of future generations in mind. Baffinland conducts its business in accordance with the Universal Declaration of Human Rights and ArcelorMittal's Human Rights Policy which applies to all employees and affiliates globally.

Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and with utmost respect for the cultural values and legal rights of Inuit. We expect each and every employee, contractor, and visitor to demonstrate courageous leadership in personally committing to this policy through their actions. The Sustainable Development and Human Rights Policy is communicated to the public, all employees and contractors and it will be reviewed and revised as necessary on a regular basis. These four pillars form the foundation of our corporate responsibility strategy:

1. Health and Safety
2. Environment
3. Upholding Human Rights of Stakeholders
4. Transparent Governance

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness, where everyone goes home safe everyday of their working life. Why? Because our people are our greatest asset. Nothing is as important as their health and safety. Our motto is "Safety First, Always".
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour, awareness and promoting active courageous leadership. We allow our employees and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- Baffinland employs a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- Baffinland applies the principles of pollution prevention, waste reduction and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop more sustainable practices.
- Baffinland ensures that an effective closure strategy is in place at all stages of project development to ensure reclamation objectives are met.

3.0 UPHOLDING HUMAN RIGHTS OF STAKEHOLDERS

- We respect human rights, the dignity of others and the diversity in our workforce. Baffinland honours and respects the unique cultural values and traditions of Inuit.
- Baffinland does not tolerate discrimination against individuals on the basis of race, colour, gender, religion, political opinion, nationality or social origin, or harassment of individuals freely employed.
- Baffinland contributes to the social, cultural and economic development of sustainable communities in the North Baffin Region.

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- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.
- We expect our employees and contractors, as well as community members, to bring human rights concerns to our attention through our external grievance mechanism and internal human resources channels. Baffinland is committed to engaging with our communities of interest on our human rights impacts and to reporting on our performance.

4.0 TRANSPARENT GOVERNANCE

- Baffinland will take steps to understand, evaluate and manage risks on a continuing basis, including those that may impact the environment, employees, contractors, local communities, customers and shareholders.
- Baffinland endeavours to ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our safety, health, environmental, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

4.1 FURTHER INFORMATION

Please refer to the following policies and documents for more information on Baffinland's commitment to operating in an environmentally and socially responsible manner:

Health, Safety and Environment Policy
Workplace Conduct Policy
Inuktitut in the Workplace Policy
Site Access Policy
Hunting and Fishing (Harvesting) Policy
Annual Report to Nunavut Impact Review Board

If you have questions about Baffinland's commitment to upholding human rights, please direct them to contact@baffinland.com.



Brian Penney
Chief Executive Officer
March 2016

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3 LEVELS OF EMERGENCY SPILL RESPONSE

To effectively manage emergency response, Baffinland has adopted a tiered emergency classification scheme. Each level of emergency, based on the significance of the event, requires varying degrees of response, effort and support. The impact on normal business operations will also differ as will the requirements for investigation and reporting. The ERP details each level of emergency; however, emergency spill response classifications are defined by the following three (3) levels:

Level 1 (Low) – Minor accidental release of a deleterious substance with:

- No threat to public safety; and/or
- Negligible environmental impact to receiving environment.

Level 2 (Medium) – Major accidental release of a deleterious substance with:

- Some threat to public safety; and/or
- Moderate environmental impact to receiving environment.

Level 3 (High) – Uncontrolled hazard which:

- Jeopardizes Project personnel safety; and/or
- Significant environmental impacts to receiving environment.

Emergency response levels are determined by the specific substance released, quantity spilled, receiving environment impacted, and risk to human health. This assessment also includes specific consideration given to spills occurring within engineered secondary containment. The following matrix provides guidance for Project personnel with regard to the level of response that is assigned to spill classifications.

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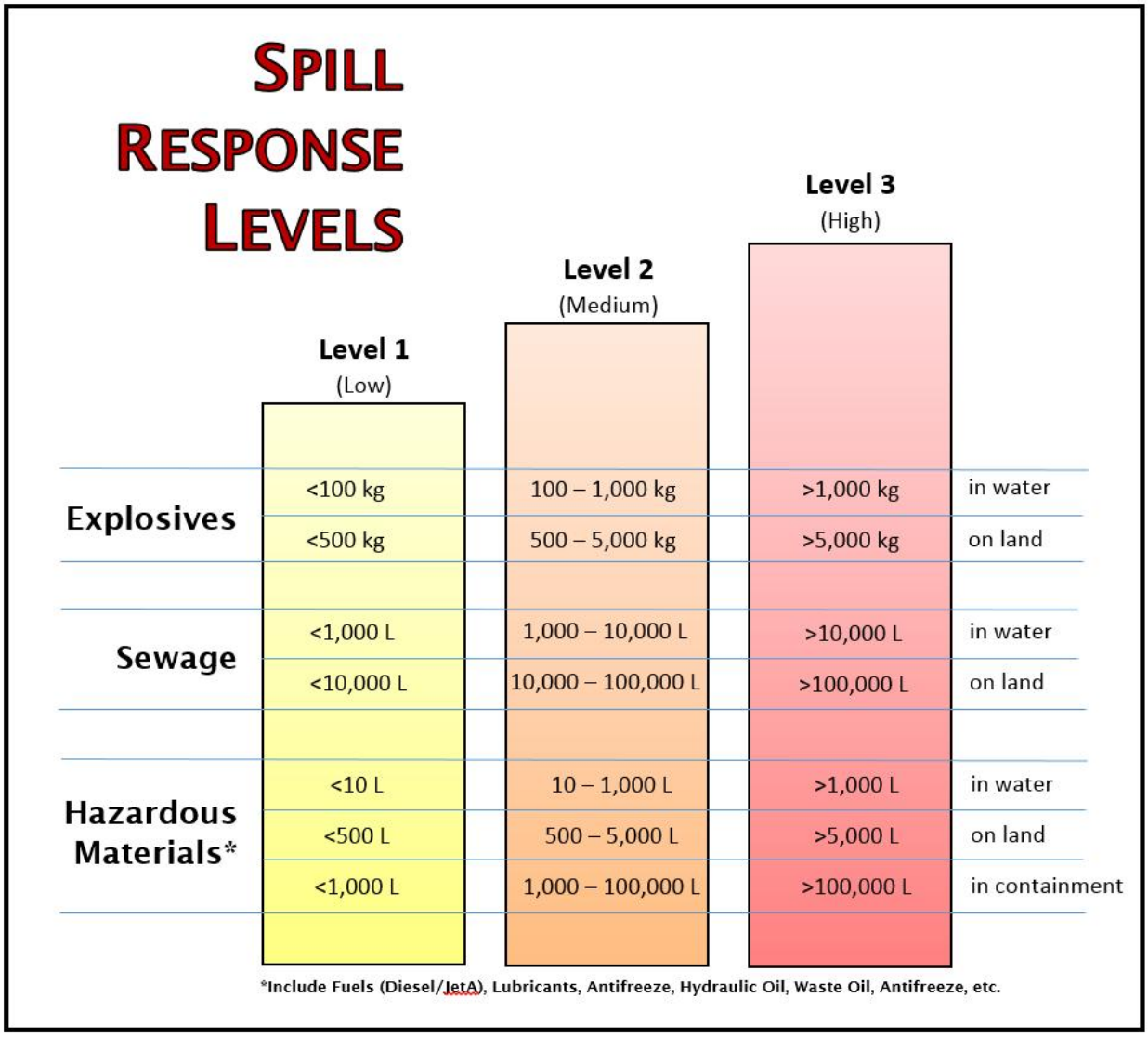


FIGURE 3-1 – EMERGENCY SPILL RESPONSE LEVELS

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4 EMERGENCY SPILL RESPONSES PROCEDURES

4.1 SPILLS ON LAND

Response to spills on land will include the general procedures detailed in the Project's ERP.

The main spill control techniques involve the use of two types of barriers: dykes and trenches. Barriers should be placed down gradient (down-slope) from the source of the spill, and as close as possible to the source of the spill. Barriers slow the progression of the spill and also serve as containment to allow for the recovery of the spill.

Depending on the volume spilled, the site of the spill as well as available material, a dyke may be built with soil, booms, lumber, snow, etc. A plastic liner should be placed at the foot of and over the dykes to protect the underlying soil or other material and to facilitate recovery of the spill. Construct dykes in such a way as to accumulate a thick layer of free product in a single area (V-shaped or U-shaped).

Trenches are useful in the presence of permeable soil and when the spilled product is migrating below the ground surface. A plastic liner should be placed on the down-gradient edge of the trench to protect the underlying soil. Liners should not be placed at the bottom of the trench to allow water to continue flowing underneath the layer of floating oil (if applicable).

The use of large quantities of absorbent materials to recover large volumes of spilled fluids should be avoided. Large volumes of free-product should be recovered and containerized, as much as possible, by using vacuums and pumps appropriate to the material. Mixtures of water and fuel may be processed through the use of an oil-water separator. Absorbent sheets should be used to soak up residual fuel on water, on the ground (soil and rock), and on vegetation.

4.2 SPILLS ON FRESHWATER

Responses to spills on freshwater include the general procedures previously detailed. Various containment, diversion and recovery techniques are discussed in the following sections. The following elements must be considered when conducting response operations:

- Type of water body or water course (lake, stream, river);
- Water depth and surface area;
- Wind speed and direction;
- Type of shoreline; and
- Seasonal considerations (open-water, freeze-up, break-up, frozen).

Containment of a hydrocarbon slick on water requires the deployment of mobile floating booms to intercept, control, contain and concentrate (i.e., increase thickness) the floating substance. For a large

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lake, typically, one end of the boom is anchored to shore while the other is towed by a boat and use to circle the slick and return it close to shore for recovery using a skimmer. Reducing the surface area of the slick increases its thickness and thereby improves recovery. Mechanical recovery equipment (i.e., skimmers and oil/water separators) will be mobilized to site if required.

If fuel is spilled in a smaller water body such as a small lake or pond, it may not be possible to deploy booms using a boat. In this case, measures are taken to protect sensitive and accessible shoreline (spills resulting from traffic incidents). The hydrocarbon slick is monitored to determine the direction of migration. In the absence of strong winds the oil will likely flow towards the discharge of the lake. Measures are taken to block and concentrate the oil slick at the lake discharge using booms where it will limit spatial migration and subsequently allow for recovery using a portable skimmer, a vacuum, or sorbent materials.

In small slowly-flowing rivers, streams, channels, inlets or ditches, inverted weirs (i.e., siphon dams) are used to stop and concentrate moving diesel fuel for collection while allowing water to continue to flow unimpeded. In the case of floating fuel, in a stream, heading for a culvert (i.e., at a road crossing), a culvert block is used to stop and concentrate moving fuel for collection while allowing water to continue to flow unimpeded. In both cases fuel would then be recovered using a portable skimmer or sorbent materials.

In the case of spills in larger rivers, with fast moving currents, diversion booming is used to direct the oil slick ashore for recovery. Single or multiple booms (i.e., cascading) may be used for diversion. Typically, the booms are anchored across the river at an angle. The angle will depend on the current velocity. Choosing a section of a river that is both wider and shallower makes boom deployment easier. Diversion booming may also be used to direct an oil slick away from a sensitive area to be protected.

4.3 Spills on Snow and Ice

In general, snow and ice will slow the movement of hydrocarbons. The presence of snow may also hide the fuel slick and make it more difficult to follow its progression. Snow is generally a good natural sorbent, as hydrocarbons have a tendency to be soaked up by snow through capillary action.

However, the use of snow as absorbent material is to be limited as reasonably practical. Snow and frozen ground also prevent hydrocarbons from migrating down into soil or at least slow the migration process. Ice prevents seepage of fuel into the underlying water body.

Response to spills on snow and ice includes the general procedures previously detailed. Most response procedures for spills on land may be used for spills on snow and ice. The use of dykes (i.e., compacted snow berms lined with plastic sheeting) or trenches (dug in ice) slow the progression of the fuel and also serve as containment to allow for the recovery of the fuel.

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Free-product is recovered by using a vacuum, a pump, or sorbent materials. Contaminated snow and ice is scraped up manually or using heavy equipment depending on volumes. The contaminated snow and ice is placed in containers or within lined berms on land. The contaminated water and product will be treated on site utilizing available oily water treatment systems. Free phase product that is recovered will be utilized as a source of fuel onsite if possible or shipped offsite for processing.

4.4 Wildlife Protection Procedures

When required, the following audible and visual techniques shall be used to prevent wildlife from interacting with spilled product or a contaminated area(s) following a spill:

- Pyrotechnics, i.e. shell crackers, screamers, propane cannons for shore based spills;
- Visual scare tactics, i.e.: helicopters, emergency response vessels or other water vessels;
- Broadcast sounds, i.e. Breco Bird Scarer designed to float with an oil spill; and
- Exclusion, i.e. netting applied in smaller contaminated areas such as settling or evaporation ponds.

To minimize environmental impact, these devices are most effective when initiated immediately.

The size of the spill and location in relation to sensitive wildlife areas must be assessed at the time of the event as to correctly apply the appropriate level of deterrence. Only workers trained in the safe and proper use of certain hazing equipment will be permitted to haze wildlife. Personal protective equipment (PPE) will be worn by all personnel using deterrent equipment, as per manufactures instructions, with the minimum PPE requirements consisting of eye and ear protection. Other workers in the vicinity of such devices should also use ear protection or remain a safe distance away. Hazing through the use of pyrotechnics should not be used too close to dry vegetation or flammable spill materials due to fire hazard.

Hazing should be administered in such a way as to prevent wildlife from entering an area where they may become endangered. It is also important to ensure that hazing efforts do not cause already contaminated animals to scatter away before they are able to receive treatment. Techniques should be applied as soon as possible to prevent wildlife from interacting with spilled product or contaminated areas and becoming oiled or contaminated.

All emergency response vessels shall be equipped with deterrent devices to ensure timely response in case of a spill occurrence off-shore. To prevent habituation, variation of hazing techniques will be used such as changing the location, appearance and types of hazing or using a combination of hazing techniques.

Efforts shall be made to collect alive or dead oiled wildlife. In the event of a spill occurring in or around a water body, shorelines and beaches shall be inspected for contaminated wildlife to be collected. Emergency response vessels shall be equipped with dip-nets, large plastic collecting bags for dead wildlife,

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and cardboard boxes or cloth bags for live oiled wildlife. To ensure that live oiled wildlife are dealt with humanely, capture and handling of wildlife shall only be done by trained individuals. Gloves shall be worn when handling contaminated wildlife (leather gloves for raptors and mammals, latex/rubber gloves for ducks and small shorebirds). Wildlife will be kept individually within cloth bags or ventilated cardboard boxes and label the date and time animal was found, name of finder, location and name of species, if known. Wildlife treatment facilities will then be contacted for advisement on treatment. All contaminated wildlife will be held in a warm quiet place until treatment. The Canadian Wildlife Services (CWS) will be consulted to determine the most humane treatment method (i.e. rehabilitation or euthanasia) to be implemented for live oiled wildlife.

For wildlife mortalities, all carcass are required to be bagged and labelled individually. The date and time animal was found, name of finder, location and name of species, if known shall be documented. CWS is required to be consulted and approval shall be obtained prior to disposing of any dead wildlife. Contact information for experts in bird hazing and bird exclusion, oiled bird rehabilitation, and, permits needed to haze, salvage, hold and clean, or euthanize birds, are provided in Table 4-1.

TABLE 4-1: EMERGENCY CONTACTS IN CASE OF SPILLS AFFECTING WILDLIFE

Name	Location	Phone Number	Purpose
Canadian Wildlife Services (CWS) Prairie and Northern Region	Eastgate Offices 9250 - 49th Street Edmonton, Alberta T6B 1K5	1-780-951-8600	Providing information on migratory bird resource and species at risk (under CWS jurisdiction) in the area of a spills (this includes damage assessment and restoration planning after the event); Minimizing the damage to birds by deterring unoiled birds from becoming oiled; and Ensuring the humane treatment of captured migratory birds and species at risk by determining appropriate response and treatment strategies (i.e. Euthanasia or cleaning and rehabilitation).
Nunavut Emergency Management	P.O. Box 1000, Station 700 Iqaluit, NU X0A 0H0	1-800-693-1666	Responsible for developing territorial emergency response plans, coordinating general emergency operations at the territorial and regional levels, and supporting community emergency response operations.
International Bird Rescue	International	1-888-447-1743	Wildlife rehabilitation specialists, that manage various aspects of wildlife response.

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5 DISPOSAL OF CONTAMINATED MATERIAL

Quatrex bags, overpack drums, or other appropriate containers as approved by the Environmental Department will be used to contain and transport contaminated soil for treatment. Depending on the nature of the spilled contaminant (hydrocarbon based spills), the soil may be treated for remediation at Baffinland's Landfarm and Contaminated Snow Containment Facility (Landfarm Facility) at Milne Port (refer to Section 5.1 below). Soil, contaminated from the spill of other hazardous chemicals will be treated as a hazardous waste and shipped offsite to a licensed facility for treatment and/or disposal. For additional information, refer to Baffinland's Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011).

Used sorbent material is burned in Project incinerators as per incinerator standard operating procedures and contaminated snow from sewage releases are disposed in Polishing and Waste Stabilizations Ponds for treatment during the summer months.

5.1 MILNE PORT SOIL LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY

The Milne Port Landfarm Facility consisting of two geomembrane lined containment cells. The larger (3,383 m^3) west cell (landfarm) was constructed for the containment and bio treatment of hydrocarbon contaminated soils. Treated soils that meet the appropriate criteria will be used as landfill cover material or other purposes following approval from the appropriate regulators and stakeholders.

The smaller (929 m^3) east cell was constructed for the containment of hydrocarbon contaminated snow generated during the winter months. Contaminated snow collected will be treated during the summer months using an onsite mobile Oily Water Treatment Facility (OWTF). During treatment, monitoring will be completed to ensure compliance with prescribed water quality guideline criteria outlined in Baffinland's Type 'A' Water Licence.

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6 TRAINING REQUIREMENTS

Emergency spill response training subject to the requirements of this Plan shall be completed in conjunction with Baffinland's ERP, whereby Baffinland's Emergency Response Lead (i.e. Emergency Rescue Coordinator), with support from the Environmental Superintendents, will identify Project training needs and the resources required to provide the necessary skills to personnel tasked with duties in emergency and spill response. Circumstantially, emergency spill responses often occur in parallel with emergency responses (i.e. an overturned fuel tanker accident along the Tote Road not only causes imminent hazards to site personnel, but also to the surrounding environment); to facilitate efficient response to overall emergency response and preparedness, Project personnel trained to respond to health and safety emergencies (Emergency Response Team) shall also receive sufficient training to effectively respond to accidental releases of hazardous materials. Emergency and spill response training shall be developed and implemented throughout the lifecycle of Project to ensure the following requirements are fulfilled:

- Meets or exceeds the requirements of NWT/Nunavut Mines Health and Safety Regulations;
- Enables responders to competently operate the equipment employed for emergency and spill response purposes; and
- Includes practices, drills and full scale exercises for responding to the types of emergencies that are reasonably predictable for the operation.

6.1 QUALIFICATIONS

All active MRT members must obtain:

- Certification within 12 months, by a physician or by a nurse in charge of a nursing station, to be fit to work in a breathing apparatus under arduous conditions;
- A valid Mine Rescue Certificate issued by the Chief Inspector;
- A valid Standard First Aid Certificate;
- Participation in training requirements subject to the direction of the Chief Mines Inspector; and
- Emergency Spill Response training; land based response training programs in addition to those completed as part of Baffinland's Oil Pollution Emergency Plan (OPEP) - Doc. No. BAF-PHI-830-0013.

6.2 TRAINING CONTENT

Emergency response personnel, as members of the ERT, have response requirements which may include administering first aid, firefighting, performing work at heights or in confined spaces, handling and transferring hazardous/controlled substances, and working in/around water. Each of these demands

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must be supported with adequate training that will allow members to safety and effectively conduct their tasks.

Additional training requirements may be provided for specific roles within the ERP and for specific functions to be performed during an emergency response including:

- Aircraft Rescue Fire Fighting (ARFF) training;
- Incident command training;
- Cold water rescue and boat operators safety; and
- Boom deployment.

6.3 Drills and Exercises

While drills and exercises can be used for training purposes, their primary function for this plan is to provide the means of testing the adequacy of the plan's provisions and the level of readiness of response personnel.

The Emergency Rescue Coordinator and Environmental Superintendents are responsible for coordinating the development of and assisting in conducting drills and exercises. The following types of drills and exercises shall be practiced:

6.3.1 Tabletop Exercises

Tabletop exercises shall be completed and will involve presenting to key emergency personnel simulated emergency situations in informal settings to elicit constructive discussions as the participants examine and resolve problems based on this Plan. These exercises will be routinely performed during ERT training sessions conducted throughout the year.

6.3.2 Functional Drills

Functional drills are practical exercises designed to evaluate the capability of personnel to perform a specific function (i.e. communications, first aid, and spill response). Functional drills will be required to be performed at a minimum of twice annually. Deficiencies and competencies identified during functional drills are documented, and used as effective development tools in the preparation of response procedures required for full-scale exercises.

6.3.3 Full-Scale Exercises

Full scale exercises are intended to evaluate the operational capability of Baffinland's emergency response and preparedness. Full-Scale Exercises will be required to be conducted annually with sufficient notice to allow for the preparation of effective emergency response procedures and to identify and correct deficiencies in advance.

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6.4 PREPARATION

Preparation for emergency and spill response exercises will vary depending on the type and scope involved; however, planning for these events shall include:

- Plan review and identification of possible problem areas;
- Establishing objectives;
- Identifying resources to be involved including personnel;
- Develop exercise scenarios, a major sequence of events list, and expected action checklists; and
- Assigning and training controllers and evacuators.

Baffinland has committed to engaging local community representatives, the Government of Nunavut and the Canadian Coast Guard as applicable in training drills and exercises.

All scenarios shall be realistic and based upon current operating conditions. The primary event (i.e. fire, spill, etc.) shall be determined based on the objective of the exercise, and completed in accordance with the prescribed regulatory requirements.

Emergency Response Trucks are maintained at both the Milne Port and the Mine Site for immediate response to all emergencies. The Emergency Response Trucks are equipped with a comprehensive list of response equipment which include, back-up power supply, hydraulic power tools, fire-fighting and spill response equipment, containment and medical response supplies. In the event of an emergency, the Emergency Response Trucks will be immediately deployed carrying the necessary equipment responders will require upon arriving at the scene of the incident. For the complete Emergency Response Truck inventory, refer to Appendix B.

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7 POTENTIAL SPILL ANALYSIS

To prepare for emergency spill response, potential spill analysis was conducted on various worst-case scenarios. The exercise serves to identify potential risk areas, as well as to determine the fate of spilled products and their environmental effects. This section examines spill scenarios as they relate to the types of Project activities.

Several types of materials have been identified as capable of causing environmental, health, and safety concerns should a spill occur while being transported, used, stored and/or handled. These include: fuel, explosives, untreated sewage and effluent, emulsion (ammonium nitrate-diesel), lubricants, and oils. These materials are planned to be utilized daily during Project operations, often in sufficiently large quantities, warranting the evaluation of potential spill scenarios. All other hazardous materials, chemicals or wastes are handled/used/stored in smaller quantities and packaged/transported in small containers that limit the magnitude of the spills that could occur at the Project.

7.1 FUEL SPILLS ON LAND

Fuel represents the greatest volume of hazardous material located onsite. For locations of the tank farms, temporary fuel depots and approximate spill kit locations at each of the Project sites, refer to Appendix B. Table 7-1 provides the maximum fuel storage capacities of permanent fuel storage infrastructure (i.e. tanks, tank farms) at Project sites.

TABLE 7-1: Maximum Fuel Storage Capacities for Permanent Fuel Storage Infrastructure at Project Sites

Location	Fuel Type	Total Fuel Inventory*
Milne Port	Jet- A	67.0 ML
	Diesel	
Mine Site	Jet- A	2.1 ML
	Diesel	

*Does not include day (iso) tanks servicing buildings and accommodation complexes

At Milne Port the fuel dispensing systems consist of two prefabricated fuel dispensing modules: the Arctic Diesel Fuel Module, and the Jet-A1 Fuel Module, located on the east and west side of the tank farm, respectively. Both modules are insulated and heated 40 foot ISO shipping containers, complete with piping, fuel transfer equipment, temperature corrected delivery systems, electrical and control components, and code compliant fire suppression systems.

An additional, prefabricated diesel fuel dispending module has also been installed at Milne Port to facilitate the fueling of Ore Haul Trucks leaving Milne Port. The prefabricated diesel dispensing module is situated within lined engineered containment and is comprised of a heated 20 foot ISO shipping container, with a 27,000 L double-walled diesel storage supply tank and associated fuel transfer equipment.

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At the Mary River Mine Site, the fuel dispensing system consists of one prefabricated Arctic diesel fuel dispensing module located on the west side of the tank farm. The module is an insulated and heated 40 foot ISO shipping container, complete with piping, fuel transfer equipment, temperature-corrected delivery system, electrical and control components, and code compliant fire suppression system.

Baffinland has constructed and continues to operate its fuel storage/dispensing facilities in accordance with applicable guidelines and regulations such as the CCME "Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (2003)", Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (Canadian Environmental Protection Act, 1999 SOR/2008-197 June 12, 2008) and National Fire Code of Canada as provided in Part D, Item 24 of Baffinland's Type 'A' Water Licence. At all Project sites, drummed fuel is placed within engineered lined containment areas.

All bulk fuel storage areas are equipped with spill kits for emergency response (see Appendix A for approximate locations). Each spill kit contains the appropriate type, size and quantity of equipment for the volume/type of product present in the storage location as well as the environment likely to be affected by a spill (i.e., ground, river, lake or ocean). Refer to Appendix B for a list of emergency and spill response supplies.

Standard Operating Procedures (SOP's) have been developed for each method of fuel storage and transfer. Proper containment and emergency response equipment shall be provided to meet or exceed regulatory requirements.

The ERP and SCP govern land-based and freshwater operations, the Spill at Sea Response Plan (BAF-PH1-830-P16-0042) governs marine spills and the OPEP - (BAF-PHI-830-0013) defines ship to shore fuel transfers procedures and protocols at Milne Port.

7.1.1 Potential Fuel Spill Scenarios

The tank farms located at Milne Port and the Mine Site are constructed in an impermeable secondary containment structure (lined and bermed containment area). The construction is in compliance with building codes and best practices for tank farm facilities. The low point of the secondary containment areas are fitted with sumps for the collection and disposal of runoff. The secondary containment areas have been designed to a capacity to contain the complete volume of the largest tank, as well as 10% of the volume of all the remaining tanks.

Due to the capacities of the secondary containments, fuel spills outside these containment areas are unlikely to occur. Adequate procedures (site wide application) and work instructions (task specific) are in place as well as the Environmental Protection Plan (EPP) to deal with equipment and machinery entering and exiting the tank farms as well as dealing with contamination resulting from traffic in and out of the secondary containment areas.

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SCENARIO 1: TANK FARM AREA SPILL

Description of Incident	Rupture or spill from 15 ML tank into containment area
Potential Causes	Tank or associated equipment failure. This may include failure as a result of human error, mechanical failure, inadequate maintenance, geotechnical issues, sabotage, etc...
Product Spilled	Diesel
Maximum Volume Spilled	15 ML
Estimated Time to Spill Entire Volume	1.5 hour
Immediate Receiving Medium	Lined containment area
Most Probable Direction of Spill Migration	The fuel will flow into the sump of the containment area.
Distance and Direction to Closest Body of Water	N/A
Resources to Protect	Must ensure fuel does not breach/overtop containment
Emergency Response Level	Level 3 (high) – Refer to ERP
Estimated Emergency Spill Response Time	20 minutes
Spill Response Procedures	If the spill is still occurring the hole/breach will be plugged or stopped, if possible. The lined containment will be inspected to ensure that it is safely containing the spill; if not it will be reinforced with temporary berms. Recoverable fuel will be collected via a vacuum truck and deposited in a suitable site (i.e. fuel storage tanks). Oily water generated by the spill will be processed onsite using an oily-water treatment facility or shipped offsite for disposal/treatment at a licenced facility.

SCENARIO 2: DAY TANK/TEMPORARY STORAGE AREA SPILL

All stand-alone day storage facilities, whether temporary (construction period) or permanent (mine pit), will be double-walled iso-tanks. There are approximately 30 double-walled day tanks at Milne Port and Mine Site camps with a capacity ranging from 5,000L to 20,000L. The iso-tanks will be contained in a restricted area so as to avoid collision from mobile equipment and placed such that they should not be damaged as a result of works.

Detailed procedures (site-wide application) and work instructions (task-specific) are in place, along with the EPP to deal with refuelling operations. The most likely source of spills is during refuelling or refilling of the day tanks with fuel. Only personnel trained in proper refuelling will have access to these tanks. The fuel transfer operation will be halted whenever a leak is detected; all dispensing will be done with auto shut off fuel dispensers, and drip trays will be utilized during all fuel transfers. In light of the robust nature of the day tanks and their built in secondary containment, and the use of proper refuelling techniques and drip trays, fuel spills are unlikely to occur. In the event that a spill does occur, a spill kit, containing adequate supplies given the volume of the tank it accompanies, will be available in close proximity. Given the volume of these tanks, access to readily available spill clean-up materials and trained personnel, it is anticipated that staff will be able to identify, contain and mitigate any potential spills in an effective and time sensitive manner. The table below details the most severe incident that could occur.

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Description of Incident	Puncture or rupture of Iso-tank
Potential Causes	Equipment failure due to faulty manufacturing or collision with mobile equipment.
Product Spilled	Diesel fuel.
Maximum Volume Spilled	20, 000 L
Estimated Time to Spill Entire Volume	10 minutes
Immediate Receiving Medium	Soil or surrounding environment. It is important to note that no iso-tank will be located within 100m of a water body.
Most Probable Direction of Spill Migration	As iso-tanks will be utilized around the Project, the direction of spill migration will depend on the specific location. Iso tanks will be placed on relatively flat laydown areas, where the potential flow of spills will be readily managed.
Distance and Direction to Closest Body of Water	Varies
Resources to Protect	Varies
Emergency Response Level	Level 2 (medium) or 3 (high) – Refer to ERP (depends on quantity and whether there is a potential to impact nearby water bodies and/or public safety)
Estimated Emergency Spill Response Time	15 minutes
Spill Response Procedures	In the event that both walls of an iso-tank are ruptured and a spill occurs the Emergency Response Team will be immediately notified. Personnel in the immediate area will act as first responders making every effort to plug the puncture point. Temporary berms, ditches, trenches and sumps will be set up downstream of the spill. The downstream wall of trenches will be lined with plastic material to ensure that exposed soil does not come in contact with the fuel. Absorbent material will be utilized where required. Once the spill has been contained it will be removed by a vacuum truck and brought to an appropriate storage/treatment facility. If necessary, contaminated soil will be removed and brought to the Project's landfarm facilities for treatment. New, uncontaminated soil will be laid down in the exposed area.

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SCENARIO 3: TOTE ROAD ACCIDENT TANKER TRUCK SPILL

Description of Incident	**Spill of the contents of a tanker truck or fuel re-supply truck to ground or stream. Spill occurs in an isolated area along the Tote Road between Milne Port and the Mine Site.**
Potential Causes	Human error, vehicle mechanical failure, traffic accident, poor weather or visibility.
Product Spilled	1. Tote Road: Diesel fuel, Jet-A Fuel 2. Ice Road: Diesel fuel
Maximum Volume Spilled	20 000 to 50 000 L (content of a tanker truck) This would require the rupture of the tanker.
Estimated Time to Spill Entire Volume	Spillage can be limited depending on severity of incident/accident 10 minutes to 48 hours – depending on severity of rupture or piping/valves associated with the tanker truck.
Immediate Receiving Medium	Soil, streams, lakes
Most Probable Direction of Spill Migration	Varies with specific location of spill.
Distance and Direction to Closest Body of Water	1. Tote Road - Downstream and into Phillips Creek; the road between the Mine Site and Milne Port follows Phillips Creek, and crosses many streams (that discharge into Phillips Creek) over a distance of approximately 50 km. Phillips Creek eventually discharges into the ocean at Milne Port. 2. Ice Road – depends on location of accident.
Resources to Protect	1. Tote Road: Streams, Phillips Creek and the ocean via Milne Inlet. 2. Ice Road: various water ways and lakes along the ice road.
Emergency Response Level	Level 2 (medium) or 3 (high) – Refer to ERP (depends on quantity and whether there is potential for impact to nearby water bodies and to public safety)
Estimated Emergency Spill Response Time	60 minutes after spill is reported to site personnel (assuming worst case scenario where the truck driver is injured and cannot commence spill response procedures).
Spill Response Procedures	1. Contain and recover diesel slick downriver and protect shorelines using sorbent booms. Collect free-product for temporary storage. Clean-up soiled shorelines. If the response crew arrives before the tanker/fuel truck has released all its contents, seal the leak where feasible, contain and recover spill on ground using dykes, trenches and spill berms. If the truck driver is not injured, he will act as a first responder and immediately initiate the Spill Contingency Plan, as defined in Section 1 of this Plan, by using the spill kit kept in the fuel trucks. 2. Once the initial cleanup is completed, free product captured during response, as well as product still contained within the tanker/fuel truck bulk tank(s) will be pumped using a vacuum truck to be discharged at an approved facility/containment berm. Oily water captured during the response would be pumped into a vacuum truck and transported to a containment facility for treatment using the oily-water treatment facility. Impacted soils (if any) would be excavated and placed within the Project's landfarm facilities.

SCENARIO 4: MARINE RESUPPLY SPILL – MILNE PORT

Refer to Milne Port OPEP (BAF-PH1-830-P16-0013).

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7.2 Explosives Transport and Storage

For an overview of the maximum cumulative quantities of explosives and ammonium nitrate Baffinland is permitted to store at the Mary River Project, refer to Table 7-2. For the location of the explosives storage facilities at Milne Port, and the Mine Site, see the site layout drawings in Appendix A. For additional information on the storage locations, handling procedures and supportive emergency procedures for Ammonium Nitrate (AN), Dyno Nobel Baffin Island Inc. has prepared an Emergency Response Assistance Plan for the Project, provided as Appendix F.

7.2.1 Ammonium Nitrate Storage and Handling

The AN used at the Project is stored in containers in two locations; the KM 97 laydown and smaller quantities at the Mine Site Dyno Nobel Emulsion Plant. The AN prill is stored in 1,000 kg tote bags, 20 of which are stored double-stacked in each of the 20 foot shipping containers. AN (in any amount) shall not be stored outside at any time and shall only be withdrawn from the containers when required by plant production. The AN is loaded directly into the AN Handling Module of the plant to minimize any exposure of the product to the environment.

7.2.2 Emulsion Storage and Handling

Emulsion is stored in a single, 36,000 kg capacity tank within the emulsion loading garage at the Dyno Nobel Emulsion Plant. Smaller quantities may be stored in the two bulk emulsion trucks (10,000 kg capacity each) which are parked in the garage when not in use.

Small spills shall be scooped up with non-sparking shovels, placed in bags and stored at the magazine site at km 105.5 until the spilled emulsion can be disposed of in blast holes. Large spills will be dealt with on an individual basis depending upon the size of the spill. Efforts shall be made to contain spills and secure the surrounding area before clean-up begins. The clean-up of large spills may involve pumping spilled emulsion into tanks or totes and/or scooping up product with shovels and storing it in approved containers/bags.

In addition, smaller quantities of AN emulsion pre-packaged explosives will be used to begin development of the quarry sites. Pre-packaged AN emulsions pose minimal risk to the environment given the hydrophobic nature of the emulsion explosives.

TABLE 7-2: **Maximum Cumulative Quantities of Explosives and Ammonium Nitrate at Project Sites**

Material	Purpose	Storage Type	Max. Quantity at Site at any time
Pre-Packaged Explosives	Explosive agent	Magazines and Shipping Containers	800,000 kg
Ammonium Nitrate	Polymer	20,000 kg per Shipping Container	2,000,000 kg

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7.2.3 Potential Spill Scenarios Related to Explosives

Scenario 1: Spill of Ammonium Nitrate

AN dissociates readily in water to form ammonia, which in its un-ionized form, is toxic to aquatic organisms and fish. Storage on land, away from water sources largely eliminates the risk of ammonia losses to water bodies.

All partially full, contaminated or ripped bags of prill, spilled prill and used empty bags are collected and stored in a dedicated contained location for reuse onsite or shipment offsite for disposal. Spills within the storage facility are completely contained and will be cleaned up by personnel trained in explosives management. All spills will be recorded on a spill report and all tote bags will be inspected regularly by the explosives contractor.

AN is expected to be used to produce explosives emulsion onsite and will be transported to various areas at the Project. Therefore the greatest potential for an AN spill to occur is during transport along the Tote Road due to mechanical failure, weather conditions or human error.

Description of Incident	**Explosives transport truck rolls over or collides with another vehicle or object. Transport container(s) as well as individual tote bags rupture resulting in a spill.**
Potential Causes	Collision, poor driving conditions or visibility, equipment error, operator error.
Product Spilled	AN
Maximum Volume Spilled	1 tonne
Estimated Time to Spill Entire Volume	Instantaneous
Immediate Receiving Medium	Depending on the location either on land or in a water body.
Most Probable Direction of Spill Migration	Depending on location
Distance and Direction to Closest Body of Water	Depending on location
Resources to Protect	Nearby water bodies
Emergency Response Level	Level 1 (low) or Level 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water bodies and/or to public safety)
Estimated Emergency Spill Response Time	15 – 60 minutes

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Spill Response Procedures	a) In the event that a spill occurs on land the Emergency Response Team will be contacted immediately. If the driver is unharmed he will act as the spill response first responder. All spilled prills will be contained, with the use of berms if required. Once the spill has been contained the prills will be cleaned up by a trained crew and transported and stored in a dedicated contained location until they can be shipped offsite. b) In the event that a spill occurs in water the Emergency Response Team will be contacted immediately. Spill containment devices (i.e. diking and/or pumping water into bladder(s)) will be constructed downstream and undissolved prills will be removed from the water body. Recovered material will be stored in a dedicated containment area before it can be shipped offsite.

For an AN spill to occur during transportation, the explosives transport truck would need to be in a significant collision/incident since both the AN prill tote bags and shipping container would need to rupture for AN prill to be released into the environment. If this did occur, the spill would pose minimal risk to the surrounding environment unless the AN prill was deposited directly into a stream/water body. Due to limited open-water season at the Project, the risk of spills that would involve the deposition of AN prill directly into a stream/water body are anticipated to be low.

Accidental spills of AN from an explosives truck shall be immediately cleaned-up, reported to the Environment Department, and logged as required by regulations. A copy of a Standard NT-NU Spill Report Form is provided in Appendix D. Clean-up shall be completed by personnel licensed to handle explosives and the contaminated material will be handled and stored in a designated area until the contaminated material can be shipped offsite.

SCENARIO 2: SPILL OF EMULSION

Emulsion materials are acutely toxic to aquatic life and therefore could have adverse impacts on fish and other aquatic life if released to surrounding water bodies and streams. Because of this, emulsion material is stored in either the form of pre-packaged explosives in an explosives magazine or at the Project's emulsion plant where spills can be completely contained within the confines of the plant. Spills within the emulsion plant would be cleaned up by employees and contractors licensed to handle explosives. Clean-up materials will be segregated in an appropriate area; incompatible materials will not be stored together, pursuant to material MSDSs and WSCC regulations.

In the event of an emulsion spill, a spill report will be completed by the explosives contractor with the support of the Environment Department. If a spill exceeds reportable quantities, notification shall be made under the spill reporting regulations applicable to Nunavut.

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SCENARIO 3: SPILL OF PRE-PACKAGED EMULSION DURING TRANSPORT

Given the precautions taken in the design of the explosives storage facilities and the suitability of containers used for storage and transport, major spills are most likely to be caused by traffic incidents during the transportation of the pre-packaged explosives by transport truck. If such an incident occurs, explosive materials will be recovered by employees or contractors licensed to handle explosives and the contaminated material will be handled and disposed of in a designated area until it can be shipped offsite.

Description of Incident	**Emulsion transport truck rolls over or collides with another vehicle or object. Transport container as well as pre-packaged explosives.**
Potential Causes	Collision, poor driving conditions or visibility, equipment error, operator error.
Product Spilled	AN emulsion
Maximum Volume Spilled	10,000 L
Estimated Time to Spill Entire Volume	Instantaneous
Immediate Receiving Medium	Depending on the location either on land or in a water body.
Most Probable Direction of Spill Migration	Depending on location
Distance and Direction to Closest Body of Water	Depending on location
Resources to Protect	Nearby water bodies
Emergency Response Level	Level 2 (medium) or Level 3 (high) – Refer to ERP (depends on quantity and whether there is potential for impact to water bodies and to affect public safety)
Estimated Emergency Spill Response Time	15 – 60 minutes
Spill Response Procedures	a) In the event that a spill occurs on land, the Emergency Response Team will be contacted immediately. If the driver is unharmed he/she will act as the spill response first responder. All spilled prills will be contained, with the use of berms if required. Once the spill has been contained the emulsion will be cleaned up by a trained crew and stored in a dedicated contained location until the cleanup materials can be shipped offsite. b) In the event that a spill occurs in water, the Emergency Response Team will be contacted immediately. Spilled materials will be contained and recovered using booms and other spill control devices. Recovered material will be stored in a dedicated containment area until it can be shipped offsite.

SCENARIO 4: SPILL OF EMULSION DURING BLAST HOLE LOADING

Emulsion spills are unlikely to occur during blast hole loading given the nature of emulsion explosives. Pre-packaged explosives are in self-contained tubes that are simply dropped into the hole. Emulsion from the emulsion plant is pumped into blast holes via hose lines on the emulsion pump truck.

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Description of Incident	Emulsion spilled while loading emulsion in blast holes.
Potential Causes	Operator error, mechanical failure or malfunction
Product Spilled	AN emulsion
Maximum Volume Spilled	<10 kg
Estimated Time to Spill Entire Volume	Instantaneous
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Not expected to migrate due to its high viscosity.
Distance and Direction to Closest Body of Water	Depending on location
Resources to Protect	Nearby water bodies
Emergency Response Level	Level 1 (low) – Refer to ERP.
Estimated Emergency Spill Response Time	5 minutes
Spill Response Procedures	In the event that a spill occurs on land, the blasting technician will respond. The spilled emulsion will immediately be cleaned up and stored in a dedicated contaminated explosives area until it can be shipped offsite.

7.3 UNTREATED SEWAGE

The Mine Site and Milne Port are equipped with dedicated sewage treatment plants (STP; Refer to Baffinland's Fresh Water Supply, Sewage and Wastewater Management Plan; BAF-PH1-830-P16-0010) equipped with Membrane Bio Reactor (MBR) technology. Sewage produced at Steensby Port will be treated using a latrine system or transported to Milne Port or the Mine Site for treatment.

7.3.1 POTENTIAL SPILLS SCENARIOS RELATED TO SEWAGE

SCENARIO 1: SEWAGE SPILL AT MILNE PORT

Description of Incident	Spill from MBR holding tank.
Potential Causes	Pipe or mechanical failure, human error.
Product Spilled	Raw sewage
Maximum Volume Spilled	48,000 L
Estimated Time to Spill Entire Volume	60 minutes
Immediate Receiving Medium	Milne Port
Most Probable Direction of Spill Migration	Milne Port or nearby stream east of camp pad.
Distance and Direction to Closest Body of Water	150 m
Resources to Protect	Milne Port
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to a nearby water body and to public safety)
Estimated Emergency Spill Response Time	15 minutes after spill is identified.
Spill Response Procedures	Contain with berms or sumps/ditches. Direct spill to the desired location and remove recoverable sewage with a vacuum truck. Transport recovered sewage to PWSP or return to the STP for treatment. Resurface area with fresh soil.

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SCENARIO 2: MINE SITE SEWAGE SPILL

Description of Incident	Spill from STP.
Potential Causes	Piping and/or tank failure.
Product Spilled	Raw sewage
Maximum Volume Spilled	48,000 L
Estimated Time to Spill Entire Volume	60 minutes
Immediate Receiving Medium	Soil
Most Probable Direction of Spill Migration	Downstream and into a local depression east of the Mine Site STP. This local depression dries up in the summer and intercepts the maximum spilled volume.
Distance and Direction to Closest Body of Water	200 m
Resources to Protect	One stream (West of STP) and Sheardown Lake.
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to a water body and/or to public safety)
Emergency Spill Response Time	15 minutes after spill.
Spill Response Procedures	Contain with berms or sumps/ditches. Direct spill to the desired location and remove recoverable sewage with a vacuum truck. Transport recovered sewage to PWSP or return to the STP for treatment. Resurface area with fresh soil.

SCENARIO 3: SEWAGE TRANSPORT TRUCK SPILL

Description of Incident	Spill from the tanker truck transporting raw sewage from temporary camp to Project STP.
Potential Causes	Road incident
Product Spilled	Raw sewage
Maximum Volume Spilled	10,000 L
Estimated Time to Spill Entire Volume	Depends on severity of accident and damage sustained by the tanker truck.
Immediate Receiving Medium	Soil
Distance and Direction to Closest Body of Water	Depends on location of accident
Resources to Protect	Soil and nearby lakes, rivers and streams
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water body and /or to public safety)
Estimated Emergency Spill Response Time	Immediate if driver is not injured; up to 60 minutes for ERT Team to arrive.
Spill Response Procedures	Report spill and contain with berms or sumps/ditches. Direct spill to the desired location and remove recoverable sewage with a vacuum truck. Transport recovered sewage to PWSP or return to the STP for treatment. Resurface area with fresh soil.

7.4 LUBRICANTS AND OILS

Lubricants and machinery oils will be used on site throughout the life of the Project. Lubricants and oils have the ability to contaminate waterways and soils if exposed to the environment. However, the risk of a lubricant or oil spill on site is expected to be minimal. Lubricants and oils shall be handled by trained personnel following established procedures and guidelines. Lubricants are stored and transported in small

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quantities. In the event of a spill, appropriate spill response equipment and procedures, as outlined in this Plan, will be readily available and utilized to minimize the impact of the spill.

7.4.1 Potential Spill Scenarios Related to Lubricants and Oils

Scenario 1: Containment puncture during transport

The most likely spill scenario to occur with regards to lubricants and oils is a puncture of an individual storage unit during transport. Lubricants and oils are typically stored in 1 cubic metre containers (1,000 L totes). When lubricants or oils are required, single totes are removed from their storage location with a forklift. In the event that the container/tote is punctured by the forklift, a maximum spill volume of 1,000 L could potentially occur. The likelihood of this occurring is minimal as all equipment operators will be trained in proper lubricant and oil transfer procedures (i.e. use of spotter). In the unlikely event that a tote is punctured, the operator will identify the puncture and will immediately proceed to contain the spill and implement mitigation procedures.

Description of Incident	**Lubricant or oil container is punctured by a forklift during transport**
Potential Causes	Operator error. Equipment failure.
Product Spilled	Lubricant or oil.
Maximum Volume Spilled	1,000 L
Estimated Time to Spill Entire Volume	5 minutes
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on area
Distance and Direction to Closest Body of Water	Depends on area
Resources to Protect	Any nearby water bodies.
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to a nearby water body)
Estimated Emergency Spill Response Time	>5 minutes
Spill Response Procedures	If the forklift driver is not injured, he will act as a first responder and immediately initiate the spill response utilizing the spill kit kept in the work area. The spill will be contained through the use of temporary berms and ditches until it can be removed and transported to an appropriate storage facility. Contaminated soil will be removed and transported to the Project's landfarm facilities for remediation.

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SCENARIO 2: SPILL DURING EQUIPMENT ROLLOVER

It is possible that the mobile equipment carrying a container of lubricant or oil could rollover or have a collision causing a spill of the entire 1 cubic metre tote. In the event that this occurs, the spill will be managed the same way as detailed above. The event of a rollover is unlikely given the safe driving procedures, speed limits, road signage and training procedures established and enforced at the Project. In addition to this, all lubricant and oil containers will be securely fastened inside the vehicle in which they are being transferred, when applicable, making a spill unlikely.

Description of Incident	**Spill during equipment rollover**
Potential Causes	Operator error. Equipment failure. Poor visibility or adverse weather. Collision.
Product Spilled	Lubricant or oil.
Maximum Volume Spilled	1,000 L
Estimated Time to Spill Entire Volume	Instantaneous
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on area
Distance and Direction to Closest Body of Water	Depends on area
Resources to Protect	Any nearby water bodies.
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to a nearby water body)
Estimated Emergency Spill Response Time	15 – 60 minutes
Spill Response Procedures	If the driver is not injured, he/she will act as the first responder and immediately initiate the Spill Contingency Plan as defined in Section 1, utilizing the spill kit kept in the work area or on the mobile equipment. The spill will be contained through the use of temporary berms and ditches until it can be removed and transported to an appropriate storage facility. Contaminated soil will be removed and transported to the Project's landfarm facilities for treatment. In the event a spill occurs in a water body, the lubricants and oils will be contain and recovered downstream as described in Section 4, with shorelines protected using sorbent booms. All free-product will be collected for temporary storage and soiled shorelines cleaned-up. If the mobile equipment operator is not injured, he will act as a first responder and immediately initiate the Spill Contingency Plan as defined in Section 1, utilizing the spill kit kept in the work area or on the mobile equipment. Once the spill is contained, contaminated water and recoverable free product will be removed by vacuum truck and transported to an appropriate storage facility for shipment offsite or treatment using the Project's onsite oily-water treatment facilities.

SCENARIO 3: SPILLS DURING TRANSFER

It is possible that a minor spill may occur during the transfer of lubricants or oil to equipment. This will most likely be the result of equipment failure, such as pumps or hoses, or operator error.

As proper maintenance procedures will be in place to reduce the chance of equipment malfunctions, along with proper training procedures, it is unlikely a spill will occur in this event. Additionally, the use of spill trays will be mandatory during all oil and lubricant transfers.

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Description of Incident	Spill during transfer
Potential Causes	Operator error. Pump failure. Hose failure.
Product Spilled	Lubricant or oil.
Maximum Volume Spilled	1,000 L
Estimated Time to Spill Entire Volume	5 – 15 minutes
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on location
Distance and Direction to Closest Body of Water	Depends on location
Resources to Protect	Nearby water bodies.
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water body)
Estimated Emergency Spill Response Time	5 -15 minutes
Spill Response Procedures	If the spill occurs in a maintenance building it will be contained as maintenance buildings are lined or equipped with concrete floors, preventing any contaminants from reaching the natural environment. The spill will be cleaned up by qualified personnel and disposed of as a hazardous material. If a spill occurs during transfer, all transfer activities will be halted immediately and clean-up of the spill with the available spill kit will commence. The spill will be contained using berms, ditches, sumps and booms where necessary. The downstream wall of trenches will be lined with plastic material to ensure unexposed soil does not come in contact with the lubricant or oils. Absorbent material will be utilized where required. Once the spill has been contained, spilled materials will be removed by a vacuum truck and brought to an appropriate storage/treatment facility. Contaminated soil will be removed and brought to the Project's landfarm facilities for treatment.

SCENARIO 4: SPILLS DURING CRUSHING OPERATIONS

It is possible that spills will occur during crushing operations at the Mine Site Crushing Facility. This will most likely be the result of equipment failure such as ruptured hoses or a rupture to the oil reservoir.

Preventative maintenance, in addition to proper equipment warm-up procedures will reduce the likelihood of spills. Several spill kits are located at the Crushing Facility and shall be maintained at all times. The spill kits are equipped with absorbent pads, booms, and PPE to effectively respond to a spill.

Description of Incident	Release of Hydraulic Fluid from Cone Crusher
Potential Causes	Hose failure. Rupture of oil reservoir
Product Spilled	Lubricant Oil
Maximum Volume Spilled	600 L
Estimated Time to Spill Entire Volume	5 minutes
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Ore pad is a level surface of medium to fine grain gravel/crushed ore.
Distance and Direction to Closest Body of Water	Depends on location - > 31 m
Resources to Protect	Nearby water bodies - > 31 m
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to nearby water bodies)
Estimated Emergency Spill Response Time	5 – 15 minutes

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Spill Response Procedures	Hydraulic fluid/oil will spill to the medium – fine gravel/crushed iron ore ground surface below the ore crusher, at the ore pad. In the event of a release of lubricant fluid from the cone-crusher tank, (max volume of 600L) crushing activities will be halted immediately and clean-up of the spill with available spill kit(s) will commence. The spill will be contained using absorbent booms where necessary. The ore crushing pad is a level surface of medium – fine grain gravel/ore fines, therefore contaminant migration is not of great concern. Absorbent material (pads) will be also be used where required. When the spill is contained, the layer of contaminated gravel/crushed ore fines will be excavated and brought to an appropriate storage facility for eventual shipment offsite or treatment at the Project's landfarm facilities. New gravel will then be placed over the exposed area.

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8 REPORTING REQUIREMENTS

Internal spill reports are written by the department responsible for the spill and are provided to the Environment Department through Baffinland's Incident Reporting System. However, all external reporting requirements (i.e. CIRNAC, NWB, NIRB, ECCC) shall be the responsibly of the Environment Department.

Table 8-1 provides guidance pertaining to spill reporting and and associated clean-up procedures for site personnel. Departments responsible for the spill are required to complete clean-up activities using the resources required. In the event of a Level 2 or 3 spill response, initial assistance and resources shall be provided by the ERT.

TABLE 8-1: GENERAL SPILL REPORTING AND CLEAN-UP REQUIREMENTS

Spill on Land		
Volume	**Required Documentation**	**Spill Clean-up**
Less than 1 L	Verbal or email report	Environment Department will advise if needed.
Greater than 1 litre and less than 100 litres	- Photos of Spill and Clean-up - Baffinland Incident Investigation Report	Spills greater than 30 litres will have an Environmental Monitor present to advise clean-up efforts.
Greater than 100 L	- Photos of Spill and Clean-up - Baffinland Incident Investigation Report - NT-NU Spill Report - Notification to regulators and the Spill Line	Environmental Superintendent or his/her designate will lead and advise clean-up efforts.
Spill on Water Body or Watercourse		
Volume	**Required Documentation**	**Spill Clean-up**
Any volume	- Photos of Spill and Clean-up - Baffinland Incident Investigation Report - NT-NU Spill Report - Notification to regulators and the Spill Line	Environmental Superintendent or his/her designate will lead and advise clean-up efforts.

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Appendix A

Site Layouts

Milne Port and Mine Site

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Note: This is an UNCONTROLLED COPY. All staff members are responsible to ensure the latest revision is used.

SAVED: I:\1\02\00181\44\A\Acad\FIGS\B02 R0, 3/22/2018 2:48:14 PM , MDEMERS PRINTED: 3/22/2018 2:49:21 PM, Layout1, MDEMERS
XREF FILE(S): x-C-TOPO-MILN-INDEX, MILNE SITE LAYOUT, x-B-SI---MOIN-LOCA-2015, X-N-TOPO-BASE-LAND-USE--CLAS IMAGE FILE(S): GIS Baffinland Logo mine_inlet_wd3745_wv2_wv3_aug2016_tile01

502 500 E
503 000 E
503 500 E
504 000 E
504 500 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
SEALIFT BARGE LANDING AREA
EXISTING HTO CABIN
SETTLING POND
EFFLUENT DISCHARGE LOCATION
FUEL TANK FARM
MP-06
MP-05
MP-C-H
MP-C-E
MP-C-F
MP-HWB-1
MP-03
MP-02
RAMP TO BEACH
LAYDOWN AREA
FUEL CONTAINMENT BERM
ORE STOCKPILE
PWSP-No. 1
MP-01a
MP-01
MP-HWB-3
MP-HWB-4
MP-HWB-2
POWER GENERATORS
POLISHING WASTE STABILIZATION POND
HAZARDOUS WASTE BERM
PORT SITE WEATHERHAVEN
SERVICE AREA PAD SITE FACILITIES, INCLUDING:
- MAINTENANCE/WAREHOUSE BUILDING
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING
CAMP SITE INFRASTRUCTURE PAD SITE FACILITIES, INCLUDING:
- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE / GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY
MP-C-B
MP-C-B01
LAND FARM
MP-04
SNOW DUMP
MP-04a
LAND FARM MP-04
MAINTENANCE BUILDING
POTABLE WATER INTAKE LOCATION
MP-MRY-2
MOBILE REFUELING MODULE TEMPORARY CONTAINMENT BERM
50 PERSON CAMP (FROM STEENSBY PORT)
MP-Q1-02
MP-Q1-01
APPROXIMATE EXTENT OF QUARRY Q1 DEVELOPMENT
CAMP PAD (CONSTRUCTED IN 2017)
TOTE ROAD(NEW ALIGNMENT)
PERMITTED OPEN BURN PIT AREA
BORROW SOURCE NO.1
BORROW PITS
MARINE MANIFOLD BUILDING
WELDING SHOP
SHIPPING CONTAINERS
ACCOMMODATION COMPLEX
WASTE MANAGEMENT BUILDING
WASTE MANAGEMENT FACILITY
TOTE ROAD (OLD ALIGNMENT)

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 10 METRES.

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

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	22MAR'18	ISSUED WITH 2017 QIA AND NWB ANNUAL REPORT	AV	MMD	AK

Baffinland

MARY RIVER PROJECT

MILNE PORT SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS

Knight Piésold CONSULTING

P/A NO. NB102-181/44 | REF NO. NB18-00172 | REV 0

Figure 1

HATCH BUILDING
ACCOMMODATION COMPLEX
EMERGENCY RESPONSE OFFICE
WELDING SHOP
MAINTENANCE BUILDING
MS-03
FUEL TANK FARM
MS-01
MS-C-F
TRUCK WASH BUILDING
TOROMONT SHOP
POWER HOUSE
MS-C-C
WATER BUILDING
SEWAGE TRUCK BUILDING
TRUCK WEIGH SCALE
LUMPS STOCKPILE
MS-08
RUN OF MINE
FINE STOCKPILE
CRUSHER AND ORE LOADING PAD
KM 97 BORROW LOCATIONS
WASTE MANAGEMENT FACILITY
EXISTING LAYDOWN AREA
SITE SERVICES GARAGE
RAW WATER INTAKE
RAW WATER PUMP HOUSE
MS-MRY-1
MS-HWB-1
MS-HWB-2
MS-HWB-4
MS-HWB-5
MS-HWB-6
MS-HWB-3
MS-MRY-6
MS-MRY-4
MS-MRY-4a
PWSP No. 2
PWSP No. 3
PWSP No. 1
BULK FUEL STORAGE FACILITY (BLADDER FARM)
AERODROME APRON
MQ-C-A
QUARRY QMR2
MQ-C-D
NEW ROAD ALIGNMENT
CONSTRUCTION LAYDOWN AREA
MQ-C-B
EXPLORATION CAMP FACILITIES
WASTE WATER TREATMENT FACILITY
HELIPAD
POLISHING WASTE STABILIZATION PONDS (PWSPs)
CAMP INFRASTRUCTURE
MS-C-E
MS-C-D
AERODROME RUNWAY
POLISHING WASTE STABILIZATION PONDS TREATED WATER DISCHARGE POINT
NEW ACCOMMODATIONS CAMP
NEW ACCOMMODATIONS CAMP PAD
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

7 914 500 N
7 913 000 N
7 911 500 N
560 000 E
561 500 E
563 000 E
564 500 E
N

WASTE ROCK SEDIMENTATION POND
WASTE ROCK FACILITY (ERP)
DEPOSIT NO.1 MINING LEASE 2484
MS-08
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION (RAIL PHASE)
PROPOSED FINAL OPEN PIT OUTLINE
110 KM LAYDOWN AREA
MINE HAUL ROAD
QUARRY D1Q1
OPEN PIT DEVELOPMENT
QUARRY D1Q2
TRUCK WEIGH SCALE
ORE CRUSHING AND LOADING
MINE OPERATIONS OFFICE
MQ-C-E
ORE CRUSHING SEDIMENTATION POND
EXPLOSIVE MAGAZINE
EXISTING LANDFILL ROAD
MS-MRY-13b
MS-MRY-13a
EXISTING LANDFILL
MS-C-H
MS-C-G
EMULSION PLANT
EFFLUENT DISCHARGE POINT
MS-C-C
MS-C-A
MS-03
MS-01
MS-C-B
MS-C-F

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
- QIA 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.

SCALE A: 300 150 0 500 1000 1500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	22MAR'18	ISSUED WITH 2017 QIA AND NWB ANNUAL REPORT	AV	MMD	AK

SAVED: (1/10/2018 9:16:44 AM by dwpFIGS\803 R0, 3/22/2018 4:18:03 PM, MDEMERS, PRINTED: 3/22/2018 4:30:21 PM, Layout1, MDEMERS
DATA FILES: Contours = 5m intervals.dwg, Mine Site_20JUL16_1.dwg, MINE SITE_LAYOUT.xlsx, MONITOR LOCATIONS.xlsx, LAYOUT PLAN.dwg, LAYOUT - CLAE IMAGE FILE.tif, GIS Baffinland Logo

Baffinland

MARY RIVER PROJECT

MINE SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS

Knight Piésold CONSULTING

PIA NO. NB102-181/44 | REF NO. NB18-00172

Figure 2 | REV 0

Appendix B

Emergency Spill Kit Supplies and Locations and Emergency Response Truck Inventory

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H349000-4000-00-015-0021

TOM RIVER

CAMP LAKE

SHEARDOWN LAKE

MARY RIVER

WASTE ROCK SEDIMENTATION POND

WASTE ROCK DUMP

DEPOSIT NO.1
MINING LEASE
2484

WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION

PROPOSED LIFE OF MINE OPEN PIT OUTLINE

OPEN PIT DEVELOPMENT (ERP)

KM 110 Spillkit

HAZARDOUS WASTE CONTAINMENT BERM (EXISTING)

STORAGE AREA

BARRELED FUEL LINED CONTAINMENT

WASTE MANAGEMENT BUILDING

Km 97 BORROW SOURCE

RAW WATER PUMP HOUSE

Waste Management Building Spillkit

HAZARDOUS WASTE CONTAINMENT AREA NEW

Surface Works Spillkit

LAYDOWN AREA

CONCRETE BATCH PLANT BUILDING

CAMP INFRASTRUCTURE:
- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE
- MEDICAL CENTRE

SITE SERVICE FACILITIES, INCLUDING:
- MAINTENANCE BUILDING
- WELDING SHOP
- TRUCKWASH
- TOROMONT BUILDING

Camp Lake Spillkit
Enviro alley Spillkit
Old Genset Spillkit
Genset Bladder Spill Chest
Hazardous Waste Berm 2 Spillkit
HWB 3 Spillkit
HWB 4 Spillkit
Old Bladder Farm Spill Chest
Old Bladder Farm Spillkit

Jet A Spillkit
Jet A Spillkit
Aerodome Spillkit
Aerodome Spillkit
Warehouse Spillkit

QUARRY QMR2

RAW WATER INTAKE PIPELINE

Ore Truck Laydown Spillkit

CONSTRUCTION LAYDOWN AREA

Heli-pad Spillkit
HELIPAD

EXPLORATION SOFT-WALL CAMP

EXISTING POLISHING WASTE STABILIZATION PONDS (PWSPs)

AERODROME APRON AND FUEL STORAGE

AERODROME RUNWAY

RAW WATER INTAKE

EXPLORATION WORKSHOPS

MSC Spillkit
MSC Spillkit
Fuel Tank Spillkit
Maintenance Spillkit
Maintenance Spillkit
Crusher Spillkit
Fuel Tank Spillkit
Power house Spillkit
Power House Spillkit
MBR Spillkit
PIT OFFICE

QUARRY D1Q2

PIT 1 HAUL ROAD

KM 104 QUARRY

KM 105 Spillkit

EXPLOSIVE MAGAZINE

Crusher Spillkit
Crusher Spillkit
Crusher Trailer Spillkit

ORE CRUSHING AND LOADING PADS

ORE CRUSHING SEDIMENTATION POND

UTILITIES, INCLUDING:
- POWER GENERATION
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- BULK FUEL STORAGE FACILITY

Emulsion Plant Spillkit
Emulsion Plant Spillkit

LANDFILL AND LANDFARM (FUTURE)

EMULSION PLANT

EFFLUENT DISCHARGE POINTS No.1, No.2 & No.3

0 200 400 600 800 1000
SCALE IN METRES

MILNE PORT

MINE SITE

KEYPLAN

FOR INFORMATION

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
2. 2016 WORK SHOWN IN RED TEXT.

LEGEND:

WATER
QUARRY
BORROW AREA
ROAD
RIVER/STREAM/DRAINAGE
RAW WATER INTAKE PIPELINE
COMMERCIAL LEASE
PROJECT DEVELOPMENT AREA

REV.	ISSUE FOR	AUTH. BY	DATE
C	ISSUED FOR USE	M.B.	J.B. 2015-10-15
B	ISSUE FOR USE	S.M.	T.M. 2014-12-10
A	ISSUE FOR USE	C.L.	A.G. 2014-10-30

ISSUE AUTHORIZATION

HATCH

DESIGNED BY: C. HEISTNER DATE 2014-10-21	DRAWN BY: J. BAJAGIC DATE 2014-10-21
CHECKED BY: G. POTTER DATE 2014-10-21	DISCIP. ENGR.: A. GRZECZKOWSKI DATE 2014-10-21
PROJ. DES. COORD.: T. THEIFFELL DATE 2014-10-21	PROJ. ENGR.: J. CLELAND DATE 2014-10-21
PROJ. MGR.: J. CLELAND DATE 2014-10-21	

Baffinland

MARY RIVER PROJECT

MINE SITE
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE	DWG. NO.	REV.
1:15000 UNLESS NOTED	H349000-4000-00-015-0021	C

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

bajagi5703
10/15/2015 9:40:01 AM
C:\Users\bajagi5703\Desktop\15703_jde_dataworker\dm=552860\H349000-4000-00-015-0021.dgn

H349000-2000-00-015-0021

MILNE INLET

AANDC NUNAVUT LEASE 47H/16-1-2

SHIPLOADER

ORE DOCK

ORE STOCKPILE SETTLING PONDS

SEALIFT BARGE LANDING AREA

OPEP Spill Response Sea Cans

RAMP TO BEACH

FUEL TANK FARM

Project Office Spill Kit

Jet A Spill Chest

HWB Kit #1 and 2

EFFLUENT DISCHARGE LOCATION
N 7976341
E 503639

HAZARDOUS WASTE BERMS

LAYDOWN AREA

EXISTING HTO CABIN

Tank Farm Spill Kit

Fixed Plant spill kit

Kitchen Spill Kit

MBR Spill Kit

BA/BC Spill Kit

BB/BD Spill Kit

Incinerator Spill Kit

FUTURE AIRSTRIP

SERVICES AREA PAD
SITE FACILITIES, INCLUDING:

- MAINTENANCE BUILDING
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING
- TOROMONT MAINTENANCE BUILDING

POWER GENERATORS

INCINERATOR, HAZARDOUS WASTE BERM

POLISHING WASTE STABILIZATION POND

EXISTING HAZARDOUS WASTE BERM

Ash Berm Spill Kit

Barm Spill Kit

MATRIX CAMP

CAMP INFRASTRUCTURE PAD
SITE FACILITIES, INCLUDING:

- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE
- EMERGENCY RESPONSE GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY

ORE STOCKPILE PAD

ADDITIONAL LAYDOWN AREA

LAND FARM

ROCK QUARRY N0.1 BOUNDARY

Ore Handling Refueling Spill Kit #1 and 2

FUTURE POLISHING WASTE STABILIZATION POND

TOTE ROAD

CONVERT EXISTING CONCRETE BATCH PLANT BUILDING TO MAINTENENACE BUILDING

POTABLE WATER SUPPLY

PHILLIPS CREEK

EXTENT OF QUARRY Q1

PERMITTED OPEN BURN PIT AREA

KM2 BORROW AREAS

FOR INFORMATION

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
2. 2016 WORK SHOWN IN RED TEXT.

0 50 100 150 200 250
SCALE IN METRES

LEGEND:

- WATER
- QUARRY
- COMMERCIAL LEASE
- AANDC LEASE 47H/16-1-2
- RIVER/STREAM/DRAINAGE
- ROAD
- PROJECT DEVELOPMENT AREA
- BORROW AREAS

REV	ISSUE FOR	AUTH. BY	DATE
D	ISSUED FOR USE	M.B.	J.B. 2015-10-15
C	ISSUE FOR USE	S.M.	T.M. 2014-12-10
B	ISSUE FOR USE	C.L.	T.M. 2014-10-31
A	ISSUE FOR USE	C.L.	A.G. 2014-06-19

ISSUE AUTHORIZATION

HATCH

DESIGNED BY: C. LEISTNER DATE 2014-10-20
DRAWN BY: J. BAJAGIC DATE 2014-10-20
CHECKED BY: S. POTTER DATE 2014-10-20
DISCIP. ENGR: A. GRZEGORCZYK DATE 2014-10-20
PROJ. DES. COORD: T. THERRIEN DATE 2014-10-20
PROJ. ENGR: J. CLELAND DATE 2014-06-19
PROJ. MGR: J. CLELAND DATE 2014-06-19

Baffinland

MARY RIVER PROJECT

MILNE PORT
INFRASTRUCTURE FOOTPRINT
WORK PLAN 2016

SCALE: 1:5000 OR AS NOTED

DWG. NO. H349000-2000-00-015-0021

REV. D

APPENDIX B: MRT Emergency Response Truck

Right Side:



Left Side:



Table B-1 – Inventory of Emergency Response Trucks

Compartment	Amount	Items
Cabin	**1**	Safety Glasses clear box
	1	Safety glasses Darks box
	1	Binoculars
	1	Rolls of duck tape
	1	Emergency Road kit
	1	First Aid kit
	2	Care Flare
	1	Thermal Imaging Camera
	2	Caution Tape
	1	2.5 pound fire extinguisher
1 Left Compartment	**7**	SCBA
	18	SCBA Cylinder
	25	SCBA Face masks
	1	RIT pack
	2	Wheel Chock
2 Left Compartment	**2**	Shovel (Spade, Shovel)
	2	Rakes
	1	Cable power puller
	1	Saws all (reciprocating saw)
	2	Saws all blades (kits)
	3	Drill bit set
	2	Cordless drill
	1	Socket set
	1	Tool box
	2	bolt cutters (Large/Small)
	1	D size 12 pack batteries
	1	C Size 12 pack Batteries
	3	9 Volt Batteries
	1	4 AAA Batteries
	6	Led head liters with 4AAA Batt
	1	4 AA batteries
	1	sledge hammer
	1	Haligan bar
	3	Big axe
	4	Winter Gloves
	1	Steel jerry can (gas)
	1	Plastic jerry can (gas)
	1	Portable fan
	1	Power pack for jaws of life
	1	Miscellaneous oils
	1	Airstar Light
	2PG	Balaclava
	1	Standard set wrenches
		work gloves
3 Left Compartment	**1**	Portable fan (electric)
	4	Tarps
	3	Various Valves and adaptors
	1	hydraulic air hammer

	1	Spreader
	1	Cutter
	1	Pincher
	1	Brace bar (hydraulic brace)
	2	Air Bags Hoses
	1	Chainsaw
	1	Chop saw
	1	1/2 Impact gun
	1	Gloves
	1	Grizzly Strots
	3	Hydraulic Hoses
4 Left Compartment	**2**	1.5 inch hose (yellow)
	4	1.5 inch hose (red)
	2	2.5 inch hose (white)
	2	Pistol Grip 2.5 hose nozzle
	1	Rubber hose
	1	Splitter 2.5" to 1.5"
	1	Y valve with adaptor
	3	Pistol Grip 1.5 inch nozzle
	4	Mustang Suits
	4	Rollgliss R550 Kit
	4	1.5 inch portable spray nozzle
	1	Victaulic coupler
		Wood (cribbing)
5 Left Compartment	**2**	Black Mustang Survivor Vest
	1	Pulley's carabineers, bag
	1	Prusik
	2	Mini 4:1
	3	Bag Carbiner
	4	Climbing harness
	1	Bag webbing &slings
	4	Beam Clamps
	8	Helmets & Gloves
	2	400' Rope Bags
	5	HH Life Vests
	2	Mustang Survival Suits
	3	Mustang Self Inflatable
	6	Orange PFD Vest
	3	Petzl AVAO Harness
	4	Boots (pairs)
	2	Rescue rope (200 foot bags)
	1	Rescue Rope 4:1 (200')
	2	Rope abrasion protection
	3	Teraphrene Boots
	2	Rescue ring
	4	"Confined space" SCBA
	2	Telescopic reach pole
1 Right Compartment	**2**	Back Boards
	2	Ferno Head Immobilizers
	2	Ked Extrication Kits

	1	Trauma Kit
	3	Blankets
	6	Insulated Coveralls
	4	Raguler Coveralls
	6	Hih-viz Vests
	4	Granola bars Box
	5	ferno spider straps
	3	Ferno CPR masks
	1	IC Command Center Board
	2	Box Safety Glasses
	1	Misc. rigid splints
	1	RsQmax Kit
	2	Padded Split Kits
	7	Folding stretchers
	2	Basket Stretcher kits
2 Right Compartment	**6**	Pylons
	2	padded splint
	5	Pails
3 Right Compartment	**3**	Grey Spill Pads (Bag)
	3	White Spill Pads (Bag)
	3	Box Absorbent Socks
	1	Plug & dyke
	1	20L Pail Gap Seal
	2	Lithium fire extinguisher
	2	15000 liter Onion bladder
	1	Ferno Stair chair
	4	Magnesium fire extinguisher
4 Right Compartment	**1**	15000 VSG Bladder
	4	Quatrex bags (white)
	1	Stair Chair
	3	Bladder repair kits
	3	Bladder fitting kit
	1	Mazar Rescue Board
5 Right Compartment	**5**	Quatrex Bags(white)
	1	spill response generator
	2	Medical disaster kits
	2	Arctic soft extension cords
	2	Chicken wire (roll)
	3	Tarps
	2	2X2 Duck Pond
	5	EXO Fit Harness
	1	Helmet Face Sheild
	15	Long gloves (pair)
	1	Honda GX 270 trash pump
	4	hip wader steel toe
		Tyvek coveralls suits
	1	Funnel
	3	rubber suits
	2	mag Lite Flash lights

Table B-2 – Inventory of Typical Spill Kits

Amount	**Description**
1	30 Gallon Drum with Lid
50	Sorbent Pads
4	Sorbent Socks
2	Sorbent Booms
1	Shaker of Safety Sorb
1	Neoprene Drain Cover
1	Disposable Bag
2 Pair	Safety Goggles
2 Pair	Nitrile Gloves

* Best efforts are made to ensure spill kits remain fully stocked at their designated locations.

Appendix C

MSDS Inventory

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It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.

Note: This is an UNCONTROLLED COPY. All staff members are responsible to ensure the latest revision is used.

Name	Manufacturer	Synonyms	Revision Date
EYEWASH	Niagara Pharmaceuticals Inc		07/03/2015
MOLYKOTE 55 O-RING GREASE	The Dow Chemical Company		09/24/2015
AeroShell Grease 7	Shell Canada Products		06/22/2015
CLEANER BLEND 300	ITW Professional Brands		09/10/2015
Flake Calcium Chloride	Sel Warwick	Powdered Calcium Chloride; Calcium Chloride Dihydrate	06/01/2012
MOBIL JET OIL II	Exxon Mobil Corporation		07/09/2015
IFB 23 Tile, Insalcor, JM-20, JM-23, JM-26, JM-28, JM-30, JM-32, K-20, K-23, K-24, K-25, K-26 , K-28, K-30, SR-90, SR- 99, SR-99-LS, TC-23, TC-26, TJM-26, TJM-28	Morgan Advanced Materials	INSULATING REFRACTORY BRICK	06/01/2015
LIMESTONE	Teichert Aggregates	Aggregate, Aglime, Barn Lime, Coverstone, Flexible Base, Fluxing Agent, Manufactured Sand, Mineral Filler, Screenings, Calcium Carbonate, Calcium Carbonate, LimeRock, Limestone CaC03	06/01/2015
Antiseptic Skin Cleanser	Canadian Custom Packaging Company		10/05/2012
Black Dashboard Cleaner	Kleen-Flo Tumbler Industries Ltd	Dashboard polish	01/02/2015
SILICA GEL, TLC	Selecto Scientific, Inc.	BIO-SIL* KIESELSAURE (GERMAN) * METASILICIC ACID *	01/22/2011
Uvex Clear Lens Cleaner	Sperian Eye & Face Protection, Inc.	Lens cleaner	10/21/2013
JET A/A-1 AVIATION TURBINE FUEL	Petro-Canada	Jet A-1; Jet A-1-DI; Aviation Turbine Kerosene (ATK); JP-8; NATO F-34; Jet F-34; Aviation Turbine Fuel, Kerosene Type (CAN/CGSB 3.23 & CAN/CGSB 3.24)	05/14/2015

Name	Manufacturer	Synonyms	Revision Date
LPS 2 (Aerosol)	LPS LABORATORIES	An industrial lubricant designed to displace moisture from equipment, provide heavy-duty lubrication and rust prevention	10/25/2014
LOCTITE 565 PST PIPE SEALANT THREAD SEALANT	Henkel Canada Corporation		10/20/2014
LePage Heavy Duty Contact Cement	Henkel Canada Corporation	Adhesive	11/19/2014
Shell Corena S4 R 46	Shell Canada Products	Compressor oil	12/18/2014
Bulab 5361P	Buckman Laboratories of Canada, Ltd.		12/01/2014
3M AUTO BEDDING AND GLAZING COMPOUND (BLACK) PN 08509	3M Corporation	Sealant	04/06/2015
LOCTITE 510 known as LOCTITE 510 GASKET ELIMINAT	Henkel Canada Corporation	Sealant	03/16/2015
50% Isopropyl Alcohol	Vi-Jon		05/05/2008
TRAXON E SYNTHETIC CD-50	Petro-Canada Lubricants Inc.		02/17/2015
TRAXON E SYNTHETIC 75W-90	Petro-Canada Lubricants Inc.		01/07/2015
HYDREX EXTREME	Petro-Canada Lubricants Inc.		02/12/2015
HEAVY DUTY SYNTHETIC BLEND ATF	Petro-Canada Lubricants Inc.		02/02/2015
Lock-De-Icer	Kleen-Flo Tumbler Industries Ltd	Spray de-icer	01/02/2015
Expo	Dustbane Products Limited		06/01/2015
Shell Gadus S2 V30KXD 1	Shell Canada Products	Automotive and industrial grease	12/18/2014
Shell Air Tool Oil S2 A 32	Shell Canada Products	Machine oil	12/18/2014
PRECISION XL RAIL CURVE GREASE	Petro-Canada Lubricants Inc.		02/27/2015
0.2 NTU RATIO TURBIDITY STANDARD	Reagecon Diagnostics Ltd		08/05/2015
LOCTITE SF 7063 known as Loctite 7063 - GERMAN	Henkel AG & Co. KGaA		06/15/2015
Isopropyl Alcohol 99%	Vi-Jon		03/04/2014

Name	Manufacturer	Synonyms	Revision Date
Alcohol 70% Isopropyl	Vi-Jon	First Aid	11/04/2014
Formaldehyde solution 37%	Thermo Fisher Scientific	Formalin; Methanal; Methylene oxide; Oxymethane; Formic aldehyde; Methyl aldehyde, Laboratory chemicals	10/29/2014
Formaldehyde solution 37%	Thermo Fisher Scientific	Formalin; Methanal; Methylene oxide; Oxymethane; Formic aldehyde; Methyl aldehyde, Laboratory chemicals	10/29/2014
Clorox Disinfecting Wipes - Fresh Scent	Clorox Company of Canada, Ltd.	Moistened disinfecting wipes	01/05/2015
LPS 3 (Aerosol)	LPS LABORATORIES		11/10/2014
Formaldehyde, 37 wt% solution	Thermo Fisher Scientific	Formalin; Formol; Methanal (Molecular Biology), Laboratory chemicals	03/06/2015
FLEETCOOL EG PREMIX (Ethylene glycol based coolant)	Cummins Filtration	Premixed antifreeze / coolant	02/27/2015
804AA 91% Isopropyl Alcohol	Vi-Jon	First-Aid	07/07/2015
SmokeCheck 25S (Smoke Alarm Tester)	HSI Fire & Safety Group		03/17/2015
S-316	HORIBA, Ltd.		12/25/2014
Stoko Gel Instant Hand Sanitizer	Deb-STOKO USA LLC		06/01/2015
Stoko Gel Free	Deb-STOKO USA LLC		06/01/2015
Iron Ore (Baffinland Iron Mines Corporation)	BAFFINLAND IRON MINES CORPORATION	BAFFINLAND MARY RIVER IRON ORE MARY RIVER LUMP ORE (LUMP: grain size - less than 31.5mm greater than 6.3mm) MARY RIVER FINE IRON ORE (FINES: grain size - less than 6.3mm) BAFFINLAND MARY RIVER IRON ORE, MARY RIVER LUMP ORE (LUMP: grain size - less than 31.5mm greater than 6.3mm), MARY RIVER FINE IRON ORE (FINES: grain size - less than 6.3mm)	07/13/2015
NO. 1 DIESEL FUEL	Exxon Mobil Corporation	Hydrocarbons and Additives, Fuel	06/08/2015
CONSAV 1GL 5600 Floor Paint Safety Yellow	Rust-Oleum Corporation		06/30/2015

Name	Manufacturer	Synonyms	Revision Date
# OMC99290 & OMC99291 OFFICE MAX DUSTER 10OZ	EXPONENT MICROPORT INC.	#OMC99290-OMC99291 OFFICE MAX 10OZ PRODUCT	01/01/2015
Sodium Hexametaphosphate (SHMP)	ICL PERFORMANCE PRODUCTS LP	Glass H, Hexaphos, Sodaphos, SHMP; glassy Sodium Phosphate; Sodium Polyphosphate, glassy; Metaphosphoric Acid, Sodium Salt; P60; Graham's Salt	05/18/2015
SODIUM SULFATE	Anachemia Canada	Disodium sulfate, Sodium sulfate anhydrous, Salt cake, Sulfuric acid disodium salt, Sodium sulphate, Thenardite, Mirabilite, AC-8515, AC-8515T, 85330, 85376	03/10/2015
LOCTITE 565 PST PIPE SEALANT h PTFE THREAD SEALANT	Henkel Corporation		09/08/2014
COD TNTPlus, LR (3-150 MG/L)	Hach Company		01/12/2015
Sodium Bicarbonate	Tronox Specialty Alkali Corporation	Baking Soda, Bicarbonate of Soda	04/07/2015
Shell Air Tool Oil S2 A 100	Shell Canada Products		01/12/2015
EL 2007 Non-Flammable Duster Aerosol	Sprayon Products		03/13/2015
Shell Omala S4 GX 150	Shell Canada Products		01/12/2015
3V PRIMER (PVC & CPVC Primer)	SLUYTER CO LTD		05/07/2015
Armor All Original Protectant	The Armor All/STP Products Company		01/31/2015
PURELL Alcohol Hand Sanitizing Wipes	GOJO Industries, Inc.		02/10/2015
Iodine Solution, 5%, Lugol	Thermo Fisher Scientific	Laboratory chemicals	08/18/2014
Fantastik All Purpose Cleaner	Sealed Air Corporation		06/11/2014
Wet Ones Citrus Scent Antibacterial Wipes	Playtex Manufacturing Inc		09/04/2012
Sunlight Liquid Dish - Lemon	Sealed Air Corporation	Dish soap	09/09/2014
BACTOL DISINFECTANT AND SANIT	AVMOR		07/10/2014

Name	Manufacturer	Synonyms	Revision Date
CALCIUM HYDROXIDE (LIME WATER)	Anachemia Canada	R-1430, 19195	11/06/2014
Digestion Solution for COD 20-1500 mg/l Range	Hach Company		01/12/2015
SULPHURIC ACID 50%	KENCRO CHEMICALS LIMITED		06/01/2014
HYDROCHLORIC, 0.50 NORMAL	REAGENTS, INC.	Muriatic acid solution, 0.5 Molar	04/23/2015
AmVer High Range Ammonia Test ´N Tube Reagent	Hach Company	Laboratory Use Determination of ammonium nitrogen	08/02/2014
NitraVer X Nitrogen, Nitrate Reagent B	Hach Company		02/02/2015
TOTAL PHOSPHATE TEST KIT	CHEMETRICS, INC.		01/31/2013
Hach One Reference Electrolyte Solution	Hach Company		08/07/2014
Rhodamine WT, 20% solution in water	Thermo Fisher Scientific	Laboratory chemicals	02/10/2015
Buffer Powder Pillows pH 10.01 ± 0.02 @ 25°C	Hach Company		05/29/2014
Buffer Powder Pillows pH 4.01 (+/-) 0.02 @ 25 Degree C	Hach Company	Buffer	07/29/2014
pH 7.00 Buffer Solution	Hach Company		10/23/2014
HI 6031 1413 (Micro)S/cm Standard Solution	HANNA INSTRUMENTS INC		06/13/2013
AMCO CLEAR TURBIDITY STANDARD, 0.0 NTU	GFS Chemicals, Inc.	Reagent for determination of turbidity of liquids	12/16/2014
AMCO CLEAR TURBIDITY STANDARD, 1.0 NTU	GFS Chemicals, Inc.	Reagent for determination of turbidity of liquids	12/17/2014
AMCO CLEAR TURBIDITY STANDARD, 10 NTU	GFS Chemicals, Inc.	Reagent for determination of turbidity of liquids	12/17/2014
AMCO CLEAR TURBIDITY STANDARD, 1000 NTU	GFS Chemicals, Inc.		01/20/2012
Shell Tellus S4 VX 32	Shell Canada Products		12/22/2014
WD-40 Specialist Penetrant	WD-40 Products (Canada) LTD.		01/23/2015

Name	Manufacturer	Synonyms	Revision Date
Shell Spirax S6 AXRME 75W-90	Shell Canada Products		01/29/2015
Aluminum potassium sulfate dodecahydrate	Sigma-Aldrich Corporation	Potassium aluminum sulfate dodecahydrate, Alum, Potassium alum	02/27/2015
ICWB LSPR 12PK CAUTION BLUE MARK	Rust-Oleum Corporation		08/26/2014
pr88 – The Wash-Off Hand Protection	URSULA RATH GMBH		04/01/2015
Anti-seize Sealing Compound	Kleen-Flo Tumbler Industries Ltd		01/02/2015
NEW RAPID TAP PASTE	Relton Corporation		03/30/2015
Calcium Chloride 2.5 M	Bio-Rad Laboratories		01/13/2015
Sodium Hypochlorite 12%	Univar Canada Ltd.	Sodium oxychloride; Soda bleach liquor; Javel water; Clorox; Javex	04/03/2014
Shell Donax TC Multiseason	Shell Canada Products		02/09/2015
Air1 Diesel Exhaust Fluid	Yara Belle Plaine, Inc		05/31/2013
HERTEL PLUS DISINFECTANT	Lavo Inc.		10/04/2013
Sulphuric Acid 93%	Benson Chemicals Ltd.	Sulfuric acid, Battery acid, Dihydrogen sulfate, Electrolyte acid, Hydrogen sulfate, Mattling acid, Oil of vitriol, Spirit of sulfur	11/15/2014
PROPANE	Exxon Mobil Corporation	Paraffinic Hydrocarbons, Gas or Liquefied Gas, Chemical feedstock	12/04/2014
Regular Gasoline	Irving Oil Refining G.P.	Natural gasoline, Automotive gasoline, Fuel	10/15/2014

Name	Manufacturer	Synonyms	Revision Date
Methanol	INTERSTATE CHEMICAL CO	4Z0A reagent#5/acetone alcohol/AI3-00409/alcohol C1 /alcohol, methyl /carbinol/ caswell No 552 / coat-B1400 / colonial spirit / colonial spirits / Columbian spirit / Columbian spirits / EPA pesticide chemical code 053301 / eureka products criosine	11/24/2014
Ammonium Nitrate	CAROLINA BIOLOGICAL SUPPLY COMPANY	Nitric Acid, Ammonium Salt	09/03/2014
Shell Rotella T Triple Protection 15W-40	Shell Canada Products		12/18/2014
Safe -T-Brake	Kleen-Flo Tumbler Industries Ltd		01/02/2015
EP61 GLASS & SURFACE CLEANER	AVMOR		09/25/2014
FRIENDLY AIR	Dustbane Products Limited		09/01/2014
CITRANET LEMON LAUND.POWD.DET.	NORCHEM DIVISON DE AVMOR		07/16/2014
TIP TOP SOLUTION STL-RF	REMA TIP TOP AG		04/01/2014
TIP TOP SOLUTION HL-T	REMA TIP TOP AG		04/01/2014
International Thinner-Eqpt Cleaner	International Paint Limited		02/20/2013
International Thinner-Eqpt Cleaner	International Paint Limited	Thinner	05/15/2013
Interplus 356 Aluminium Part A	International Paint Limited		02/04/2014
Interplus 356 Part B	International Paint Limited		05/02/2014
Interthane 990 Base Light Part A	International Paint Limited		12/03/2014
INTERTHANE 990 PART B	International Paint Limited		06/18/2014
Loctite 7063	Henkel Limited	Solvent based cleaner	06/27/2014
Loctite 7063 - FRENCH	Henkel Technologies France SAS	Dégraissant à base de solvants	06/27/2014
Loctite 586 - GERMAN	Henkel AG & Co. KGaA		02/04/2014

Name	Manufacturer	Synonyms	Revision Date
404 Quick Set Instant Adhesive	Henkel Corporation		08/28/2014
LPS ChainMate	LPS LABORATORIES		06/29/2014
LePage PL9000 Heavy Duty Construction Adhesive	Henkel Canada Corporation		06/02/2014
LOCTITE 242 THREADLOCKER	Henkel Corporation		08/21/2014
Toner WorkCentre 7525, WorkCentre 7530, WorkCentre 7535, WorkCentre 7545, WorkCentre 7556	Xerox Corporation		08/20/2013
Drum Cartridge for WorkCentre 7525, WorkCentre 7530, WorkCentre 7535, WorkCentre 7545, WorkCentre 7556	Xerox Corporation		10/17/2013
Expo White Board (Care) Cleaner, Expo White Board (Care) Cleaning Wipes	Newell Rubbermaid		03/05/2013
EP70 WASHROOM CLEANER	AVMOR		01/10/2014
XIRTEC 11 GRY Low VOC PVC Plastic Pipe Cement	IPS Corporation		06/12/2013
MAGIC FOG-BE-GONE LENS CLEANING ANTI-STAT, ANTI-FOG FLUID	MAGIC SAFETY PRODUCTS		05/04/2013
Formazin Turbidity Standard, 4000 FNU	Hach Company		04/17/2014
SUPER DOUCET MOUSSE	Groupe Savon Olympic Inc.	White antibacterial foam hand and body soap	03/18/2013
SBS 40 Medicated Skin Cream	Deb USA, Inc.		12/31/2013
DOW CORNING 736 HEAT RESISTANT/SEALANT	The Dow Chemical Company		06/26/2013
DOW CORNING 732 MULTI -PURPOSE SEALANT CLEAR	The Dow Chemical Company		04/05/2013
DEVCON Flexane High Performance Putty - KIT	ITW Professional Brands		12/30/2012
262 Threadlocker Permanent Strength	Henkel Canada Corporation		01/09/2014
LOCTITE 262 THREADLOCKER HIGH STRENGTH	Henkel Canada Corporation		01/09/2014
LPS 1	LPS LABORATORIES	Petroleum Distillates	10/07/2013
LOCTITE SUPERFLEX RED HIGH TEMP RTV V Silicone Adhesive Sealant Silicone Adhesive Sealant	Henkel Canada Corporation		04/01/2014
Quickstix 268 Threadlocker High Strength	Henkel Canada Corporation		04/25/2014

Name	Manufacturer	Synonyms	Revision Date
660 Quick Metal Retaining Compound	Henkel Canada Corporation		02/14/2014
MASTERS PRO-DOPE	G.F. THOMPSON CO. LTD.		12/01/2012
Master Appliance Ultratane Butane Fuel (Petroleum Gases, Liquefied)	Master Appliance Corporation		03/14/2014
LPS QB Duster	LPS LABORATORIES		06/13/2013
Worthington Petroleum Based Soldering Flux	Worthington Industries Inc		06/18/2013
All Season Windshield Washer	Recochem Inc.		03/20/2014
BASICS Pressurized Duster	Falcon Safety Products, Inc		05/14/2012
3M Windo-Weld Super Fast Urethane PN 08608, 08609	3M Corporation		03/19/2014
Eberhard Faber Dry Erase Markers	Newell Rubbermaid		03/05/2013
Berol, Expo Low Odor , Expo Click, Expo Original, Eberhard Faber - Dry Erase Markers, Sharpie Whiteboard Markers	Newell Rubbermaid		04/01/2014
DOW CORNING 832 MULTI-SURFACE ADHESIVE SEALANT, OFF-WHITE	The Dow Chemical Company		01/27/2014
OFF! DeepWoods Spray Insect Repellent 5	S.C. Johnson and Son, Limited		01/10/2014
LYSOL Brand III All Purpose Cleaner 4 in 1 - Trigger - (All Scents, All Sizes)	Reckitt Benckiser (Canada) Inc.		04/25/2012
KRYLON Industrial TOUGH COAT Fluorescent Acrylic Enamel, Electric Green Fluorescent	THE SHERWIN-WILLIAMS COMPANY- KRYLON Products Group		05/24/2014
KRYLON Industrial QUIK-MARK Water-Based Inverted Marking Paint, Chalk-Line Clear	THE SHERWIN-WILLIAMS COMPANY- KRYLON Products G		05/21/2014
WINDEX MULTI-SURFACE DISINFECTANT TOUCH-UP CLEANER - FRESH SCENT	S.C. Johnson and Son, Limited		07/19/2012
WINDEX MULTI-SURFACE CLEANER - VINEGAR	S.C. Johnson and Son, Limited		05/21/2014
PRECISION SYNTHETIC MOLY	Petro-Canada Lubricants Inc.		02/14/2013
DURON-E SYNTHETIC 5W-40	Petro-Canada Lubricants Inc.		10/28/2013

Name	Manufacturer	Synonyms	Revision Date
PC FAST ORANGE LOTION WITH PUMICE 3.78 L	ITW Permatex Canada		05/17/2013
prDry Hands - Skin Protection Gel	URSULA RATH GMBH		04/01/2014
PURELL Instant Hand Sanitizer	GOJO Industries, Inc.		04/29/2013
PURELL Advanced Moisturizing Foam Hand Rub	GOJO Industries, Inc.		06/04/2014
Sharpie Fine Point Marker, Sharpie Ultra Fine Point Marker, Sharpie Extra Fine Marker, Sharpie Chisel Tip Marker, Sharpie Twin Tip Marker, Super Sharpie Marker, Super Sharpie Twin Tip Marker, Sharpie Mini Fine Point Marker, Sharpie Micro Marker	Newell Rubbermaid	Sharpie Grip Marker, Sharpie Retractable Fine Point Marker, Sharpie Magnum Marker, Sharpie King Size Marker, Sharpie Liquid Tip Marker. Sharpie Premium, Sharpie CD Marker, Sharpie Pro, Sharpie Pro King Size, Sharpie Pro Magnum, Sharpie Aluminum Barrel	04/02/2014
Shell Gadus S2 V220 2	Shell Canada Products		12/09/2013
Shell Gadus S5 V100 2	Shell Canada Products		12/09/2011
Shell Gadus S5 U100KD 1	Shell Canada Products		12/09/2011
Spray Nine 4L	ITW Professional Brands		10/04/2012
Shell Spirax S3 TLV	Shell Canada Products		12/09/2011
CAT FINAL DRIVE AND AXLE OIL SYNTH (FDAO-SYN)	Exxon Mobil Corporation		04/08/2013
Monitor Cleaning Wipes, 100ct SKU 775488 (model 16982) [STP08002]	Kleinmann GmbH	Staples Monitor Cleaning Wipes Tub of 100	01/01/2014
CONSTANT CHLOR PLUS BRIQUETTES	Arch Chemicals, Inc.		04/16/2014
PGP Comet Deoderizing Cleanser with Chlorinol	Procter & Gamble		10/15/2013
Belkin Air Duster 10/12 oz r134a	Kleen Concepts		12/04/2012
Braze Core Silver, Copper, Tin, Zinc	Lucas Milhaupt, Inc.		05/09/2014

Name	Manufacturer	Synonyms	Revision Date
Shell Spirax S6 ATF A295	Shell Canada Products		06/10/2013
KEYSTONE ANTIBACTERIAL LIQUID HAND SOAP	Ecolab Inc.		04/07/2014

Appendix D

NT-NU Spill Report

The information contained herein is proprietary to Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied.
It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.

Note: This is an UNCONTROLLED COPY. All staff members are responsible to ensure the latest revision is used.

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR	REPORT NUMBER
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME	☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	____-____

C	LAND USE PERMIT NUMBER (IF APPLICABLE) **IOL - Commercial Lease No.: Q13C301**	WATER LICENCE NUMBER (IF APPLICABLE) **2AM-MRY-1325 Type "A"**
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS
F	RESPONSIBLE PARTY OR VESSEL NAME **Baffinland Iron Mines Corp.**	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION **2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3**
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION

H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS		

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Appendix E

Dyno Nobel Baffin Island Inc. – Emergency Response Assistance Plan

The information contained herein is proprietary to Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied.
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BAFFIN ISLAND

DYNO

Dyno Nobel

Baffin Island

EMERGENCY RESPONSE ASSISTANCE PLAN

DYNO NOBEL Baffin Island INC.
EMERGENCY RESPONSE ASSISTANCE PLAN
Emergency Response Notification

1. In the event of an emergency Mary river Site Security/MRT will be notified first at:

Radio:

- Radio Channel: EMERGENCY and or SS TAC (Site Services/Security)
- Call "Code 1, Code 1, Code 1"
- State Name
- Emergency Details
- Location
- **Phone:**
- Security 647-253-0596 Ext 6047

2. Dyno Nobel Baffin island on site plant will be contacted at:
   (647) 253 0596. Ext 6067
3. Off-Site notification:

	NAME	HOME	CELL
1.	NFLD Hardrok (24hr emergency)	(709) 754-4900	
2.	Jim Kasemets	(709) 632-4007	(709) 632-4007
3.	Roland Walsh	(709) 699-8987	(709) 765-6031
4.	Mark Gillis	(709) 634-2993	(709) 640-7969
5.	Kevin McDonald	(902) 341-2181	(902) 848-6849

Revision and Distribution

An updated copy of this ERAP must be kept in the following locations. Revisions to this ERAP must be reviewed and signed-off on by all who possess a copy:

Emulsion Plant Office	Mary River Site Security
DNBI Pick-ups – LTP040 & LTP043	Mary River MRT
DNBI Loader – LDR020	NHR Office – Corner Brook, NL
Emulsion Trucks – RC913 & RC914	NHR Office – St. John's, NL

Contents

EMERGENCY ACTION 4
Fire 4
Fire not involving explosives or ammonium nitrate (AN) **4**
Fire involving explosives or AN **4**
Detonation 4
Lightning 4
Spills 5
Ammonium Nitrate **5**
Emulsion **5**
Oils, fuels, etc **5**
PLANT EVACUATION PROCEDURES 6
Evacuation 6
Guarding 6
Response 6
RESOURCES 7
APPENDIX A: FIRE FIGHTING INFORMATION 8
APPENDIX B: ENVIRONMENTAL RELEASE PROCEDURES 11
APPENDIX C: EMULSION PLANT LAYOUT 14

EMERGENCY ACTION

Fire

Fire not involving explosives or ammonium nitrate (AN)

In the event of a fire not involving explosives or ammonium nitrate, Mary River Site Security will be notified of a "CODE ONE" on either the "Emergency" or "SS TAC" channel, or by phone at (647) 253-0596 ext. 6047**.** Fires which do not involve explosives or ammonium nitrate will be extinguished using normal fire-fighting procedures.

Fire involving explosives or AN

No attempt will be made to fight fires involving explosives or equipment containing explosive residue (AN included). The plant will be shut down and evacuated to the muster station (shown in Appendix C). After a verified head count all individuals will evacuate and blockade the main gate as shown on map to ensure no one enters. When all employees are out of harm's way, personnel will call a "CODE 1" on radio channel "Emergency" or "SS TAC" or call Security by phone at 647-253-0596 (extension number 6047).

The procedure for plant site evacuation is given in the Plant Evacuation Procedures section (page 6). In all cases, keep away from the gases and smoke released by the fire.

Detonation

In the event of a detonation at the plant, the emergency plan will go into effect immediately, starting with complete evacuation of the plant site. See page 6 of this ERAP.

Lightning

If lightning approaches the plant, remove all personnel to the main gate until all clear. See page 6 of this ERAP. If lightning approaches while the explosives truck is in pit, the truck should return to plant, time permitting, and follow the evacuation procedure. If there is no time to return to plant, leave the truck in the pit and notify the pit supervisor. Evacuate all pit personnel from the pit until the lightning passes.

Spills

Ammonium Nitrate

Ammonium nitrate for use at the Mary River Project is stored in containers in two locations; the KM 97 laydown and smaller quantities at the emulsion plant. The AN prill is stored in 1,000 kg tote bags, 20 of which are stored double-stacked in each of the 20' containers. No AN is stored outside at any time. AN is only withdrawn from the containers when required by plant production. It is loaded directly into the AN Handling Module of the plant to minimize any exposure of the product to the environment (See Appendix C)

Small spills will be swept up with plastic dust pan and broom and emptied in plastic cans marked AN only, to be either recycled in the plant or disposed of in blast holes. Large spills will be dealt with on an individual basis depending upon size of spill. Efforts will be made to contain spill and area will be secured before clean up begins.

Emulsion

Emulsion is stored in a single, 36,000 kg capacity tank within the emulsion loading garage (see the site plan in Appendix C). Smaller quantities may be stored in the two bulk emulsion trucks (10,000 kg capacity each) which are parked in the garages when not in use in the mine.

Small spills will be scooped up with non-sparking shovels and placed in bags, transported to magazine site at KM 105.5, to be stored until ready for disposal in blast holes. Large spills will be dealt with on an individual basis depending upon size of spill. Efforts will be made to contain spills and an area will be secured before clean-up begins. This may involve pumping of large spills into a tanker or scooping up product with shovels.

Oils, fuels, etc.

Methods of spill containment in all fuel/lubricant storage areas within the plant are is use to ensure spills are adequately contained before they occur. However, in the event of a spill outside of the designated storage areas, spills will be diked and absorbent pads used to collect the spill. Residual product not capable of being reused will be contained, collected with adequate amounts of soil absorbent to solidify the material and render it inert.

PLANT EVACUATION PROCEDURES

Evacuation

In the event that a fire involving explosives/AN, or a detonation occurring at the plant, the site must be immediately evacuated. Personnel must report to the muster point (noted on the site plan in Appendix C) where a head-count is to be conducted. When all personnel are accounted for, personnel must proceed to the main gate.

A "Code 1" alert must be broadcast on radio channel "Emergency" or "SS TAC" as soon as it is safe to do so. After repeating "code one, code one, code one", state your name, location and nature of the emergency. Indicate that there is a fire/detonation at the emulsion plant and no firefighting measures are to be taken. Security will re-broadcast this message to ensure all personnel on site are aware. Inbound or outboard air traffic must be halted or redirected.

As the landfill area is within the danger radius of a fire/detonation at the plant, plant personnel should sweep the landfill on their way out the emulsion plant road to ensure all personnel are clear of this area.

Guarding

The road to the emulsion plant must be guarded at the location given on the overall site plan in Appendix C. **NO ONE IS PERMITTED TO RE-ENTER THE AREA UNTIL AN "ALL-CLEAR" IS GIVEN.** If BIM employees are required to stand guard, Dyno Nobel Baffin Island (DNBI) employees will provide direction.

Response

It is the responsibility of Dyno Nobel Baffin Island management to direct the emergency response to a fire involving explosives/detonation at the plant. If no management personnel are on site, this will be coordinated through by the most senior DNBI employee on site. As previously stated, **the only response to a fire involving explosives/detonation**

at the plant is evacuation of the plant and guarding of all access points until the danger has passed.

RESOURCES

Milne Inlet - Port Site Complex			
For Outside caller - Main line # 647-253-0598 then Dial the Extension			
Name	**Position/Department**	**Phone Number**	**Internal Ext**
MRT	MRT	647-253-0598	4219
Health and Safety Coordinator	Health and Safety	647-253-0598	4122

Mary River			
For Outside caller - Dial 647-253-0596 +ext.			
Name	**Position/Department**	**Phone Number**	**Internal Ext**
Security Lead	Scarlet Security	(647) 253-0596	6047
MRT	MRT	(647) 2	6020
Environment Manager	Environment	(647) 253-0596	6016
Health and Safety Superintendent	Health and Safety	(647) 253-0596	6006

Outside resources include:

Emergency Services Dispatch	(867) 979-5662
R.C.M.P	1 (800) 979-1111
CANUTEC	(613) 996-6666
NRCAN Explosives Regulatory Division	(613) 948-5200
Environment Canada	1 (866) 283-2333

APPENDIX A: FIRE FIGHTING INFORMATION

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Ammonium Nitrate - 83% solution colourless	Use flooding amounts of water in early stages of fire. Keep upwind. This is an oxidizing agent which supports combustion and is an explosive hazard if heated under confinement that allows high pressure buildup. Evacuate to designated area if fire cannot be controlled.	Toxic oxides of nitrogen are given off during combustion. Fire-fighters require positive pressure self-contained breathing apparatus. Avoid contaminating with organic materials.
Ammonium Nitrate Prill - odourless white to light tan crystalline solid	Use flooding amounts of water in early stages of fire. Keep upwind. This is an oxidizing agent which supports combustion and is an explosive hazard if heated under confinement that allows high pressure buildup. Evacuate to designated area if fire cannot be controlled.	Toxic oxides of nitrogen are given off during combustion. Fire-fighters require positive pressure self-contained breathing apparatus. Avoid contaminating with organic materials. Many powdered metals such as Al, Sb, Si, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, Sn Zn and brass react violently and explosively with fused AN below 200 degrees C. Sensitivity to detonation increases when heated.
N-17	Flash Point: Not applicable Extinguishing Media: Not applicable	Wear self-contained breathing apparatus and protective clothing. No unusal fire explosion hazard.
L-2 Clear to pale yellow liquid. Very little if any odor.	Use water, CO_2, or Dry chemical	Fire fighters must be equipped to prevent breathing vapors or fumes of combustion. Highly toxic gases may result from exposure to fire or high temperatures.

APPENDIX A: FIRE FIGHTING INFORMATION

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Citric Acid Odourless, white or opaque crystals	Use water, Dry chemical, Alcohol or carbon dioxide	When heated to decomposition, citric acid emits acrid smoke. Fire fighters must wear self-contained breathing apparatus with full piece operated in positive pressure mode.
Fuel Oil (No. 2 diesel) dyed or pale yellow liquid with petroleum odour	Use water spray to cool fire exposed surfaces and to protect personnel. Shut off fuel from fire. Use foam, dry chemical or water spray to extinguish fire. Avoid spraying water directly into storage container due to danger of boilover.	Avoid strong oxidizing agents.
5168D Emulsifier dark viscous liquid with hydrocarbon odour Sodium Thiocyanate Colourless crystals with slight ammoniacal odour	Use carbon dioxide or dry chemicals on small fires. Use foam (alcohol, polymer or ordinary) and water spray for large fires. Use dry chemical, water spray, water fog, carbon dioxide, foam or sand/earth to extinguish fire.	May form oxides of nitrogen upon thermal decomposition. Positive pressure self-contained breathing apparatus is required for fire-fighters. Contact with strong acids or oxidizing agents or combustion may generate toxic concentrations of sulphur dioxide, oxides of nitrogen, cyanides or hydrogen sulphide.
Sodium Nitrite white or slightly yellow solid	Apply aqueous film forming foam (AFFF) according to manufactures instructions or water in the form of fog for large fires. Use carbon dioxide or dry chemical media for small fires.	Thermal decomposition products include toxic oxides of nitrogen. Sodium nitrite promotes combustion. May explode if heated above 537 degrees Celsius.
Acetic Acid clear colourless liquid with sharp vinegar odour	Use water spray, dry chemical, carbon dioxide or alcohol foam to extinguish fire. Eliminate all nearby sources of ignition since flammable hydrogen gas will be liberated upon contact with some active metals.	Avoid alkalis, oxidizing or reducing materials and nitric acid.

APPENDIX A: FIRE FIGHTING INFORMATION

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Nitric Acid water white to slightly yellow liquid with nitrogen dioxide odour	Use an all purpose type AFFF foam according to manufacturers instructions. Carbon dioxide or dry chemical media for small fires. If only water is available, use it in the form of a fog.	Combustibles can have an increased flammability after contact with nitric acid. Nitric acid reacts with metals to liberate flammable hydrogen gas. Toxic oxides of nitrogen may also be liberated.
Caustic Soda, Anhydrous Odourless, white granular solid	Do not use water, foam, Carbon Dioxide, Dry Chemical. Use media appropriate for surrounding fire and or materials. Remove containers from fire zone wherever possible.	Avoid direct contact of this product with water as this can cause a violent exothermic reaction. Use self-contained breathing apparatus and protective clothing.
Ethylene Glycol Colourless liquid with mild odour	Extinguish fire with water fog, carbon dioxide or dry chemical. Direct application of water or foam into container may cause violent frothing and boilover.	Never use welding or cutting torch on or near drum (even empty or with small residue) because product can ignite spontaneously.

APPENDIX B: ENVIRONMENTAL RELEASE PROCEDURES

MATERIAL	SPILL AND LEAK PROCEDURES	WASTE DISPOSAL
Ammonium Nitrate - 83% solution colourless	- Prevent spills from entering water courses. Contain by dyking with earth or other inert material. Allow to freeze. Shovel into clean, non-combustible container. Wash remaining trace residues with water. Wear rubber gloves and chemical goggles to minimize contact with the skin and eyes. - Refer to Ekati Spill Contingency plan – section V page 55 for details on procedures for spills resulting from fuelling of equipment at fuel stations.	- Dispose of recovered material in approved landfill or other waste disposal facility.
Ammonium Nitrate Prill - odourless white to light tan crystalline solid	- Remove source of heat and ignition. Sweep or shovel spill into a clean, non-combustible container. Wash remaining trace residues with water. Wear rubber gloves and safety glasses to minimize contact with skin and eyes.	- Re-use if possible or dispose of as is in approved facility. Otherwise, dissolve in large amount of water. Add soda ash and mix and neutralize with 6M HCl to produce neutralized sludge. Sludge can then be buried in approved landfill. Sludge incineration requires scrubbing capability for oxides of nitrogen.
N-17 Clear to light blue liquid, sharp vinegar odor	Wear appropriate protective clothing and respiratory protection. Contain spills and avoid discharging into sewer or streams. Neutralize small spills with soda ash or lime. Absorb with vermiculite or other inert material.	- Re-use if possible, otherwise dispose of in approved landfill or other waste disposal facility
Citric Acid Odourless, white or opaque crystals	Sweep up material and place in tightly closed container in a cool, dry and well ventilated area. Avoid discharge into sewer and surface water. Spills to waterways will cause PH depression.	In accordance with Provincial and Federal regulations

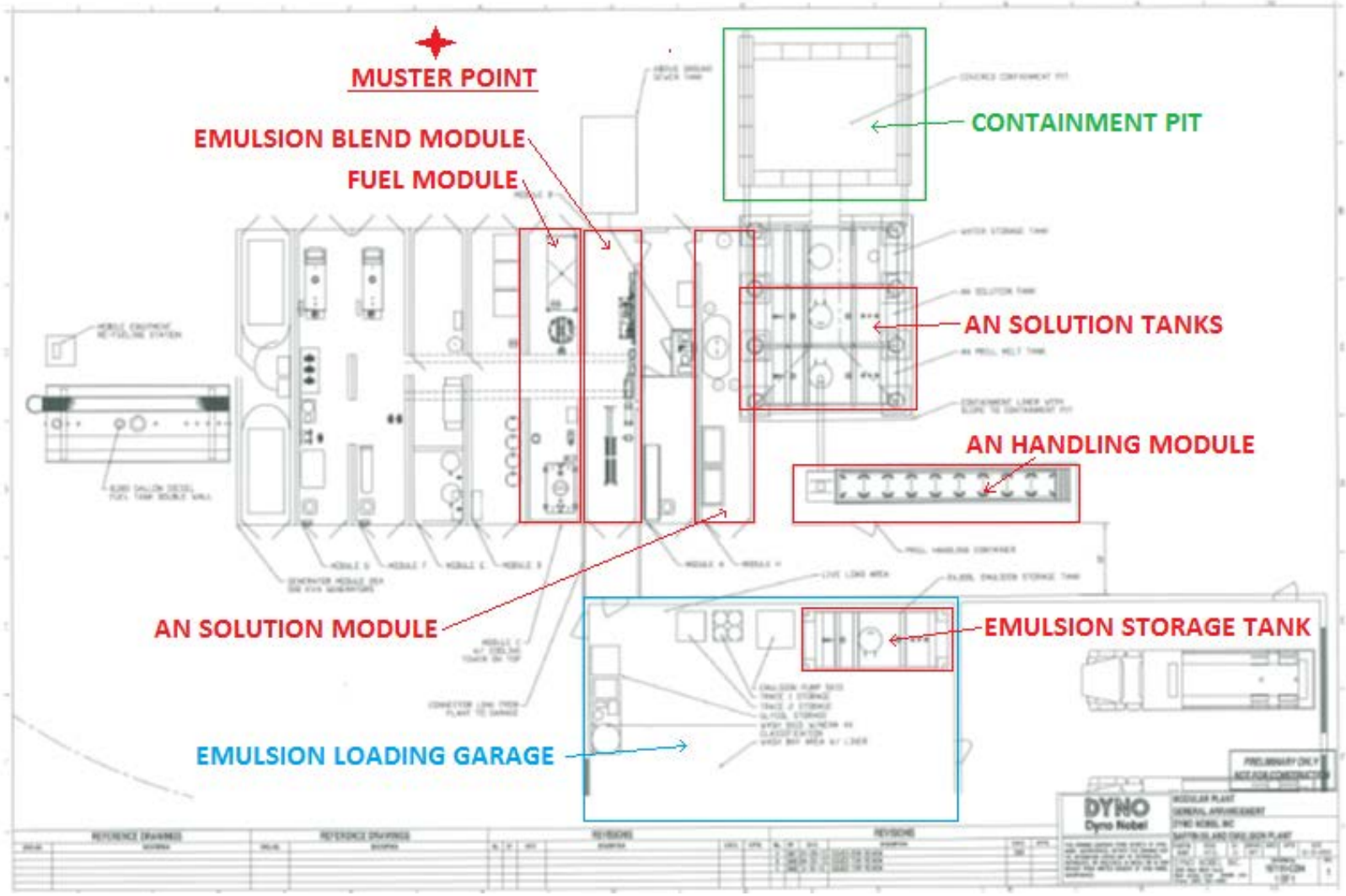
APPENDIX B: ENVIRONMENTAL RELEASE PROCEDURES

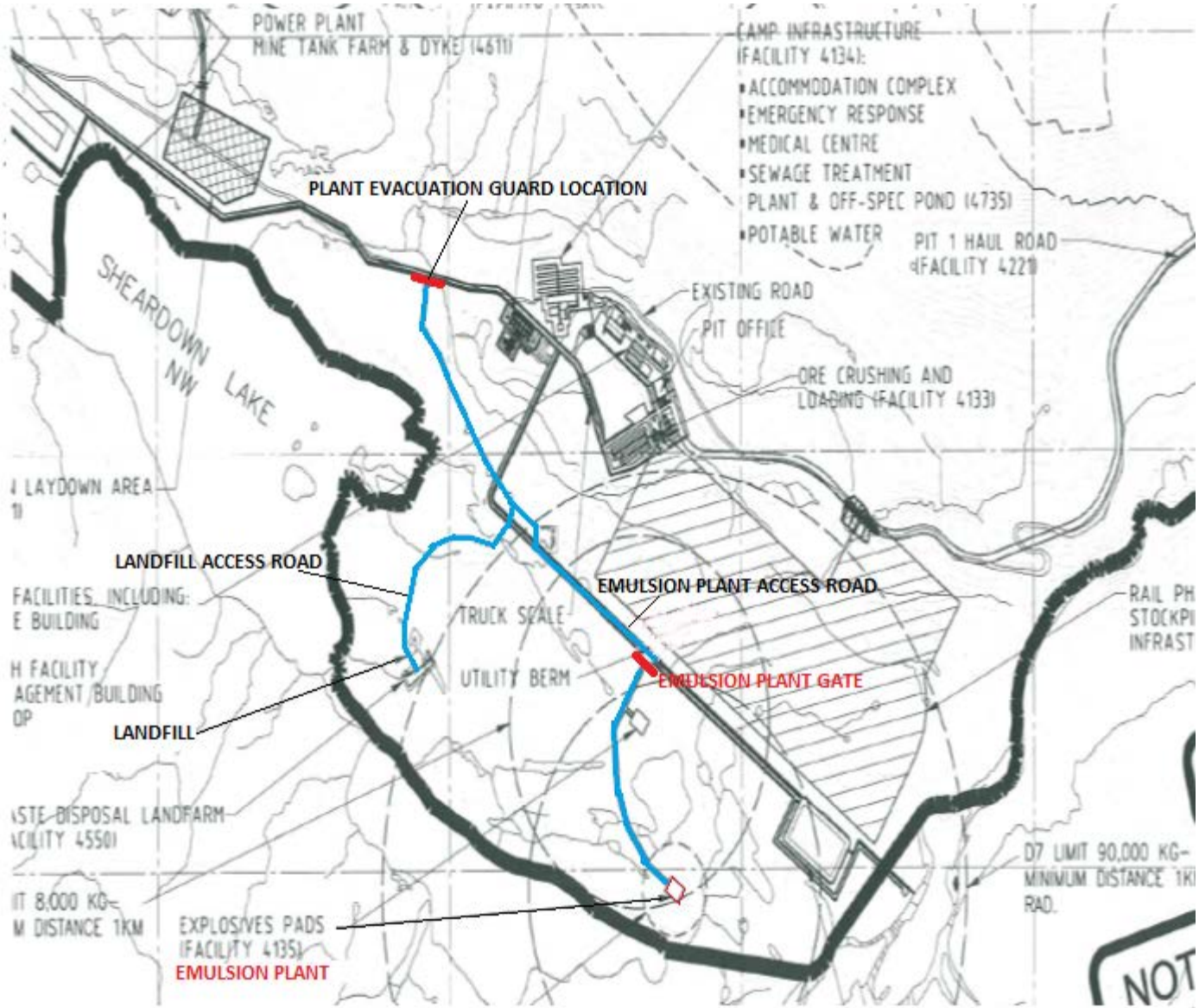
MATERIAL	SPILL AND LEAK PROCEDURES	WASTE DISPOSAL
L-2 Clear to pale yellow liquid. Very little if any odor	Wear appropriate chemical resistant clothing including rubber gloves, rubber boots. Contain spill and keep out of sewer, storm draines, surface water and soil. Keep away from incompatible materials.	- Dispose of recovered material in approved landfill or other waste disposal facility. Check with Provincial and Federal regulation.
Fuel Oil (No. 2 diesel dyed or pale yellow liquid with petroleum odour.	- Eliminate any source of ignition. Prevent spills from entering water courses. Contain with sand or earth. Recover with pump or inert adsorbent material into clean container. Wear safety glasses and rubber gloves to prevent contact with the eyes and skin.	- Dispose of recovered material in approved landfill or other waste disposal facility.
5168D Emulsifier dark viscous liquid with hydrocarbon odour	- Contain with sand or earth. Recover with inert adsorbent material and transfer into clean container. Wear chemical goggles and rubber gloves to prevent contact with the eyes and skin. Wash area with suitable detergent and rinse with water.	- Dispose of recovered material in approved landfill or other waste disposal facility.
Sodium Thiocyanate Colourless crystals with slight ammoniacal odour	- Sweep or shovel spill into a clean container. Prevent spills from entering any water courses. Wash remaining trace residues with water. Wear rubber gloves and chemical goggles to minimize contact with skin and eyes.	- Dispose of recovered material in approved landfill or other waste disposal facility.
Sodium Nitrite white or slightly yellow solid	- Sweep or shovel into clean, non-combustible drum. Remove any flammable materials and sources of ignition. Flush remaining trace residues with water. Wear chemical goggles and rubber gloves to minimize contact with the eyes and skin.	- Dispose of recovered material in approved landfill or other waste disposal facility.

APPENDIX B: ENVIRONMENTAL RELEASE PROCEDURES

MATERIAL	SPILL AND LEAK PROCEDURES	WASTE DISPOSAL
Acetic Acid clear colourless liquid with sharp vinegar odour	- Eliminate any source of ignition. Prevent spills from entering water courses. Contain with sand, earth or other inert adsorbent material. Transfer into clean, non-combustible container. Wash remaining trace residues with water. Wear chemical goggles and rubber gloves to prevent contact with the eyes and skin.	- Neutralize with soda ash or lime. Dispose of recovered material in approved landfill or other waste disposal facility.
Nitric Acid water white to slightly yellow liquid with nitrogen dioxide odour	- Eliminate any source of ignition. Prevent spills from entering water courses. Contain with sand, earth or other inert adsorbent material. Transfer into clean, non-combustible container. Wash remaining trace residues with water. Wear chemical goggles and rubber gloves to prevent contact with the eyes and skin.	- Neutralize with soda ash or lime. Dispose of recovered material in approved landfill or other waste disposal facility.
Caustic Soda, Anhydrous Odourless, white granular solid	- Sweep or shovel into clean, non-combustible drum. Neutralize the area carefully with weak acid to PH of 6 to 9. Neutralization is expected to be exothermic. Effervescence may result.	Neutralize the area carefully with weak acid to PH of 6 to 9. - Dispose of recovered material in approved landfill or other waste disposal facility
Ethylene Glycol Colourless liquid with mild odour	- Prevent spills from entering water courses. Contain with sand, earth or other inert adsorbent material. Transfer into clean, non-combustible container. Wash remaining trace residues with water. Wear chemical goggles and rubber gloves to prevent contact with the eyes and skin.	- Dispose of recovered material in approved landfill or other waste disposal facility.

APPENDIX C: EMULSION PLANT LAYOUT




POWER PLANT
MINE TANK FARM & DYKE (4611)
CAMP INFRASTRUCTURE
(FACILITY 4134):
•ACCOMMODATION COMPLEX
•EMERGENCY RESPONSE
•MEDICAL CENTRE
•SEWAGE TREATMENT
PLANT & OFF-SPEC POND (4735)
•POTABLE WATER
PLANT EVACUATION GUARD LOCATION
PIT 1 HAUL ROAD
(FACILITY 4221)
SHEARDOWN NW LAKE
EXISTING ROAD
PIT OFFICE
ORE CRUSHING AND
LOADING (FACILITY 4133)
LAYDOWN AREA
LANDFILL ACCESS ROAD
EMULSION PLANT ACCESS ROAD
FACILITIES, INCLUDING:
E BUILDING
TRUCK SCALE
H FACILITY
AGEMENT BUILDING
OP
UTILITY BERM
EMULSION PLANT GATE
LANDFILL
STE DISPOSAL LANDFARM
CILITY 4550)
IT 8,000 KG-
M DISTANCE 1KM
EXPLOSIVES PADS
(FACILITY 4135)
EMULSION PLANT
D7 LIMIT 90,000 KG-
MINIMUM DISTANCE 1K
RAD.
NOT

Appendix F

Options Exercise Notices

November 1, 2018

Fai Ndofor
Regulatory Manager, QIA
P.O. Box 1340
Iqaluit, NU X0A 0H0

RE: 2018 Land Classification Amendment (Options Exercise Notice)
Commercial Lease No. Q13C301

In accordance with Section 3.2 of Commercial Lease No. Q13C301 (Commercial Lease) between the Qikiqtani Inuit Association (QIA) and Baffinland Iron Mines Corporation (Baffinland), the purpose of this letter is to request an amendment to reclassify Lands (Options Exercise Notice; OEN) outside the limits of the Impact Areas for the Mary River Project (the Project), outlined in the Commercial Lease. Amendments to the Impact Area limits are being requested to:

1. Accommodate quarries and laydowns proposed in the 2019 Work Plan;
2. Reconcile Milne Inlet Tote Road (Tote Road) Impact Area limits to reflect Tote Road realignments and upgrades completed for the Early Revenue Phase (ERP) of the Project; and,
3. Finalize amended Tote Road Impact Area limits to reflect communication network upgrades completed in 2018.

A completed Options Exercise Notice (OEN) Application Form for this request, consistent with the requirements of Section 3.4 of the Commercial Lease and Lease Operations Guide "Option Exercise Notice Submission", is provided in Attachment 1. Satellite photography taken of the Project in the summer of 2018 has been used to delineate Project infrastructure and the required amendments to the Project's Impact Area limits. Figures showing the proposed amendments to the Impact Area limits are provided in Attachment 2. New survey points that delineate the amended Impact Area limits are provided in Attachment 3.

2019 Work Plan – Quarries and Laydowns

The 2019 Work Plan includes the development of several quarries and laydowns. Table 1 outlines the quarries and laydowns in the 2019 Work Plan that require an amendment to the Impact Area limits defined in the Commercial Lease.

Table 1 – 2019 Work Plan Works Requiring an Amendment to Impact Area Limits

Development ID	Type of Development	Approximate Location	Project Area	Figure Reference	Additional Impact Area Required (m^2)
Q5 Quarry	New Quarry	Km 5 to 8	Tote Road	Figure 3, 4	156,183
PQ2a Quarry	New Quarry	Km 31	Tote Road	Figure 10	861,831
PQ4a Quarry	New Quarry	Km 45	Tote Road	Figure 14	241,912
PQ12a Quarry	New Quarry	Km 77	Tote Road	Figure 23	374,932

Development ID	Type of Development	Approximate Location	Project Area	Figure Reference	Additional Impact Area Required (m^2)
Laydown 2 (L2)	New Laydown	Km 6.5	Tote Road	Figure 3	27,784
Laydown 4 (L4)	New Laydown	Km 25	Tote Road	Figure 8	49,514
Laydown 7 (L7)	New Laydown	Km 47	Tote Road	Figure 15	7,755
Laydown 10 (L10)	New Laydown	Km 78	Tote Road	Figure 24	32,077
Total (m^2)					**1,751,988**
Total (hectares)					**175.2**

Tote Road Realignments and Upgrades

To facilitate the transportation of ore from the Mine Site to Milne Port for the ERP of the Project, sections of the Tote Road have been upgraded and realigned since 2013. The upgrades and realignments have improved the operational efficiency of the Tote Road as well as addressed health, safety and environmental concerns identified by operations. Satellite photography taken in the summer of 2018 has been used to delineate Tote Road realignments and upgrades completed to date. Tote Road realignments and upgrades that require an amendment to the Tote Road Impact Area limits are presented in Table 2 below.

Table 2 – Tote Road Realignments and Upgrades Requiring an Amendment to Tote Road Impact Area Limits

Approximate Location	Figure Reference	Additional Impact Area Required (m^2)
Km 9	Figure 4	5,146
Km 12	Figure 5	15,692
Km 23	Figure 8	8,325
Km 38	Figure 12	16,594
Km 40	Figure 13	4,825
Km 52	Figure 16	6,837
Km 54	Figure 17	17,024
Km 57	Figure 17	7,281
Km 75	Figure 23	23,820
Km 76	Figure 23	25,748
Km 77	Figure 23	8,500
Km 80	Figure 24	6,392
Km 87	Figure 26	3,920
Total (m^2)		**150,104**
Total (hectares)		**15.0**

Communication Network Upgrades

On January 16, 2018, Baffinland submitted to the QIA an OEN to support planned upgrades to the Project's communication network[1]. On February 15, 2018, Baffinland received approval from the QIA for the OEN and associated works[2]. Construction associated with the proposed upgrades was completed by July 2018.

Baffinland has used the 2018 satellite photography to delineate the new infrastructure and disturbance areas created by the communication network upgrades in order to reconcile post-construction disturbance and finalize amendments to the Tote Road Impact Area limits. Table 3 outlines the communication network upgrades that require an amendment to the Project's Impact Area limits. As shown in Table 3, all upgrades requiring an amendment to the Project's Impact Area limits were located along the Tote Road.

Table 3 – Communication Network Upgrades Requiring an Amendment to Impact Area Limits

Development ID	Type of Development	Figure Reference	Additional Impact Area Proposed– Pre-Construction (m^2)[1]	Additional Impact Area Required – Post Construction (m^2)
Km 26 Com. Tower	Installation of New Tower	Figure 9	2,200	2,530
Km 49 Com. Tower	Replacement of Com. Tower	Figure 15	5,300	6,609
Km 69 Com. Tower	Replacement of Com. Tower	Figure 21	4,800	4,459
Km 80 Com. Tower	Installation of New Tower	Figure 24	9,000	10,552
Km 88 Com. Tower	Installation of New Tower	Figure 27	27,400	21,064
Total (m^2)			**48,700**	**45,214**
Total (hectares)			**4.9**	**4.5**

Notes:

[1]As proposed by Baffinland in the original Communication Network Upgrades OEN (January 16, 2018).

Post-construction, finalized amendments to the Tote Road Impact Area limits for the upgrades outlined in Table 3 are presented in Attachment 2.

[1] Baffinland (2018). Re: Communications Network Upgrade Notification and Land Classification Amendment (Options Exercise Notice) Commercial Lease No. Q13C301. January 16, 2018 (Dated January 10, 2018)

[2] QIA (2018). Conditional Approval for Communications Network Upgrade Notification and Land Classification Amendment. February 15, 2018.

Conclusion

We trust that this information provides an understanding of what Baffinland is proposing as it relates to the reclassifying Lands at the Project under Section 3 of the Commercial Lease. Please do not hesitate to contact the undersigned, should you have any questions or comments.

Regards,



Christopher Murray
Environmental and Regulatory Compliance Manager

Attachments:

Attachment 1: OEN Application Form
Attachment 2: Figures
Attachment 3: Coordinates for New Survey Points Proposed

cc. Sean Joseph (QIA)
Grant Goddard, Megan Lorde-Hoyle, Andrew Vermeer (Baffinland)

Attachment 1

OEN Application Form

#	OEN APPLICATION FORM	
1	OEN Title	**2018 Land Classification Amendment**
2	General geographic UTM coordinates of the areas subject to amendment	Refer to Attachments 2 and 3 for geographical locations and coordinates of areas subject to amendment.
3	A description of the characteristics of the land including acknowledgement and explanation of any environmental sensitivities[3]	Vegetation at the Project is discontinuous. Dry sites are very sparsely vegetated, whereas wet areas tend to have a more continuous cover of sedge, cottongrass, saxifrage, and moss. Landform is a broad, gently warped, old erosion surface composed of crystalline Precambrian rocks. Bedrock outcroppings are common, and Turbic Cryosols developed on hummocky, thin, discontinuous sandy moraine is the dominant soil. Organic and Static Cryosolic soils also occur. Most of the ecoregion is underlain by continuous permafrost with low ice content. No other unique environmental sensitivities are expected and environmental management will be done in accordance to site environmental management and regulatory requirements.
4	The specific nature of activities that have historically occurred on the proposed Lands[4]	To accommodate the quarries, laydowns and Tote Road realignments/upgrades, Lands outside the current Commercial Lease Impact Area limits will need to be reclassified as Impact Area near Milne Port and along the Tote Road. These Lands are undisturbed and are currently classified as General Areas of the Property in the Commercial Lease. No Project activities have occurred within these Lands. As discussed in the original OEN for communications network upgrades at Km 26, Km 49, Km 69, Km 80 and Km 88, the upgrades involved reclassifying Lands outside of the current Commercial Lease limits along the Tote Road. Select upgrade locations were already partially disturbed prior to construction as result of normal operation of the Tote Road.
5	The specific nature of activities to be conducted on the proposed Lands[5]	Activities at quarry locations will include blasting, stockpiling and crushing aggregate.

[3] This description shall at a minimum include a complete description of the following components:

i. Wildlife
ii. Vegetation
iii. Permafrost
iv. Water quality (includes Acid Rock Drainage and Metal Leaching)
v. Air quality
vi. Associated map(s), sketches and other information in sufficient detail and in a scale as to QIA to consider the amendment request, including clear presentation of existing geographical features and relevant project facilities. The map(s) will include nearby facilities and geographical features (e.g. water bodies, topography).
vii. Photographic record of pre-operations in the OEN area.

[4] Indicate whether lands are disturbed or undisturbed - if disturbed, nature and duration of past disturbance (e.g. hectares of land disturbed, tonnes of material quarried, other types of activities etc.)

[5] Associated drawings and designs are to be included as annexes.

#	OEN APPLICATION FORM	
		Activities at laydown locations will include the storage of equipment and supplies. Amendments to the Project's Tote Road Impact Areas to reflect Tote Road realignments and upgrades have been proposed to ensure a 50 metre buffer of undisturbed land is maintained between Project infrastructure/disturbance areas and the Tote Road Impact Area limits. As a result, no activities are planned within the reclassified Lands that make up the 50 metre undisturbed buffer.
6	Proposed duration of the activities	Work is planned to commence following QIA approval of this application and any subsequent approvals required (i.e. Quarry Management Plans, Water Licence Modification, etc.). Quarries, laydowns and Tote Road realignments/upgrades are expected to be in use for the remainder of the Project's life.
7	Associated changes to all Environmental Management and Monitoring Plans[6]	Quarry Management Plans will be developed and submitted to QIA for approval for quarries on IOL: Q5, PQ2a, PQ4a and PQ12a.
8	All related Annual Work Plan amendments, if any.[7]	The 2018 Work Plan (Rev. 1) included reclamation security requirements for the communication network upgrades, as proposed in the original OEN (Jan. 16, 2018). The 2019 Work Plan includes reclamation security requirements for the proposed development of the quarries and laydowns. The 2019 Work Plan Addendum will reconcile disturbance areas at the Project using the 2018 satellite photography, including disturbance areas associated with the communication network upgrades and Tote Road realignments/upgrades.
9	Relevant information concerning financial security, including the Security Deposit.	Same as above.
10	Indicate whether changes are required to existing approvals, licences, plans, permits or authorizations.	Water Licence Modification and/or DFO authorization may be required for the proposed quarries and associated access road culverts.
11	The anticipated increase or decrease in Rent payment where the increase or decrease is shown compared against the initial Rent payment amount pre-OEN approval.	An additional 1,947,300 m^2 (194.7 hectares) of Lands is anticipated to be reclassified as Impact Area. This increase in Impact Area is anticipated to increase rent by approximately $38,940 which will be reconciled in next year's rent payment.

[6] Relevant environmental management plans associated with the OEN. If there are no revisions required to management plans, a list of the most current environmental management plans will be provided.

[7] Indicate whether activity is outside of scope of relevant Annual Work Plan.

Attachment 2

Figures

(Refer to Accompanying Files)

Attachment 2

Figures

510,000
520,000
530,000
540,000
550,000
560,000
7,980,000
7,970,000
7,960,000
7,950,000
7,940,000
7,930,000
7,920,000
7,910,000
7,900,000
MILNE PORT
SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7
SHEET 8
SHEET 9
SHEET 10
SHEET 11
SHEET 12
SHEET 13
SHEET 14
SHEET 15
SHEET 16
SHEET 17
SHEET 18
SHEET 19
SHEET 20
SHEET 21
SHEET 22
SHEET 23
SHEET 24
SHEET 25
SHEET 26
SHEET 27
SHEET 28
SHEET 29
MINE SITE
SCALE 2 1 0 2 4 6 8 10 km

LEGEND:

- MILNE PORT / MINE SITE
- MILNE INLET TOTE ROAD
- IOL SURFACE AND SUBSURFACE
- IOL SURFACE ONLY
- REFERENCE SHEET EXTENT
- POTENTIAL DEVELOPMENT AREA
- WATER

NOTES:

1. COORDINATE GRID IS IN METRES.
   COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP: HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004).
3. FIGURE CREATED BY KNIGHT PIESOLD LIMITED.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	01NOV'18	ISSUED WITH TRANSMITTAL	AV	AS	AV

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD OVERVIEW

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 1 REV 0

SAVED: I:\102\00181\48\A\GIS\Figs\B09 R0.mxd; Nov 01, 2018 12:52 PM; asimpson



LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. ORTHO IMAGERY COLLECTED SUMMER OF 2018, PROVIDED BY BAFFINLAND IRON MINES CORPORATION, OCTOBER 6, 2018.
3. COMMERCIAL LEASE BOUNDARY COORDINATES OBTAINED FROM BAFFINLAND IRON MINES CORPORATION, JANUARY, 2018. BOUNDARY EXTENTS HAVE BEEN DIGITIZED BASED ON THESE POINT LOCATIONS ARE ARE APPROXIMATE ONLY.
4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 1 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 2 REV 0

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503,500
7,973,000
504,000
7,973,500
504,500
7,974,000
7,972,500
504,000
7,972,000
504,500
7,971,500
505,000
7,971,000
505,500
7,970,500

KM 4
KM 5
KM 6
KM 7

Q1 (222,136 m²)
Q4
Q5
Q6
Q7

LAYDOWN AREA
LD-3
LAYDOWN AREA
LD-5

CV-173
CV-172
CV-171
CV-170
CV-169
CV-168
CV-167
CV-166
CV-165
CV-164
CV-163
CV-162

MILNE PORT
MINE SITE

Phillips Creek

1
2
3
4
5
6
7
8
9
10
11
12
13

L2 (56,430 m²)
27,784 m²
1,602 m²
(14,967 m²)
45,058 m²
Q5 (1,225,590 m²)
109,523 m²

EXPLOSIVES
MAGAZINE
LAYDOWN

SCALE 100 50 0 100 200 300 400 500 m

LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

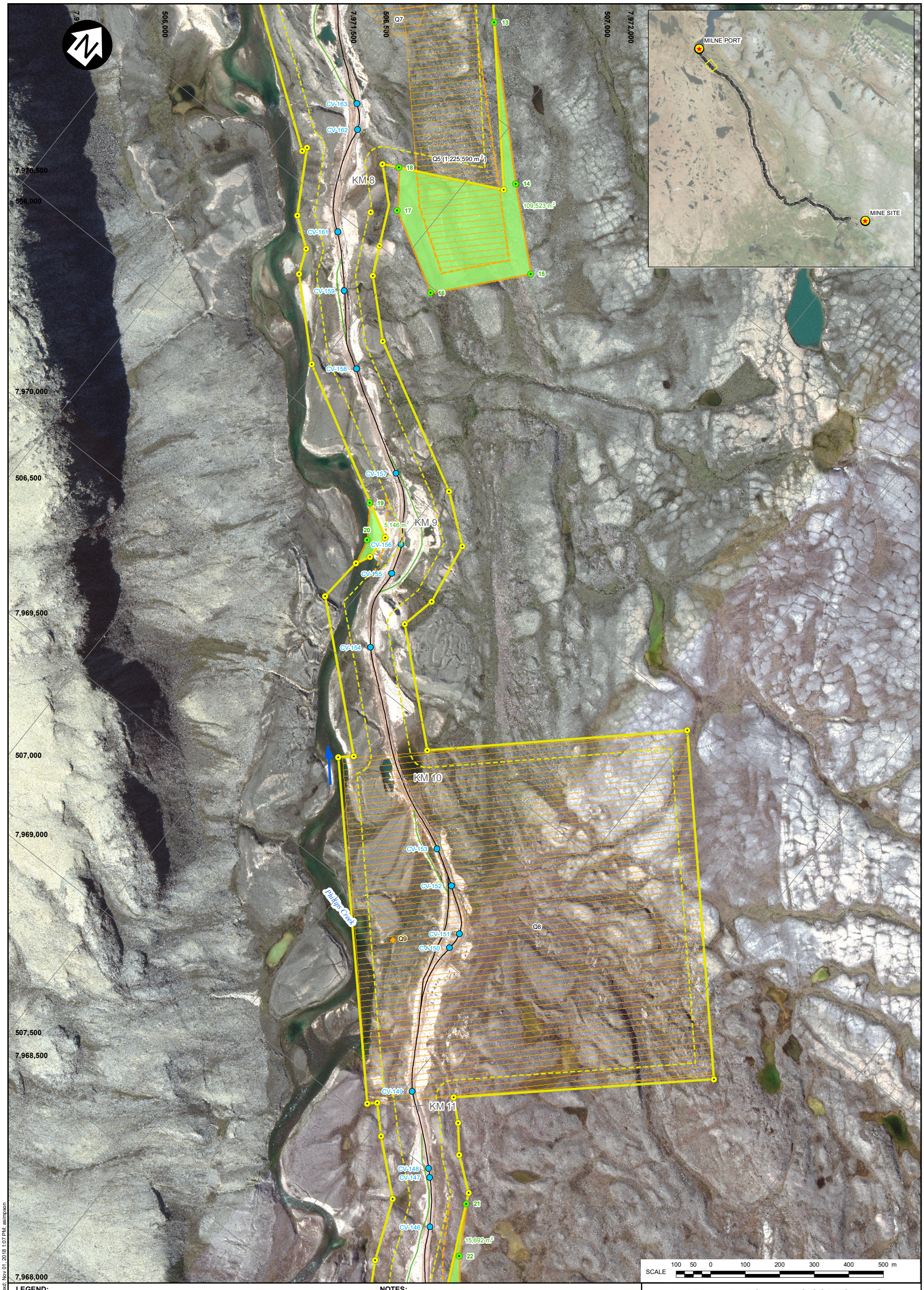
TOTE ROAD ALIGNMENT (SHEET 2 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 3 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
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- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 3 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 4 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
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- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 4 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 5 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
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- PROPOSED LEASE BOUNDARY EXPANSION
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- FLOW DIRECTION

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 5 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 6 REV 0

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7,965,000
513,500
514,000
7,965,500
514,500
7,964,500
513,500
7,964,000
514,000
7,963,500
7,963,000
514,500
7,962,500
515,000
7,962,000

MILNE PORT
MINE SITE

KM 19
KM 20
KM 21
KM 22

CV-126
CV-125
CV-124
CV-123

Phillips Creek

Q11

SCALE 100 50 0 100 200 300 400 500 m

LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
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- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 6 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 7 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

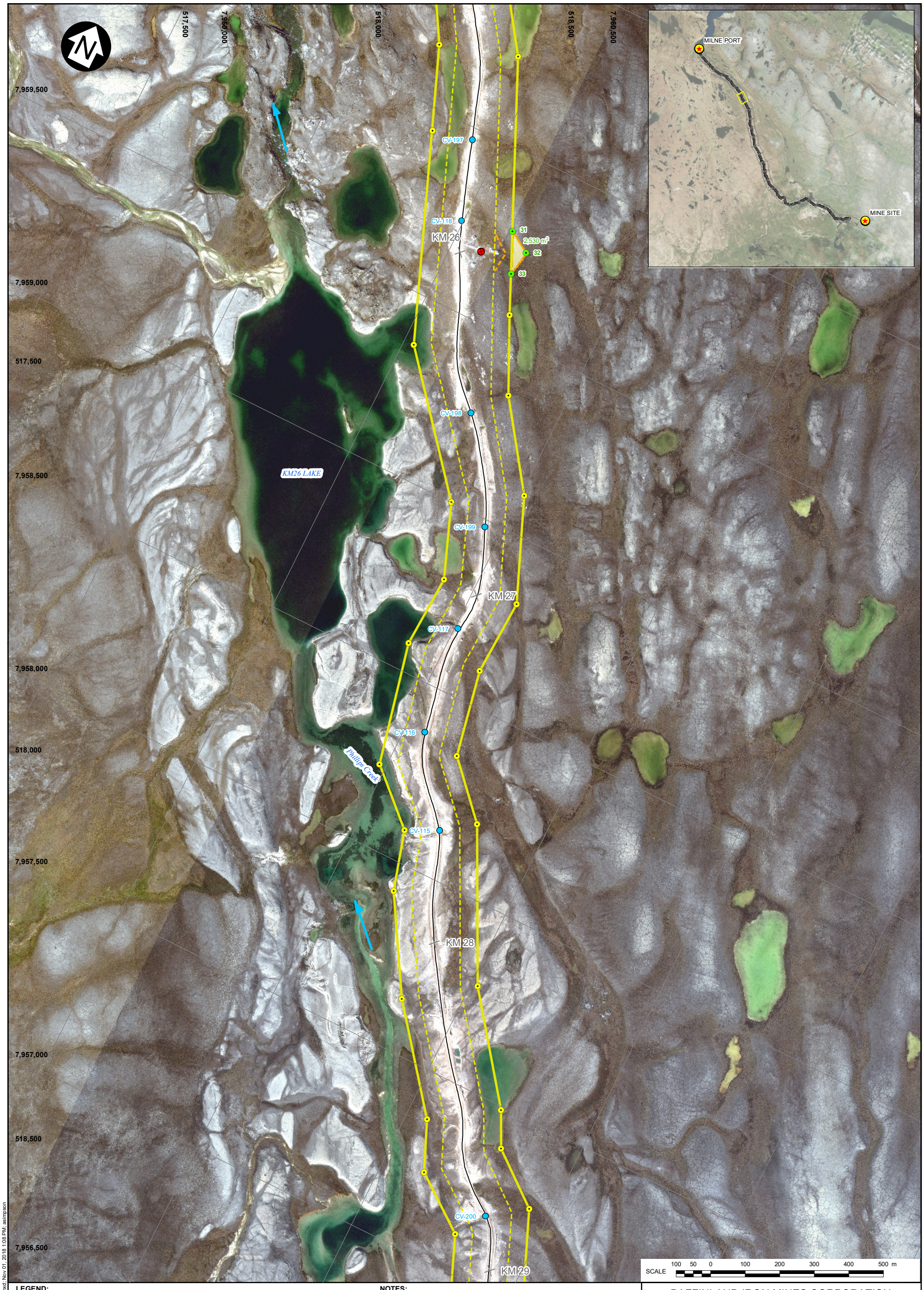
TOTE ROAD ALIGNMENT (SHEET 7 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 8 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
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- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 8 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 9 REV 0

SAVED: I:\1\02\00181\48\A\GIS\Figs\B.07 R0.mxd; Nov 01, 2018 1:08 PM; asimpson

519,000
519,500
520,000
7,957,500
7,956,500
7,956,000
519,500
7,955,500
7,955,000
520,000
7,954,500
7,954,000
520,500

MILNE PORT
MINE SITE

CV-200
KM 29
CV-114
KM 30
Phillips Creek
Q13
CV-201
CV-113
861,831 m²
KM 31
57
37
36
38
34
39
(143,036 m²)
56
35
40
41
42
PQ2 A (486,031 m²)
861,831 m²
43
55
44
45
54
46
47
48
53
52
49
51
50
CV-112
KM 32
CV-111
CV-110
Km 37 Lake

SCALE 100 50 0 100 200 300 400 500 m

LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
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- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 9 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

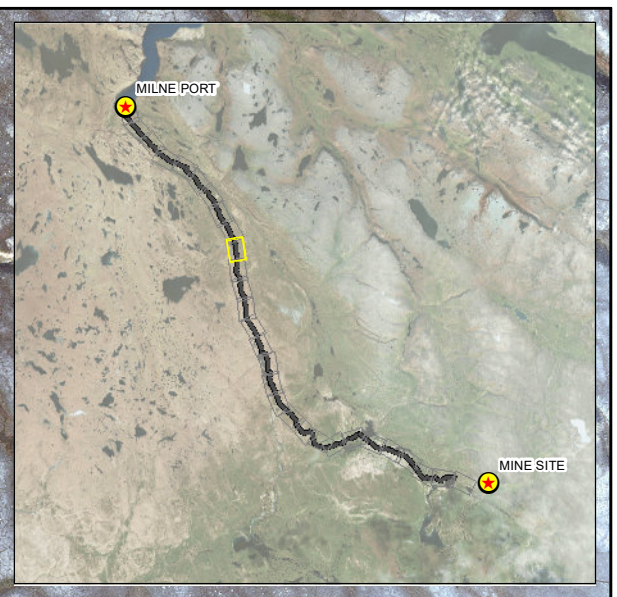
FIGURE 10 REV 0

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520,500
521,000
7,954,500
521,500
7,954,000
7,953,500
7,953,000
7,952,500
520,500
7,952,000
7,951,500
7,951,000

CV-111
CV-110
CV-109
CV-108
CV-202
CV-107
CV-106
CV-105
CV-104
CV-203
CV-204

Km 37 Lake
KM 32 LAKE (MP-MRY-3)
KM 33
KM 34
KM 35



SCALE 100 50 0 100 200 300 400 500 m

LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 10 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 11 REV 0

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520,500
521,000
521,500
522,000
7,951,000
520,500
7,950,500
7,950,000
7,949,500
7,949,000
7,948,500
7,948,000
7,947,500

N

MILNE PORT
MINE SITE

CV-103
CV-102
KM 36
Phillips Creek
CV-101
KM 37
CV-100
58
59
16,594 m²
60
61
CV099
CV-099
KM 38
CV-098
KM 39
CV-097

SCALE 100 50 0 100 200 300 400 500 m

LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 11 OF 29)

Baffinland

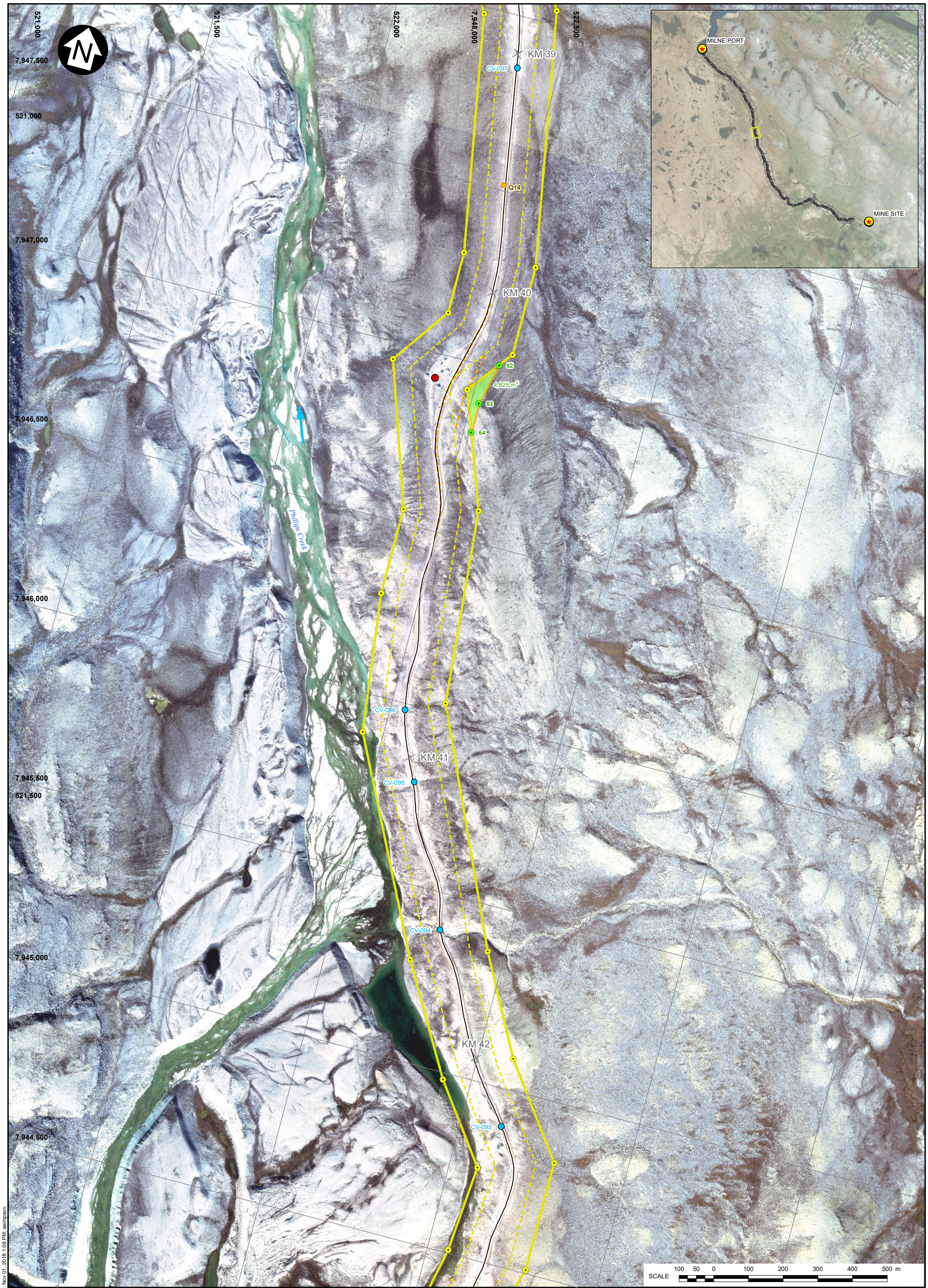
P/A NO. NB102-181/48

REF NO. NB18-00627

FIGURE 12

REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
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- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. ORTHO IMAGERY COLLECTED SUMMER OF 2018, PROVIDED BY BAFFINLAND IRON MINES CORPORATION, OCTOBER 6, 2018.
3. COMMERCIAL LEASE BOUNDARY COORDINATES OBTAINED FROM BAFFINLAND IRON MINES CORPORATION, JANUARY, 2018. BOUNDARY EXTENTS HAVE BEEN DIGITIZED BASED ON THESE POINT LOCATIONS ARE ARE APPROXIMATE ONLY.
4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 12 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 13 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 13 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 14 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 14 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 15 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

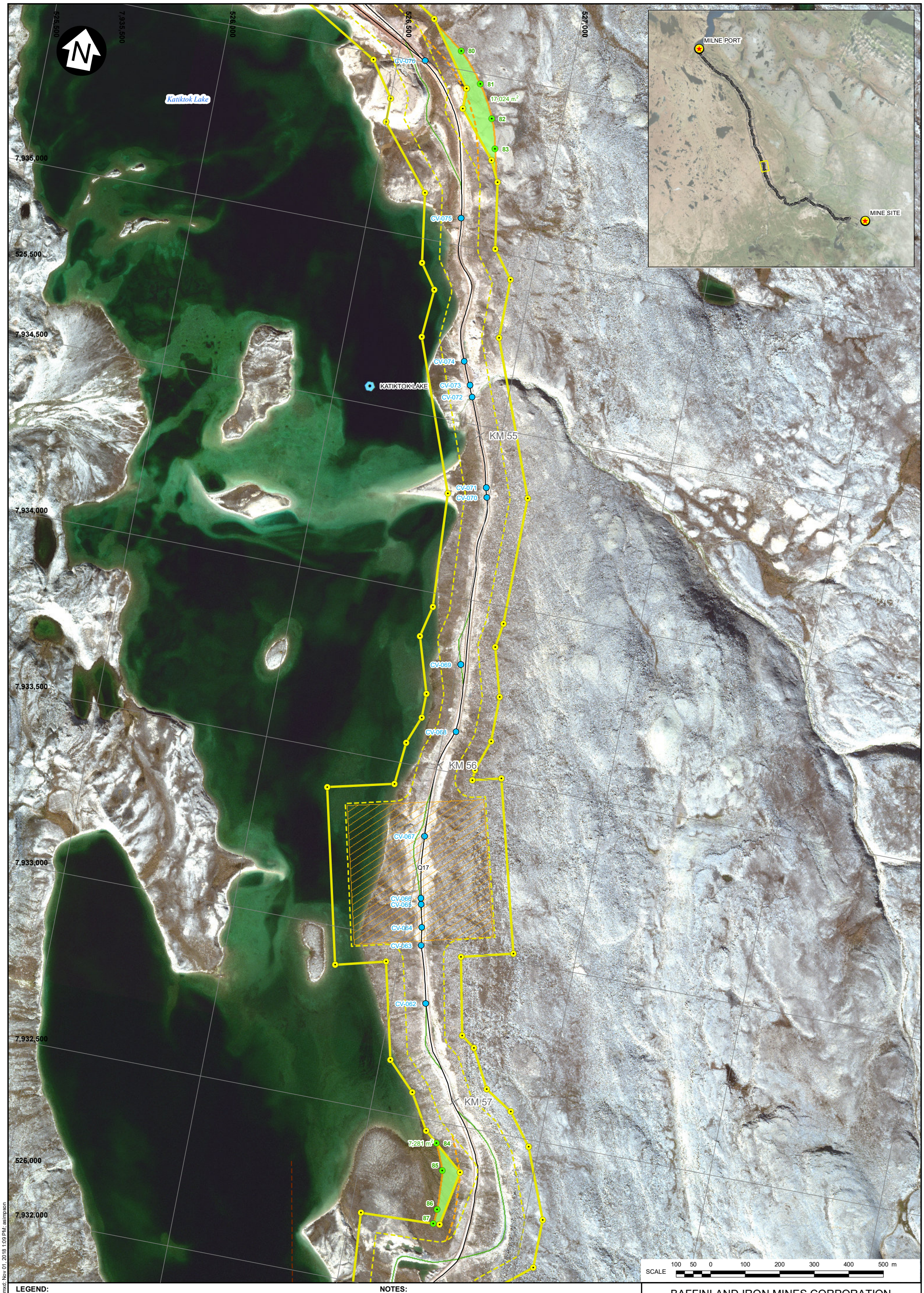
TOTE ROAD ALIGNMENT (SHEET 15 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 16 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 16 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 17 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

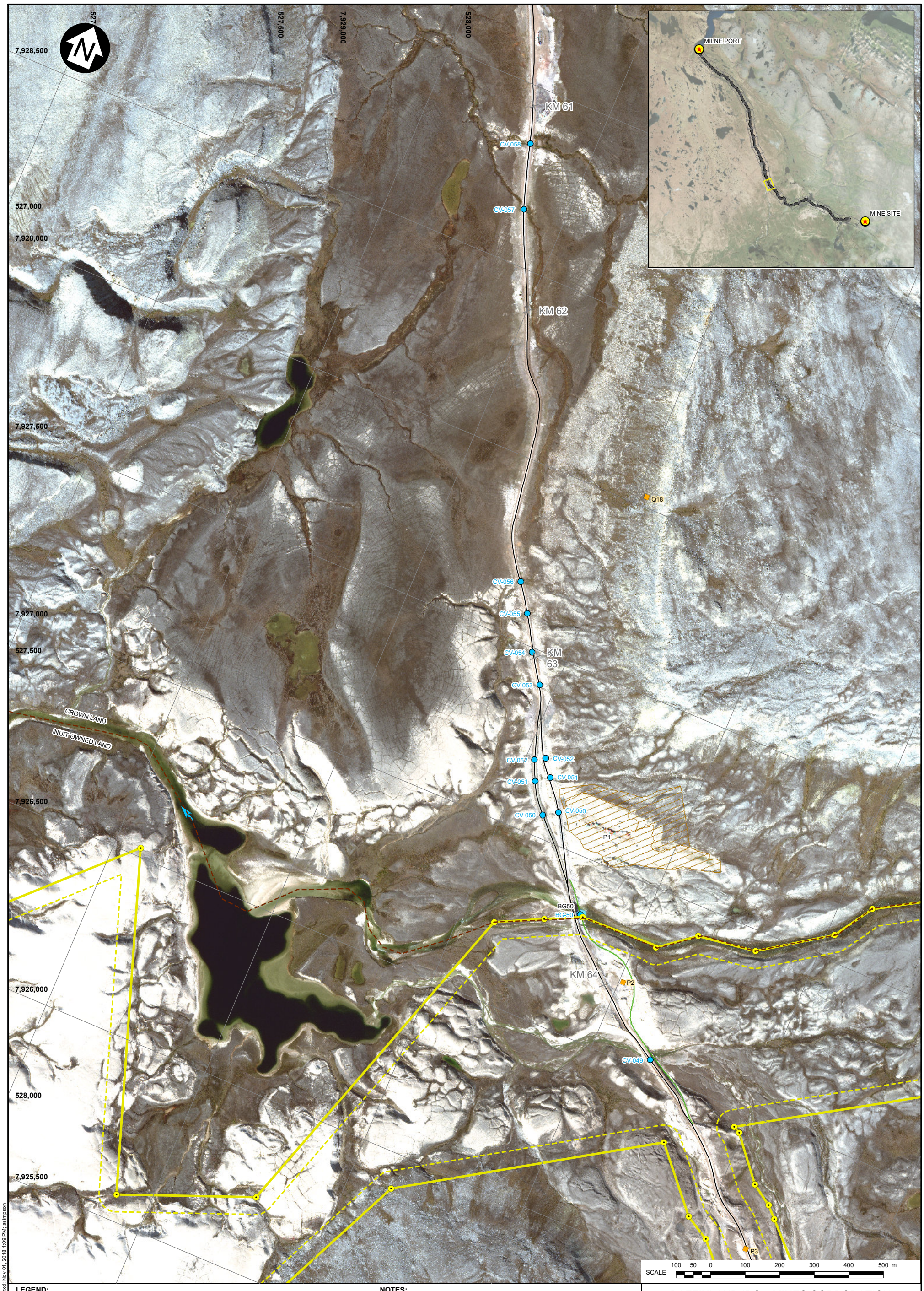
TOTE ROAD ALIGNMENT (SHEET 17 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 18 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

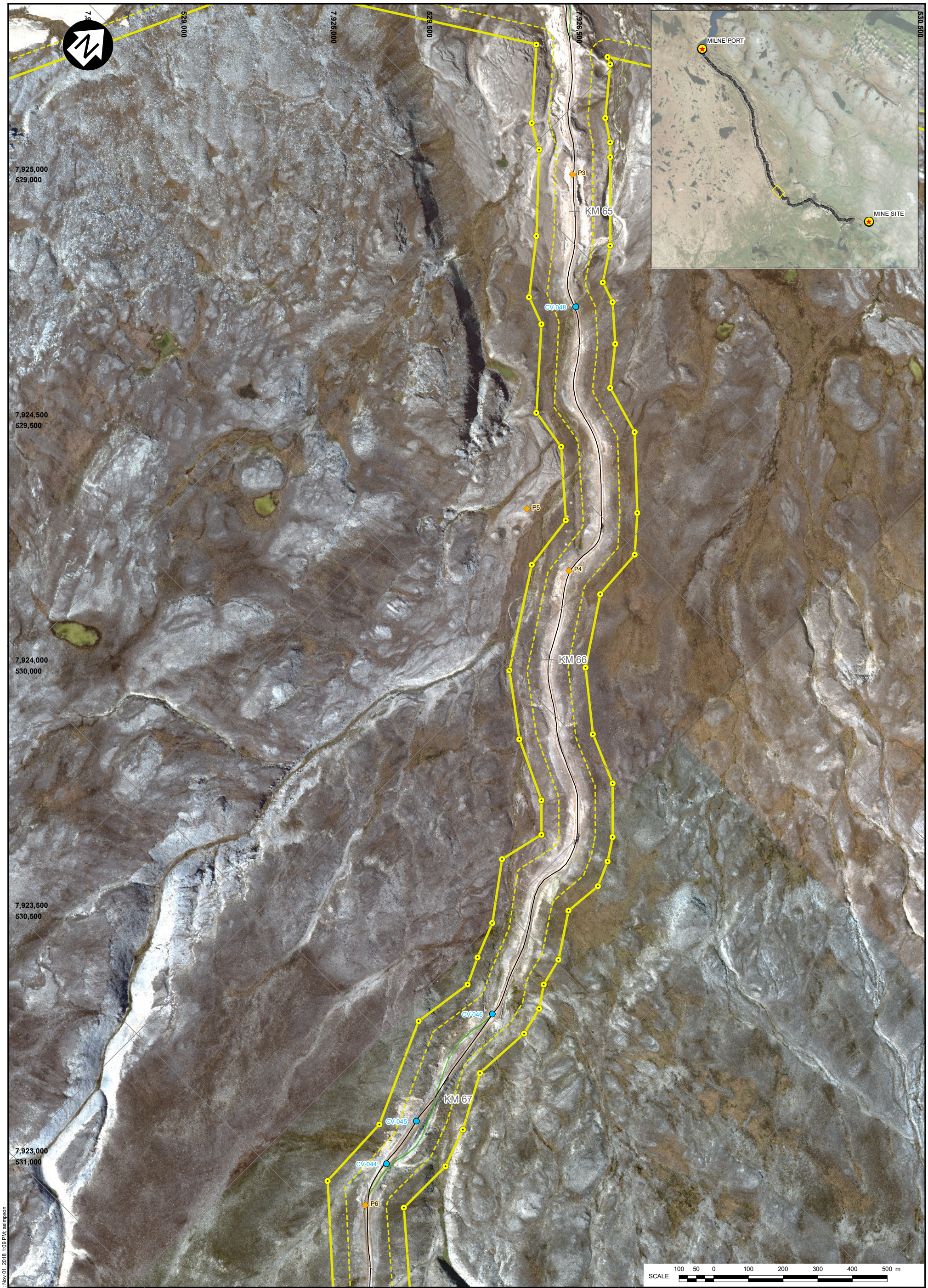
TOTE ROAD ALIGNMENT (SHEET 18 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 19 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 19 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 20 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 20 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 21 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 21 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 22 REV 0

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537,000
538,000
538,500
539,000
539,500
540,000
7,919,000
7,919,500
7,920,000
536,500

KM 74
KM 75
KM 76
KM 77
CV-036
CV-211
CV-212
CV-033
BG-33
P9
P10
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
23,820 m²
15,048 m²
10,700 m²
PQ12A (279,890 m²)
(6,891 m²)
8,500 m²
374,932 m²

MILNE PORT
MINE SITE

SCALE 100 50 0 100 200 300 400 500 m

LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 22 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 23 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 23 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 24 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 24 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 25 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
- PROPOSED LEASE BOUNDARY EXPANSION
- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. ORTHO IMAGERY COLLECTED SUMMER OF 2018, PROVIDED BY BAFFINLAND IRON MINES CORPORATION, OCTOBER 6, 2018.
3. COMMERCIAL LEASE BOUNDARY COORDINATES OBTAINED FROM BAFFINLAND IRON MINES CORPORATION, JANUARY, 2018. BOUNDARY EXTENTS HAVE BEEN DIGITIZED BASED ON THESE POINT LOCATIONS ARE ARE APPROXIMATE ONLY.
4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 25 OF 29)

Baffinland

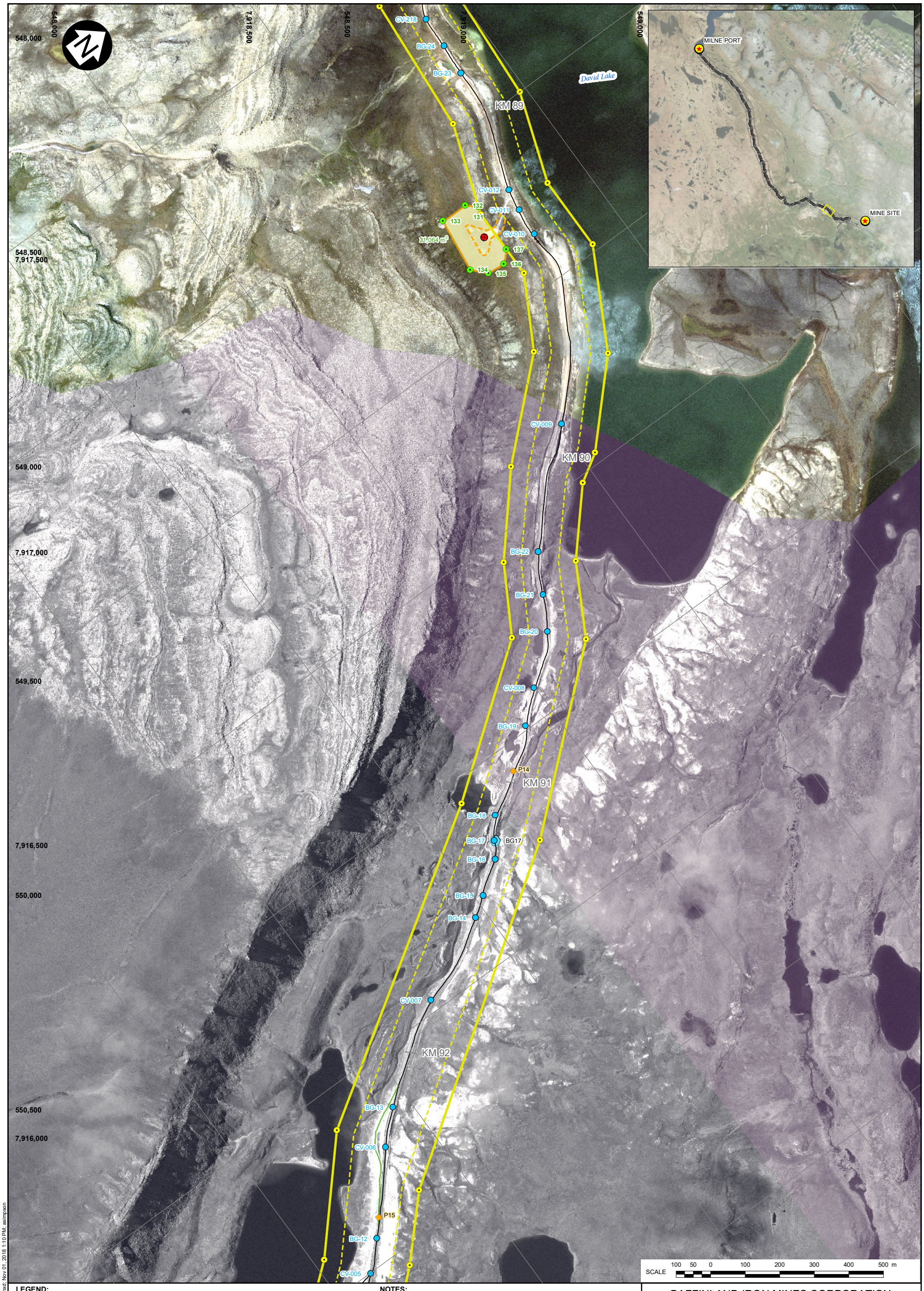
P/A NO. NB102-181/48

REF NO. NB18-00627

FIGURE 26

REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
- COMMUNICATION TOWER
- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
- COMMERCIAL LEASE BOUNDARY SURVEY POINTS
- COMMERCIAL LEASE EXTENDED PORTIONS
- CURRENT COMMERCIAL LEASE BOUNDARY
- UNDISTURBED 50 m BUFFER FROM COMMERCIAL LEASE BOUNDARY
- PROPOSED LEASE BOUNDARY EXPANSION FOR COMMUNICATION NETWORK UPGRADES – POST-CONSTRUCTION
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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

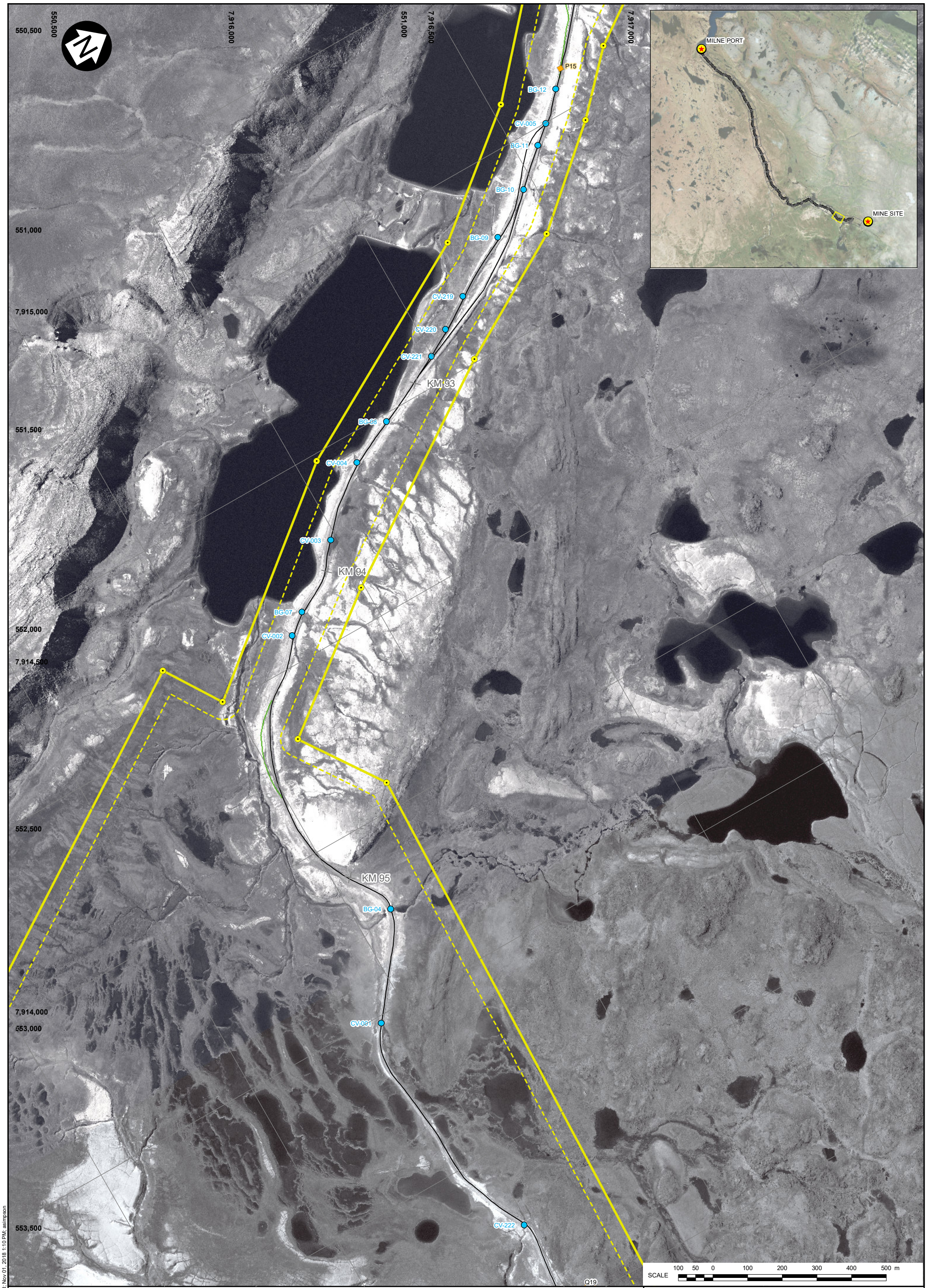
TOTE ROAD ALIGNMENT (SHEET 26 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 27 REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
- BORROW AREA
- LAYDOWN AREA
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- WATER CROSSING
- APPROVED WATER SOURCE
- QUARRY POINT LOCATION (HATCH 2014)
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- UNDISTURBED 50 m BUFFER FROM PROPOSED COMMERCIAL LEASE BOUNDARY
- FLOW DIRECTION

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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 27 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 28 REV 0

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7,914,000
7,914,500
554,000
7,915,000
7,915,500
554,000
554,500
555,000
555,500
556,000
556,500
7,913,500
557,000

CV-222
Q19
BG-03
KM 96
BG-02
CV-223
CV223 (TOM RIVER)
KM 97
KM 97 BORROW PIT #5
Q20
KM 97 BORROW PIT #3
KM 97 BORROW PIT #4
CV-224
KM 98
KM 97 BORROW PIT #2
KM 97 BORROW PIT #1
KM 99
CV-225
L13 (7,049 m²)
Camp Lake

MILNE PORT
MINE SITE

SCALE 100 50 0 100 200 300 400 500 m

LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
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4. FIGURE CREATED BY KNIGHT PIESOLD LTD.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	01NOV'18	ISSUED WITH TRANSMITTAL	RAC	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 28 OF 29)

Baffinland

P/A NO. NB102-181/48

REF NO. NB18-00627

FIGURE 29

REV 0

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LEGEND:

- TOTE ROAD km POST
- TOTE ROAD CENTERLINE
- HISTORIC TOTE ROAD CENTERLINE (TO BE RECLAIMED)
- QUARRY AREA
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- LAYDOWN AREA
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REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TOTE ROAD ALIGNMENT (SHEET 29 OF 29)

Baffinland

P/A NO.	REF NO.
NB102-181/48	NB18-00627

FIGURE 30 REV 0

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Attachment 3

Coordinates for New Survey Points Proposed

New Survey Point ID	Northing[1]	Easting[1]
1	7,971,960	505,442
2	7,971,870	505,431
3	7,971,620	505,570
4	7,971,780	505,624
5	7,973,230	505,418
6	7,973,190	505,463
7	7,973,130	505,522
8	7,973,080	505,555
9	7,972,940	505,676
10	7,972,720	506,039
11	7,972,460	506,138
12	7,972,280	506,270
13	7,971,710	506,777
14	7,971,390	507,116
15	7,971,210	507,313
16	7,970,990	507,121
17	7,971,110	506,897
18	7,971,210	506,823
19	7,970,400	507,362
20	7,970,310	507,423
21	7,968,990	508,844
22	7,968,860	508,923
23	7,968,730	509,029
24	7,968,660	509,119
25	7,968,560	509,280
26	7,961,160	517,948
27	7,961,190	518,017
28	7,960,850	518,191
29	7,960,520	518,305
30	7,960,480	518,271
31	7,959,780	518,640
32	7,959,740	518,702
33	7,959,670	518,690
34	7,955,470	521,356
35	7,955,450	521,714
36	7,955,740	521,585
37	7,955,960	521,727
38	7,955,950	521,939
39	7,955,820	522,084
40	7,955,750	522,292
41	7,955,670	522,352
42	7,955,610	522,346
43	7,955,520	522,397
44	7,955,470	522,441
45	7,955,380	522,485
46	7,955,350	522,540
47	7,955,260	522,516
48	7,955,220	522,530
49	7,955,140	522,598

New Survey Point ID	Northing[1]	Easting[1]
50	7,954,980	522,557
51	7,954,840	522,344
52	7,954,950	522,251
53	7,954,960	522,121
54	7,955,060	521,979
55	7,955,200	521,868
56	7,955,230	521,298
57	7,955,370	520,967
58	7,949,190	521,860
59	7,949,090	521,885
60	7,948,990	521,922
61	7,948,910	521,971
62	7,947,010	522,550
63	7,946,890	522,522
64	7,946,800	522,522
65	7,943,000	523,440
66	7,943,030	523,499
67	7,943,050	523,498
68	7,943,290	523,597
69	7,943,070	523,883
70	7,942,600	523,927
71	7,942,550	523,617
72	7,942,810	523,508
73	7,942,860	523,509
74	7,942,800	523,414
75	7,940,780	523,991
76	7,940,500	524,174
77	7,938,470	525,045
78	7,938,360	525,043
79	7,938,350	525,140
80	7,935,550	526,674
81	7,935,470	526,747
82	7,935,380	526,799
83	7,935,290	526,824
84	7,932,440	527,207
85	7,932,360	527,238
86	7,932,250	527,244
87	7,932,210	527,242
88	7,922,620	532,679
89	7,922,640	532,761
90	7,922,560	532,815
91	7,919,930	536,750
92	7,920,000	536,951
93	7,920,060	537,127
94	7,920,140	537,352
95	7,920,450	538,216
96	7,920,540	538,659
97	7,920,820	538,927
98	7,920,820	538,895

New Survey Point ID	Northing[1]	Easting[1]
99	7,921,020	538,685
100	7,921,600	539,036
101	7,921,680	539,359
102	7,921,330	539,408
103	7,921,190	539,334
104	7,921,030	539,304
105	7,921,010	539,249
106	7,920,950	539,198
107	7,920,990	539,237
108	7,921,240	540,208
109	7,921,140	540,259
110	7,921,260	540,490
111	7,921,380	540,488
112	7,922,320	542,021
113	7,922,400	542,071
114	7,922,420	542,093
115	7,922,430	542,133
116	7,922,410	542,179
117	7,922,380	542,205
118	7,922,350	542,221
119	7,922,110	542,219
120	7,922,070	542,204
121	7,921,970	542,339
122	7,921,970	542,361
123	7,921,950	542,385
124	7,921,950	542,395
125	7,921,930	542,417
126	7,919,780	546,974
127	7,919,790	546,983
128	7,919,780	547,058
129	7,919,720	547,113
130	7,919,710	547,110
131	7,918,690	549,197
132	7,918,660	549,171
133	7,918,580	549,170
134	7,918,560	549,330
135	7,918,600	549,369
136	7,918,650	549,373
137	7,918,680	549,343

Notes:

[1]NAD83 UTM Zone 17