# MARY RIVER PROJECT
# PHASE 2 PROPOSAL

## Updated Application for Amendment No. 2 of Type A Water Licence 2AM-MRY1325

| | |
|---|---|
| **Prepared for:** | Baffinland Iron Mines Corporation |
| **Prepared by:** | Knight Piésold Ltd. |
| **P/A Number:** | NB102-181/53-3 |
| **Revision Number:** | 0 |
| **Date:** | May 2, 2019 |

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**NB102-181/53-3**

# MARY RIVER PROJECT - PHASE 2 PROPOSAL

# UPDATED APPLICATION FOR AMENDMENT NO. 2 OF TYPE A WATER LICENCE 2AM-MRY1325

| Rev | Description | Date |
|---|---|---|
| 0 | Issued in Final | May 2, 2019 |

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# Abbreviations

| | |
|---|---|
| the Project | Mary River Project |
| AEMP | Aquatic Effects Monitoring Plan |
| ARD | acid rock drainage |
| AREMA | American Railway Engineering and Maintenance-of-Way Association |
| Baffinland | Baffinland Iron Mines Corporation |
| DFO | Fisheries and Oceans Canada |
| EPP | Environmental Protection Plan |
| ERP | Early Revenue Phase |
| FEIS | Final Environmental Impact Statement |
| Golder | Golder Associates Ltd. |
| Hatch | Hatch Ltd. |
| IFC | Issued for Construction |
| Knight Piésold | Knight Piésold Ltd. |
| Licence | Type A Water Licence 2AM-MRY1325 |
| MBR | Membrane Biological Reactor |
| ML | metal leaching |
| MSC | Mine Site Complex |
| Mtpa | million tonnes per annum |
| NIRB | Nunavut Impact Review Board |
| NPC | Nunavut Planning Commission |
| NWB | Nunavut Water Board |
| OPEP | Oil Pollution Emergency Plan |
| PSC | Port Site Complex |
| PWSP | Polishing Waste Stabilization Pond |
| RBC | Rotating Biological Contactor |
| ROM | Run of Mine |
| SNP | Surveillance Network Program |
| STP | sewage treatment plant |
| TSD | Technical Supporting Document |
| WRF | waste rock facility |
| WWTP | wastewater treatment plant |

# 1.0 INTRODUCTION

## 1.1 OVERVIEW

Baffinland Iron Mines Corporation (Baffinland) requires a second amendment to its Type A Water Licence 2AM-MRY1325 (the Licence; Nunavut Water Board (NWB), 2015) to support the Phase 2 Proposal at the Mary River Project (the Project). The Mary River Project is an operating iron ore mine located in the Qikiqtani Region of Nunavut (Figure 1.1). Baffinland is the owner and operator of the Project. The Phase 2 Proposal is described in Section 1.2.

This application for a second amendment to the Licence is being submitted to the NWB as part of an Amendment No. 2 to the Final Environmental Impact Statement (FEIS Amendment No. 2) being filed with the Nunavut Impact Review Board (NIRB), so that the Phase 2 Proposal can be evaluated jointly by the NIRB and the NWB in a coordinated process (NIRB and NWB, 2012). This is an updated application, as an initial application was submitted to the NWB in September 2018 (KP, 2018a). The content of this application in relation to the original application is described in Section 1.4.

Item 10 of Part B (General Conditions) of the Licence states:

> *The Licensee shall notify the NWB of any major or significant changes in development plans, phase, or conditions associated with the Project, including commencement of the full Operations Phase and other phases associated with the Project, at least sixty (60) days prior to carrying such changes.*

The Phase 2 Proposal represents a significant modification to the Project (Nunavut Planning Commission, 2018).

Also relevant to this application to amend the Licence, Item 12 of Part B (General Conditions) of the Licence states:

> *The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted for approval/acceptance, cannot be undertaken without subsequent written Board approval and/or direction. The Board may alter or modify a Plan if necessary to achieve the objectives of the Licence of other regulatory instruments. For plans submitted for Board approval, the Board will notify the Licensee in writing of the Board's approval, rejection or alteration of the Plan. Plans or drawings submitted to the Board for review and/or comments do not necessarily require Board approval prior to implementation; however, the Board may request revisions to those Plans, as required.*

Part G of the Licence (Conditions Applying to Modifications) describes the process to seek and implement modifications to aspects of the Project authorized under the Licence. The Phase 2 Proposal cannot be implemented consistent with the terms of the current Licence (Part G, Item 1). As such, Baffinland is seeking written approval from the Board, in accordance with Part G, Item 2 of the Licence. Part G, Item 3 outlines the information to be provided to the Board when seeking such approval.

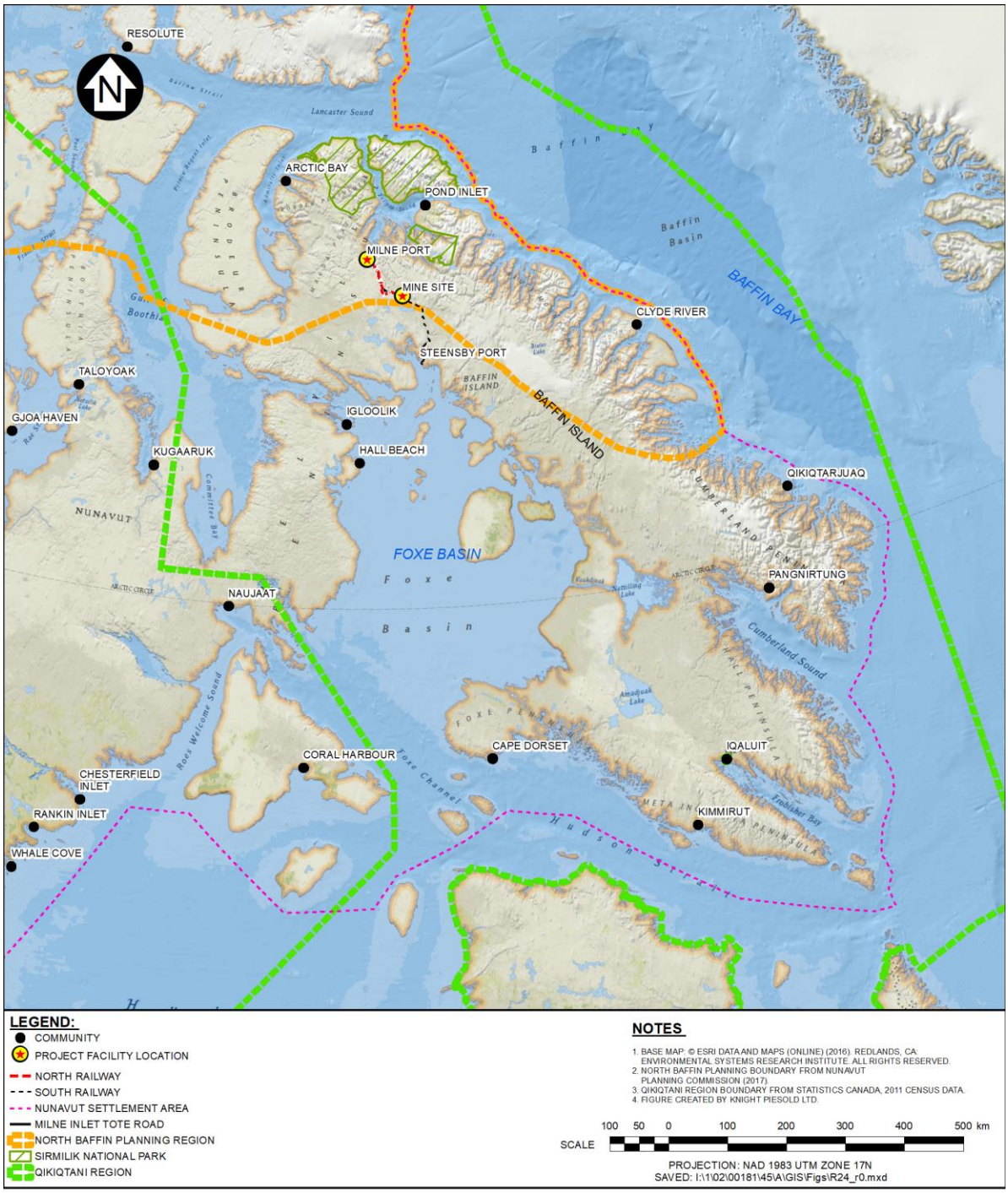


**Figure 1.1 Project Location Map**

*3. Applications for modifications shall contain:*

*a. A description of the facilities and/or works to be constructed;*

*b. The proposed location of the structure(s);*

*c. Identification of any potential impacts to the receiving environment;*

*d. A description of any monitoring required, including sampling locations, parameters measured and frequencies of sampling;*

*e. Schedule for construction;*

*f. Drawings of engineered structures stamped by a Professional Engineer; and*

*g. Proposed sediment and erosion control measures.*

This document describes the activities associated with the Phase 2 Proposal, including required modifications to existing infrastructure currently authorized under the Licence and new infrastructure and/or facilities that are designed to contain, withhold, divert or retain water and/or waste. Information has been provided at a conceptual level for all relevant aspects of the Phase 2 Proposal to support amending the scope of the Licence. In select instances, detailed engineering drawings will be provided to the Board for approval prior to implementation of those same project components, in accordance with the requirements of the current Licence.

## 1.2 ABOUT THE PHASE 2 PROPOSAL

As part of the regulatory approval process, Baffinland submitted a FEIS to the NIRB, which presented in-depth analyses and evaluation of potential environmental and socioeconomic effects associated with the Project (Baffinland, 2012).

In 2012, NIRB issued Project Certificate No 005 which provided approval for Baffinland to mine 18 million tonnes per annum (Mtpa) of iron ore, construct a railway to transport the ore south to a port at Steensby Inlet which operates year-round, and to ship the ore to market (NIRB, 2012). The Project Certificate was subsequently amended to include the mining of an additional 4.2 Mtpa of ore, trucking this amount of ore by an existing road (the Tote Road) north to an existing port at Milne Inlet, and shipping the ore to market during the open water season (NIRB, 2014). The total approved iron ore production was increased to 22.2 Mtpa (4.2 Mtpa transported by road to Milne Port, and 18 Mtpa transported by rail to Steensby Port). This is now considered the Approved Project. The 18 Mtpa Steensby rail project has not yet been constructed, however 4.2 Mtpa of iron ore is being transported north by road to Milne Port currently. In April 2018, Baffinland submitted a request for a second amendment to Project Certificate No.005 to allow for a short-term increase in production and transport of ore via road through Milne Port from the current 4.2 Mtpa to 6.0 Mtpa (Stantec Consulting Ltd., 2018). NIRB (2018a) issued Amendment No. 2 of Project Certificate No. 005 to Baffinland on October 20, 2018.

The Phase 2 Proposal involves increasing the quantity of ore shipped through Milne Port to 12 Mtpa, via the construction of a new railway running adjacent to the existing Tote Road (called the North Railway; Figure 1.2). The total mine production will increase to 30 Mtpa with 12 Mtpa being transported via the North Railway to Milne Port and 18 Mtpa transported via the South Railway to Steensby Port. Construction on the North Railway is planned to begin in late 2019. Completion of the North Railway is expected in 2020 with transportation of ore to Milne Port by trucks and railway ramping up as mine production increases to

12 Mtpa by 2020. Shipping from Milne Port will also increase to 12 Mtpa by 2020. Construction of the South Railway and Steensby Port will commence in 2021 with commissioning and a gradual increase in mine production to 30 Mtpa by 2024. Shipping of 18 Mtpa from Steensby Port will begin in 2025.

Phase 2 also involves the development of additional infrastructure at Milne Port, including a second ore dock (Figure 1.3). Shipping at Milne Port will continue to occur during the open water season, and may extend into the shoulder periods when the landfast ice is not being used to support travel and harvesting by Inuit. Various upgrades and additional infrastructure will also be required at the Mine Site and along both the north and south transportation corridors to support the increase in production and construction of the two rail lines (Figure 1.4).

Facilities associated with the South Railway and Steensby Port have yet to be built. Issued for Construction (IFC) drawings and other required submissions will be submitted to the Board in accordance with Part B, Item 10 of the Licence, prior to construction of these project components.

## 1.3 PROPOSED CHANGES TO THE LICENCE SCOPE

The Phase 2 Proposal will involve an increase in the intensity of use of approved activities and an expansion of existing infrastructure. There are no new types of activities associated with the Phase 2 Proposal; for example, the Phase 2 Proposal includes a new North Railway, but the existing licence contemplates the South Railway. With respect to mining, while the annual production rate will increase, there is no change to the mine plan; the same orebody will be mined at a different rate and schedule. As such, the current Licence already contains the mechanisms and provisions to regulate the Phase 2 Proposal, with only modest modifications to the Licence required.

Part A, Item 1 of the current Licence presents a bulleted list describing the scope of the Licence. This scope is presented in Table 1.1 along with proposed modifications that are part of the Phase 2 Proposal.

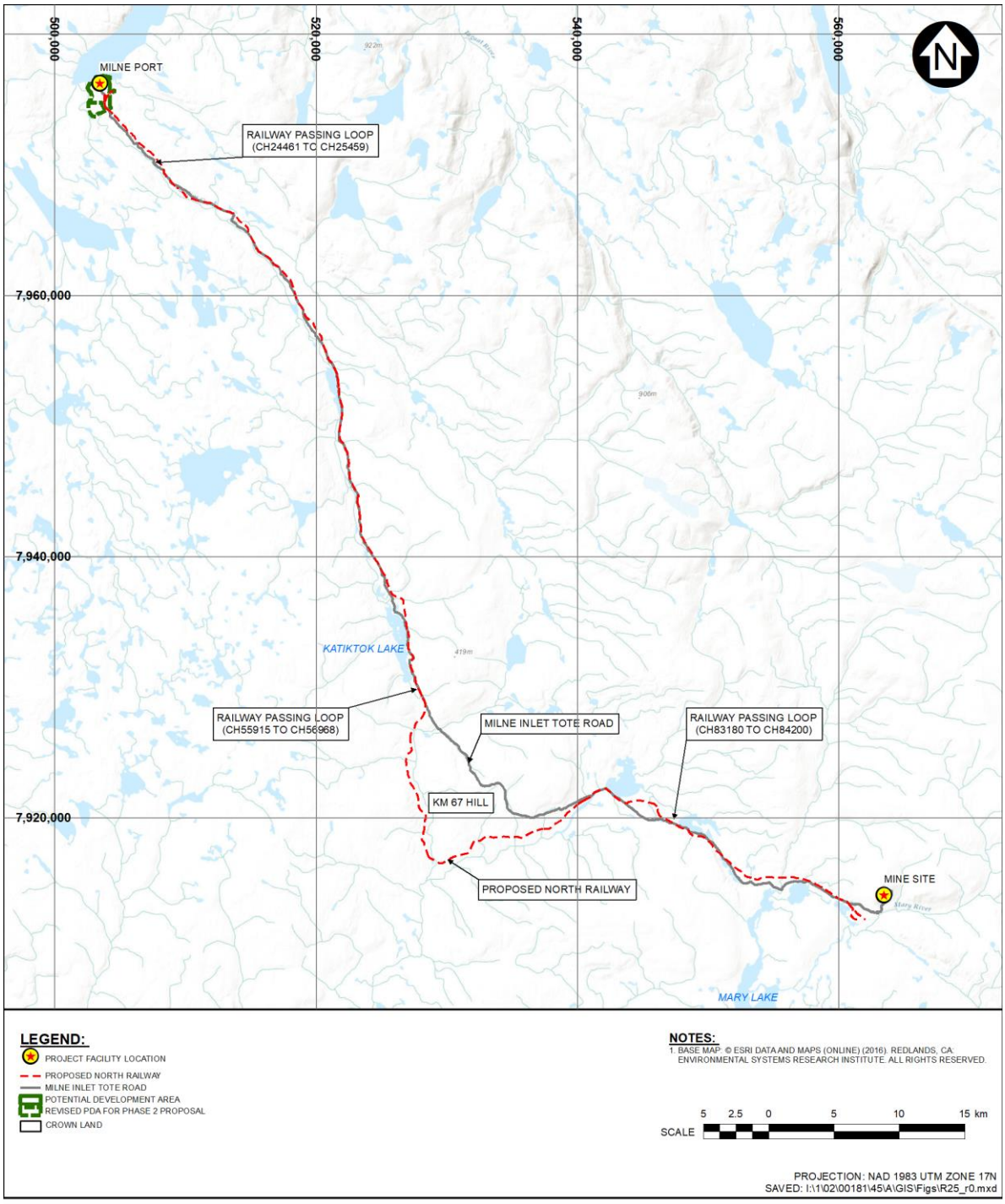


**Figure 1.2 North Railway Location**

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XREF FILE(S): X-C-TOPO-MILN-INDEX; C-PH02-YR21-MILNE-PORT IMAGE FILE(S):

7 977 000 N
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7 975 500 N
7 975 000 N
7 974 500 N
7 974 000 N
7 973 500 N
502 500 E
503 000 E
503 500 E
504 000 E
504 500 E

MILNE INLET
PHILLIPS CREEK

SHIPLOADER NO. 2
CAPE-SIZE ORE DOCK NO. 2
SPUD BARGE
FREIGHT DOCK
ORE DOCK NO. 1
SHIPLOADER NO. 1
BARGE RAMP
MARINE FUEL MANIFOLD BUILDING
SEWAGE EFFLUENT PIPE DISCHARGE
HTO CABIN
STORMWATER POND NO. 2
STORMWATER POND NO. 2A
STORMWATER POND NO. 1A
STORMWATER POND NO. 1
FUEL TANK FARM
SERVICE AREA
SEWAGE TREATMENT PLANT #1
TREATED SEWAGE EFFLUENT PIPELINE
STORMWATER POND #3
PORT SITE COMPLEX
PSC EXPANSION
FINE ORE STOCKPILES
LAYDOWN LP-2
POLISHING WASTE STABILIZATION POND
SEWAGE TREATMENT PLANT #2
PORT SITE WEATHERHAVEN CAMP
LUMP ORE STOCKPILES
EASTERN CLEAR WATER POND
LANDFARM
QUARRY Q1 EXTENTS
SUMMER WATER SUPPLY FROM PHILLIPS CREEK
SEWAGE TREATMENT PLANT #3
MAINT. BUILDING
SPOILS DISPOSAL LOCATION 1
STEENSBY CAMP
380 PERSON CAMP
LAYDOWN W10A AND W10B
SOUTHERN BYPASS
STORMWATER POND #4
TRANSFER CONVEYOR
RAIL YARD AND WORKSHOP
ORE TRANSFER TOWER
LAYDOWN LP-5 AND LP-6
ROTARY CAR DUMPER
LAYDOWN LP-7
STORMWATER POND #5
FINE ORE STOCKPILE
CRUSHING AND SCREENING PLANT
CRUSHING FEED STOCKPILE
LANDFILL
ACCESS ROAD
RAIL YARD ACCESS ROAD
SPOILS DISPOSAL LOCATION 2
NORTH RAILWAY
TOTE ROAD

SCALE A 100 50 0 100 200 300 400 500 m

**LEGEND:**

- WATER
- SPOILS DISPOSAL LOCATION
- TREATED SEWAGE EFFLUENT PIPELINE
- QUARRY EXTENTS
- ROAD
- APPROVED INFRASTRUCTURE
- ADDITIONAL PHASE 2 PROPOSAL INFRASTRUCTURE
- COMMERCIAL LEASE BOUNDARY
- PROJECT DEVELOPMENT AREA
- PROJECT DEVELOPMENT AREA EXPANSION FOR PHASE 2 PROPOSAL
- FORESHORE LEASE BOUNDARY / MARINE PDA

**NOTES:**

1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. CONTOUR INTERVAL IS 10 METRES.
4. PROPOSED MILNE PORT INFRASTRUCTURE PROVIDED BY HATCH APRIL, 2019.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
| 0 | 02MAY'19 | ISSUED WITH REPORT | RAC | CJV | SRA |

BAFFINLAND IRON MINES CORPORATION

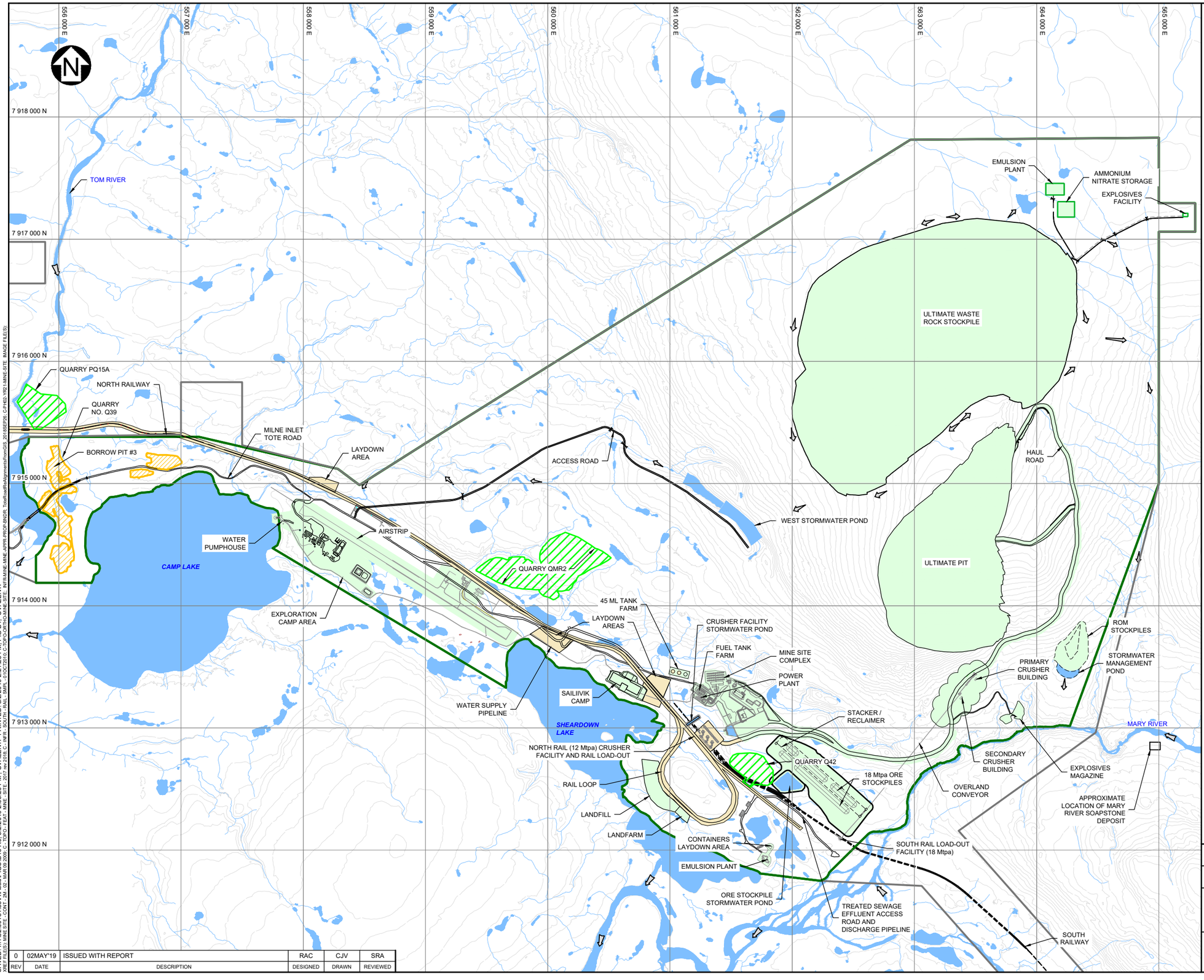
MARY RIVER PROJECT

**PHASE 2 PROPOSAL**
**MILNE PORT LAYOUT**

Knight Piésold CONSULTING

P/A NO. NB102-181/53 | REF NO. 3

**FIGURE 1.3** | REV 0




**LEGEND:**

- APPROVED INFRASTRUCTURE
- ADDITIONAL PHASE 2 PROPOSAL INFRASTRUCTURE
- EXISTING BORROW AREA
- QUARRY
- WATER
- MILNE INLET TOTE ROAD
- COMMERCIAL LEASE BOUNDARY
- PROJECT DEVELOPMENT AREA
- RAILWAY
- FLOW DIRECTION

**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 INFRASTRUCTURE BASED ON HATCH DRAWING NO. H353004-00000-220-272-0005-0001

SCALE A: 300 150 0 500 1000 1500 m

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
| 0 | 02MAY'19 | ISSUED WITH REPORT | RAC | CJV | SRA |

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

**PHASE 2 PROPOSAL**
**MINE SITE LAYOUT**
**FINAL YEAR OF MINING**

Knight Piésold CONSULTING

P/A NO. NB102-181/53 | REF NO. 3

**FIGURE 1.4** | REV 0

**Table 1.1 Proposed Modifications to the Scope of the Current Water Licence**

| Item No. | Scope of Current Water Licence (NWB, 2015) | Proposed Modifications (Phase 2 Proposal) |
|---|---|---|
| 1 | Water supply for domestic uses and industrial purposes at the Milne Port (Milne Inlet) Site, Mine (Mary River) Site, Steensby Port (Steensby Inlet) Site and the railway camps | No change |
| 2 | Site drainage and surface water management for the Milne Port, Mine Site, Steensby Port, and relevant minor project sites | Modifications to site drainage and surface water management at Milne Port and the Mine Site |
| 3 | Sewage Treatment Facilities for the Milne Port camp, the Mine Site exploration, construction, and permanent camps; the Steensby Port construction and permanent camps; and the railway camps | No change |
| 4 | Oily water treatment facilities for wastewater and oily storm water treatment for maintenance facilities and fuel storage berms at the Milne Port Site, the Mine Site and Steensby Port Site | Additional oily water treatment facilities within the rail maintenance facility proposed at Milne Port |
| 5 | Storage and management of hazardous materials at the Milne Port Site and Mine Site | No change |
| 6 | Landfarm facilities for the deposition and treatment of hydrocarbon contaminated snow and soil at the Milne Port Site, the Mine Site, and Steensby Port Site | No change |
| 7 | Fuel tanks, dispensing storage facilities and associated secondary containment areas or berms for Bulk Fuel Storage Facilities and day tanks at the Milne Port, the Mine Site, and the Steensby Port Site | Bulk fuel storage quantities will increase: two additional 15 ML tanks will be added to the Mine Site tank farm that being constructed under the current Licence |
| 8 | Containment areas for temporary storage of hazardous/ nonhazardous waste (waste transfer areas) and new product storage for drums and totes at Milne Port, the Mine Site, and Steensby Port | No change |
| 9 | Ongoing decommissioning of existing and historic camp infrastructure (Fuel bladder farm and ancillary facilities and more) at the Milne Port Site | No change; historic camp infrastructure and fuel bladder farm have already been decommissioned |
| 10 | Explosives storage and explosives manufacturing facilities at the Mine Site and Steensby Port Site | Additional temporary explosives storage facilities will support construction |
| 11 | Waste sorting facilities and temporary storage of hazardous wastes at the Mine Site | No change |
| 12 | Landfills for disposal of solid waste at the Mine Site and Steensby Port Site | A new landfill will be constructed in an exhausted quarry at Milne Port once construction is complete |

| Item No. | Scope of Current Water Licence (NWB, 2015) | Proposed Modifications (Phase 2 Proposal) |
|---|---|---|
| 13 | Incinerator Systems for camp and combustible wastes at the Milne Port Site, the Mine Site, Steensby Port Site, and railway construction camps | No change |
| 14 | Waste rock stockpile and waste rock pile runoff management at the Mine Site | No change |
| 15 | Ore Stockpile runoff management at the Mine Site and Steensby Port Site | Water management facilities at the Mine Site and Milne Port will be upgraded to accommodate expanded ore crushing pads, stockpiling areas and rail loading and offloading facilities. New water management facilities will be constructed at ore staging area at km57 along the North Railway. |
| 16 | Secondary Containment for fuel storage and hazardous materials (if any) at each rail camp location | No change |
| 17 | Waste disposal facilities for each proposed camp along the railway corridor | All waste generated by temporary camps along the North Railway during its construction will be disposed of in existing waste management facilities |
| 18 | Watercourse crossings including pipelines, jetties, bridges; roads associated with channels; and bank alterations, culverts, spurs, erosion control, and artificial accretion | The North Railway will require the installation of bridges and culverts, bank alterations, and erosion control measures |
| 19 | Flood control, diversions, alteration of flow or storage by means of dykes or dams | The North Railway will involve infilling of select streams intersected by deep rock cuts. The upstream portion of the infilled streams will be diverted to an adjacent stream. |
| 20 | Ongoing inspection and maintenance of all water course crossings and associated infrastructure | No change |
| 21 | Tote Road (approximately 100 km all-weather road), which extend from the Mine Site to Milne Port Site in its current form except for routine maintenance and minor upgrades for the transportation of equipment during the Construction Phase of the project | The tote road will also be re-aligned between rail chainages 83+900 and 85+620. The tote road will be adjacent to the railway along this section to avoid two additional crossings. Where the North Rail will invariably cross the Tote Road, the road has been realigned to achieve a perpendicular grade crossing. |
| 22 | Ongoing activities in support of engineering and scientific studies for the Project | No change |
| 23 | Ongoing maintenance to existing project infrastructure | No change |
| 24 | 299 $m^3$/day of Water for domestic and industrial purposes during construction activities occurring at Milne Port and related to the Early Revenue Phase (ERP) of the wider Mary River Project including earthworks, laydown areas, concrete and production | No increase in water use is proposed from Milne Port water sources. The Licence currently permits 367.5 $m^3$/day of water to be used for domestic and industrial purposes during the construction and operation phases. |

| Item No. | Scope of Current Water Licence (NWB, 2015) | Proposed Modifications (Phase 2 Proposal) |
|---|---|---|
| 25 | Continued operation of the Matrix Camp (Camp) erected in 2013 for construction activities and expansion of the camp to support additional manpower of up to 350 persons during site preparation work but less than 225 persons during the construction of infrastructure at Milne Port | The number of beds at Milne Port will increase to 1,010 beds during the construction period; reducing to 710 permanent beds during the operation phase |
| 26 | Construction and eventual operation of an additional Waste Stabilization Pond at Milne Inlet (Milne Port) | No change |
| 27 | Construction of ore stockpile areas and associated sedimentation ponds, permanent ore dock, ship loading facilities and associated earthworks activities, ore reclaiming conveying equipment, at Milne Inlet (Milne Port) | Additional rail ore unloading, crushing and screening facilities will be constructed; the existing ore stockpile area will be expanded; additional ore reclaiming and conveying equipment, and a second ore dock with its own shiploader will be installed |
| 28 | Deposit of Waste during construction activities | No change. Additional construction waste will be generated from an additional construction phase. |
| 29 | Water use from specified sources or waterbodies for dust suppression or control along the Tote Road during the Early Revenue Phase | An additional 13 water sources for dust suppression are proposed. The overall daily volume of water for dust suppression will increase from 1,500 to 2,600 $m^3$/day. |
| 30 | Management of ore stockpile runoff at the Milne Port Site | Ore stockpile runoff management facilities will be expanded to accommodate larger ore stockpiles and the relocation of ore crushing and screening operations from the Mine Site to Milne Port |
| 31 | Recommissioning of an existing Rotating Biological Contactor (RBC) type Sewage Treatment Plant located at the Milne Port Site | No longer applicable; the RBC Sewage Treatment Plant was decommissioned |
| 32 | Construction of an additional Polishing Waste Stabilization Pond (PWSP) to treat off-specification effluent as allowed and described above under the cope of Type B Licence No. 8BC-MRY1416. The PWSP will be of similar capacity and design specifications to the one constructed in 2013. | No change |
| 33 | Relocation of the treated sewage effluent discharge, from a location north of the old airstrip to north of the Milne Tank Farm | Further relocation of the discharge to an area near the freight dock was approved as part of Modification Request #7. No further modifications are proposed as part of the Phase 2 Proposal. |
| 34 | Additional fuel storage to include the installation of two 100,000 L marine diesel tanks | No change |
| 35 | Construction of a 4 million tonne ore stockpile pad, associated drainage structures, and two (2) settling or sedimentation ponds | This item overlaps with items 27 and 30 above. The ore stockpile will be expanded to 7.8 Mt. Additional stormwater ponds will collect runoff from the larger stockpile. |

| Item No. | Scope of Current Water Licence (NWB, 2015) | Proposed Modifications (Phase 2 Proposal) |
|---|---|---|
| 36 | Construction and operation of an ore dock and ore loading system as allowed under the scope of Licence No. 8BC-MRY1416, and additional ancillary buildings, and maintenance facilities required for the shipment of iron ore | A second ore dock and associated ore loading system will be constructed |
| 37 | Tote Road (approximately 100-kilometre, all-weather road), which extends from the Mine Site to the Milne Port Site in its current form except for routine maintenance and minor upgrades being required primarily for the purpose of safety and ensuring compliance with applicable safety regulations under the Mine Health and Safety Act and relevant regulations intended to support the safe transportation of equipment during construction and transportation of ore extracted under the Early Revenue Phase of the Project | This item overlaps with Item 21 above. Modifications to the Tote Road are proposed as described under Item 21. |
| 38 | Withdrawal of up to 1,500 $m^3$/day of water from several specific waterbodies located along the Tote Road, for use in dust suppression or control | This item overlaps with Item 29 above. An additional 13 dust suppression water sources are proposed, and the daily maximum water use will increase to 2,600 $m^3$/day. |
| 39 | Extended use, beyond timeframe previously anticipated, for some infrastructure and/or facilities established for the Project, such as camps, buildings, fuel and transitional fuel storage facilities | No change |
| 40 | Use of transitional fuel storage facilities | The bladder tank farms used in exploration no longer store fuel |
| 41 | Discharge of treated sewage effluent onto land during the winter months in accordance with the relevant terms and conditions included in the licence | No change |

## 1.4 CONTENTS OF THIS APPLICATION

This report forms Part 1 of the application, with three other parts described below. As with the original Application (KP, 2018a), the following Sections of this Application address the following corresponding Parts of the Licence:

- Section 2 - Part D Conditions Applying to Construction and Operations
- Section 3 - Part E Conditions Applying to Water Use and Management
- Section 4 - Part F Conditions Applying to Waste Disposal and Management
- Section 5 - Part H Conditions Applying to Emergency Response and Contingency Planning
- Section 6 - Part I Conditions Applying to General and Aquatic Effects Monitoring
- Section 7 - Part J (Conditions Applying to Abandonment, Reclamation and Closure) and Part C (Conditions Applying to Security)

Section 8 summarizes the status of management plans required under the Type A Water Licence, while Section 9 describes future submissions to the NWB and associated timeframes. Table 1.2 lists the main attachments to this document.

**Table 1.2 Attachments to this Application**

| Attachment No. | Attachment Title |
|---|---|
| PART 1 | MAIN REPORT (This report) |
| PART 2 | APPLICATION AND PROPONENT INFORMATION |
| 1 | Executive Summary |
| 2 | Water Licence Amendment Application |
| 3 | Application Concordance |
| 4 | Regulatory Correspondence |
| 5 | Compliance Report |
| 6 | Proponent Information |
| PART 3 | TECHNICAL INFORMATION |
| 7 | Design Criteria |
| 8 | Geotechnical Studies |
| 9 | Geochemical Evaluations |
| 10 | North Railway Detailed Figures |
| 11 | North Railway Design |
| 12 | Road Modifications |
| 13 | Watercourse Crossings |
| 14 | Mine Site Material Handling and Water Management |
| 15 | Port Site Material Handling and Water Management |
| 16 | Temporary Ore Staging Area |
| 17 | Mine Site Fuel Tank Farm |
| 18 | Water Supply and Sewage |
| 19 | Milne Port Landfarm Manual |
| PART 4 | MANAGEMENT PLANS |
| 20 | Emergency Response Plan |
| 21 | Spill Contingency Plan |
| 22 | Surface Water, Aquatic Ecosystem Management Plan |
| 23 | Fresh Water Supply, Sewage and Wastewater Management Plan |
| 24 | Waste Management Plan |
| 25 | Hazardous Materials and Hazardous Waste Management Plan |

| Attachment No. | Attachment Title |
|---|---|
| 26 | Borrow Pit and Quarry Management Plan |
| 27 | Aquatic Effects Monitoring Plan |
| 28 | Environmental Protection Plan |
| 29 | Interim Closure and Reclamation Plan |

In Baffinland's response to technical comments received during the NIRB's reconsideration process, the Company committed to providing a Supplemental Information Package by May 1, 2019. Baffinland subsequently decided in consultation with the NWB to submit an updated application instead, so that all relevant materials that form the application are under one submission,

Table 1.3 lists the information that Baffinland committed to provide in this document and identifies where this information can be found in this document. Each of the specified items has been provided at the location indicated above, except for the Updated Hydrological Assessment. This item has not been included as it is still under preparation. Related mostly to fish habitat, it will be provided with the fish habitat quantification to Fisheries and Oceans Canada by May 31, 2019.

**Table 1.3 Information Provided in This Document**

| Information Title | Information Description | Location |
|---|---|---|
| Issued for Construction (IFC) Drawings | IFC drawings will be provided for those project components without IFC drawings in the September 2018 water licence amendment application | Attachments 11 to 18 |
| Geotechnical | Additional geotechnical information, some of which is being included in Baffinland's March 2019 response to technical comments, and some still under preparation | Attachment 8 - Geotechnical Studies |
| Geochemistry | All relevant geochemistry evaluations completed to date and referenced in the response to technical review comment CIRNAC 07 (in this submission) | Attachment 9 - Geochemical Evaluations |
| Rail Drawings | Updated rail plan and profile and standard typical drawings; rail construction access road locations | Attachment 11 - Rail Design<br>Attachment 12 - Road Modifications<br>Attachment 13 - Water Crossings |
| Watercourse Crossings | Updated lists of crossings for both the railway and Tote Road based on the revised railway alignment and incorporating 2018 fisheries survey information, updated crossing typicals and issued for tender bridge drawings, and a supporting document that describes the crossing type selection criteria | Attachment 13 - Water Crossings |
| Updated Hydrological Assessment | An updated hydrological assessment is being completed for any remaining stream diversions, and culverts will be re-assessed for fish passage | Not included |

| Information Title | Information Description | Location |
|---|---|---|
| | using actual rather than the previously assumed gradients | |
| Detailed Railway Figures | Figure B.4 (the 33 detailed railway figures with satellite imagery) will be updated showing the latest rail, road, crossings and fish presence information | Attachment 10 - North Railway Detailed Figures |
| Milne Port Water Management Plan | This plan is being revised to reflects changes to the ore stockpile that align with Modification #12 | Attachment 15 - Port Site Material Handling and Water Management<br>An updated Mine Site Surface Water Management Plan is also provided in Attachment 14 |

# 2.0 CONSTRUCTION AND OPERATIONS (PART D)

## 2.1 OVERVIEW OF CHANGES

An overview of the Phase 2 Proposal is provided in Section 1.2. The Phase 2 Proposal involves construction of the following additional permanent infrastructure:

**Mine Site**

- Expanded crusher pad and rail ore loading facilities
- Two additional 15 ML fuel tanks at the Mine Site

**Northern Transportation Corridor**

- North Railway
- Minor realignments of the Tote Road to accommodate the North Railway
- Quarry development

**Milne Port**

- Second ore dock
- Larger ore stockpiles
- Shiploading infrastructure

The following features will form part of construction activities for the Phase 2 Proposal:

- Temporary construction camps at Km 40 and Km 84
- 38 quarries (32 quarries not previously permitted)

The construction period for Phase 2 will commence in 2020 and is expected to be completed in 2021.

Baffinland believes that the terms and conditions of the existing Water Licence 2AM-MRY-1325 are satisfactory to cover the scope of proposed amendments under the Phase 2 Proposal.

## 2.2 APPLICABLE MANAGEMENT PLANS

The following approved management plans relate to the items discussed in this section:

- Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019a)
- Borrow Pit and Quarry Management Plan (Baffinland, 2014a)
- Quarry specific management plans
- Phase 1 Waste Rock Management Plan (Baffinland, 2014b)

Draft updates to the first two these plans are presented as Attachments 22 and 26, for approval by the NWB in accordance with Items 1 and 2 of Part E of the Licence. Quarry specific management plans will be developed and submitted for approval prior to development of particular quarries. Baffinland committed during NIRB technical meetings in April 2019 to submitting an updated Phase 1 Waste Rock Management Plan by December 31, 2019.

## 2.3 NORTH RAILWAY

The North Railway connecting the Mine Site and Milne Port is the most substantial infrastructure component associated with the Phase 2 Proposal. The railway will be 110 km in length, and most of the length of the railway embankment will be constructed adjacent to the Tote Road. However, a 20 km section of the railway will deviate from the Tote Road alignment due to steep topography. The construction of the railway is estimated to take two years, with the rail being operational in 2021. The construction of the rail will require multiple laydown sites, temporary construction camps, and quarries for aggregate. The facilities and activities required for the construction and operation of the North Railway include:

- Construction of railway including embankments, signaling equipment and communication towers, water crossings, level crossing with the Tote Road
- Construction and use of multiple laydown areas, shelters and small equipment shops at each laydown
- Use of the ore staging area at km 57 as an intermediate staging area for ore transportation
- Construction and operation of two temporary construction camps at Km 40 and Km 84
- Exploitation and closure of up to 36 quarries along the North Railway corridor
- Ongoing inspection and maintenance of the railway embankment, railway, signaling and communication equipment
- Transportation of iron ore by trucks and by railway to Milne Port

The ore staging area at km 57 of the North Railway will operate for 1 to 2 years during rail construction. This transfer area will facilitate the movement of ore from haul trucks to railcars. The haul trucks will deliver ore to the ore staging area from the Mine Site via the Tote Road. The ore will be stockpiled at the ore staging area in three 4,150 t stockpiles. The ore will be loaded on railcars using front-end loaders. Once loaded the train will proceed north to Milne Port. Runoff from the stockpiles will be collected and directed to a stormwater pond. Runoff from the ore stockpiles at this facility will be directed to a settling pond. The capacity of this pond is 1,100 $m^3$. Discharge from the stormwater pond will be monitored to ensure it meets requirements outlined in the current Licence and effluent collected in this pond will be sampled to ensure it meets the mine effluent discharge criteria specified in the Licence before applying the water to the Tote Road as part of dust suppression efforts.

A detailed description of the facilities and activities listed above is provided in Section 3.2 of TSD (technical supporting document) 2 Project Description (Baffinland, 2018a). Railway design criteria, civil design criteria, and the geotechnical design basis are presented in Attachment 7 (Hatch, 2017a; 2018a; and 2018b). Detailed layouts of the North Railway are presented as Attachment 10. Rail design drawings are included in Attachment 11.

## 2.4 TOTE ROAD REALIGNMENTS AND ACCESS ROADS

In general, the Tote Road alignment will remain unchanged, however some upgrades and minor realignments will be required to facilitate railway crossings. The railway will cross the existing Tote Road at eight locations. These updates are identified in Section 3.2 of TSD 2 Project Description. The use of the Tote Road as envisioned for the Phase 2 Proposal is detailed in Section 3.1 of the Project Description.

Attachment 12 provides drawings detailing the Tote Road modifications, including:

- Grade crossings at eight locations, so that the road crosses perpendicular to the railway
- Relocation of the Tote Road from Rail CH 83+900 to 85+620 (north of Muriel Lake)

In addition, a large number of short access roads will be constructed including:

- **Milne Port -** A 2.7 km south bypass access road will be constructed around the circumference of the ore stockpiles along the south and west sides (Figure 1.3).
- **Northern Transportation Corridor -** A number of short access roads up to 500 m in length will be constructed to access quarries and explosives storage areas, and 1.5 km of temporary haul road will be constructed at the km 57 temporary ore transfer area. In addition, more than 50 short access roads will be constructed to temporarily access the rail alignment from different locations along the Tote Road. These access roads are shown on detailed railway figures presented as Attachment 10. Additional minor access roads will likely be required to connect the Tote Road to the railway right-of-way during construction.
- **Mine Site -** In addition to minor realignments of the Tote Road, described in Attachment 12, the mine haul road will be extended from the current crusher pad area to the new crusher pad area and rail load-out area servicing the North Railway (Figure 1.4).

Access roads and haul roads will be constructed in accordance with the design criteria and construction methodologies presented in Attachment 7 (Hatch, 2018a). Crossings associated with these access roads are included in the Tote Road crossing list referenced in Section 2.5.

## 2.5 WATERCOURSE CROSSINGS AND DIVERSIONS

### 2.5.1 NORTH RAILWAY CROSSINGS

Construction of the North Railway and the upgrades to Tote Road will result in a large number of watercourse crossings. Detailed layouts of the North Railway showing the crossings are presented in the detailed railway figures in Attachment 10. The watercourses identified in these attachments reflect changes from the revised railway alignment, subsequent to submission of the original water licence amendment application (KP, 2018a).

The North Railway will be constructed mostly adjacent to the Tote Road and will cross an estimated 395 streams and drainages along the North Railway. An assessment of the interactions of the Phase 2 Proposal with fish habitat is provided as Attachment 13.1 (North/South Consultants Inc., 2019a). Supplemental fisheries surveys were conducted during the 2018 open water season, the results of which are presented in Attachment 13.2 (North/South Consultants Inc., 2019b). Most crossings (approximately 90%) are confirmed as not fish-bearing (Table 2.1).

**Table 2.1 Fish Presence at Stream Crossings Along North Railway**

| Habitat Quality | Species | |
|---|---|---|
| | Arctic Char | Ninespine Stickleback |
| Not Fish-bearing | 355 | 383 |
| Marginal | 11 | 2 |
| Important | 29 | 10 |
| Totals | 395 | 395 |

Of the total of 355 sites that were classified as not char-bearing, 307 sites would not be expected to support char due to the presence of a permanent downstream barrier, the lack of connectivity to overwintering habitat, or the absence of a stream channel at the site (i.e., sites are not aquatic habitat). The remaining 48 sites may potentially support char under higher flow conditions; however, some of these sites may never be accessible due to the presence of soft barriers, such as sub-surface flow and high gradients.

Only 12 sites were identified as fish-bearing for Ninespine Stickleback in 2018 (North/South Consultants Inc., 2019b). Most stickleback habitat along the rail corridor is distributed within approximately 20 km of the Mary River mine site. Stickleback prefer different habitat types than char, favouring little to no flow over fine substrates, and are thus more frequently observed in lakes/ponds.

The above totals include streams with culvert crossings only, and do not include sites where a culvert in combination with a lake/pond encroachment or infill are proposed, nor do they include Project interactions with fish habitat within the Mine Port and Mine Site PDAs or due to modifications to the Tote Road.

Corrugated steel pipe culverts are proposed at most water crossings along the North Railway (Attachment 13.1). Culverts will be designed in accordance with American Railway Engineering and Maintenance-of-Way Association guidelines (AREMA, 2018) and the railway design criteria for the Project (Hatch, 2017a; Attachment 7). Culvert diameters will range from 0.6 m to 1.8 m, and will be covered with a minimum of 1 m of fill. Attachment 13.1 provides a list of the railway crossings. Typical culvert details for the railway are provided in Attachment 13.4. Typical culvert details at the Milne Port are shown in Attachment 13.5.

Plate arch culverts are proposed at eight locations, and bridges at the four crossings which are equipped with bridges on the Tote Road. Bridge spans are based on the existing normal flow riverbank. Attachment 13.8 presents preliminary drawings of the four railway bridges and bridge crossing details. Bridge designs will be based on the 1:200 year 24-hour storm, sufficiently conservative to account for climate change induced increases in precipitation and runoff (TSD 6 Climate Change Assessment). Temporary cofferdams will be used in the construction of the bridges to isolate areas in which bridge piers will be constructed.

### 2.5.2 NORTH RAILWAY POND ENCROACHMENTS AND INFILLINGS

A total of 35 lake/pond encroachments/infilling sites were assessed along the rail alignment (Attachment 13.2; North/South, 2019b). For Arctic Char, seven were identified as fish-bearing in 2018. The fishless ponds were of insufficient depth for overwintering (generally less than 2 m maximum depth) and were completely isolated from other waterbodies.

### 2.5.3 NORTH RAILWAY STREAM DIVERSIONS

In areas where the rail alignment is cut into the terrain, it is not feasible to pass streams across the rail alignment. The previous railway alignment involved substantially more cuts in rock than is now proposed, necessitating stream diversions at 27 locations. This has now been reduced to 10 diversions at nine locations, none of which are in fish habitat (North/South, 2019). Fish habitat is present downstream several of the diversions.

The effects of diverting streams in terms of both hydrology, fish passage and impacts to fish habitat of the remaining diversions will be forthcoming in hydrological modelling and fish habitat quantification reports that Baffinland intends to issue to the DFO by May 31, 2019. Baffinland will be implementing mitigation on crossing-by-crossing basis to reduce flow velocities which may include additional culvert barrels, channel widening, construction of habitat features, regarding, and channel stabilization.

### 2.5.4 NEW AND MODIFIED CROSSINGS ON THE TOTE ROAD

A total of 37 culvert crossings, one pond encroachment and one culvert plus pond encroachment will occur along the Tote Road, due to modifications including new crossings and existing culverts that will need to be relocated. Of the 17 sites surveyed in 2018, Arctic Char were present at five of the sites and stickleback were present at two of the Char-bearing streams (Attachment 13.2).The installations will be consistent with direction previously received from the Fisheries and Oceans Canada (DFO) in the fisheries authorization and letters of advice. New and modified culvert crossings along the Tote Road are identified in Attachment 13.1.No changes to the Southern Railway watercourse crossings are proposed beyond that presented in the original Type A Water Licence application and addressed in the current scope of the Licence.

## 2.6 ORE DOCK AND ASSOCIATED INFRASTRUCTURE

Baffinland will construct a second ore dock at Milne Port capable of berthing Cape size ore carriers, as part of the Phase 2 Proposal (Figure 1.3). The dock face will be positioned parallel to the seabed contours. To construct the second ore dock it may be necessary to dredge sediments/soft material on the ocean floor beneath the dock embankment. Localized removal of the upper layer of unsuitable substrate material is anticipated within the confined limits of the sheet pile enclosure. The materials will be transported and disposed with consideration of mitigation design considerations taken to reduce the potential for environmental impacts. The materials may be suctioned and pumped directly to a disposal area located either on land or within a silt curtain confined water lot area, behind the ore dock that will no longer be connected to Milne Inlet. Design shall include consideration of an outlet for stormwater release, if required. Further detail regarding the ore dock, including dock construction methodology is presented in Section 4.2 and Appendix F of TSD 2 Project Description. Information provided is preliminary and is subject to change upon completion of detailed design. Once detailed design has been completed, final details will be provided to the NWB.

A second shiploader will be constructed to fill vessels berthing at the new Cape size dock with ore from the lump ore stockpile. A bucket wheel reclaimer will be used to reclaim ore from the stockpile to feed the shiploader. Details regarding the shiploading system are provided in Section 4.3 of TSD 2 Project Description.

The existing ore stockpiles at Milne Port will be expanded and reorganized to accommodate the second dock and shiploader. Ore will arrive from the Mine Site and will undergo secondary ore crushing at Milne Port, where it will be sorted into lump ore and fine ore.

Water management related to the ore stockpiles at Milne Port is discussed in Section 4.4.

## 2.7 QUARRIES

### 2.7.1 LIST OF PROPOSED QUARRIES

Table 2.2 lists the approved and proposed quarries that may be used to supply aggregate for construction of the Phase 2 Proposal, mainly the North Railway. Quarry locations are shown on Figure 2.1, as well as the detailed railway figures (Attachment 10).

**Table 2.2 Proposed Quarries**

| Quarry No. | Railway Chainage | Material | Available Volume ($m^3$) | Approximate Footprint (ha) | UTM Easting | UTM Northing |
|---|---|---|---|---|---|---|
| Q1[1] | CH2000 | Granitic Gneiss | 400,000 | 33.6 | 504070 | 7974944 |
| PQ5 | CH5000 | Granitic Gneiss | 700,000 | 67.3 | 505764 | 7972642 |
| Q4 | CH7200 | Granitic Gneiss | 7,687 | 0.8 | 507438 | 7970518 |
| Q6 | CH7800 | Granitic Gneiss | 6,348 | 0.6 | 507804 | 7969988 |
| Q10 | CH11800 | Granitic Gneiss | 14,140 | 1.4 | 510638 | 7967431 |
| Q11 | CH14900 | Limestone | 5,000 | 0.4 | 513679 | 7966223 |
| Q13 | CH16200 | Limestone | 118,245 | 7.9 | 514295 | 7965314 |
| PQ2B | CH22000 | Limestone | 160,000 | 23.7 | 517664 | 7961973 |
| PQ2A | CH28900 | Limestone | 160000 | 24.7 | 521827 | 7955356 |
| Q16 | CH 31700 | Limestone | 81,717 | 5.5 | 521838 | 7952395 |
| Q19 | CH39200 | Limestone | 28,114 | 2.8 | 523024 | 7945186 |
| PQ4A | CH41600 | Limestone | 180,000 | 11.4 | 523646 | 7942901 |
| PQ4B | CH42500 | Limestone | 180,000 | 12.9 | 523651 | 7941894 |
| Q21 | CH44600 | Limestone | 9,000 | 1.1 | 524356 | 7940085 |
| PQ5A | CH45700 | Limestone | 240,000 | 22.9 | 525359 | 7938861 |
| PQ5B | CH46800 | Limestone | 500,000 | 57.1 | 525986 | 7937802 |
| Q23 | CH48600 | Limestone | 4,041 | 0.6 | 525909 | 7936604 |
| Q24 | CH51250 | Limestone | 42,412 | 4.9 | 527063 | 7934336 |
| PQ6A | CH56200 | Limestone | 417,000 | 24.0 | 528552 | 7929786 |
| PQ6B | CH57100 | Limestone | 414,000 | 22.7 | 528900 | 7928994 |
| Rail Sand Pit | CH58000 | Glacial till | 150,000 | 8.0 | 528498 | 7927790 |
| PQ2 | CH61000 | Limestone | 500,000 | 18.8 | 527843 | 7926119 |
| Q27 | CH63350 | Limestone | 136,086 | 10.6 | 527160 | 7923193 |
| PQ9A | CH66000 | Limestone | 247,500 | 7.0 | 527512 | 7920441 |
| PQ9B | CH66000 | Limestone | 75,000 | 2.3 | 527651 | 7920446 |
| PQ10A | CH73100 | Limestone | 237,000 | 12.1 | 531568 | 7917522 |
| PQ10B | CH74200 | Limestone | 177,000 | 9.3 | 531982 | 7917635 |
| PQ12A | CH84500 | Limestone | 262,500 | 26.0 | 539072 | 7921210 |
| PQ12B | CH84500 | Limestone | 142,500 | 19.3 | 539876 | 7921782 |
| PQ13 | CH85700 | Limestone | 180,000 | 46.0 | 542584 | 7923675 |
| PQ14A | CH96700 | Limestone | 80,000 | 4.7 | 550836 | 7917829 |
| PQ14B | CH96000 | Limestone | 80,000 | 10.7 | 550983 | 7917407 |

| Quarry No. | Railway Chainage | Material | Available Volume ($m^3$) | Approximate Footprint (ha) | UTM Easting | UTM Northing |
|---|---|---|---|---|---|---|
| PQ15A | CH101500 | Limestone | 80,000 | 8.7 | 555853 | 7915626 |
| PQ15B | CH102300 | Limestone | 45,000 | 6.2 | 555270 | 7915586 |
| QMR2[1] | CH107000 | Diorite | 400,000 | 28.4 | 559982 | 7914260 |
| Q42 | CH109000 | Diorite | 125,000 | 6.9 | 561673 | 7912667 |
| D1Q1[1] | Deposit No. 1 | Granitic Gneiss/schist | 275,000 | 6.7 | 563055 | 7914645 |
| D1Q2[1] | Deposit No. 1 | Granitic Gneiss/schist | 700,000 | 13.1 | 563376 | 7913330 |

**NOTES:**

1. EXISTING APPROVED QUARRY WITH AN EXISTING QUARRY MANAGEMENT PLAN.
2. THE RAIL SAND PIT IS EXPECTED TO BE USED DURING RAIL OPERATIONS ONLY, EXTRACTING 5,000 TO 10,000 $m^3$ OF SAND AND GRAVEL ANNUALLY.

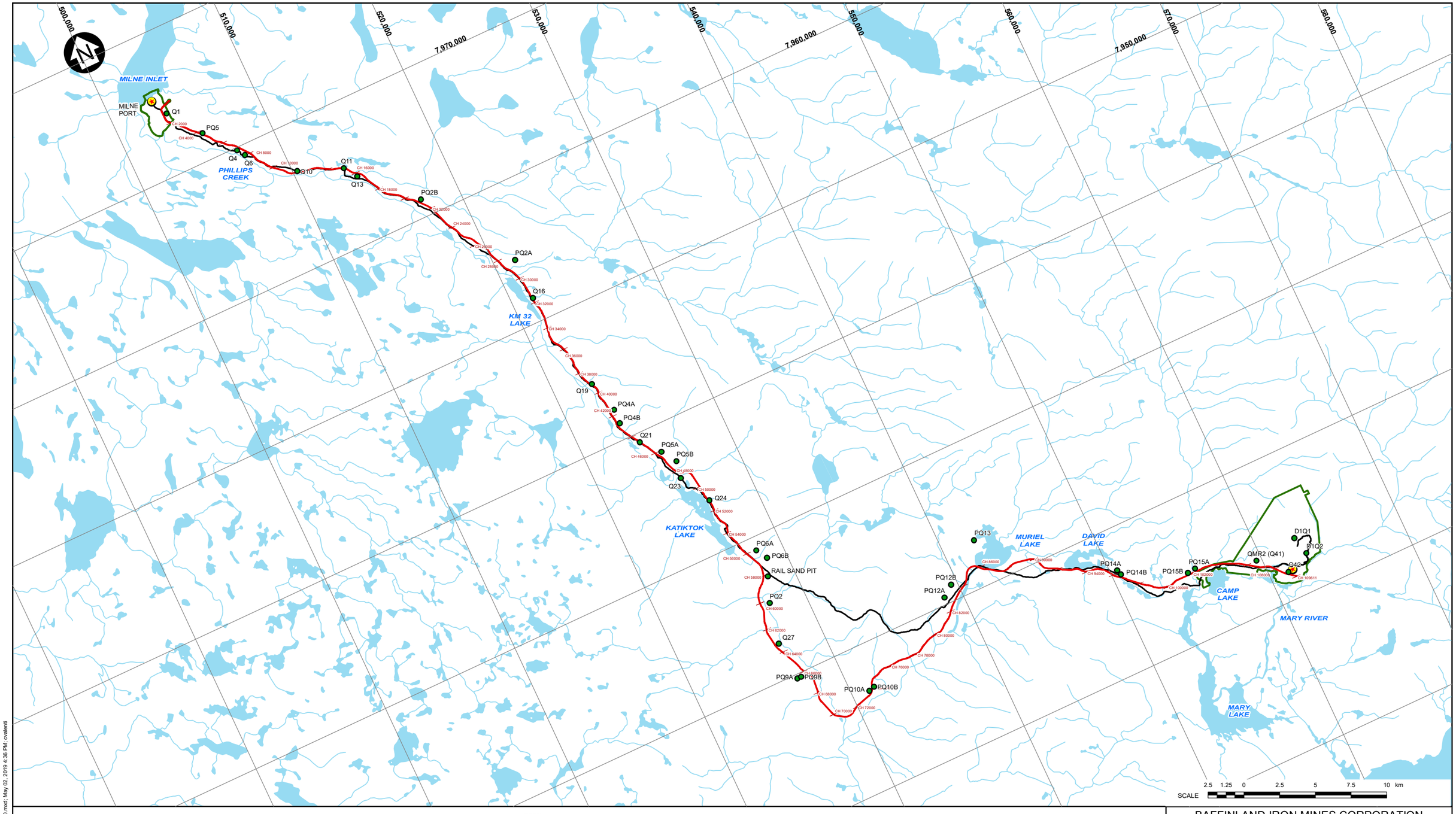
Existing licensed borrow areas between Milne Port and the Mine Site will continue to be used during the life of the Project for various purposes. Aggregate material required for the Tote Road maintenance and upgrades will be extracted from existing quarry sites that have been identified along the Tote Road and new quarry sites along the North Railway depending on proximity to work being completed. One additional borrow area (Rail Sand Pit) is proposed, located at approximately railway chainage km 59.6. Sand will be extracted from this location during the operation phase for rail maintenance. There may be times that sanding of the railway track is required to assist the locomotives with traction when ascending slopes. Between 5,000 to 10,000 $m^3$ of material may be required annually from this source. Quarry-specific management plans will be submitted to the NWB under the Licence prior to the development of the above-noted quarry and borrow sources.

A total of 79 proposed quarries are also located along the South Railway and at Steensby Port. These quarries are part of the Approved Project, and quarry-specific management plans will be submitted to the NWB under the Licence prior to their development.

### 2.7.2 ARD/ML TESTING

Of the 38 planned quarries to be used to construct the North Railway and other Phase 2 Proposal infrastructure, 28 are located in sedimentary rocks (limestone or sandstone), both of which have a high buffering capacity, and present no Acid Rock Drainage (ARD) risk (Hatch Ltd., 2017; AMEC, 2010). One of the above quarries is sand and gravel, and the remaining nine quarries are located in granitic gneiss or diorite, both of which have a low sulphide content, making them unlikely candidates for producing ARD (AMEC, 2010).

A total of 76 samples have been analyzed to date (KP, 2007; AMEC, 2010; Hatch, 2017b and 2019), and none of the samples are potentially acid-generating (KP, 2019). Additionally, most of the samples have low to no potential for ML, given the neutral to alkaline nature of the tested material. Though some samples did demonstrate some elevated concentrations of metals above CEQG-PAL (Canadian Council of Ministers of the Environment, 2019), this was primarily under acidic laboratory conditions and is not indicative of field conditions (KP, 2019).




**LEGEND:**

- PROJECT FACILITY LOCATION
- NORTH RAILWAY
- MILNE INLET TOTE ROAD
- QUARRY LOCATIONS
- NORTH RAILWAY CHAINAGE (m)
- WATER

**NOTES:**

1. COORDINATE GRID IS IN KILOMETRES.
   COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP/IMAGERY: © ESRI AND DATA (ONLINE) SERVICE LAYERS (2017). REDLANDS, CA: ENVIRONMENTAL SYSTEM RESEARCH INSTITUTE. ALL RIGHTS RESERVED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

**PROPOSED QUARRY LOCATIONS**

Knight Piésold CONSULTING

| P/A NO. | REF NO. |
|---|---|
| NB102-181/53 | 3 |

**FIGURE 2.1** REV 0

Results, to date, of geochemical testing for ARD/ML of quarries along the South Railway, indicate that quarry materials have low potential for acid generation and metal leaching (ML) (Baffinland, 2012). During the NIRB technical review of the Phase 2 Proposal, Baffinland committed to conducting additional geochemical testing within the southern portion of the North Railway alignment.

The tested and untested quarries will be subject to additional geotechnical and geochemical investigation as the Project proceeds. Baffinland's Borrow Pit and Quarry Management Plan (Baffinland, 2014a) includes an ARD testing protocol as an appendix. Based on geochemical testing completed to date, as well as established protocols for testing prior to quarrying (applicable also to rock cuts), the risk of these activities generating ARD/ML is low. In the unlikely instance that ARD/ML issues are identified at a quarry, Baffinland will avoid using the quarry.

There may be less flexibility if ARD/ML issues are identified at rock cuts. Options to reroute the railway to avoid an ARD/ML rock cut will be considered. If the railway cannot be realigned to avoid a potential ARD/ML rock cut, other mitigation measures will be evaluated to prevent the release of adverse quality runoff. ARD/ML rock excavated from such areas will not be used as embankment fill, and the rock will be disposed of in a suitable fashion (including possible disposal with PAG waste rock in the waste rock stockpile at the Mine Site). Any exposed faces of ARD/ML rock at such rock cuts will be managed according to site specific conditions. Options may range from do-nothing (if exposed faces are limited and/or runoff from the faces is not of adverse quality) to covering the exposed faces with non-PAG/ML material to placing limestone within seepage paths to increase pH of the runoff and precipitate metals (KP, 2018b).

### 2.7.3 FUTURE QUARRY-SPECIFIC MANAGEMENT PLANS

A Borrow Pit and Quarry Management Plan approved under the current Licence identifies its overarching quarry management practices and principles (Baffinland, 2014a). A draft update of this plan for the Phase 2 Proposal is presented as Attachment 26. In accordance with Part D, Item 6 of the Licence, Baffinland will submit individual quarry management plan prior to the development of a selected quarry site, provided that the approved Borrow Pit and Quarry Management Plan does not adequately address the development of a given borrow pit or quarry.

## 2.8 LAYDOWN AREAS

A total of 32 laydown areas will be established to support construction of the Phase 2 Proposal (Table 2.3). This includes 26 laydown areas to be located along the North Railway, one laydown area at Milne Port, and five laydown areas at the Mine Site. Several laydown areas at Milne Port and the Mine Site have been previously approved. The laydown areas are shown on Figure 2.2 and on the detailed railway figures (Attachment 10).

The laydown areas will be constructed by filling directly over undisturbed ground, including filling in low-lying areas that collect water. The laydown areas will be constructed utilizing blasted rock with granular topping to a total maximum thickness of 1 m. Fill will be sourced from existing quarries and borrow pits and those proposed under this application (Section 2.7).

**Table 2.3 Proposed Laydown Areas**

| Laydown Area | Approximate Location | | Area (ha) | Easting | Northing |
|---|---|---|---|---|---|
| | Road km | Rail Chainage | | | |
| LD-1 | Milne Port | | 3.4 | 504032 | 7974598 |
| LD-2 | km2.1 | CH2200 | 2.6 | 504049 | 7974015 |
| LD-3 | km2.7 | CH3000 | 2 | 504492 | 7973629 |
| LD-4 | km3.7 | CH4000 | 2.8 | 504913 | 7972741 |
| LD-5 | km5.0 | CH5700 | 1.5 | 505809 | 7971792 |
| LD-6 | km5.6 | CH5400 | 1 | 506309 | 7971592 |
| LD-7 | km11.7 | CH12000 | 1.6 | 510802 | 7967353 |
| LD-8 | km16.6 | CH16400 | 0.6 | 514586 | 7965208 |
| LD-9 | km20.9 | CH21000 | 0.4 | 517314 | 7961896 |
| LD-10 | km30.8 | CH31000 | 1.2 | 521698 | 7953050 |
| LD-11 | km39.1 | CH39000 | 1 | 522987 | 7945107 |
| LD-12 | km43.7 | CH44000 | 2.5 | 524033 | 7940555 |
| LD-13 | km52.4 | CH529000 | 2 | 527204 | 7932775 |
| LD-14 | km52.7 | CH530000 | 0.3 | 527169 | 7932595 |
| LD-15 | km56.6 | CH57000 | 1.7 | 528177 | 7928987 |
| LD-16 | km56.6 | CH57000 | 1.5 | 528241 | 7929131 |
| LD-17 | km56.6 | CH57000 | 2.3 | 528353 | 7929018 |
| LD-18 | km56.6 | CH57000 | 1.7 | 528318 | 7929012 |
| LD-19 | km57.4 | CH58000 | 1.9 | 528375 | 7928223 |
| LD-20 | On Rail Line Only | | 3.5 | 529262 | 7916527 |
| LD-21 | km74.1 | CH84000 | 2 | 540501 | 7921431 |
| LD-22 | km75.9 | CH86000 | 2.5 | 542504 | 7921907 |
| LD-23 | km76.8 | CH86500 | 1.5 | 542999 | 7921484 |
| LD-24 | km76.8 | CH86500 | 0.3 | 543186 | 7921431 |
| LD-25 | km81.2 | CH92000 | 1.7 | 547058 | 7919695 |
| LD-26 | km90.9 | CH101500 | 2.5 | 554771 | 7914864 |
| LD-27 | km91.2 | CH101000 | 2.8 | 555311 | 7914686 |
| LD-28 | km92.3 | CH102000 | 1.7 | 556192 | 7915289 |
| LD-29 | Mine Site | | 1.5 | 558174 | 7914997 |

| Laydown Area | Approximate Location | | Area (ha) | Easting | Northing |
|---|---|---|---|---|---|
| | Road km | Rail Chainage | | | |
| LD-30 | Mine Site | | 2.3 | 560010 | 7913726 |
| LD-31 | Mine Site | | 1.4 | 560886 | 7913354 |
| LD-32 | Mine Site | | 1.7 | 560829 | 7913258 |

## 2.9 CONSTRUCTION CAMPS

The camps that are currently at Milne Port, along with the construction and operation phase camp occupancies, are presented in Table 2.4.

**Table 2.4 Milne Port Camp Occupancies**

| Camp/Facility | Current | Production Increase | Phase 2 Construction | Phase 2 Operation |
|---|---|---|---|---|
| Port Site Complex | 120 | 120 | 330 | 330 |
| Steensby Camp | 54 | 54 | 54 | |
| Matrix Camp | 153 | 153 | 153 | |
| Permanent Camp | | 380 | 380 | 380 |
| Total Beds | 327 | 707 | 917 | 710 |

In early 2019, Baffinland received approval from the NWB to construct the 380-bed camp identified in Table 2.4 (NWB, 2019).

The camp components at Milne Port associated with the Phase 2 Proposal (this application) include an expansion of the Port Site Complex (PSC) to 330 beds (210 beds will be relocated from the Mine Site to add to the existing 120 beds). The total number of beds at Milne Port will peak at 917 during construction of the Phase 2 Proposal, and this will be reduced to 710 beds during operation with the removal of the Steensby and Matrix Camps.

Two temporary camps will be used during the construction of the railway. These camps may be located at any or all of the proposed laydown areas throughout the construction phase, so as to accommodate workers closer to the active work front. The three mobile camps will have a combined bed capacity136 beds. The quantities of water required for these camps is within the allowable water draw from Camp Lake under the current Licence. Water will be trucked from approved domestic water sources to storage tanks, with a daily water supply usage of 34 $m^3$.

The construction workforce at the Mine Site will be accommodated by existing camp facilities (Section 2.10).

500,000
510,000
520,000
530,000
540,000
550,000
560,000
570,000
580,000
7,970,000
7,960,000
7,950,000

MILNE INLET
MILNE PORT
LD-01
LD-02
LD-03
LD-04
LD-05
LD-06
LD-07
LD-08
LD-09
LD-10
LD-11
LD-12
LD-13
LD-14
LD-15
LD-16
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LD-27
LD-28
LD-29
LD-30
LD-31
LD-32

CH 2000
CH 4000
CH 8000
CH 10000
CH 16000
CH 18000
CH 22000
CH 24000
CH 26000
CH 28000
CH 30000
CH 32000
CH 34000
CH 36000
CH 38000
CH 40000
CH 42000
CH 46000
CH 48000
CH 50000
CH 52000
CH 54000
CH 56000
CH 58000
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CH 64000
CH 66000
CH 68000
CH 70000
CH 72000
CH 74000
CH 76000
CH 78000
CH 80000
CH 82000
CH 86000
CH 90000
CH 94000
CH 100000
CH 102000
CH 106000
CH 108611

PHILLIPS CREEK
KM 32 LAKE
KATIKTOK LAKE
MURIEL LAKE
DAVID LAKE
CAMP LAKE
MARY RIVER
MARY LAKE

SCALE 2.5 1.25 0 2.5 5 7.5 10 km

**LEGEND:**

- PROJECT FACILITY LOCATION
- NORTH RAILWAY
- MILNE INLET TOTE ROAD
- LAYDOWN AREA LOCATIONS
- NORTH RAILWAY CHAINAGE (m)
- WATER

**NOTES:**

1. COORDINATE GRID IS IN KILOMETRES.
   COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP/IMAGERY: © ESRI AND DATA (ONLINE) SERVICE LAYERS (2017). REDLANDS, CA: ENVIRONMENTAL SYSTEM RESEARCH INSTITUTE. ALL RIGHTS RESERVED.

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
| 0 | 02MAY'19 | ISSUED WITH REPORT | AMH | CJV | RAC |

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

**PROPOSED LAYDOWN AREA LOCATIONS**

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| P/A NO. | REF NO. |
|---|---|
| NB102-181/53 | 3 |
| **FIGURE 2.2** | REV 0 |

Water supply to the camps is discussed in Sections 3.4 and 3.7. Sewage treatment and disposal is discussed in Section 4.7.

## 2.10 PERMANENT CAMPS

The camps to be added and removed at Milne Port as the result of the Phase 2 Proposal is described in Section 2.9 and in Table 2.4. At the end of the construction phase, two camps will remain: the 380-bed camp to be constructed at Milne Port through a modification request under the current Licence, and the PSC expanded to 330 beds.

An 800-person camp was constructed at the Mine Site in 2018 through a modification request under the current Licence (the approved capacity of camps at the Mine Site is 1,200 beds). This will meet the needs of the 12 Mtpa North Railway operation.

Water supply to the camps is discussed in Sections 3.4 and 3.7. Sewage treatment and disposal is discussed in Section 4.7.

## 2.11 SEDIMENT AND EROSION CONTROL MEASURES

Baffinland will implement the water management features to convey water around or through the laydown areas. Sediment and erosion control measures to address sedimentation concerns (check dams, rip-rap, silt fences, etc.) will be implemented during construction in accordance to Baffinland's Environmental Protection Plan (EPP; Baffinland, 2016b) and Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019a). Draft updates to these plans are presented as Attachments 22 and 28. No sediment or erosion control measures are expected to be required once construction has been completed and site conditions have been stabilized.

Similarly, the quarries proposed as part of the Phase 2 Proposal will have plans for ditches, diversions and ponds (as required) in their respective quarry management plans to be submitted to the NWB prior to their development.

# 3.0 WATER USE AND MANAGEMENT (PART E)

## 3.1 OVERVIEW OF CHANGES

As part of the Phase 2 Proposal, Baffinland has identified the need to increase water takes from three existing sources, as well has identified thirteen additional water source locations (detailed discussed in Sections 3.3 to 3.5). Water management at Milne Port will be updated to account for the larger stockpiles and new crusher at the Port (see Section 3.6).

## 3.2 APPLICABLE MANAGEMENT PLANS

There are two approved management plans that relate to water use and management:

- Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019a)
- Freshwater Supply, Sewage and Wastewater Management Plan (Baffinland, 2018a)

Draft updates to these plans, presented as Attachments 22 and 23, are being submitted to the NWB for approval in accordance with Items 1 and 2 of Part E of the Licence.

## 3.3 CONSTRUCTION PHASE WATER USE

The Phase 2 Proposal will not require additional sources or changes in the volume of water used for domestic and industrial purposes during the construction phase. Table 3.1 lists the approved construction phase water sources and volumes of water to be used for domestic and industrial purposes.

**Table 3.1 Construction Phase Water Sources**

| Site | Source | Authorized Water Use Volume ($m^3$/day) |
|---|---|---|
| Milne Port (Milne Inlet) | Phillips Creek (summer) | 367.5 |
| | km 32 Lake (winter) | |
| Mine Site (Mary River) | Camp Lake | 657.5 |
| Steensby Port (Steensby Inlet) | ST 347 km Lake | 435.8 |
| | 3 km Lake | |
| Ravn River | Camp Lake | 145.2 |
| Mid-Rail | Nivek Lake (summer) | 79.5 |
| | Ravn Camp Lake (winter) | |
| Cockburn North (Tunnels Camp) | Cockburn Lake | 101.4 |
| Cockburn South Camp | Cockburn Lake | 111.1 |

## 3.4 OPERATION PHASE WATER USE

The Phase 2 Proposal will not require additional sources or changes in the volume of water used for domestic and industrial purposes during the operation phase. Table 3.2 lists the approved operation phase water sources and volumes of water to be used for domestic and industrial purposes.

**Table 3.2 Operation Phase Water Sources**

| Site | Source | Authorized Water Use Volume ($m^3$/day) |
|---|---|---|
| Milne Port | Phillips Creek (summer) | 367.5 |
| | km 32 Lake (winter) | 367.5 |
| Mine Site (Mary River) | Camp Lake | 355.4 |
| Steensby Port | ST 347 km Lake | 243.6 |
| | 3 km Lake | |

Expansions of the potable water treatment plants at Milne Port and the Mine Site will be required over time to meet increased volume requirements (Section 3.7).

## 3.5 DUST SUPPRESSION WATER USE

Additional dust suppression water sources along the Northern Transportation Corridor are proposed as part of the construction and operation phases of the Phase 2 Proposal. Table 3.3 lists the approved water sources and volumes identified in Table 2-3 of Part E, Item 25 of the Licence, along with the additional water sources and revised daily volumes.

Of the approved water sources, Baffinland proposes to increase the volumes at three sources, CV078, BG50, and BG32. Thirteen new water sources have been identified, of which one (CWP12) will require the restriction of taking water in June and July only during low flow years. An assessment of the new and revised water sources is presented in TSD 13 Surface Water Assessment (KP, 2018b). All water intakes will be equipped with fish screens in accordance to DFO's fish screen guideline (DFO, 1995), as described in the Fresh Water Supply, Sewage and Wastewater Management Plan (Baffinland, 2018a).

As a means of reducing water consumption, stormwater collected at the ore staging area will be used for dust suppression provided the effluent is confirmed to meet the mine effluent discharge limits in Table 10 (Part F, Item 24) of the Licence.

**Table 3.3 Approved and Proposed Dust Suppression Water Sources**

| Water Take Station (Source) | Coordinates | | Authorized Water Use | Additional Water Use Requested | Revised Maximum Water Use |
|---|---|---|---|---|---|
| | Northing (m) | Easting (m) | ($m^3$/day) | ($m^3$/day) | ($m^3$/day) |
| MP-MRY-2 (Phillips Creek) | 7,975,254 | 502,829 | 212 | - | 212 |
| CV128 | 7,965,895 | 513,545 | 579.5 | - | 579.5 |
| MP-MRY-3 (km32 Lake) | 7953,660 | 521,189 | 364 | - | 364 |
| CV099 | 7,948,820 | 521,811 | 110 | - | 110 |
| CV087 | 7,941,040 | 523,704 | 90 | - | 90 |
| CV078 | 7,936,787 | 525,852 | 75 | 15 | 90 |
| Katiktok Lake | 7,934,552 | 526,600 | 318 | - | 318 |
| BG50 | 7,926,846 | 529,334 | 150 | 65 | 215 |
| BG32 | 7,921,622 | 540,706 | 120 | 60 | 180 |
| CV217 | 7,922,158 | 542,219 | 130 | - | 130 |
| Muriel Lake | 7,921,987 | 542,508 | 212 | - | 212 |
| David Lake | 7,919,396 | 547,885 | 132 | - | 132 |
| BG17 | 7,917,643 | 550,703 | 75 | - | 75 |
| CV223 (Tom River) | 7,914,691 | 555,818 | 135 | - | 135 |
| Camp Lake | 7,914,684 | 557,793 | 86 | - | 86 |
| CWP1 | 7,970,914 | 506,663 | - | 140 | 140 |
| CWP2 | 7,967,146 | 510,978 | - | 110 | 110 |
| CWP3 | 7,963,947 | 515,215 | - | 55 | 55 |
| CWP4 | 7,962,497 | 516,439 | - | 75 | 75 |
| CWP5 (km26 Lake) | 7,958,592 | 518,839 | - | 120 | 120 |
| CWP6 | 7,945,826 | 522,434 | - | 80 | 80 |
| CWP7 | 7,942,153 | 523,218 | - | 60 | 60 |
| CWP8 | 7,939,580 | 524,497 | - | 35 | 35 |
| CWP9 | 7,938,445 | 524,839 | - | 45 | 45 |
| CWP10 | 7,923,139 | 527,413 | - | 55 | 55 |
| CWP11 | 7,916,686 | 529,119 | - | 100 | 100 |
| CWP12 | 7,916,606 | 551,452 | - | 80 | 80 |
| CWP3 (Sheardown Lake) | 7,913,489 | 560,288 | - | 10 | 10 |

## 3.6 SITE WATER MANAGEMENT

Site water management is described below. Further detail on the management of ore stormwater is provided in Section 4.4, and sewage disposal is described in Section 4.7. Existing site drainage plans require alteration to accommodate the additional infrastructure at both the Mine Site and at Milne Port. Water management plans for the Mine Site and Milne Port are presented as Attachments 14.2 and 15.3, respectively.

Water management facilities at the Mine Site will be modified to account for changes to the crusher pad associated with the 12 Mtpa North Rail operation. A new crusher pad will be constructed along with a new stormwater pond. A stream diversion will be required to divert water away from the crusher pad. Fish are not present within the section of stream (referred to as Sheardown Lake Tributary 12 in the FEIS) that will be affected by the diversion. IFC drawings of the crusher and screening pad and pond are included as Attachment 15.1.

Similarly, water management at Milne Port will undergo changes to accommodate larger ore stockpiles and new facilities associated with ore crushing and the North Railway. The proposed new infrastructure at the Milne Port to crush, screen, stockpile and transfer the ore to ships, and associated water management measures, are shown in Attachment 15.

No change to the mine effluent stormwater final discharge points at Milne Port are proposed. An additional ore stormwater pond will result in an additional final discharge point at the Mine Site (Sections 4.4 and 6.2).

Site water management will also be required at the ore staging area (Section 2.3). A pad will be established upon which ore will be unloaded from haul trucks, temporarily stockpiled, and loaded into rail cars. Runoff from this pad will be directed to a stormwater pond. Effluent from the pond meeting mine effluent discharge criteria will be used for dust suppression, as noted in Section 3.5.

Similarly, the quarries proposed as part of the Phase 2 Proposal (Section 2.6) will have plans for ditches, diversions and ponds (as required) in their respective Quarry Management Plans that will be submitted to the NWB prior to their development.

Best management practices are incorporated into the design of these site drainage features in accordance to Part F, Item 27 of the Licence.

## 3.7 WATER SUPPLY INFRASTRUCTURE

Water for domestic and industrial use at Milne Port will continue to be drawn from the same summer and winter sources with no change in the maximum daily volume, as described in Section 3.3 (construction phase) and Section 3.4 (operation phase). Baffinland is building a new water treatment plant at Milne Port for the 380-person camp that the NWB approved in early 2019 (Section 2.9). As part of the Phase 2 Proposal and this application, the existing water treatment plant servicing the Port Site Complex will be upgraded to accommodate the increase in the number of beds from 120 to 330 persons (see the Milne Port water and sewage process flow diagram presented as Attachment 18.2). Details on this component will be submitted to the NWB in the future (Section 9).

As described in Sections 2.9 and 2.10, the 800-bed Sailiivik Camp was constructed at the Mine Site in 2018 as part of the Approved Project. No additional water supply infrastructure at the Mine Site is required as

part of this application. A current water and sewage process flow diagram for the Mine Site is presented as Attachment 18.1.

## 3.8 UPDATED BLOCK FLOW DIAGRAMS

Updated area water balance block flow diagrams for the Mine Site, Milne Port and the temporary ore transfer area are included as Attachments 14.3, 15.4 and 16.2, respectively. Updates to these diagrams will be completed and submitted annually for information to the NWB as part of the annual report in accordance with Part E, Item 10 of the Licence.

# 4.0 WASTE DISPOSAL AND MANAGEMENT (PART F)

## 4.1 OVERVIEW OF CHANGES

An expansion of current solid waste management facilities will not be required for the Phase 2 Proposal, however a new landfill will be constructed at Milne Port following construction.

Details regarding the proposed changes are provided below.

## 4.2 APPLICABLE MANAGEMENT PLANS

Four approved management plans relate to waste disposal and management:

- Waste Management Plan (Baffinland, 2018b)
- Phase 1 Waste Rock Management Plan (Baffinland, 2014b)
- Life of Mine Waste Rock Management Plan (Baffinland, 2014c)
- Hazardous Materials and Waste Management Plan (Baffinland, 2017a)

Draft updates of the Waste Management Plan and Hazardous Materials and Waste Management Plan for the Phase 2 Proposal are presented as Attachments 24 and 25, in accordance with Items 1 and 2 of Part E of the Licence.

## 4.3 WASTE ROCK

Waste rock management is described in a Phase 1 Waste Rock Management Plan (Baffinland, 2014b) and a Life-of-Mine Waste Rock Management Plan (Baffinland, 2014c). The Phase 1 Waste Rock Management Plan addresses the first four years of mining (2015 to 2018) during execution of the ERP.

Baffinland has identified water quality issues associated with the waste rock facility (WRF) in mid-2017 and has implemented several actions, including the installation of a water treatment plant in June 2018. The runoff water quality issue is being addressed as part of current operations under the conditions of the Licence, including the implementation of Interim Waste Rock Management Plans over the short-term (Golder, 2018a and 2019). Baffinland will submit an updated Phase 1 Waste Rock Management Plan to the NWB by December 31, 2019.

The production of waste rock will be accelerated with the development of Phase 2. The Key Facts table (Appendix C of TSD 2 Project Description) provides an updated waste rock production schedule. The revised Phase 1 Waste Rock Management Plan due to the NWB at the end of 2019 will address both the water quality issues addressed by the Interim Waste Rock Management Plan and the higher production rate associated with the Phase 2 Proposal.

## 4.4 ORE STOCKPILE STORMWATER

Larger stockpiles and rail loading/unloading facilities at both the Mine Site and Milne Port will necessitate additional water management features to be installed. Table 6.1 identifies the new infrastructure for which Baffinland anticipates Surveillance Network Program (SNP) monitoring stations may be required in an amended Licence (Section 6.2). A discussion of Milne Port, the Mine Site and the ore staging area is provided below.

At Milne Port, the two existing stormwater ponds (Stormwater Ponds No. 1 and 2) collecting runoff from the ore stockpile area, along with Stormwater Pond No. 3 to be constructed in 2019, will be insufficient to contain a larger volume of runoff. Ditching along the east and west perimeter of the lump ore stockpile will contain runoff from the lump ore stockpile. The perimeter ditching will have sumps and the effluent will be discharged by pumping at the current effluent discharge point at Milne Inlet, provided it meets discharge criteria. Two other ponds (Stormwater Ponds No. 4 and 5) will be constructed near the crusher feed stockpile and the fines stockpile and will discharge to Milne Inlet via the final discharge points associated with the existing stormwater ponds.

At the Mine Site, current road haul stockpiles will be expanded for the North Railway adjacent to the present location and will have a new stacking conveyor and rail loading facility. A new stormwater pond for the primary crushing pad will be constructed. A new stormwater discharge pipeline will be installed to join the new stormwater pond to the combined stormwater and sewage outfall. No change to the outfall location is proposed. Once the North Railway crusher pad and pond are operational, the existing crusher pad and stormwater pond associated with the ERP operation will be decommissioned.

The ore staging area at km 57 of the North Railway will operate for 1 to 2 years during rail construction. Runoff from the ore stockpiles at this facility will be directed to a settling pond. The capacity of this pond is 1,100 $m^3$. Effluent collected in this pond will be sampled to ensure it meets discharge criteria before applying the water to the Tote Road as part of dust suppression efforts.

## 4.5 WASTE GENERATION AND SOLID WASTE MANAGEMENT FACILITIES

Baffinland currently operates a landfill at the Mine Site and incinerators at both the Mine Site and Milne Port. Table 4.2 identifies the existing solid waste management facilities, and modifications or additions required for the Phase 2 Proposal. A new landfill will be constructed in the exhausted Quarry Q1 at Milne Port following completion of construction activities.

During construction, most waste generated by the mobile rail construction camps will be non-hazardous and combustible, and, will be directed to one of the existing incinerators at the closer of Milne Port or the Mine Site. Waste will be collected from the camps regularly to not accumulate significant volumes of waste that may attract wildlife. Non-hazardous waste not suitable for incineration generated by the mobile camps will be directed to the landfill at the Mine Site, as the new landfill at Milne Port will not be constructed right away.

**Table 4.1 Modifications and Additions to Existing Solid Waste Management Facilities**

| Location/Facility | Modification or Addition |
|---|---|
| **Milne Port** | |
| Incinerators | No modification required |
| Landfill (new) | A landfill will be constructed within the boundaries of Quarry Q1 at Milne Port following construction of the Phase 2 Proposal |
| **Northern Transportation Corridor** | |
| Mobile construction camps | All solid wastes will be transported to existing facilities at the Mine Site or Milne Port for disposal |
| **Mine Site** | |
| Incinerator | No modification required |
| Landfill | No change; in 2018 the existing landfill reached its initial design capacity, and a modification request was submitted to the NWB for the staged expansion to the landfill. This proposed expansion will be sufficient to accommodate the Phase 2 Proposal. |

The facilities for the storage of hazardous waste will remain unchanged. Any hazardous wastes generated at the camps will be transported to existing hazardous waste storage facilities at Milne Port or the Mine Site. Hazardous waste will be shipped off site for disposal at licenced facilities. Handling, storage and transportation of these wastes will be in accordance with the Transportation of Dangerous Goods Regulations (Transport Canada, 2017).

The expected volumes of waste generated including disposal method, are provided in Table 4.3.

**Table 4.2 Projected Waste Quantities**

| Project Site | Type of Waste | Disposal Method | Volume |
|---|---|---|---|
| Mine Site | Treated sewage | Land discharge reporting to the Mary River | 360 $m^3$/day |
| | Combustible non-hazardous waste | Incineration | 1,100 $m^3$/year |
| | Non-combustible non-hazardous waste | Landfill | 7,500 $m^3$/year |
| Milne Port | Treated sewage | Land discharge reporting to Milne Inlet | 240 $m^3$/day |
| | Combustible non-hazardous waste | Incineration | 1,100 $m^3$/year |
| | Non-combustible non-hazardous waste | Landfill | 7,500 $m^3$/year |
| | Hazardous waste | Storage and disposal at licenced facility and shipped off site | 1,200 $m^3$/year |
| Temporary Camps | Treated sewage | Stored and trucked to Mine Site or Milne Port WWTP | 34 $m^3$/day |
| | Combustible non-hazardous waste | Trucked to Mine Site or Milne Port Incinerator | 192 $m^3$/year |

As with its current operations Baffinland will continue to make efforts to minimize waste by reusing and repurposing equipment and materials when possible.

## 4.6 OILY WATER TREATMENT FACILITY

Baffinland operates oily water treatment units as part of the truck wash facilities located within the maintenance facilities at both the Mine Site and Milne Port.

Rail maintenance facilities (rail workshop and locomotive workshop) will be added at Milne Port (Attachments 11.6 and 11.7), and a truck maintenance workshop will be added at the Mine Site (Attachment 14.4). The facilities will be consistent with the design of oily water treatment facilities at the Mine Site. The oily treatment facility will collect oily water from the workshops and areas that may have come into contact with grease, oil or fuel. Discharges from the oily water treatment facility will meet effluent quality limits prescribed in the Licence in Table 6 (Part F, Item 20 and Table 6.1 of the FWSWMP).

## 4.7 SEWAGE DISPOSAL

Water and sewage schematics for the Mine Site and Milne Port are presented as Attachments 18.1 and 18.2.

The Mine Site has two MBR Sewage Treatment Plants, one installed in 2014 and one another installed in 2018 specifically for the Sailiivik Camp Complex shown on Figure 1.4. The Rotating Biological Contactor (RBC) type STP (Seprotech manufactured), previously used to treat sewage from the Mine Site Weatherhaven camp, will eventually be decommissioned however in the interim it is being used as a temporary holding facility/surge tank for the Mine Site Weatherhaven camp. Raw sewage is transported from the RBC by vacuum truck to the MBR for treatment. In the meantime, the option to re-commission this plant remains, should the need arise, as the required approvals for this facility are still in place. Treated sewage effluent from the camp will continue to be land discharged at the same location, reporting to Mary River. The existing treated sewage effluent pipeline and outfall is shown on Figure 1.4.

One sewage treatment plant currently operates at Milne Port. Baffinland will commission two additional sewage treatment plants (STP) in 2019 and 2020 as part of current operations. STP#2 is the Membrane Biological Reactors (MBR) currently servicing the Mine Site Complex (MSC) at the Mine Site, which will be relocated to Milne Port along with the MSC buildings in 2019 or 2020. STP#3 will be commissioned in 2019 next to the 380-person construction camp, described in Section 2.9. Each of these STPs are equipped with the same MBR technology.

Treated effluent will be monitored to ensure it meets applicable discharge criteria as specified in the Licence Part 5, Item 18, Table 5 prior to discharge. Treated sewage effluent will be discharged to Milne Inlet from the final discharge point shown on Figure 1.3, and Attachment 18.3).

The existing and planned sewage treatment plants at both Milne Port and the Mine Site will have sufficient capacity to treat the sewage from the temporary camps. Each temporary camp will generate an estimated 17 $m^3$ of sewage per day. Sewage will be held in holding tanks and then transported by truck to one of the sewage treatment plants at Milne Port or at the Mine Site. Waste will be trucked regularly to the incinerator at either Milne Port or the Mine Site. Sewage holding tank details are provided as Attachment 18.4.

## 4.8 LANDFILL AT MILNE PORT

The proposed landfill at Milne Port will be constructed within the exhausted Quarry Q1 following construction, as shown on Figure 1.3. The Milne Port landfill will be designed based on the design of the existing landfill at the Mine Site (KP, 2008) and consistent with the *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories* (Ferguson, Simek Clark, 2003). As with the existing landfill at the Mine Site, the new landfill at Milne Port will only receive non-hazardous waste that cannot be incinerated. The area method will be used for waste disposal wherein a low height berm will be constructed along up to two sides of the landfill site (or alternatively against a quarry face), 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 following closure, the final cover will be thicker than the active layer. Appropriate surface water, erosion and sediment control measures will be implemented during operations. The landfill is not expected to significantly change the quality of surface waters in the area due to the inert nature of the waste and small landfill footprint. Because the landfill will be positioned within a rock quarry, no groundwater monitoring is proposed.

A design report including an operations and maintenance manual will be submitted to the NWB in approximately June 2020 in accordance with Part G of the Water Licence.

## 4.9 RAIL CONSTRUCTION SOIL SPOILS

The railway will be constructed using a combination of cut and fill, with material gained from cuts filling the lower lying areas along the alignment. Most cuts will be into rock, to minimize cuts in soils, particularly ice-rich soils, to avoid inducing thermal changes and causing geotechnical instability issues. Soil spoils generated at the Milne Port will be placed in designated areas, as shown on Figure 1.3. Soil spoils generated during railway construction along the alignment will be disposed of in quarries, which are shown on the detailed railway figures (Attachment 10).

Table 4.3 provides a breakdown of the estimated volume of soil spoils generated in 10 km increments. An estimated 1.85 $Mm^3$ of soil spoils will be generated during construction of the North Railway; approximately 960,000 $m^3$ of soil spoils will be generated along the rail alignment and approximately 880,000 $m^3$ will be generated during quarry development. Approximately 230,000 $m^3$ of the material along the proposed railway alignment is classified as Type 1, which consists of all soft waste that is not suitable for fill and may be susceptible to creep or flow (i.e. ice rich soils in summer, soils with high silt/clay content, etc.). The remaining 730,000 $m^3$ (approx.) of material will be frozen material or bedrock that will require drilling and blasting before excavation.

Table 4.3 also summarizes the proposed soil spoil disposal sites (borrow areas and quarries). There is approximately 5.5 $Mm^3$ of available storage and therefore it is expected that all the soil spoils generated along the railway can be placed in borrow pits and quarries. This approach will most likely avoid the use of dedicated disposal sites that would occupy additional land.

The soil spoils will require disposal at locations and in a manner that does not result in runoff of sediment-laden water. The following disposal criteria will be applied to reduce the potential for sediment laden runoff to report to water bodies and to ensure long-term stability of these materials:

- Soil spoils will be placed in designated locations at the Milne Port and in exhausted quarries and borrow pits along the Tote Road. Historic quarries and borrow areas represent an existing disturbed footprint with limited future use and potential instability due to alterations of the existing thermal gradient. As such, these sites are ideal for soil spoil storage, provided they will not be used for other purposes during construction.
- In all instances, as a standard condition of land-use approvals, disposed overburden materials will be placed >31 m from a surface water body.
- Disposal locations will be approved by the appropriate construction personnel (i.e., engineer, construction superintendent, foreman, etc.) who have been given such authority, to avoid unauthorized and indiscriminate disposal.
- Disposal locations will be located well away from the railway embankment.
- Stockpiles will be designed with minimal slopes that are physically stable.
- Overburden spoils generated during construction will not be re-used without prior approval by the supervising engineer.
- Overburden soils will be transported directly to the disposal site, without short-term storage and re-handling.

Sediment and erosion control measures will be implemented as identified in the Surface Water and Aquatic Ecosystem Management Plan (Baffinland, 2019a) to prevent runoff of sediment and to possibly divert runoff away from the disposed material. The Surface Water and Aquatic Ecosystem Management Plan update for the Phase 2 Proposal is presented as Attachment 22.

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**TABLE 4.3**

**BAFFINLAND IRON MINES CORPORATION**
**MARY RIVER PROJECT - PHASE 2 PROPOSAL**

**UPDATED APPLICATION FOR AMENDMENT NO.2 OF TYPE A WATER LICENCE 2AM-MRY1325**
**SOIL SPOILS GENERATION AND STORAGE SUMMARY**

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| Chainage (km) | Spoil Volume Generation | | | | Spoil Volume Storage | | | Additional Storage Requirement |
|---|---|---|---|---|---|---|---|---|
| | Railway - Type 1 Excavation[2] ($m^3$) | Railway - Type 2 Excavation[3] ($m^3$) | Quarry - Type 1/2 Excavation ($m^3$) | Total Spoils Generated[4] ($m^3$) | Available Borrow Storage[5] ($m^3$) | Available Quarry Storage[6] ($m^3$) | Total Available Spoils Storage ($m^3$) | ($m^3$) |
| Port Site (0)[7] | 34,000 | 136,000 | 0 | 170,000 | 93,899 | 0 | 93,899 | 76,101 |
| 0 to 10 | 77,127 | 71,973 | 6,699 | 155,799 | 67,139 | 1,017,173 | 1,084,312 | 0 |
| 10 to 20 | 6,530 | 47,925 | 63,562 | 118,016 | 56,181 | 96,962 | 153,143 | 0 |
| 20 to 30 | 9,567 | 39,553 | 44,053 | 93,173 | 56,645 | 233,079 | 289,724 | 0 |
| 30 to 40 | 15,120 | 67,101 | 69,124 | 151,345 | 0 | 54,478 | 54,478 | 96,867 |
| 40 to 50 | 10,557 | 49,845 | 55,086 | 115,487 | 0 | 458,560 | 458,560 | 0 |
| 50 to 60 | 11,468 | 40,970 | 75,149 | 127,586 | 29,857 | 518,767 | 548,624 | 0 |
| 60 to 70 | 1,858 | 11,654 | 195,540 | 209,052 | 102,897 | 749,117 | 852,014 | 0 |
| 70 to 80 | 6,865 | 38,144 | 87,549 | 132,559 | 14,664 | 1,140,654 | 1,155,318 | 0 |
| 80 to 90 | 4,328 | 15,066 | 71,306 | 90,699 | 0 | 0 | 0 | 90,699 |
| 90 to 100 | 20,404 | 121,521 | 84,489 | 226,414 | 155,819 | 284,905 | 440,724 | 0 |
| 100 to 110 | 15,369 | 91,387 | 78,203 | 184,958 | 0 | 345,485 | 345,485 | 0 |
| Mine Site (110) | 18,825 | 0 | 51,237 | 70,062 | 0 | 0 | 0 | 70,062 |
| **TOTAL** | **232,016** | **731,138** | **881,996** | **1,845,150** | **577,101** | **4,899,180** | **5,476,281** | **333,729** |

I:\1\02\00181\53\A\Data\Work Files\WF01 - Soil Spoils Volume Estimates\[Soil Spoils Disposal Summary - For Report 3 Rev 0.xlsx]Table 4.3- Spoil Summ

**NOTES:**

1. ALL SOIL SPOIL STORAGE LOCATIONS ARE WITHIN THE SAME 10 km INCREMENT AS THE SOILS SPOIL GENERATION ESTIMATE.
2. TYPE 1 EXCAVATION CONSISTS OF ALL SOFT WASTE THAT IS NOT SUITABLE FOR FILL AND MAY BE SUSCEPTIBLE TO CREEP OR FLOW (I.E. ICE RICH SOILS IN SUMMER, SOILS WITH HIGH SILT/CLAY CONTENT, ETC.).
3. TYPE 2 EXCAVATION CONSISTS OF ALL WASTE THAT IS NOT SUITABLE FOR FILL AND IS DRILLED AND BLASTED, INCLUDING ICE RICH SOILS IN THE WINTER MONTHS.
4. REQUIRED SPOIL VOLUME AT PORT SITE AND BY CHAINAGE PROVIDED BY HATCH VIA EMAIL ON APRIL 8, 2019.
5. AVAILABLE STORAGE AREA AT PORT PROVIDED BY HATCH VIA EMAIL ON APRIL 8, 2019. AVAILABLE STORAGE AREA ALONG TOTE ROAD ESTIMATED BY KP. AVAILABLE STORAGE VOLUME ESTIMATED BY KP, ASSUMING EACH AREA IS 1 m DEEP.
6. AVAILABLE STORAGE AREA ESTIMATED BY KP BASED ON CURRENT INFORMATION. AVAILABLE STORAGE VOLUME ESTIMATED BY KP, ASSUMING EACH AREA IS 1 m DEEP.
7. TOTAL EXCAVATION VOLUME PROVIDED. 20% ASSUMED TO BE TYPE 1 EXCAVATION AND 80 % ASSUMED TO BE TYPE 2 EXCAVATION, BASED ON REVIEW OF QUANTITIES ALONG RAILWAY.

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# 5.0 EMERGENCY RESPONSE AND CONTINGENCY PLANNING (PART H)

## 5.1 OVERVIEW OF CHANGES

Changes to the Project relevant to emergency response and contingency planning include the addition of two 15 ML fuel tanks to the planned Mine Site fuel farm that will be constructed under the current Licence. A number of temporary explosives storage facilities will also be placed at key locations along the North Railway.

## 5.2 APPLICABLE MANAGEMENT PLANS

The following management plans relate to emergency response and spill contingency measures:

- Emergency Response Plan (Baffinland, 2018c)
- Spill Contingency Plan (Baffinland, 2017b)
- Oil Pollution Emergency Plan (OPEP; Baffinland, 2017c)
- Railway Emergency Response Plan (Baffinland, 2018d)

The first two plans are regulated under the Licence. Updates to the first two of these plans for the Phase 2 Proposal are presented as Attachments 21 and 22; these are submitted to the NWB for approval in accordance with Item 1 of Part H of the Licence. A Railway Emergency Response Plan was recently prepared by Baffinland for the North Railway.

## 5.3 FUEL TANKS

Under the current Licence, Baffinland will be installing a fuel tank farm and a 15 ML tank at the Mine Site. The fuel tank farm will be built to accommodate an additional two 15 ML fuel tanks. As part of the Phase 2 Proposal Baffinland will install the remaining two 15 ML fuel tanks, bringing the Mine Site fuel storage capacity to 45 ML. Details regarding the expansion of Mine Site fuel storage is provided in Section 2.8 of the Project Description. Drawings for the Mine Site tank farm and fuel tank details are also provided as Attachment 17.

Mobile fuel trucks will supply fuel to the construction camps along the northern transportation corridor. Mobile double-walled fuel tanks will also be positioned at laydown areas or near construction work fronts during rail construction.

## 5.4 EXPLOSIVES MANUFACTURING AND STORAGE

Phase 2 requires the expansion of ammonium nitrate storage and explosives magazine storage facilities to support rail construction. Temporary storage of magazines will be required at three locations along the northern transportation corridor. This includes magazine storage facilities at km 13, km 52.4, km 59.3 and km 78.2. Existing magazine storage facilities are located at km 7,km 63, and km 97. Table 5.1 outlines the maximum cumulative quantities of explosives and ammonium nitrate Baffinland intends to store at the Mary River Project, including the quantities needed to support construction of the Phase 2 Proposal.

**Table 5.1 Maximum Cumulative Quantities of Explosives and Ammonium Nitrate**

| Storage Location | Material | Purpose | Storage Container | Maximum Quantity (kg) |
|---|---|---|---|---|
| Milne Port | AN | Temporary storage between unloading and transport to km97 storage | Seacans | 15,000,000 |
| Km 7 (existing/proposed) | Prepackaged explosives, boosters, detonators | Store explosives and hardware | Magazines/Bulk Truck | 6,000/10,000 |
| Explosives Area No. 1 Km 13 (proposed) | | | Magazines | 200,000 |
| Explosives Area No. 2 Km 52.4 (proposed) | | | Magazines | 200,000 |
| Explosives Area No. 3 Km 59.3 (proposed) | | | Magazines | 200,000 |
| Explosives Area No. 4 Km 63 (existing) | | | Magazines | 300,000 |
| Explosives Area No. 5 Km 78.2 (proposed) | | | Magazines | 200,000 |
| Explosives Area No. 6 Km 97 (existing) | AN | Storage for emulsion plant | Seacans | 15,000,000 |
| Mine site (existing) | Prepackaged Explosives | Open pit mining | Magazines | 132,000 |
| | Emulsion | Open pit mining | ISO tank in plant | 35,000 |
| | Detonators | Open pit mining | Magazines | 110,000 units |
| | AN | Emulsion manufacture | Totes on plant conveyor | 8,000 |
| | | | Seacans | 200,000 |
| Explosives trucks (2) | Emulsion | Rail construction | Explosives truck | 10,000 |
| Explosives trucks (2) | Emulsion | Open pit mining | | 10,000 |
| | AN | | | 4,000 |

A heating facility for emulsion trucks will also be constructed south of Milne Port. The heating facility does not include a wash bay, therefore there is no anticipated contact with water and the trucks while within the building. The location of these features is shown on the North Railway detailed figures in Attachment 10.

# 6.0 GENERAL AND AQUATIC EFFECTS MONITORING (PART I)

## 6.1 APPLICABLE MANAGEMENT PLANS

The following management plans relate to monitoring:

- Aquatic Effects Monitoring Plan (AEMP; Baffinland, 2016a)
- Environmental Protection Plan (EPP; Baffinland, 2016b)
- Surface Water Sampling Program - Quality Assurance and Quality Control Plan (Baffinland, 2016c)

The AEMP is designed to monitor the aquatic ecosystem in the immediate area of the Mine Site that may be affected by multiple stressors (i.e., effluent discharges, dust deposition, sedimentation). The Phase 2 Proposal does not meaningfully change the footprint and hence the potentially affected aquatic receiving environment. Therefore, the AEMP is expected to be adequate as is to continue to monitor the effects of the Project on the aquatic environment without meaningful changes. Draft updates of the first two of these plans for the Phase 2 Proposal are presented as Attachments 27 and 28. The Surface Water Sampling Program QA/QC Plan, which is unchanged for the Phase 2 Proposal, is presented as Attachment 30.

## 6.2 POTENTIAL NEW MONITORING STATIONS

Baffinland has identified that changes will be required to Part I of the Licence and its accompanying Schedule I as a result of the Phase 2 Proposal. Tables 6.1 and 6.2 identifies the new infrastructure for which Baffinland anticipates monitoring stations may be required in an amended Licence for Milne Port and the Mine Site, respectively. These additional stations would need to be incorporated into Tables 13 to 15 in Schedule I.

Not included in Table 6.1 are monitoring stations that will need to be established downgradient of the various new quarries. These monitoring stations will be identified in future quarry-specific management plans developed and filed with the NWB in accordance with Part D, Item 6.

In accordance with Part I, Item 6, Baffinland will confirm the locations of newly proposed monitoring stations through GPS coordinates with an inspector. Signs will also be posted to identify the new monitoring stations in accordance with Part I, Item 9 of the Licence.

Existing and proposed SNP monitoring stations at Milne Port and the Mine Site are shown on Figures 6.1 and 6.2, respectively. Additions and modifications to the SNP are shown in green, and include modifications proposed by Baffinland under Part E, Item 12 of the Licence in a March 31, 2019 letter to the NWB (Baffinland, 2019b).

**Table 6.1 Proposed Revisions to the Milne Port SNP Stations**

| SNP Station | Description | Project Phases | Monitoring Parameters | Frequency | Status and Proposed Changes for Phase 2 Proposal |
|---|---|---|---|---|---|
| MP-MRY-2 | Freshwater Intake at Phillips Creek (Summer) | Construction<br>Operations<br>Closure | Group 1 | Record Daily<br>Report Monthly | Unchanged |
| MP-MRY-3 | Freshwater Intake from Km 32 Lake (Winter) | Construction<br>Operations<br>Closure | Group 1 | Record Daily<br>Report Monthly | Unchanged |
| MP-MRY-04 | Milne Exploration Phase Sewage Treatment Facilities (to become inactive after transition period | Construction<br>Operations<br>Closure | Groups 1, 2<br>Group 3 | Monthly<br>Annually | Inactive; see Note 1 |
| MP-MRY-04a | Milne Exploration Phase Sewage Treatment Facilities (to become inactive after transition period | Construction<br>Operations<br>Closure | Groups 1, 2<br>Group 3 | Monthly<br>Annually | Inactive; see Note 1 |
| MP-MRY-7 | Milne Exploration Phase Bladder Fuel Storage Facility Storm water (to become inactive after transition period) | Construction<br>Operations<br>Closure | Groups 1 and 5 | Daily Flow<br>Monthly | Inactive; see Note 1 |
| MP-MRY-12 | Bulk Sample Stockpile Area Seepage | Construction<br>Operations<br>Closure | Groups 1 and 7<br>Group 3 | Monthly<br>Annually | Inactive; see Note 1 |
| MP-01 | Milne Port Sewage Treatment Facilities (discharge into ditch prior to ocean) | Construction<br>Operations | Groups 1, 2<br>Group 3 | Monthly<br>Annually | No change |

| SNP Station | Description | Project Phases | Monitoring Parameters | Frequency | Status and Proposed Changes for Phase 2 Proposal |
|---|---|---|---|---|---|
| MP-01a | Milne Port Polishing Waste Stabilization Pond (PWSP) | Construction Operations | Groups 1, 2 | Once prior to discharge and monthly | No change |
| | | | Group 3 | Annually | |
| MP-02 | Milne Port Maintenance Shop Oily water/WWTF | Construction Operations | Groups 1 and 4 | Monthly | No change |
| MP-03 | Milne Port Bulk Fuel Storage Facility Stormwater | Construction Operations | Groups 1 and 5 | Daily Flow Monthly | No change; clarifying that monitoring parameters include Groups 1 and 5 |
| MP-04 | Milne Port Landfarm Facility Stormwater | Construction Operations Closure | Groups 1 and 5 | Daily Flow Monthly | No change; proposing to remove reference “plus TSS” in the monitoring parameters, since TSS is included in the Group 5 monitoring group |
| MP-04B (new) | Milne Port Contaminated Snow Dump | Construction Operations Closure | Groups 1 and 5 | Monthly | Proposed; see Note 2. |
| MP-05 | Milne Port Ore Stockpile Sedimentation Pond (East) | Construction Operations | Groups 1 and 7 | Monthly during summer | Re-name: Milne Port Ore Stockpile Stormwater Ponds No. 2 and 2A; remove closure phase as this pond will be decommissioned at closure |
| | | | Group 3 | Annually | |
| MP-06 | Milne Port Ore Stockpile Settling Pond (West) | Construction Operations | Groups 1 and 7 | Monthly during summer | Re-name: Milne Port Ore Stockpile Stormwater Ponds No. 1 and 1A; remove closure phase as this pond will be decommissioned at closure |
| | | | Group 3 | Annually | |
| MP-07 (new) | Milne Port Ore Stockpile Stormwater Pond No. 3 | Construction Operations | Groups 1 and 7 | Monthly during summer | New ore stormwater pond |

| SNP Station | Description | Project Phases | Monitoring Parameters | Frequency | Status and Proposed Changes for Phase 2 Proposal |
|---|---|---|---|---|---|
| | | | Group 3 | Annually | |
| MP-08 (new) | Milne Port Ore Stockpile Stormwater Pond No.4 | Construction Operations | Groups 1 and 7 | Monthly during summer | New ore crusher feed stockpile stormwater pond |
| | | | Group 3 | Annually | |
| MP-09 (new) | Milne Port Ore Stockpile Stormwater Pond No.5 | Construction Operations | Groups 1 and 7 | Monthly during summer | New ore fines stockpile stormwater pond |
| | | | Group 3 | Annually | |
| MP-10A (new) | Lump Ore Stockpile Perimeter Ditching East | Construction Operations | Groups 1 and 7 | Monthly during summer | New perimeter ditching pond |
| | | | Group 3 | Annually | |
| MP-10B (new) | Lump ore stockpile perimeter ditching West | Construction Operations | Groups 1 and 7 | Monthly during summer | New perimeter ditching pond |
| | | | Group 3 | Annually | |
| MP-11 (new) | Milne Port Rail Maintenance Shop Oily water/WWTF | Construction Operations | Groups 1 and 4 | Monthly | New oily water treatment facility |
| MP-12 (new) | Milne Port Landfill | Construction Operations Closure | Groups 1 and 6 | Daily Monthly | Proposed monitoring station to monitor surface or subsurface drainage from the landfill, as appropriate, at a location to be determined with the landfill design report |
| MP-Q1-01 | Surface runoff from Quarry Q1 | Construction Operations Closure | Groups 1 and 8 | Monthly | These two stations are being monitored but are not currently part of the SNP. Baffinland proposed that the two stations be added. Drainage from Quarry Q1 has changed; new locations will be confirmed with the Water Resource Officer in 2019. |
| | | | Group 3 | | |
| MP-Q1-02 | Surface runoff from Quarry Q1 | Construction Operations Closure | Groups 1 and 8 | Monthly | |

| SNP Station | Description | Project Phases | Monitoring Parameters | Frequency | Status and Proposed Changes for Phase 2 Proposal |
|---|---|---|---|---|---|
| MP-C-A | Surface discharge downstream of construction area at Milne Port | Construction | Groups 1 and 8 | During periods of flow and following significant precipitation events, on a monthly basis | Station is inactive; propose removal from SNP |
| MP-C-B | | | | | No change proposed |
| MP-C-B01 | | | | | Relocation of this station is proposed |
| MP-C-C | | | | | Relocation of this station is proposed |
| MP-C-D | | | | | Station is inactive; propose removal from SNP |
| MP-C-E | | | | | No change proposed |
| MP-C-F | | | | | No change proposed |
| MP-C-G | | | | | Station is inactive; propose removal from SNP |
| MP-C-H | | | | | No change proposed |

**NOTES:**

1. BAFFINLAND SUBMITTED A MARCH 31, 2019 LETTER TO THE NWB REQUESTING CHANGES TO THE SNP THAT IDENTIFIES THESE STATIONS AS INACTIVE AND PROVIDES AN EXPLANATION FOR WHY REMOVAL OF THE SITES FROM THE SNP PROGRAM IS SOUGHT.
2. BAFFINLAND RECOMMENDS THE ADDITION OF SNP STATION MP-04A, AS THE CONTAMINATED SNOW DUMP IS A CONTAINMENT AREA SEPARATE FROM THE LANDFARM.

**Table 6.2 Proposed Revisions to the Mine Site SNP Stations**

| SNP Station | Description | Project Phases | Monitoring Parameters | Frequency | Status and Proposed Changes for Phase 2 Proposal |
|---|---|---|---|---|---|
| MS-MRY-1 | Freshwater Intake from Camp Lake | Construction Operations Closure | Group 1 | Record Daily | No change proposed |
| MS-01 | Mine Site Sewage Treatment Facilities | Construction Operations Closure | Groups 1 and 2 | Monthly | No change proposed |
| | | | Group 3 | Annually | No change proposed |
| MS-01A | Mine Site Polishing/Waste Stabilization Pond (PWSP) | Construction Operations | Groups 1 and 2 | Once prior to discharge and Monthly | No change proposed |
| | | | Group 3 | Annually | |
| MS-01B | Effluent from Sailivik Camp Sewage Treatment Plant | Construction Operations | Groups 1 and 2 | Monthly | Proposed new station for the Sailiivik Camp Sewage Treatment Plant effluent |
| | | | Group 3 | Annually | |
| MS-02 | Mine Site Maintenance Shop Oily Water WWTF | Construction Operations | Groups 1 and 4 | Monthly | No change proposed |
| MS-MRY-4A, MS-MRY-4B & MS-MRY-4C | Exploration Camp Polishing/Waste Stabilization Ponds | Construction Operations | Groups 1 and 2 | Once prior to discharge and Monthly | These three stations have been monitored and reported for several years but are not currently part of the SNP. Baffinland proposed that the three stations be added. |
| | | | Group 3 | Annually | |
| MS-MRY-04 | Exploration Camp Sewage Treatment Facility | Construction Operations Closure | Groups 1 and 2 | Monthly | No longer in use |
| | | | Group 3 | Annually | |
| MS-03 | Mine Site Bulk Fuel Storage Facility Stormwater | Construction Operations | Groups 1 and 5 | Daily Flow Monthly | No change proposed |
| MS-03B | Mine Site Bulk Fuel Storage Facility No.2 Stormwater | Construction Operations | Groups 1 and 5 | Daily Flow Monthly | Proposed new station for the second tank farm |
| MS-04 | Mine Site Fuel Unloading Station Stormwater | Construction Operations | Groups 1 and 5 | Daily Flow Monthly | No change proposed |

| SNP Station | Description | Project Phases | Monitoring Parameters | Frequency | Status and Proposed Changes for Phase 2 Proposal |
|---|---|---|---|---|---|
| MS-05 | Mine Site Landfarm Facility | Construction Operations | Groups 1 and 5 Plus TSS | Daily Flow Monthly | This is an approved facility planned to be built in 2019. |
| MS-05B | Mine Site Contaminated Snow Dump | Construction Operations | Groups 1 and 4 | Monthly | This is part of the approved Mine Site landfarm facility to be built in 2019. |
| MS-MRY-6 | Exploration Camp Bulk Fuel Storage Facility | Construction Operations | Groups 1 and 5 | Daily Flow Monthly | No changes proposed |
| MS-06 | Ore stockpile (crusher pad) pond stormwater | Operations | Groups 1 and 7 | Monthly during summer | Suggest re-naming station "Stormwater Pond No. 1 at Crusher Pad Facility". Project phase should be operations only, as the pond will be decommissioned at closure |
| | | | Group 3 | Annually | |
| MS-06B | Stormwater Pond No. 2 at North Rail Loadout Facility | Operations | Groups 1 and 7 | Monthly during summer | New stormwater pond |
| | | | Group 3 | Annually | |
| MS-07 | Run of Mine (ROM) Ore Stockpile Pond Stormwater | Operations Closure | Groups 1 and 7 | Monthly during summer | Not yet constructed; no changes proposed |
| | | | Group 3 | Annually | |
| MS-08 | Waste Rock Stockpile West Pond | Operations Closure | Groups 1 and 7 | Monthly during summer | Operational, but discharges to the Mary River as the east pond intended |
| | | | Group 3 | Annually | |
| MS-09 | Waste Rock Stockpile East Pond | Operations Closure | Groups 1 and 7 | Monthly during summer | Not yet constructed; no changes proposed |
| | | | Group 3 | Annually | |
| MS-MRY-09 | 2008 Bulk Sample Program - Open Pit - Downstream Surface Water Drainage | Construction Operations | Groups 1 and 7 | Monthly during summer | Inactive; relocation proposed |
| | | | Group 3 | Annually | |
| MS-MRY-10 | 2008 Bulk Sample Program - Ore Stockpile Area – Downstream Surface Water Drainage | | Groups 1 and 7 | Monthly during summer | Inactive; relocation proposed |

| SNP Station | Description | Project Phases | Monitoring Parameters | Frequency | Status and Proposed Changes for Phase 2 Proposal |
|---|---|---|---|---|---|
| | | Construction<br>Operations<br>Closure | Group 3 | Annually | |
| MS-MRY-11 | 2008 Bulk Sample Program - Ore Processing Area - Downstream Surface Water Drainage | Construction<br>Operations<br>Closure | Groups 1 and 7 | Monthly during summer | Inactive; can be discontinued |
| | | | Group 3 | Annually | |
| MS-MRY-13a & MS-MRY-13b | Mine Site Non-Hazardous Waste Landfill Facility - Downstream Surface Water Drainage | Construction<br>Operations<br>Closure | Groups 1 and 6 | Daily<br>Monthly | No change proposed |
| MS-C-A | Surface discharge downstream | Construction | Groups 1 and 8 | During periods of flow and following significant precipitation events, on a monthly basis | No change proposed |
| MS-C-B | | | | | |
| MS-C-C | | | | | |
| MS-C-D | | | | | |
| MS-C-E | | | | | |
| MS-C-F | | | | | |
| MS-C-G | | | | | Down gradient of emulsion plant |
| MS-C-H | | | | | Down gradient of emulsion plant |
| MQ-C-A | Surface water drainage downstream of QMR2 Quarry. | Construction<br>Operations<br>Closure | Groups 3 and 8 | During periods of flow on a monthly basis | These two stations have been monitored and reported for several years but are not currently part of the SNP. Baffinland proposed that the two stations be added. |
| MQ-C-B | | | | | |
| MQ-C-D | | | | | |
| OS-01 | Ore Staging Area Stormwater Pond | Construction | (Same as other ore stockpiles) | (Same as other ore stockpiles) | New pond to collect runoff from the ore staging area for a period of 1 to 2 years during rail construction/ commissioning. Final discharge will be to use the effluent for dust suppression on Tote Road. |

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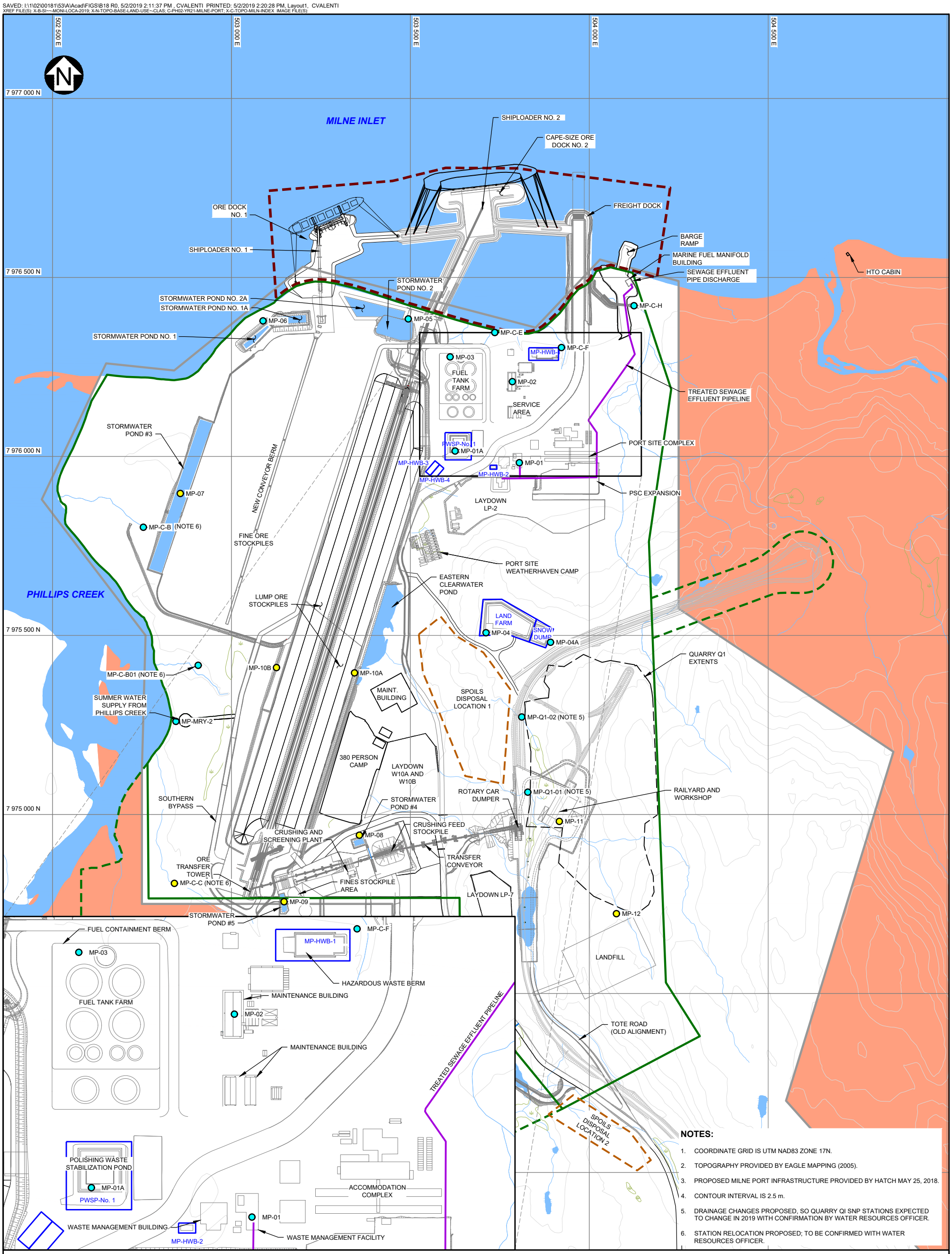


**NOTES:**

1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PROPOSED MILNE PORT INFRASTRUCTURE PROVIDED BY HATCH MAY 25, 2018.
4. CONTOUR INTERVAL IS 2.5 m.
5. DRAINAGE CHANGES PROPOSED, SO QUARRY QI SNP STATIONS EXPECTED TO CHANGE IN 2019 WITH CONFIRMATION BY WATER RESOURCES OFFICER.
6. STATION RELOCATION PROPOSED; TO BE CONFIRMED WITH WATER RESOURCES OFFICER.

**LEGEND:**

- WATER
- SPOILS DISPOSAL LOCATION
- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- WASTE STORAGE AREA
- ROAD
- WATER LICENCE SURVEILLANCE NETWORK PROGRAM (SNP) STATION
- PROPOSED SURVEILLANCE NETWORK PROGRAM STATION
- COMMERCIAL LEASE BOUNDARY
- PROJECT DEVELOPMENT AREA (PDA)
- PDA EXPANSION FOR PHASE 2 PROPOSAL
- FORESHORE LEASE BOUNDARY / MARINE PDA
- RIVER/STREAM/DRAINAGE
- TREATED SEWAGE EFFLUENT PIPELINE

SCALE A: 100 50 0 100 200 300 400 500 m

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BAFFINLAND IRON MINES CORPORATION

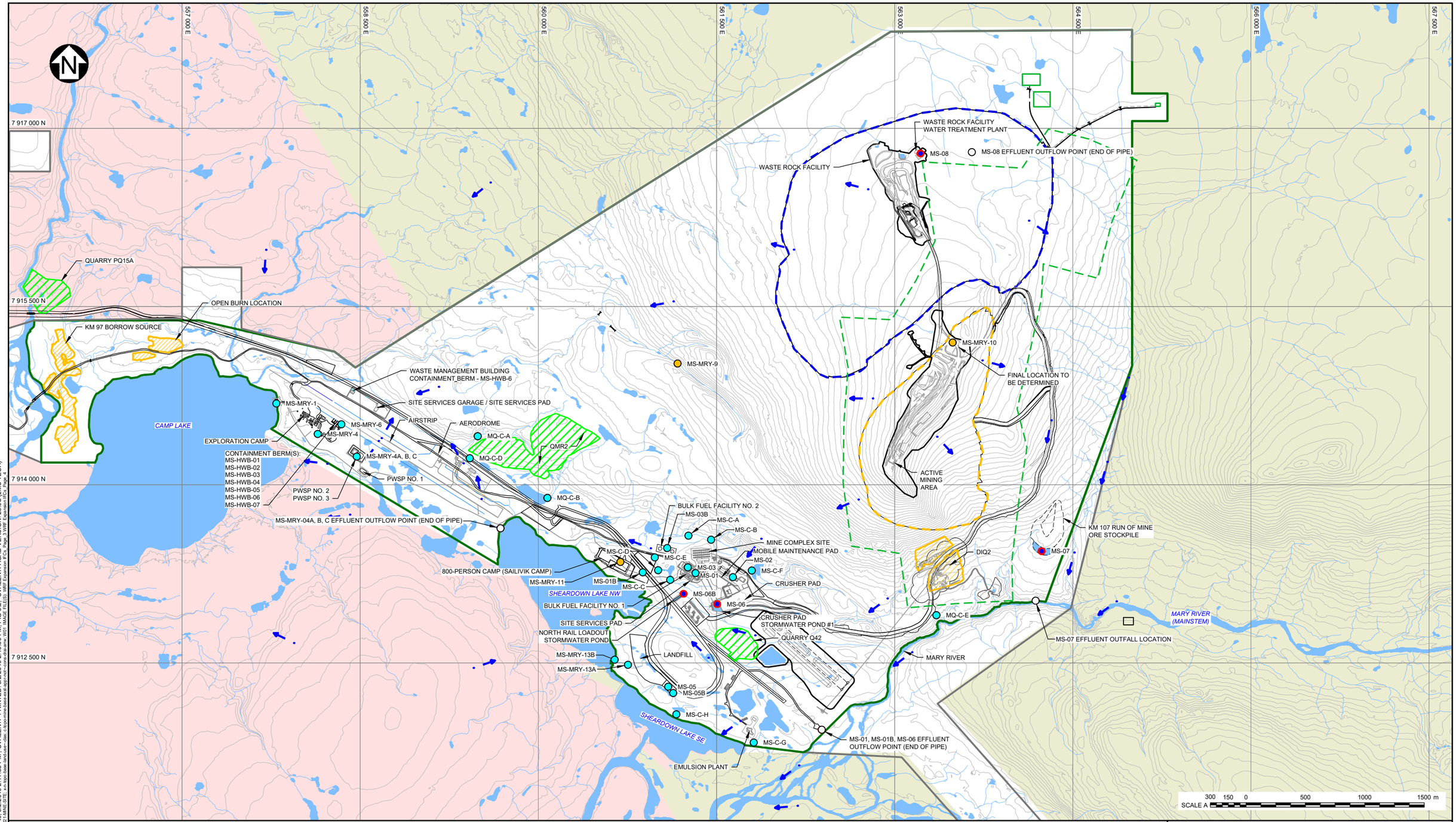
MARY RIVER PROJECT

# PHASE 2 PROPOSAL
# MILNE PORT LAYOUT SHOWING
# WATER LICENCE MONITORING STATIONS

Knight Piésold CONSULTING

P/A NO. NB102-181/53 | REF NO. 3

FIGURE 6.1 | REV 0




**LEGEND:**

- EXISTING BORROW AREA
- QUARRY
- INUIT OWNED LAND SURFACE AND SUBSURFACE
- INUIT OWNED LAND SURFACE ONLY
- CONTOUR
- WATER
- QIA SURFACE COMMERCIAL LEASE BOUNDARY
- POTENTIAL DEVELOPMENT AREA BOUNDARY
- ULTIMATE DEPOSIT NO. 1 PIT LIMITS
- ULTIMATE WASTE ROCK STOCKPILE LIMITS
- SURVEILLANCE NETWORK PROGRAM (SNP) STATION
- SNP STATION / METAL AND DIAMOND MINING EFFLUENT REGULATIONS (MDMER) FINAL DISCHARGE POINT
- INACTIVE SNP
- EFFLUENT OUTFLOW POINT (END OF PIPE)
- DRAINAGE DIRECTION

**NOTES:**

1. COORDINATE GRID IS UTM NAD83, ZONE 17.
2. DETAILED WATER AND CONTOURS FROM EAGLE MAPPING (2005). CONTOUR INTERVAL IS 10 m.
3. CURRENT MINE AREA FROM THE WASTE DUMP TO THE CRUSHER PAD, AND DITCHES ALONG THE HAUL ROAD PROVIDED BY BIM (MARCH 12, 2018).
4. ALL OTHER SITE INFRASTRUCTURE PROVIDED BY HATCH (AUGUST 2, 2016). AND SIMPLIFIED BY KP STAFF (JAN, 2018).

| REV | DATE | DESCRIPTION | DESIGNED | DRAWN | REVIEWED |
|---|---|---|---|---|---|
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

**PHASE 2 PROPOSAL**
**MINE SITE LAYOUT SHOWING**
**WATER LICENCE MONITORING STATIONS**

Knight Piésold CONSULTING

| P/A NO. | REF NO. |
|---|---|
| NB102-181/53 | 3 |

**FIGURE 6.2** REV 0

# 7.0 ABANDONMENT, RECLAMATION AND CLOSURE (PART J)

## 7.1 OVERVIEW OF CHANGES

The Phase 2 Proposal involves the construction and operation of additional infrastructure that requires incorporation into the Interim Closure and Reclamation Plan. The reclamation security estimate will also increase once the additional project components have been constructed.

## 7.2 INTERIM CLOSURE AND RECLAMATION PLAN

A draft update of the Interim Closure and Reclamation Plan is included as Attachment 29, in accordance to Part J, Item 2 of the Licence.

## 7.3 SECURITY

In accordance to Part C of the Licence, Baffinland will update the security requirements for the Project annually, with necessary adjustments accounted for in the results of the Annual Security Review process. The annual review process has been established by the NWB in recognition of the phased approach adopted by Baffinland for the implementation of the Mary River Project.

# 8.0 ENVIRONMENTAL MANAGEMENT PLANS

Table 8.1 identifies the existing Environmental Management Plans currently required under the Licence, and those that have been updated in draft for the Phase 2 Proposal and are provided as attachments to this Application. The Interim Closure and Reclamation Plan is not identified in Table 8.1 as that plan is discussed in Section 7.2.

**Table 8.1 Status of Management Plans Required Under the Type A Water Licence**

| Type A Water Licence Requirement | Plan (Document No.) | Current Version | Draft Updates for Phase 2 Proposal |
|---|---|---|---|
| Part B, Item 14a<br>Part H, Items 1, 6, 7 and 9 | Emergency Response Plan (BAF-PH1-840-P16-0002) | February 2016 | Attachment 20 |
| Part B, Item 14b<br>Part H, Items 1, 6, 7 and 9 | Spill Contingency Plan (BAF-PH1-830-P16-0036) | March 2016 | Attachment 21 |
| Part B, Item 14c<br>Part E, Item 2 | Surface Water, Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026) | March 2019 | Attachment 22 |
| Part B, Item 14d<br>Part E, Item 1 | Fresh Water Supply, Sewage, and Wastewater Management Plan (BAF-PH1-830-P16-0010) | March 2019 | Attachment 23 |
| Part B, Item 14e<br>Part F, Item 1 | Waste Management Plan (BAF-PH1-830-P16-0028) | March 2018 | Attachment 24 |
| Part B, Item 14s<br>Part D, Item 5h<br>Part F, Item 2 | Phase 1 Waste Rock Management Plan (BAF-PH1-830-P16-0029) | April 2014 | Update the waste rock production schedule; this plan will be submitted to the NWB by December 31, 2019 |
| Part B, Item 14f<br>Part F, Item 2 | Life of Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) | April 2014 | No update required |
| Part B, Item 14q<br>Part F, Item 4 | Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011) | March 2017 | Attachment 25 |
| Part B, Item 14i<br>Part D, Item 5a | Borrow Pit and Quarry Management Plan (BAF-PH1-830-P16-0004) | March 2014 | Attachment 26 |
| Part E, Item 24 | Blasting Management Plan (see Note 1) | April 2013 | To be updated or new plan developed that addresses blasting associated with rail construction |
| Part I, Item 2 | Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039) | April 2016 | Attachment 27 |

| Type A Water Licence Requirement | Plan (Document No.) | Current Version | Draft Updates for Phase 2 Proposal |
|---|---|---|---|
| Part I, Item 3 | Environmental Protection Plan (BAF-PH1-830-P16-0008) | August 2016 | Attachment 28 |
| Part I, Item 16 | Surface Water Sampling Program - Quality Assurance and Quality Control Plan (BAF-PHI-830-P16-0001) | March 2017 | No update required; Attachment 30 |
| **Individual Quarry Management Plans** | | | |
| | Borrow Source Management Plan - km 2 (BAF-PH1-830-P16-0030) | October 2014 | No update required |
| | Borrow Source Management Plan - km 97 (BAF-PH1-830-P16-0032) | October 2014 | No update required |
| | Borrow Source Management Plan - km 104 (BAF-PH1-830-P16-0035) | March 2014 | No update required |
| | Quarry Management Plan D1Q1 (H349000-4200-07-245-0001) | October 2013 | No update required |
| | Quarry Management Plan D1Q2 (H349000-4200-07-245-0002) | October 2013 | No update required |
| Part B, Item 14j<br>Part D, Item 5b | Quarry Management Plan Q1 (H349000-1000-07-126-0013) | March 2013 | No update required |
| | Quarry Management Plan Q11 (H349000-3000-07-245-0002) | October 2013 | No update required |
| | Quarry Management Plan Q19 (H349000-3000-07-245-0003) | October 2013 | No update required |
| | Quarry Management Plan Q7 (H349000-3000-07-245-0001) | October 2013 | No update required |
| Part B, Item 14k<br>Part D, Item 5c | Quarry Management Plan QMR2 (BAF-PH1-830-P16-0040) | September 2014 | Update required to expand quarry boundaries |
| Part B, Item 14l<br>Part D, Item 5d | Quarry Management Plan – Quarry QS2 | January 2012 | No update required |
| Part B, Item 14m<br>Part D, Item 5e | Quarry Management Plan - Quarry Q7 + 500 | January 2012 | No update required |
| Part B, Item 14n<br>Part D, Item 5f | Quarry Management Plan - Quarry Q133 +500 | January 2012 | No update required |
| Part B, Item 14o<br>Part D, Item 5g | Quarry Management Plan - Quarry Q77 +200 | February 2012 | No update required |

**NOTES:**

1. PART D, ITEM 6 REQUIRES BAFFINLAND TO SUBMIT FOR REVIEW AN ADDENDUM TO THE BORROW PIT AND QUARRY MANAGEMENT PLAN, OR TO SITE-SPECIFIC QUARRY MANAGEMENT PLANS IF NOT ADEQUATELY ADDRESSED BY THE BORROW PIT AND QUARRY MANAGEMENT PLAN.

   *"THE LICENSEE SHALL SUBMIT TO THE BOARD FOR REVIEW, AN ADDENDUM TO THE PLAN REFERRED TO IN PART D, ITEM 6A FOR ANY QUARRY SITE SELECTED FOR FUTURE DEVELOPMENT THAT THE PLAN DOES NOT ADEQUATELY ADDRESS. IF THE CONTENT OF THE EXISTING QUARRY PLAN*

*REFERRED TO UNDER PART D, ITEM 6A, DOES NOT ADEQUATELY ADDRESS THE PROPOSED ACTIVITIES FOR THE MANAGEMENT REQUIREMENTS OF THE SELECTED QUARRY SITE, THE LICENSEE SHALL SUBMIT TO THE BOARD FOR APPROVAL, A SITE-SPECIFIC QUARRY MANAGEMENT PLAN."*

Items 1 and 2 of Part E and Item 1 of Part H of the Licence specify the requirements for filing updates to the management plans with upcoming annual reports. Baffinland has provided updated management plans as indicated in Table 8.1, presented as Attachments 20 to 32.

Although not prescribed by the current Licence, the Snow Management Plan is an important plan that identifies measures to mitigate the release of sediment to watercourses from meltwater originating from snow piles. This plan will be updated by May 13, 2019 to identify revised snow stockpile locations based on site layout changes arising from the Phase 2 Proposal.

Two new biophysical management plans will be required for the Phase 2 Proposal, and therefore were included in the Addendum to the FEIS (Baffinland, 2018a):

- **Offsetting Plan for the Serious Harm to Fish - Railway (TSD 15; KP, 2018c) -** Construction of the North Railway will involve the installation of new watercourse crossings, and stream diversions that result from rock cuts along the alignment, which will result in serious harm to fish and fish habitat.
- **Offsetting Plan for the Serious Harm to Fish - Second Ore Dock (TSD 23; Golder, 2018b) -** Construction of the second ore dock at Milne Port will require a conceptual offsetting plan to be submitted with the Addendum to the FEIS.

# 9.0 FUTURE SUBMISSIONS TO THE NWB

Table 9.1 lists the future submissions to the NWB in support of this application for an amendment to the Licence amendment, and when these submissions will be provided.

**Table 9.1 Timelines for Future Submissions to the NWB**

| Project Component | Additional Information | Timeline |
|---|---|---|
| Milne Port Landfill | Construction plan and schedule, design report with IFC drawings and operation and maintenance manual | June 2020 |
| New and Modified Quarries | New and/or updated quarry-specific management plans | Prior to quarry development |
| Construction Plan and Schedule | Construction plan and construction schedule for water works (SIG Table 5, Item 46d) | 60 days prior to construction |

# 10.0 REFERENCES

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# 11.0 CERTIFICATION

This report was prepared and reviewed by the undersigned.

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Approval that this document adheres to the Knight Piésold Quality System: