BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT - PHASE 2 PROPOSAL



APPLICATION TO AMEND TYPE A WATER LICENCE 2AM-MRY1325

PREPARED FOR:

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Document Key

Main Report

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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.
ML	metal leaching
Mtpa	million tonnes per annum
NBRLUP	North Baffin Regional Land Use Plan
NIRB	Nunavut Impact Review Board
NPC	Nunavut Planning Commission
NWB	Nunavut Water Board
OPEP	Oil Pollution Emergency Plan
PAG	Potentially Acid Generating
PWSP	Polishing Waste Stabilization Pond
RBC	Rotating Biological Contactor
ROM	Run of Mine
WRF	waste rock facility
WWTP	wastewater treatment plant

1 – 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 undertake its proposed 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, and in more detail in the Project Description Technical Supporting Document to which this water licence amendment application is an Appendix. A document map presenting FEIS Amendment No. 2 is included.

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).

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.

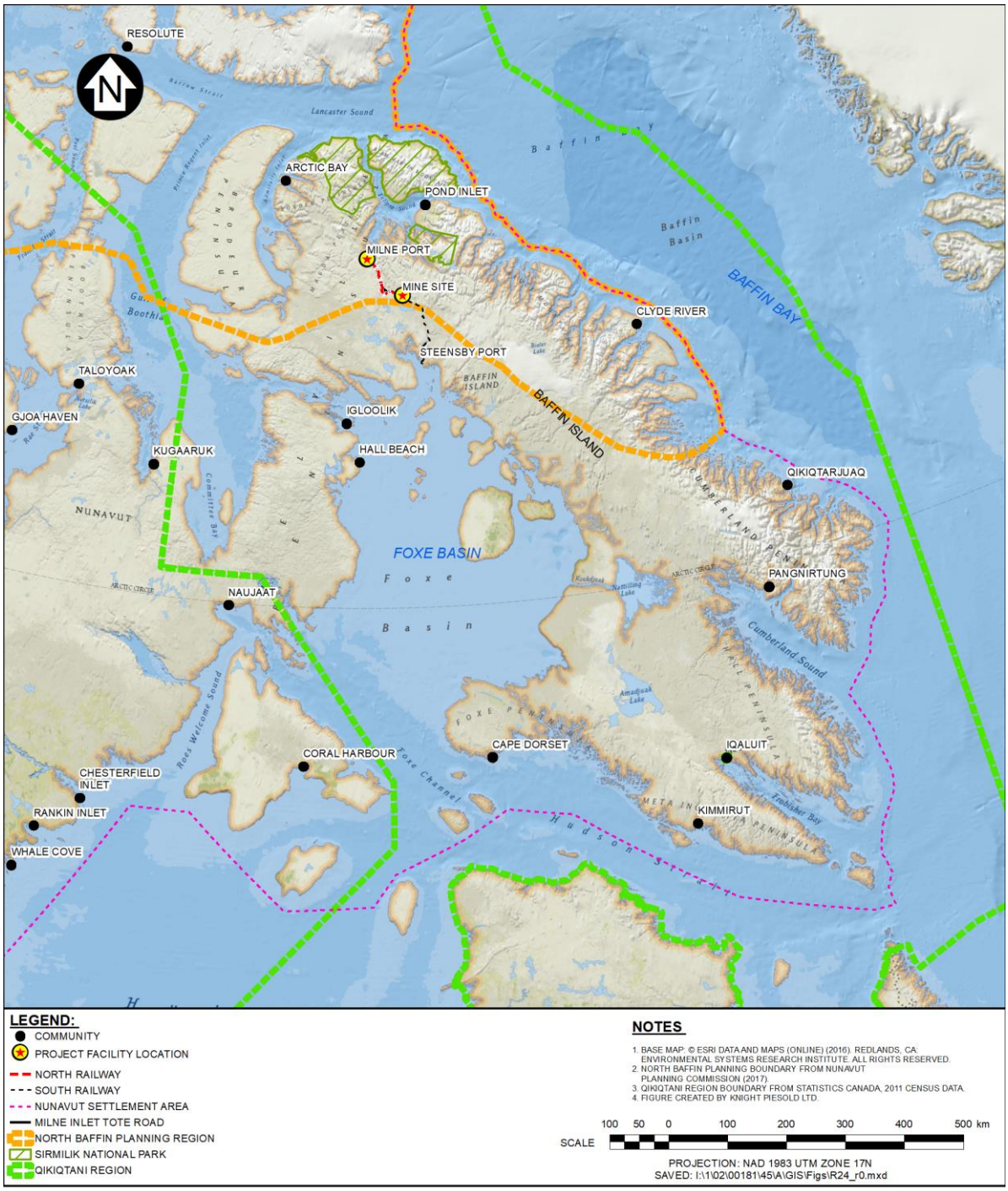

Figure 1.1 Project Location Map

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.

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. 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. 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. Baffinland recently 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.

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 AMENDMENTS TO THE SCOPE OF THE CURRENT LICENCE

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.

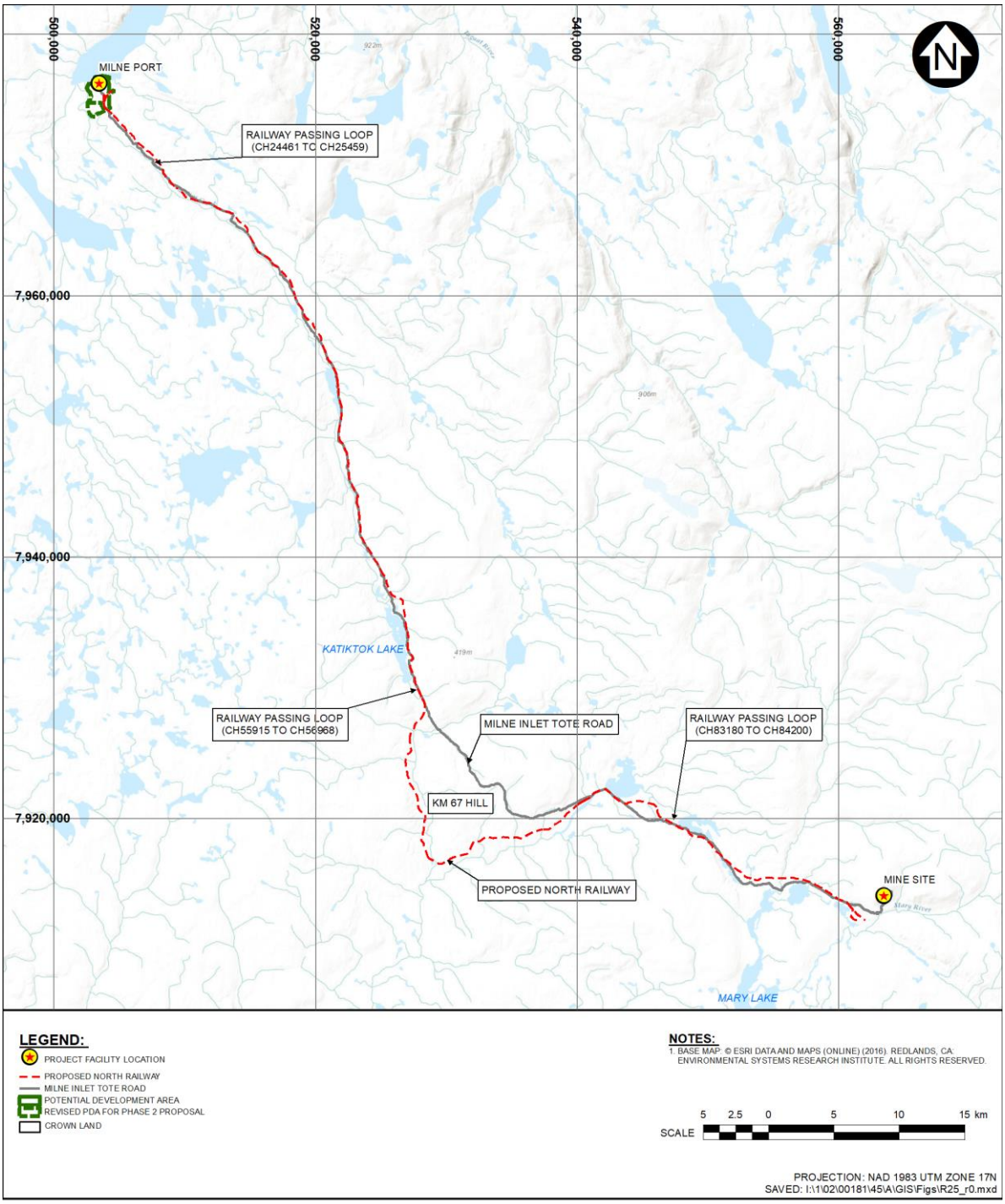

Figure 1.2 North Railway Location

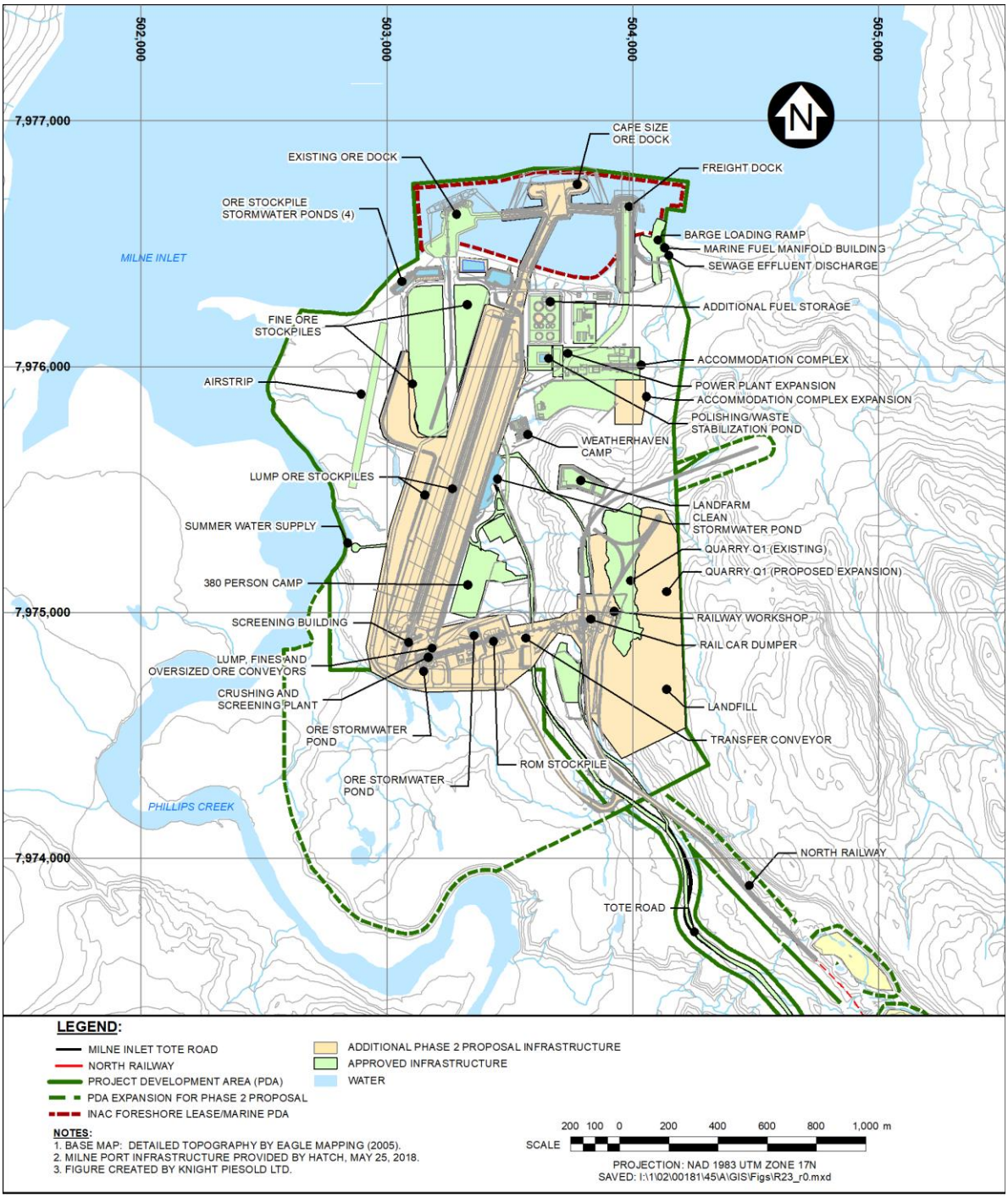

Figure 1.3 Milne Port - Phase 2 Layout

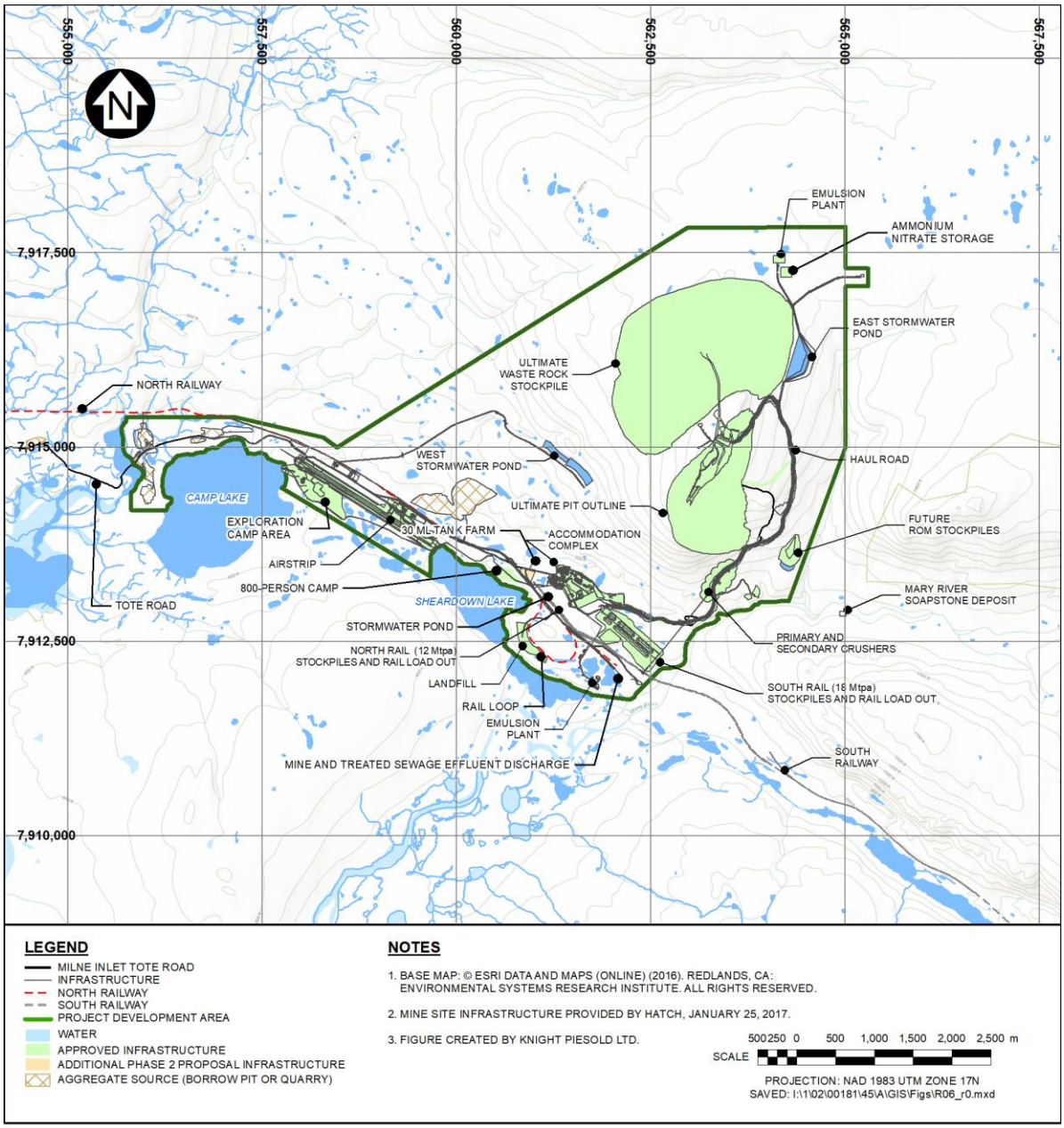

Figure 1.4 Mine Site - Phase 2 Layout

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 is being submitted as a notification 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

Item No.	Scope of Current Water Licence (NWB, 2015)	Proposed Modifications (Phase 2 Proposal)
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
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 mobile 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	Several sections of the existing Tote Road will be realigned to accommodate the North Railway. Where the North Rail will invariably cross the Tote Road, the road has been realigned to achieve a perpendicular railroad 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

Item No.	Scope of Current Water Licence (NWB, 2015)	Proposed Modifications (Phase 2 Proposal)
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.
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

Item No.	Scope of Current Water Licence (NWB, 2015)	Proposed Modifications (Phase 2 Proposal)
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.
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

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 attachments to this document, which collectively form Baffinland's application for a second amendment to the Licence.

Table 1.2 Attachments to this Application

Attachment No.	Attachment Title
1	Executive Summary
2	Application for Water Licence Amendment
3	Water Licence Concordance Tables
4	Regulatory Correspondence
5	Design Criteria
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9	Quarry and Laydown Location Figures
10	Water Management Plans
11	Updated Block Flow Diagrams
12	Mine and Port Site Geotechnical Reports
13	Fuel Tank Drawings
14	Compliance Report
15	Corporate and Financial Information
16	Mobile Camps Water and Sewage Tank Design Details
17	Landfarm Manual

1.5 REQUEST UNDER REVIEW

In May 2018, Baffinland submitted a separate Project Proposal to the Nunavut Planning Commission (NPC) requesting a reconsideration of Project Certificate No. 005 to allow the Company to increase the annual production of the current ERP from 4.2 million tonnes per year (Mtpa) to 6.0 Mtpa. On May 18, 2018, the NPC issued a positive conformity determination and referred the proposal to the NIRB for screening. On August 31, 2018, NIRB issued a Reconsideration Report and Recommendations (NIRB, 2018) that rejected the production increase portion of the proposal, but approved Baffinland's plans to construct a 380-person camp and an additional 15 ML fuel tank at Milne Port.

With the NIRB's approval of the camp and fuel tank, Baffinland proposes to submit a modification request to the NWB in the near future to seek approval of these approved elements of the production increase proposal.

2 – 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
- Additional 380-bed camp at Milne Port

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

- Three mobile construction camps
- 36 quarries (32 quarries not previously permitted)

The construction period for Phase 2 will commence in late 2019 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:

- Borrow Pits and Quarries Management Plan (Baffinland, 2014a)
- Quarry Specific Management Plans (to be developed for quarries prior to their development)
- Phase 1 Waste Rock Management Plan (Baffinland, 2014b)
- Surface Water and Aquatic Ecosystems Management Plan (Baffinland, 2016a)

Any required updates to these plans to account for the Phase 2 Proposal are identified in Section 8. Updates to these plans will be submitted to the NWB for approval in accordance with Items 1 and 2 of Part E of the Licence.

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 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, mobile 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 three mobile camps
- 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 that requirements outline 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 2 Project Description.

The following rail design information is provided in Attachment 6:

6.1	North Railway Terrain Analysis
6.2	North Railway Factual Geotechnical Report
6.3	North Railway Geotechnical Embankment Report
6.4	Quarry Geochemical Evaluation
6.5	North Railway Catchment Drawings
6.6	Diagrammatic Conceptual Layout
6.7	North Railway Plan & Profile Drawings
6.8	Km57 Temporary Ore Transfer Area Drawings
6.9	Rail Embankment Drawings

Additionally, detailed layouts of the North Railway are presented in Figure B.4 in Appendix B of TSD 2 Project Description.

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 10 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 7 provides drawings detailing the Tote Road modifications, including:

7.1	Tote Road Relocation Drawings
7.2	Tote Road Rail Crossing Drawings
7.3	Tote Road Typical Drawings

In addition, there are a large number of short access roads that will be constructed as part of the Phase 2 Proposal, summarized as follows:

- **Milne Port** – A 2.7 km 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. These access roads are shown on Figure B.4 in Appendix B of TSD 2 Project Description. 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 7, 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 B.1 in in Appendix B of TSD 2 Project Description).

Access roads and haul roads will be constructed in accordance with the design criteria presented by Hatch (2018), and the construction methodology described by KP (2018), included as Attachments 5.1 and 5.2, respectively. 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

The construction of the North Railway and the upgrades to Tote Road will result in a number of watercourse crossings. A comprehensive list of watercourse crossings and typicals is provided in Attachment 8; Attachments 8.1 and 8.2 present lists of watercourse crossings proposed along the North Railway and Tote Road / access roads, respectively.

The North Railway will be constructed mostly adjacent to the Tote Road and will cross an estimated 465 watercourse and drainage crossings along the North Railway. The railway will not encroach on any lakes. The majority of crossings (approximately 60%) are confirmed as not fish-bearing. Table 2.1 identifies the fish bearing potential for the North Railway crossings.

Table 2.1 North Railway Crossings and Fish-Bearing Potential

Fish-Bearing Potential	No. of Crossings	Proportion of Total
Certain	65	14%
Probable	36	7%
Potential	42	9%
Unlikely	45	10%
Not fish-bearing	278	60%
Total	**465**	**100%**

Baffinland will conduct field fisheries surveys on the undetermined crossings, to confirm the presence/absence of fish habitat. Further information relating to watercourse crossings is provided in Section 3.2.11 of TSD 2 Project Description. Detailed layouts of the North Railway showing the crossings are presented in Figure B.4 in Appendix B of TSD 2 Project Description.

In areas where the rail alignment is cut into the terrain, it is not feasible to pass streams across the rail alignment. In these 27 locations, the watercourse will be diverted along the rail alignment to an adjacent watercourse. Of the 27 diversions, 23 are considered low risk and the remaining are considered medium or high risk based on the percentage increase of flow in the receiving stream. One of the four streams is a probable fish bearing stream. Baffinland will be implementing mitigation on crossing-by-crossing bases to reduce flow velocities which may include additional culvert barrels, channel widening, construction of habitat features, regarding, and channel stabilization. Details of the hydrologic assessment are provided in Appendix D of TSD 13 Surface Water Assessment.

Four bridges and 417 culverts will be constructed along the North Railway. Bridge spans are based on the existing normal flow riverbank. Attachment 8.3 presents preliminary drawings of the four railway bridges. 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. Culverts will be installed at other water crossings along the railway. Culverts will be designed in accordance with American Railway Engineering and Maintenance-of-Way Association (AREMA) (2018) guidelines and approved railway design criteria and rationale (provided as Attachment 6.1). 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 8.1 provides a list of the railway crossings, while Attachment 8.3 provides crossing typical drawings.

In order to accommodate the construction of the North Railway, approximately eight culverts will be upgraded along the Tote Road. Details pertaining to the upgrades of these culverts will be explored in the detailed engineering phase. The installations will be consistent with direction previously received from the Fisheries and Oceans Canada (DFO) in the fisheries authorization and the letters of advice. Watercourse crossing for the Tote Road are provided in Attachment 8.2 and typical crossing drawings are provided in Attachment 8.3.

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 detail 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. The fines ore stockpile will be expanded and appropriate water management features included under a separate modification request to be submitted to the NWB in 2018. 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 9.1 in Attachment 9.

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	504013	7974915
PQ1	CH4500 to 6200	Granitic Gneiss	1,110,000	66.7	505953	7972448
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

Quarry No.	Railway Chainage	Material	Available Volume (m^3)	Approximate Footprint (ha)	UTM Easting	UTM Northing
Q13	CH16200	Limestone	118,245	7.9	514295	7965314
PQ2b	CH22000	Limestone	160,000	23.3	517664	7961973
Q16	CH 31700	Limestone	81,717	5.4	521838	7952395
Q19	CH39200	Limestone	28,114	2.8	523024	7945186
PQ4a	CH41600	Limestone	180,000	11.1	523697	7942901
PQ4b	CH42500	Limestone	180,000	12.3	523651	7941894
Q21	CH44600	Limestone	9,000	1.1	524356	7940085
PQ5a	CH45700	Limestone	240,000	18.6	525439	7938839
PQ5b	CH46800	Limestone	500,000	47.2	526119	7937802
Q23	CH48600	Limestone	4,041	0.4	525886	7936586
Q24	CH51250	Limestone	42,412	4.2	527063	7934336
PQ6a	CH56200	Limestone	360,000	26.9	528552	7929763
PQ6b	CH57100	Limestone	300,000	22.4	528993	7928994
Rail Sand Pit	CH58000	Glacial till	TBD2	8.0	528498	7927790
Q27	CH63350	Limestone	136,086	9.1	527208	7923193
PQ9a	CH66000	Limestone	225,000	6.4	527378	7920441
PQ9b	CH66000	Limestone	75,000	2.2	527651	7920425
PQ10a	CH73100	Limestone	180,000	13.5	531568	7917522
PQ10b	CH74200	Limestone	120,000	9.7	531982	7917635
PQ12a	CH84500	Sandstone	240,000	25.8	539072	7921210
PQ12b	CH84500	Sandstone	120,000	20.4	539898	7921837
PQ13	CH85700	Sandstone	180,000	44.7	542676	7923983
PQ14a	CH96700	Sandstone	80,000	4.6	550836	7917829
PQ14b	CH96000	Sandstone	30,000	9.5	550983	7917458
PQ15a	CH101500	Diorite	80,000	8.3	555853	7915626
PQ15b	CH102300	Diorite	45,000	6.1	555270	7915586
QMR2[1]	CH107000	Diorite	250,000	28.0	559982	7914323
Q42	CH109000	Diorite	125,000	6.6	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 36 planned quarries to be used to construct the North Railway and other Phase 2 Proposal infrastructure, 24 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. (Hatch), 2018; AMEC, 2010). 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). However, these rock types also have a low neutralization potential, which means that they could produce ARD if the neutralizing materials within them are insufficiently reactive, or depleted at a faster rate than the sulphides. Overall, the ARD potential of the granitic rocks has been assessed to be low (AMEC, 2010; Hatch, 2017).

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). The tested and untested quarries will be subject to additional geotechnical and geochemical investigation as the Project proceeds.

Baffinland's Borrow Pits 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.

2.7.3 Future Quarry-Specific Management Plans

A Borrow Pits and Quarry Management Plan approved under the current Licence identifies its overarching quarry management practices and principles (Baffinland, 2014a). 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 Pits and Quarry Management Plan does not adequately address the development of a given borrow pit or quarry.

2.8 LAYDOWN AREAS

A total of 21 laydown areas will be established to support construction of the Phase 2 Proposal (Table 2.3). This includes 14 laydown areas to be located along the North Railway, 7 laydown areas at Milne Port, and 4 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 9.2 in Attachment 9.

Table 2.3 Proposed Laydown Areas

Laydown Area	Approximate Location		Area (ha)	Easting	Northing
	Road km	Rail Chainage			
LD-1	Milne Port		3.4	504031.7205	7974597.534
LD-2	km3.7	CH2200	2.6	504048.7622	7974014.558
LD-3	km4.2	CH3000	2.0	504491.5259	7973629.297
LD-4	km5.5	CH4000	2.8	504974.8249	7972675.944
LD-5	km7.0	CH5700	1.5	506327.9788	7971603.115
LD-6	km13.5	CH12000	1.0	510799.1138	7967350.206
LD-7	km23.0	CH21000	1.6	517314.0528	7961896.303
LD-8	km33.5	CH31000	0.6	521690.9776	7953049.867
LD-9	km41.8	CH39500	0.4	522987.3914	7945107.75
LD-10	km46.8	CH44000	1.2	524032.6564	7940558.284
LD-11	km56.8	CH53000	1.0	527217.2405	7932785.764
LD-12	km62.0	CH57800	2.5	528375.0108	7928223.09
LD-13	km78.0	CH84000	2.0	540504.0646	7921426.459
LD-14	km81.0	CH87000	0.3	543185.6927	7921430.623
LD-15	km86.5	CH92000	1.7	547057.519	7919694.509
LD-16	Mine Site		1.5	557978.2855	7914998.395
LD-17	Mine Site		2.3	560009.8703	7913726.444
LD-18	Mine Site		1.7	560829.4248	7913257.917
LD-19	Mine Site		1.9	560909.1397	7913352.577

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).

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		
Matrix Camp	153	153		
Construction Camp			300	
Permanent Camp		380	380	380
Total Beds	327	707	1010	710

As noted in Section 1.5, Baffinland received approval from NIRB to construct the 380 bed camp identified in Table 2.4. A modification request will be submitted in the near future separate from this request for an amendment to the Licence for the Phase 2 Proposal, seeking approval from the NWB for the camp (and fuel tank) under the current Licence.

The camp components at Milne Port associated with the Phase 2 Proposal (this application) include an expansion of the Port Site Complex to 330 beds (210 beds will be relocated from the Mine Site to add to the existing 120 beds), and the additional of a 300-bed construction camp. The total number of beds at Milne Port will peak at 1,010 during construction of the Phase 2 Proposal, and this will be reduced to 710 beds during operation with the removal of the 300-bed construction camp. These changes will allow Baffinland to decommission the temporary 153-bed Matrix camp and the 54-bed Steensby camp early in the construction phase.

Three mobile 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 capacity 255 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 76.5 m^3.

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

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 Port Site Complex expanded to 330 beds.

An 800-person camp is being 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 Ecosystems Management Plan (Baffinland, 2016a). No sediment or erosion control measures are expected to be required once construction has been completed.

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 – 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:

- Freshwater Supply, Sewage and Wastewater Management Plan (Baffinland, 2018a)
- Surface Water and Aquatic Ecosystems Management Plan (Baffinland, 2016a)

Any required updates to these plans to account for the Phase 2 Proposal are identified in Section 8. Updates to these plans will be 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 (Knight Piésold, 2018a). 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 10.1 and 10.2, 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. Drawings of the crusher pad and pond are included as Attachment 10.3. The existing crusher pad and stormwater pond will be decommissioned once the new water management features are in place. IFC engineering drawings will be submitted to the NWB at least 60-days prior to construction, in accordance with Part G of the Licence.

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 Milne Port Water Management Plan presented as Attachment 10.2 contains layouts showing water management features including ditches, diversions and ponds.

No changes are proposed for the final discharge points at both the Mine Site and Milne Port for mine effluent stormwater.

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 will build a new water treatment plant at Milne Port for the new 380-person camp under a separate modification request, as described in Section 1.5.

As part of the Phase 2 Proposal and this application, the existing water treatment plant servicing the Port Site Complex will be upgraded or replaced to accommodate the increase in the number of beds from 120 to 330 persons. Details on this component will be submitted to the NWB in the future (Section 9).

As described in Sections 2.9 and 2.10, an 800-bed camp and related water supply facilities are being 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.

Water and sewage process flow diagrams for the Mine Site and Milne Port are included as Attachments 11.2 and 11.4, respectively.

3.8 UPDATED BLOCK FLOW DIAGRAMS

Updated area water balances block flow diagrams for the Mine Site, Milne Port and the temporary ore transfer area are included as Attachments 11.1, 11.3 and 11.5, 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 – 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)

Any required updates to these plans to account for the Phase 2 Proposal are identified in Section 8. Updates to these plans will be submitted to the NWB for approval 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. A revised Phase 1 Waste Rock Management Plan is under development, and is expected to be implemented starting in April 2019.

Since mid-2017, Baffinland has identified water quality issues associated with the waste rock facility (WRF). This issue is being addressed as part of current operations under the conditions of the Licence, including the implementation of an Interim Waste Rock Management Plan over the short-term (Golder, 2018a).

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 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 4.1 below identifies the new infrastructure in relation SNP monitoring stations and proposed changes for the Phase 2 Proposal. A discussion of Milne Port, the Mine Site and the ore staging area is provided below.

Table 4.1 Proposed Changes to Existing Mine Effluent Discharges

SNP Station	Description	Status and Proposed Changes for Phase 2 Proposal
Mine Site		
MS-06	Ore stockpile (crusher pad) pond stormwater	Operational; new stormwater pond will replace new pond, with no changes to final discharge point
MS-07	Run of Mine (ROM) Ore Stockpile Pond Stormwater	Not yet constructed; no changes proposed
MS-08	Waste Rock Stockpile West Pond	Operational, but discharges to the Mary River as the east pond intended
MS-09	Waste Rock Stockpile East Pond	Not yet constructed; no changes proposed
Milne Port		
MP-05	Milne Port Ore Stockpile Sedimentation Pond - East (Stormwater Pond No. 2)	Operational; a second adjacent pond will be constructed in 2018 as part of ongoing operations under a separate modification to the current water Licence 2AM-MRY-1325
MP-06	Milne Port Ore Stockpile Sedimentation Pond - West (Stormwater Pond No. 1)	Operational; a second adjacent pond will be constructed in 2018 as part of ongoing operations under a separate modification to the current water Licence 2AM-MRY-1325
(new)	Stormwater Pond No. 3	New pond to collect runoff from a new ore fines stockpile. Final discharge will be to Milne Inlet via Stormwater Ponds 1/1a or 2/2a, or for use in dust suppression on roads.
(new)	Stormwater Pond No.4	New pond to collect runoff from a new crusher feed stockpile. Final discharge will be to Milne Inlet via Stormwater Ponds 1/1a or 2/2a, or for use in dust suppression on roads.
(new)	Lump ore stockpile perimeter ditching East	New pond to collect runoff along the east perimeter of the lump ore stockpile. Final discharge will be to Milne Inlet via Stormwater Ponds 1/1a or 2/2a, or for use in dust suppression on roads.
(new)	Lump ore stockpile perimeter ditching West	New pond to collect runoff along the west perimeter of the lump ore stockpile. Final discharge will be to Milne Inlet via Stormwater Ponds 1/1a or 2/2a, or for use in dust suppression on roads.
Northern Transportation Corridor		
(new)	Ore Staging Area Stormwater Pond	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.

At Milne Port, the two stormwater ponds (stormwater ponds No. 1 and 2) collecting runoff from the ore stockpile area 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. 3 and 4) will be constructed near the crusher feed stockpile and the fines stockpile and will discharge to Milne Inlet via the existing final discharge point 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. The surface area of the mine site ore stockpile area will increase by approximately 40% to support the Phase 2 Proposal. Hence, the quantity of runoff from the stockpile and crusher pad area will increase by approximately the same proportion. 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 final discharge point 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 maintains 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.

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 so as 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 4.2 Modifications and Additions to Existing Solid Waste Management Facilities

Location/Facility	Modification or Addition
Milne Port	
Incinerator	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 will be reaching its initial design capacity, and a modification request is being 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 4.3 Projected Waste Quantities

Project Site	Type of Waste	Disposal Method	Volume
Mine Site	Treated sewage	Discharge to tundra	360 m^3/day
	Combustible non-hazardous waste	Incineration	1457 m^3/year
	Non-combustible non-hazardous waste	Landfill	7,500 m^3/year
Milne Port	Treated sewage	Discharge to Milne Inlet	240 m^3/day
	Combustible non-hazardous waste	Incineration	603 m^3/year
	Non-combustible non-hazardous waste	Landfill	7,500 m^3/year
	Hazardous waste	Storage and disposal at licenced facility	240 m^3/year
	Hazardous waste and tires	Shipped off site	510 m^3/year
Mobile Camps	Treated sewage	Stored and trucked to Mine Site or Milne Port WWTP	76.5 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.

A railway maintenance facility will be added at Milne Port and at the ore staging area located at km 57. 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).

4.7 SEWAGE DISPOSAL

One sewage treatment plant currently operates at Milne Port. Baffinland will construct a second sewage treatment facility to accommodate the permanent 380-person permanent camp described in Section 2.10. The facility has a capacity for treating effluent of 600 persons based on conservative daily use rates. The 380-person camp (and associated water and sewage infrastructure is now part of the Approved Project (Section 1.5), and therefore Baffinland will submit a modification request to the NWB for this component in the near future.

As part of the Phase 2 Proposal and this application, a third sewage treatment plant is proposed to service the larger Port Site Complex. Details on this component will be submitted to the NWB in the future (Section 9).

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 continue to be discharged to Milne Inlet from the same final discharge point shown on Figure B.5 in Appendix B of TSD 2 Project Description.

For its current operations, Baffinland recently submitted a modification request under the Licence for a new 800-person camp and new sewage treatment plant. These facilities are part of the Approved Project will be constructed in 2018 at the location shown on Figure 1.4. 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 in Figure B.1 in Appendix B of TSD 2 Project Description. A new sewage discharge line will also be installed in 2018 under a separate modification request.

Similarly, 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 mobile camps. The mobile camps will generate an estimated 76.5 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. Water and sewage holding tank details are provided in Attachment 16.

Water and sewage process flow diagrams for the Mine Site and Milne Port are included as Attachments 11.2 and 11.4, respectively.

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 (Knight Piésold, 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 which includes an operations and maintenance manual will be submitted to the NWB in 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. The majority of cuts will be into rock, to minimize cuts in soils, particularly ice-rich soils, to avoid inducing thermal changes and causing geotechnical instability issues. An estimated 650,000 m^3 of soil spoils will be generated during construction of the North Railway. Approximately half of the material will be unfrozen and excavated, while the other half will be frozen material that will require drilling and blasting before excavation.

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

- Soil spoils will be placed in exhausted quarries and borrow pits along the Tote Road as a preferred option. Quarries and borrow areas represent an existing disturbed footprint with limited future use, and therefore make ideal disposal sites, provided they are not planned for use as explosive storage areas during construction.
- Other disposal sites will be identified near to the construction activity. Local depressions or low-relief areas will be selected as opposed to slopes where material can run-off.
- In all instances, as a standard condition of land-use approvals, disposed overburden materials will be placed >33 m from a surface water body.
- Disposal locations will be approved by the appropriate construction personnel (i.e., engineer, construction superintendent or foreman) who have been given such authority, to avoid unauthorized and indiscriminate disposal.
- Disposal locations will be well removed from the railway embankment.
- The stockpile will be designed with a minimal slope that is physically stable.
- Overburden spoils in 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 Ecosystems Management Plan to prevent runoff of sediment and to possibly divert runoff away from the disposed material.

5 – 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:

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

The first two plans are regulated under the Licence. Any required updates to these plans to account for the Phase 2 Proposal are identified in Section 8. Updates to these plans will be submitted to the NWB for approval with the next annual report following amendment of the licence 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

As mentioned in Section 1.5, Baffinland is seeking a short-term increase in production in 2018 and 2019 (to 6 Mtpa) leading up to the Phase 2 Proposal. To this end, a 15 ML fuel tank at Milne Port is included in the scope of the Project Proposal currently under review by the NIRB. If the Project Proposal conforms to the North Baffin Regional Land Use Plan (NBRLUP) and NIRB approves the activity by amending the Project Certificate, then Baffinland will submit a modification request as part of the production increase proposal to construct a 15 ML tank.

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 in Attachment 13.

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, and km 59.3. Existing magazine storage facilities are located at km 7 and km 63.

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.

6 – 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, 2015)
- 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. Required updates to these management plans are noted in Section 8.

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. Table 6.1 identifies the new infrastructure for which Baffinland anticipates monitoring stations may be required in an amended Licence. 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.

Table 6.1 Proposed Additional Monitoring Stations

Location	Description	Project Phases	Monitoring Parameters	Frequency
Milne Port				
1	Milne Port Ore Stockpile Stormwater Pond No. 3	Construction Operation Closure	Groups 1 and 7	Daily Monthly
			Group 3	Annually
2	Milne Port Ore Stockpile Stormwater Pond No. 4	Construction Operation Closure	Groups 1 and 7	Monthly during summer
			Group 3	Annually
3	Milne Port Landfill, Downstream Surface Water Drainage	Construction Operation Closure	Groups 1 and 6	Daily Monthly
4	Lump Ore Stockpile Perimeter Ditching East	Construction Operation Closure	Groups 1 and 7	Monthly during summer
			Groups 3	Annually
5	Lump Ore Stockpile Perimeter Ditching West	Construction Operation Closure	Groups 1 and 7	Monthly during summer
			Group 3	Annually
North Railway				
6	Ore Staging Area Stormwater Pond	Construction	Groups 1 and 7	Monthly during summer
			Group 3	Annually

7 – ABANDONMENT, RECLAMATION AND CLOSURE (PART J)

7.1 OVERVIEW OF CHANGES

The Phase 2 Proposal involves the construction and operation of additional infrastructure that will require incorporation into the next revision to 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

Baffinland will submit a revised version of the Interim Closure and Reclamation Plan within 60 days following approval of the requested water licence amendment, in accordance to Part J, Item 2 of the Licence.

7.3 SECURITY

In accordance to Part C of the Licence, Baffinland will updated 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 – ENVIRONMENTAL MANAGEMENT PLANS

Table 8.1 identifies the existing Environmental Management Plans currently required under the Licence. The table also identifies whether updates to the Environmental Management Plans will be required for the Phase 2 Proposal. 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.)	Version	Required Updates for Phase 2 Proposal
Part B, Item 14a Part H, Items 1, 6, 7 and 9	Emergency Response Plan (BAF-PH1-840-P16-0002)	February 2016	Update site layouts in Appendix B
Part B, Item 14b Part H, Items 1, 6, 7 and 9	Spill Contingency Plan (BAF-PH1-830-P16-0036)	March 2016	Add the location and details of new fuel storage and new spill response equipment
Part B, Item 14c Part E, Item 2	Surface Water, Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026)	March 2016	Update to reflect changes in water management associated with ore and product stockpiles and disposal of soil spoils from rail construction
Part B, Item 14d Part E, Item 1	Fresh Water Supply, Sewage, and Wastewater Management Plan (BAF-PH1-830-P16-0010)	March 2016	Update to reflect changes in water management associated with ore and product stockpiles; water supply and sewage treatment to mobile construction camps; and the addition of dust suppression water sources within the Northern Transportation Corridor.
Part B, Item 14e Part F, Item 1	Waste Management Plan (BAF-PH1-830-P16-0028)	March 2016	Update to incorporate new landfill proposed at Milne Port
Part B, Item 14s Part D, Item 5h Part F, Item 2	Phase 1 Waste Rock Management Plan (BAF-PH1-830-P16-0029)	April 2014	Update the waste rock production schedule
Part B, Item 14f 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 Part F, Item 4	Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011)	March 2016	Update with Phase 2 layouts and revised quantities of explosives and ammonium nitrate.
Part B, Item 14i Part D, Item 5a	Borrow Pits and Quarry Management Plan (BAF-PH1-830-P16-0004)	March 2014	Update table and figure with new quarries

Type A Water Licence Requirement	Plan (Document No.)	Version	Required Updates for Phase 2 Proposal
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)	March 2015	No update required
Part I, Item 3	Environmental Protection Plan (BAF-PH1-830-P16-0008)	August 2016	Update to include rail construction and rail watercourse crossing installation
Part I, Item 16	Surface Water Sampling Program - Quality Assurance and Quality Control Plan (BAF-PHI-830-P16-0001)	March 2016	No update required
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 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 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 Part D, Item 5d	Quarry Management Plan – Quarry QS2	January 2012	No update required
Part B, Item 14m Part D, Item 5e	Quarry Management Plan - Quarry Q7 + 500	January 2012	No update required

Type A Water Licence Requirement	Plan (Document No.)	Version	Required Updates for Phase 2 Proposal
Part B, Item 14n Part D, Item 5f	Quarry Management Plan - Quarry Q133 +500	January 2012	No update required
Part B, Item 14o 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 will provide all updated management plans following the scheduled technical meeting, which should occur by February 28, 2018, and may provide interim updated management plans before February 28, 2018 as necessary to support the technical review. TSD 28 Management and Monitoring Plans provides a detailed description of the proposed edits to the management plans prescribed by both the Water Licence and by NIRB (2015).

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 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 have been included in the Addendum to the FEIS:

- **Offsetting Plan for the Serious Harm to Fish - Railway (TSD 15; Knight Piésold, 2018b) -** 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 this Addendum to the FEIS.

9 – 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
Milne Port Water Treatment Plant Expansion	Engineering details and operation and maintenance plans	60 days prior to construction (Part D, Item 2)
Milne Port Sewage Treatment Plant (No. 3)	Engineering details and operation and maintenance plans	60 days prior to construction (Part D, Item 2)
Milne Port Ore Stockpiles and Stormwater Ponds	IFC drawings	60 days prior to construction (Part D, Item 2)
km 57 Ore Staging Area and Stormwater Pond	IFC drawings	60 days prior to construction (Part D, Item 2)
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
Environmental Management System	Updates to reflect changes as a result of the Phase 2 Proposal, as described in TSD 28 Management and Monitoring Plans	See Section 8

10 – REFERENCES

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Baffinland Iron Mines Corporation (Baffinland), 2014a. *Borrow Pits and Quarry Management Plan*. March 20. Ref. No. BAF-PH1-830-P16-0004, Rev. 0.

Baffinland Iron Mines Corporation (Baffinland), 2014b. *Phase 1 Waste Rock Management Plan*. April 30. Ref. No. BAF-PH1-830-P16-0029, Rev. 0.

Baffinland Iron Mines Corporation (Baffinland), 2014c. *Life of Mine Waste Rock Management Plan*. April 30. Ref. No. BAF-PH1-830-P16-0031, Rev. 0.

Baffinland Iron Mines Corporation (Baffinland), 2015. *Aquatic Effects Monitoring Plan.* Ref. No. BAF-PH1-830-P16-0039, Rev. 1.

Baffinland Iron Mines Corporation (Baffinland), 2016a. *Surface Water and Aquatic Ecosystem Management Plan*. March 17. Ref. No. BAF-PH1-830-P16-0026, Rev. 4.

Baffinland Iron Mines Corporation (Baffinland), 2016b. *Environmental Protection Plan*. August 30. Ref. No. BAF-PH1-830-P16-0008, Rev. 1.

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11 – CERTIFICATION

This report was prepared and reviewed by the undersigned.

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Approval that this document adheres to Knight Piésold Quality Systems: D.G.