MARY RIVER PROJECT
ENVIRONMENTAL IMPACT STATEMENT

VOLUME 3
PROJECT DESCRIPTION

Document Structure

Volume 1
Main Document

Volume 2
Consultation, Regulatory, Methods
- Consultation
- Regulatory Framework
- Impact Assessment Methodology

Volume 3
Project Description
- Project Description
- Workforce and Human Resources
- Alternatives

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Human Environment
- Population Demographics
- Education and Training
- Livelihood and Employment
- Economic Development and Self Reliance
- Human Health and Well Being
- Community Infrastructure and Public Service
- Contracting and Business Opportunities
- Cultural Resources
- Resources and Land Use
- Cultural Well-being
- Benefits, Taxes, and Royalties
- Government and Leadership

Volume 5
Atmospheric Environment
- Climate
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- Noise and Vibration

Volume 6
Terrestrial Environment
- Landforms, Soil and Permafrost
- Vegetation
- Birds
- Terrestrial

Volume 7
Freshwater Environment
- Freshwater Quantity
- Freshwater Quality
- Freshwater Biota and Habitat

Volume 8
Marine Environment
- Sea Ice
- Seabed Sediments
- Marine Fish and invertebrates
- Marine Mammals

Volume 9
Cumulative Effects and Other Assessments
- Cumulative Effects Assessment
- Effects of the Environment on the Project
- Accidents and Malfunctions
- Transboundary Effects Assessment
- Navigable Water Assessment

Volume 10
Environmental, Health and Safety Management System
- Individual Management Plans

The Master Table of Contents for the entire EIS Document is presented in Volume 1 as Appendix 1D.

MARY RIVER PROJECT
ENVIRONMENTAL IMPACT STATEMENT PROJECT HIGHLIGHTS

Location	• Located at Mary River, North Baffin Island, 1000 km north of Iqaluit, 160km south of Pond Inlet, 155 north of Igloolik
Reserves	• Comprised of nine known iron ore deposits in the vicinity of Mary River • The current project is focused on Deposit No.1 with known reserves of 365 million tonnes at >64% iron
Construction Phase	• Construction of the project could commence as early as 2012 and will require approximately 4 years to complete • Approximate $4 billion investment
Operational Phase	• Operations will involve mining, ore crushing and screening, rail transport and marine shipping of ore to market
Open Pit Mine	• Projected annual production of 21 million tonnes for approximately 21 years
Processing	• No secondary processing is required; no tailings will be produced, due to the high grade of ore
Rail Transport and Shipping	• A rail system will be built for year round transportation (149 km) of ore south to Steensby Port • A port will be constructed at Steensby Inlet to accommodate cape sized vessels • Specially designed ships will transport ore to market year round • Annual shipment from Steensby Port of approximately 18 million tonnes
Road Haulage and Shipping Alternative	• Road haulage and shipping via Milne Inlet is also considered an alternative at this time • Iron ore will be hauled north along the existing tote road (100km) to Milne Inlet • A port will be constructed at Milne Inlet • Shipping would take place during the open water period • Annual shipment from Milne Port of approximately 3 million tonnes
Environment	• Baseline studies have been conducted by Baffinland since 2005 • Inuit Qaujimajatuqangit (traditional knowledge) information has been collected since 2006 • Baseline studies form the basis of a draft environmental impact statement (DEIS), and provide information for the development of mitigation and management plans • Baseline studies cover the terrestrial, freshwater, atmospheric and marine environments, as well as socio-economic conditions and land use
Social and Economic Benefits	• Baffinland is currently in negotiations with the Qikiqtani Inuit Association (QIA) regarding an Inuit Impact Benefits Agreement (IIBA) • Construction of the project will peak at 2,800 people onsite • The operational phase of the project will require payroll of 750 people for the rail portion of the project and an additional 300 people for the road haulage alternative • Provide 21,000 person years of employment over life of mine • $2.8 billion in taxes to the Government of Nunavut over the life of the project • $1.9 billion in royalties to Nunavut Tunngavik Inc. • Additional economic provisions to flow to QIA via the IIBA
Closure and Post-Closure Phase	• Conceptual mine closure planning has been completed • Closure will ensure that operational footprint is both physically and chemically stable in the long term for protection of people and the natural environment • Post-closure environmental monitoring will ensue for 5 years to verify that reclamation objectives have been met

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Revision 2 – January 1st, 2011

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SECTION 1.0 - INTRODUCTION

1.1 PROJECT DESCRIPTION OVERVIEW

The iron ore deposit, Deposit No. 1, is located on North Baffin Island, in the Qikiqtani Region of Nunavut. The Deposit No. 1 reserves consist of approximately 365 Mt of direct shipping iron ore at an average iron grade 64.66%. The basis of the Mary River Project (the Project) is production and shipment of 21 million tonne-per-annum (Mt/a) of high grade iron ore from this deposit. The high grade ore is suitable for shipment to international markets after crushing and screening with no need for additional processing requirements. Deposit No. 1 has associated resources capable of meeting the production design over the operating period of 21 years. This EIS has been carried out for a maximum duration of 21 years so that the environmental effects can be properly characterized.

Baffinland is committed to developing the Project in an environmentally and socially sustainable manner that will benefit the Company and the people of Nunavut.

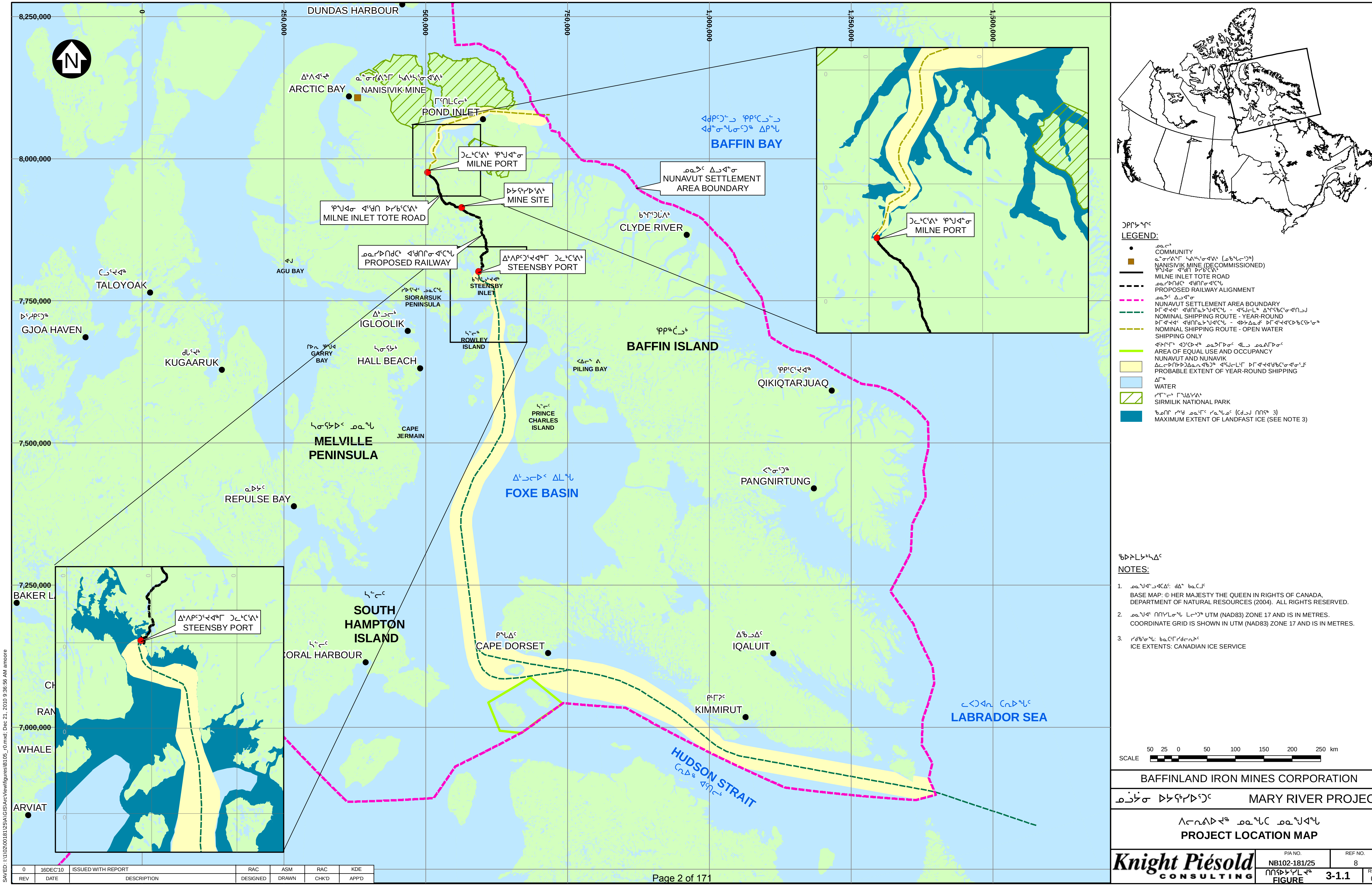
The Project consists of the construction, operation, closure, and reclamation of an open pit mine and associated infrastructures for extraction, transportation and shipment of iron ore from two newly constructed ports at Milne Inlet and Steensby Inlet. After crushing and screening, iron ore will be transported from the Mine Site to either Milne Port or Steensby Port for shipment. The existing Milne Inlet Tote Road linking the Mine Site to Milne Port will be upgraded to improve access from the Milne Port to the Mine Site while a Railway will be constructed to connect Steensby Port to the Mine Site.

It is proposed that Milne Port will operate during the open water season while Steensby Port will operate all year.

A freight dock and an ore loading dock will be constructed at Milne Port. At the onset of the Project, much of the construction material and supplies, fuel and mining equipment will be received at Milne Port during the open water season. By the second year of construction, the Milne ore loading dock will be operational and up to 3 Mt/a of ore will be transported by trucks and shipped from Milne Port during the open water season.

It is expected that the Steensby Port facilities and the Railway will take four years to construct. Once the Railway is operational, 18 Mt/a of iron ore will be transported by Railway and shipped from Steensby Port. Shipping of ore will occur year round from Steensby Port and will therefore require vessels with ice breaking capabilities.

Figure 3-1.1 shows the location of the Project and Figure 3-1.2 shows the key Project sites along with land ownership and current surface and mineral leases. The key facts about the Project are summarized by site location in Table 3-1.1.


DUNDAS HARBOUR
ARCTIC BAY
NANISIVIK MINE
POND INLET
BAFFIN BAY
MILNE PORT
NUNAVUT SETTLEMENT AREA BOUNDARY
MINE SITE
MILNE INLET TOTE ROAD
CLYDE RIVER
AGU BAY
TALOYOAK
PROPOSED RAILWAY
STEENSBY PORT
STEENSBY INLET
SIORARSUK PENINSULA
GJOA HAVEN
IGLOOLIK
ROWLEY ISLAND
BAFFIN ISLAND
GARRY BAY
HALL BEACH
KUGAARUK
PILING BAY
QIKIQTARJUAQ
PRINCE CHARLES ISLAND
CAPE JERMAIN
MELVILLE PENINSULA
PANGNIRTUNG
FOXE BASIN
REPULSE BAY
BAKER LAKE
SOUTH HAMPTON ISLAND
CAPE DORSET
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CORAL HARBOUR
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LEGEND:
COMMUNITY
NANISIVIK MINE (DECOMMISSIONED)
MILNE INLET TOTE ROAD
PROPOSED RAILWAY ALIGNMENT
NUNAVUT SETTLEMENT AREA BOUNDARY
NOMINAL SHIPPING ROUTE - YEAR-ROUND
NOMINAL SHIPPING ROUTE - OPEN WATER SHIPPING ONLY
AREA OF EQUAL USE AND OCCUPANCY NUNAVUT AND NUNAVIK
PROBABLE EXTENT OF YEAR-ROUND SHIPPING
WATER
SIRMILIK NATIONAL PARK
MAXIMUM EXTENT OF LANDFAST ICE (SEE NOTE 3)
NOTES:
1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES (2004). ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. ICE EXTENTS: CANADIAN ICE SERVICE
SCALE 50 25 0 50 100 150 200 250 km
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT
PROJECT LOCATION MAP
Knight Piésold CONSULTING
P/A NO. NB102-181/25
REF NO. 8
FIGURE 3-1.1
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Table 3-1.1 Key Project Facts

Potential Development Area (ha)	Milne Port	224 ha
	Tote Road	865 ha
	Mine Site	2,739 ha
	Railway	1,308 ha
	Steensby Port	2,419 ha
Number of Identified Potential Quarries/ Aggregate Site	Milne Port	One borrow area and one rock quarry at future ore stockpiles
	Tote Road	20 rock quarries (Q1 to Q20) and 16 borrow areas (P1 to P16)
	Mine Site	One existing borrow area (Borrow Area #3), one existing rock quarry (Rock Quarry #2) and one proposed quarry (QMR2)
	Railway	63 rock quarries
	Steensby Port	1 rock quarry (QS2), plus one large rock cut for airstrip

Total quantities Aggregate (tonnes)		**Quarried Rock**	**Borrowed Sand and Gravel**
	Milne Port	1,200,000	100,000
	Tote Road	2,700,000	50,000
	Mine Site	2,700,000	100,000
	Railway	27,000,000	--
	Steensby Port	1,300,000	10,000

Traffic		**Construction Phase**				**Operation Phase**
		Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5 - 25**
Air Traffic (Max. size aircraft / Estimated flights)	Milne Port (Dash-8 / ATR)	1 daily	1 daily	1 each week	1 each week	1 each week or less
	Mine Site (Boeing 737)	1 daily	1 daily	1 daily	1 daily	3x / week
	Steensby Port (Boeing 737)	1 daily	1 daily	1 daily	1 daily	Emergency/alternate landings only
Road Traffic (Avg. trucks per day)	Tote Road	30	30	120	120	110
Railway traffic	Railway	N/A				4 round trips/day
Workforce (numbers)	Exploration	150	150	150	150	150
	Construction On-Site	2,140	2,844	2,811	1,457	--
	Construction Payroll	4,280	5,688	5,622	2,914	--
	Operation 3 Mt/a	0	150	311	311	311
	Operation 18 Mt/a	0	0	0	0	746

Table 3-1.1 Key Project Facts (Cont'd)

Camps, Water Supply and Wastewater		Construction Phase				Operation Phase
		Year 1	Year 2	Year 3	Year 4	Year 5 - 25
Camp Capacity (peak # of people)	Milne Port	165	165	165	165	30 to 105
	Tote Road	50	50	Camp removed		
	Tote Road emergency shelters	14	14	14	14	14
	Mine Site	1,200	1,200	1,200	1,200	475
	Mid-Rail	200	200	200	200→0	Camps removed
	Ravn River	200	200	200	200→0	
	Tunnels	0	100	100	0	
	S. Cockburn	0	400	400	400→0	
	Steensby Port	600	600	600	600	175
Water Demand m^3/day (expected)	Milne Port and Tote Road	29,000	29,000	122,900	122,900	122,900
	Mine Site	262,050	273,250	184,800	184,800	93,500
	Railway	135,400	135,400	135,400	135,400	0
	Steensby Port	103,070	143,070	93,070	93,070	75,860
Treated (Sewage) Effluent (m^3/day)	Milne Port	18	63	63	63	6
	Tote Road Camp	Trucking 15 m^3/day	Trucking 15 m^3/day	Camp decommissioned – refuge stations only		
	Mine Site	420	420	420	420	60
	Mid-Rail	60	60	60	60	Camps removed
	Ravn River	Trucked to the Mine Site WWTP				Camp removed
	Cockburn Lake	Trucked to Steensby Port WWTP				Camp removed
	Cockburn South	Trucked to Steensby Port WWTP				Camp removed
	Steensby Port	360	360	360	360	55
Waste						
Waste to Landfill m^3/yr	Mine Landfill	2,750	2,750	2,750	2,750	900
	Steensby Landfill	1,400	1,400	1,400	1,400	300
Waste to Incinerator Tonnes/yr	Milne Port	200	200	200	200	170
	Mine Site	1,700	1,700	1,700	1,700	600
	Steensby Port	1,550	1,550	1,550	1,550	230

Table 3-1.1 Key Project Facts (Cont'd)

Shipping of Freight and Fuel		Construction Phase				Operation Phase
		Year 1	Year 2	Year 3	Year 4	Year 5 - 25
Shipping Milne Port	Freight vessels	10	6	3	3	3
	Freight (tonnes)	165,000	95,000	43,000	46,000	46,000
	Fuel tankers	2	3-6	3-6	3-6	3-6
	Fuel delivery	20 ML	60 ML	60 ML	60 ML	60 ML
Shipping Steensby Port	Freight vessels	13	9	7	4	3
	Freight (tonnes)	206,000	150,000	107,000	80,000	60,000
	Fuel tankers	2	4	4	3	3-6
	Fuel delivery	20 ML	35 ML	35 ML	120 ML	160 ML
Fuel Storage						
	Milne port	Multiple Iso-containers	Permanent tank farm operational 2 steel tanks at 30 ML capacity; total storage of 60 ML			
	Tote Road	Multiple 20,000 L Iso-containers positions as required		none		
	Mine Site	Existing fuel bladders	3 steel tanks at 5.2 ML capacity; total storage of 15.6 ML			
	Railway	Multiple 20,000 L Iso-containers positions as required				none
	Steensby Port	Multiple Iso-containers	Permanent tank farm operational Diesel = 4 steel tank at 40 ML ; Total storage of 160 ML Diesel = 1 steel tank at 7.5 ML (island tank)			
Explosives						
Explosives	Milne Port	Magazine				
	Tote Road	Mobile Mixing Unit and magazines				
	Mine Site	Magazine	ANFO Mixing Plant			
	Railway	Mobile Mixing Unit and magazines				
	Steensby Port	Magazine	ANFO Mixing Plant			

Table 3-1.1 Key Project Facts (Cont'd)

Production		Construction Phase Year 1	Construction Phase Year 2	Construction Phase Year 3	Construction Phase Year 4	Operation Phase Year 5 - 25
Ore Production (million tonnes per annum – Mt/a)	Trucking		0.5	3	3	3
	Railway	--	--	--	--	18
Total Waste Rock & Overburden	(approximate tonnage)	2	2	6	22	30
Ore Stockpiles (tonnes)	Milne Port		3,000,000	3,000,000	3,000,000	3,000,000
	Mine ROM		400,000	400,000	400,000	400,000
	Mine – Road Operation	--	50,000	250,000	500,000	500,000
	Mine - Railway	--	--	--	--	1,400,000
	Steensby Port - 1.4 Mt fine ore stockpile capacity					900,000
	Steensby Port - 3.2 Mt coarse ore stockpile capacity					2,300,000
Ore Shipments (ships per year)	Milne Port Handymax (50,000 DWT) or Panamax (75,000 DWT) vessels		Less than 30	50 to 60	50 to 60	50 to 60
	Steensby Port Ten dedicated icebreaker ore carriers (160,000 to 190 ,000 DWT)					102
Power Supply						
Power Supply Milne Port	Annual consumption	50,000 MWh				
	Running Load	9.8 MW				
	Installed Power	15.8 MW				
	Number / Size of unit	5 units at 5.6 MW each (2 standby units)				
Tote Road Upgrade	Stand alone generators as required for quarries and temporary mid-way camp					
Power Supply Mine Site	Annual consumption	114,000 MWh				
	Running Load	9.8 MW				
	Installed Power	15.8 MW				
	Number / Size of unit	5 units at 5.6 MW each (2 standby units)				
Railway Construction	Temporary generators installed at camps and quarries					
Power Supply Steensby Port	Annual consumption	120,000 MWh				
	Running Load	11 MW				
	Installed Power	22 MW				
	Number / Size of unit	6 units at 5.6 MW each (2 standby units)				

1.2 PROJECT HISTORY

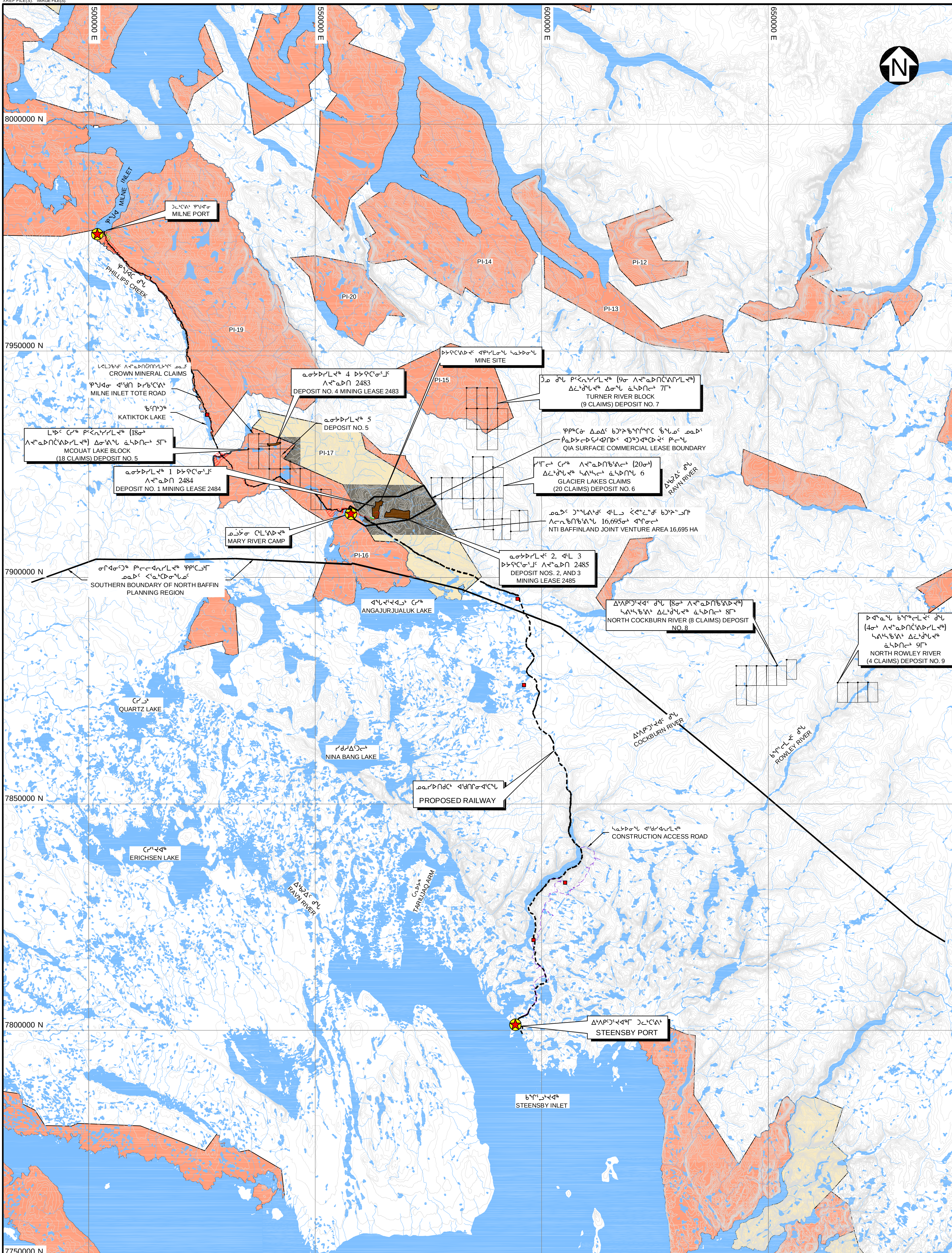
The Mary River iron ore deposits were originally discovered in 1962 by Murray Watts of British Ungava Explorations Limited (Brunex). Brunex staked ten claim groups in the Project area, including the Flo, Donna, and Mary claims which cover the areas now known as Deposits No. 1 (Flo); 2, 3 and 3b (Donna); and 4 (Mary), shown on Figure 3-1.2. The private company Baffinland Iron Mines Ltd. (BIML) was established in 1963 by the financial participants and prospectors of the Brunex group to hold the Mary River claims and leases and to develop the prospects.

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

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

The year 2008 also saw the completion of a drill program focused on geotechnical, exploration and geomechanical work, as well as further investigations at the Milne Inlet and Steensby Port sites and along the Railway. In addition, a bulk sampling program was undertaken to extract, transport and ship ore for testing in Europe (Knight Piésold, 2006). The results were used to prepare a definitive feasibility study, which found ‘excessively robust economics’ for a Project based on 18 Mt/a of iron ore production (Baffinland press release, February 23, 2009). The Company engaged CIBC World Markets and Citigroup to seek a minority strategic partner and appointed the well-known mining firm AMEC to serve as Engineering Procurement Construction Management (EPCM) Contractor. In March 2008, the Company submitted a Development Proposal and associated initial permit applications in order to initiate the regulatory review of a Project based on currently defined iron ore reserves.

In mid-2010, the Company announced a feasibility study for producing an additional 3 Mt/a (Baffinland Press Release dated July 12, 2010). Regional exploration undertaken in 2010 resulted in the staking of claim blocks covering four new iron ore deposits in the area (Deposits No. 6, 7, 8 and 9; see Figure 3-1.2). These deposits have been sampled at surface but not drilled. Additional detail is provided in Volume 2, Section 2.



LEGEND:

- WATER
- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
- MINERAL LEASE BOUNDARY
- CROWN LAND
- EXISTING BORROW AREA (IOL COMMERCIAL LEASE)
- EXISTING ROCK QUARRY (IOL COMMERCIAL LEASE)
- NTI EXPLORATION AREA
- CROWN MINERAL CLAIMS
- MILNE INLET TOTE ROAD
- PROPOSED RAIL ALIGNMENT
- PROPOSED CONSTRUCTION ACCESS ROAD
- RIVER/STREAM/DRAINAGE
- CONTOUR
- TEMPORARY CONSTRUCTION CAMP

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES (2004). ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. PROPOSED RAIL ALIGNMENT PROVIDED BY CANARAIL CONSULTANTS INC.

1.
2. UTM (NAD83) ZONE 17
3.
4. CANARAIL CONSULTANTS INC

SCALE A 8 4 0 10 20 30 40 km

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

LOCATION OF PROJECT ACTIVITIES

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/25	8

FIGURE 3-1.2 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

1.3 SCOPE AND SCHEDULING

The construction and operation of major capital projects in the arctic requires significant up-front planning to address the short summer and open water season, activity-limiting extreme cold and darkness of winter, and challenging logistics due to its remoteness.

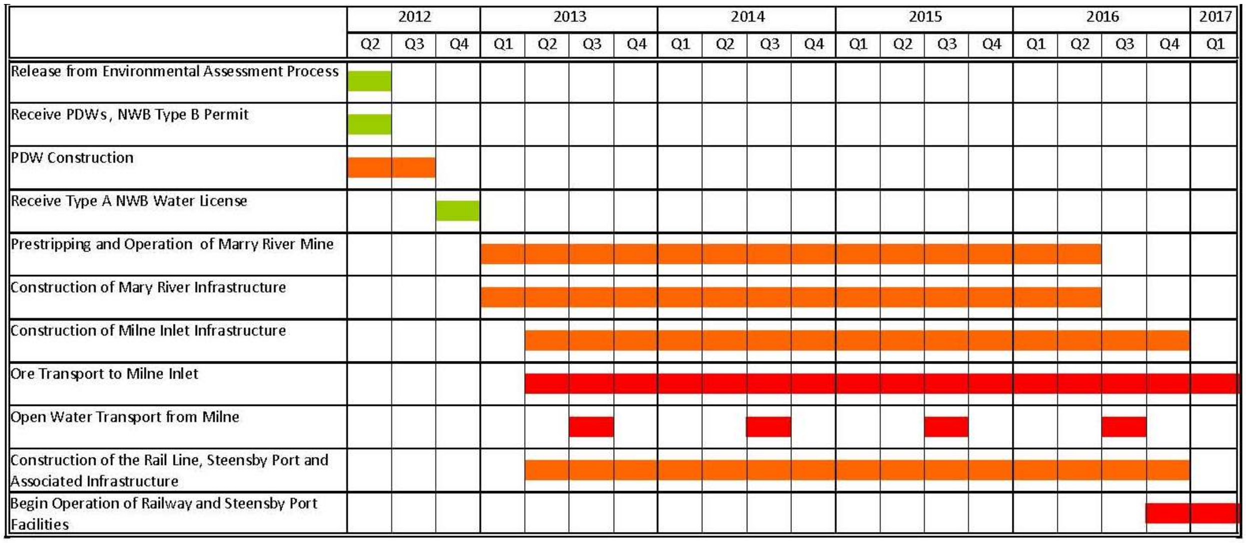
To address these constraints, Baffinland plans to seek an exception under Section 12.10.2 of the NLCA to allow for the early issuance of permits to carry out preparatory "pre-construction" activities, to enable construction to begin as soon as the Project has received the necessary approvals to proceed. These pre-construction activities include:

- pre-delivery of materials and equipment in the open water season to Milne and Steensby Ports;
- positioning of barges containing gravel aggregate at Steensby Port;
- initiation of civil works (foundation preparations) for a permanent 60 ML tank farm to be constructed onsite in Year 1;
- installation of prefabricated 1 ML steel tanks within the secondary containment of the future 60ML tank farm, so that the existing bladder fuel tanks may be drained and subsequently decommissioned;
- initiation of civil works for one of the future 5.2 ML tank at the Mine Site; continued use of the existing 1.2 ML fuel bladder tank farm at the Mine Site until the 5.2 ML tank is installed;
- tanker delivery of fuel to the new steel tank farm at Milne Port; road transport of fuel to the Mine Site;
- minor improvements to the existing Milne Inlet Tote Road, Milne Port and Mine Site camp and laydown areas, to prepare for transport and storage of construction supplies from Milne Port to the Mine Site; and
- mitigation of archaeological sites at Milne Port and along the Milne Inlet Tote Road.

These pre-construction activities may be carried out under existing or new interim regulatory approvals, including land use permits/leases, water licence, *Fisheries Act* authorization, and approvals under the *Navigable Waters Protection Act*. Approval will also be required from the Nunavut Department of Culture, Language, Elders and Youth (CLEY) for archaeological work.

Figure 3-1.3 shows the project sequencing of the construction activity leading to full production. Once the Project is released from the Nunavut Impact Review Board environmental assessment process and receives the Nunavut Water Board Type B License, the Company will begin the construction "pre-development works" as outlined below. It is expected that once the NWB Type A licence is issued, project construction will begin. The primary focus of the pre-development works construction period will be to upgrade the Milne Inlet Tote Road, Milne Port and Mine Site camp and laydown areas. It is expected that 200,000 to 250,000 tonne of iron ore will be shipped from the Milne facilities once these pre-development works are complete. By the following year, the Milne Inlet facilities should be sufficiently completed to allow for shipment of 3 Mt of ore. After a four year construction period, the ramp up period for rail haulage and shipping from Steensby Port is expected to be one year.

Figure 3-1.3 Construction Schedule



Depending on completion of the environmental assessment process and the order and delivery of high capital critical path items, shipment from Steensby could occur earlier in the project schedule.

The scope of the Project includes all works or undertakings required for the construction, operation, modification, maintenance, decommissioning, reclamation or other undertakings of the following components:

- Milne Port docks and port facilities;
- Milne Inlet Tote Road upgrade;
- Mine Site support infrastructure and facilities;
- Railway;
- Steensby Port docks, port and railway terminal infrastructure and support facilities;
- Marine Shipping;
- Air Traffic;
- Ongoing Geotechnical Exploration.

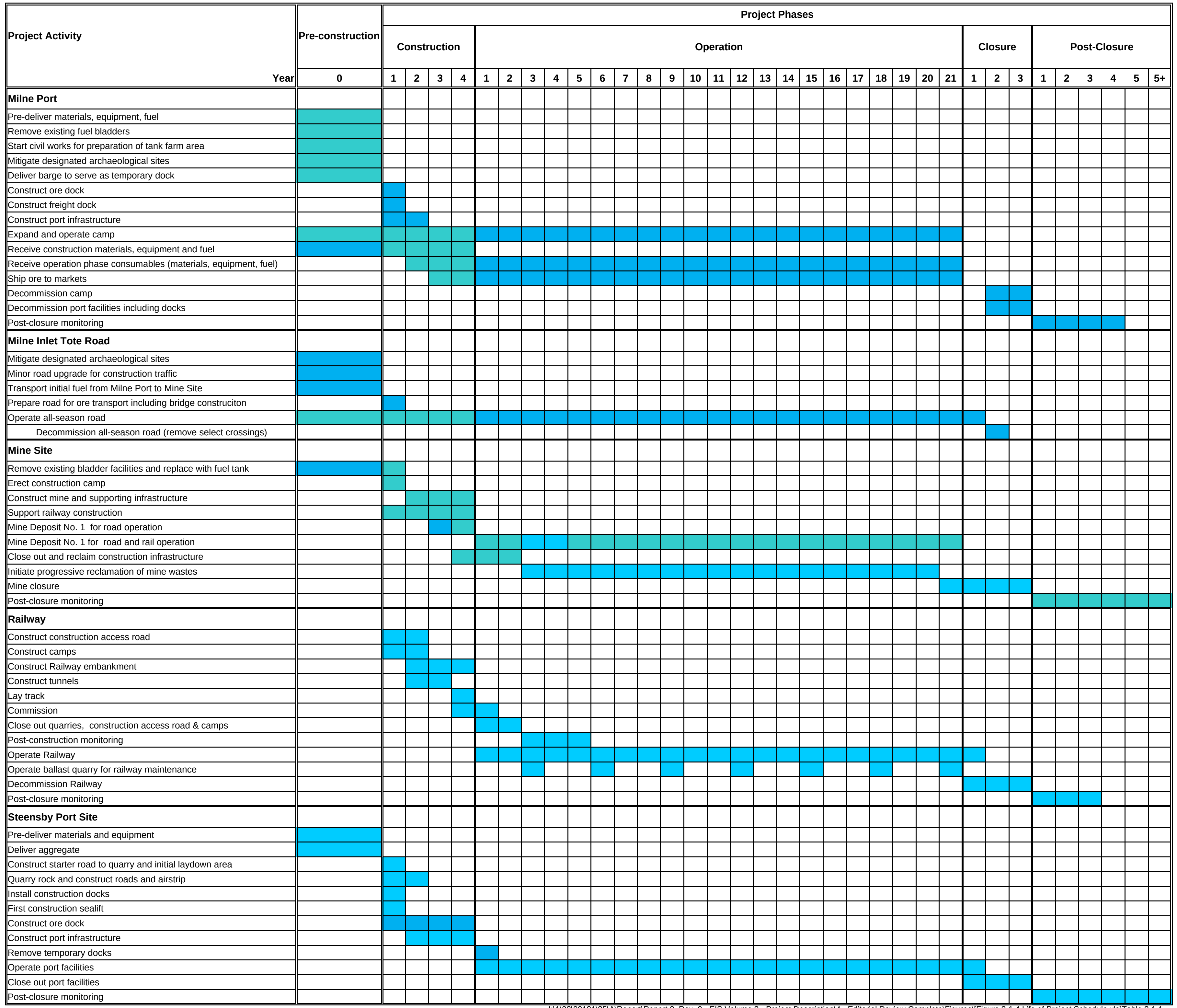
Air traffic and ongoing geotechnical exploration are discussed within each of the main Project locations. There are three main project phases described herein:

- 4-year Construction Phase (Year 1 through Year 4, which includes the first years of limited operation using road haulage;
- an approximate 21-year Operation Phase (Year 5 through Year 25);
- an approximate 3-year Closure Phase (Year 26 through Year 28); and
- a 5-year Post-Closure Monitoring Phase (Year 29 to Year 33)

The Life of Project schedule is presented in Figure 3-1.4.

FIGURE 3-1.4

LIFE OF PROJECT SCHEDULE



I:\1\02\00181\25\A\Report\Report 8, Rev. 0 - EIS Volume 3 - Project Description\4 - Editorial Review Complete\Figures\[Figure 3-1.4 Life of Project Schedule.xls]Table 3-1.1

21-Dec-10

1.4 NEED AND PURPOSE OF THE PROJECT

The purpose of the Project is to extract, crush and screen, and ship approximately 21 Mt/a of iron ore to steel mills overseas over a 21 year period in an environmentally and socially sustainable manner, while providing a competitive rate of return to the Company's investors and lenders, and sharing Project benefits directly with the local Inuit communities.

There is a five-fold need for this project:

1. To provide a return on investment to the Company's shareholders.
2. To supply high quality iron ore to the international marketplace. The reasonably foreseeable international demand for iron ore has created market conditions that Baffinland believes are favourable for opening a mine at Mary River.
3. To support the Nunavut Planning Commission Broad Planning Principles, Policies and Goals (Nunavut Planning Commission, 2007). The Planning Commission goals include:
    - Strengthening Partnership and Institutions
    - Protecting and Sustaining the Environment
    - Encouraging Conservation Planning
    - Building Healthy Communities
    - Encouraging Sustainable Economic Development
4. To contribute to the development of infrastructure, skills training, employment, and business opportunities in Nunavut, as outlined in the Nunavut Exploration and Mining Strategy (Government of Nunavut, 2007). This will help build healthy communities and strengthen partnerships between Baffinland and stakeholders and institutions.
5. To contribute to Canada's northern strategy to strengthen Canada's sovereignty, protect the country's environmental heritage, promote economic and social development and improve Northern governance. (Indian and Northern Affairs Canada, 2008).

1.4.1 Benefits of the Project

The social benefits of the Project are detailed in Volume 4 of this EIS. Volume 4 also analyses the positive and negative social and economic effects on existing industries, markets, and communities over the life of the Project. The distribution and magnitude of benefits and/or losses to specific socio-economic groups in the relevant study area are also addressed.

Given the future demand for iron ore in the global marketplace, the Project has the potential, through its mineral exploration and mining activities, to contribute to meeting Nunavummiut needs for infrastructure, training, and sustainable economic development. The Project will generate benefits to local Inuit communities through capacity-building, employment and business opportunities, and revenues to the Territorial and Federal governments in the form of tax revenues. The Inuit Impact and Benefits Agreement (IIBA), currently under negotiation between Baffinland and the regional Inuit association, will ensure that benefits from the Project flow to nearby Inuit communities and the Qikiqtani Region of Nunavut.

Over the long term, the road, Railway and port infrastructure built by the Project will provide opportunities to access further mineral deposits in the North Baffin Region and will improve access for Inuit harvesting and tourism. The two ports will provide opportunities for additional commercial uses and the bathymetry information collected by the Project will provide important information for shipping lanes through Foxe Basin. The power generating and mobile equipment could be made available for community or government use after closure. In addition, Project activity will help confirm Canadian sovereignty over the region.

The direct investment for the Project is estimated to be about $4 billion. It will produce iron ore worth about $23 billion, provide 21,080 person years of employment, and Baffinland will pay more than $1.6 billion in 1997 dollars ($2.764 billion in nominal dollars) in profits taxes to the Government of Nunavut and more than $1.9 billion 1997 dollars in royalties would flow to Nunavut Tunngavik Incorporated (NTI) over the life of the Project. By comparison, the government of Nunavut's revenue from all sources was $1.336 billion in 2007.

Across the ten provinces, economic modeling indicates the potential for the Project to increase real GDP by $7.2 billion and increase employment by nearly 5,500 person years over the life of the Project.

1.4.2 Project Financing

Based on the shipment of 21 million tonnes of high-grade iron ore (64.7% iron) per year primarily to the European market, the proven reserves of 160 million tonnes and probable reserves of 205 million tonnes sustain a mine life of over 20 years. Project pre-tax cash flow over the life of the mine is forecast to be $18.1 billion with after-tax cash flow of $11.2 billion (Baffinland, 2008a).

Ultimate project financing is expected to include a substantial debt component. Baffinland has been seeking a strategic partner to help finance the capital required for the Project. The Federal Republic of Germany has expressed its interest in acquiring the iron ore to be produced by approving in principle an untied loan guarantee for $1.2 billion worth of loans for the Project (Baffinland, 2009).

1.4.3 Project Accommodation for Concurrent Uses

Baffinland recognizes the need to accommodate the safe joint use by the Project and the people of Nunavut of the Project sites. Examples of the accommodation provisions in the Project include:

- The Nunavut Land Claims Agreement (NLCA) establishes the requirements and expectations for development activities occurring in Nunavut. This Agreement includes a public easement on the Milne Inlet Tote Road. Therefore access to this Road will not be restricted. Provisions will ensure that hunter use is compatible with Project operations as stipulated in the Road Management Plan in Volume 10, Appendix D10-8.
- Hunters will be welcome to stop into the Project sites for meals and gas for their snowmobiles and ATV's as indicated in the Land Use Impact Assessment, Volume 4.
- Along the Railway, locations will be provided for hunter crossings and animal crossings. Final positions of these crossings will be determined in consultation with stakeholders.
- Hunters who would pass by snowmobile across the landfast ice at the entrance of Steensby Inlet will need to circle around the Steensby Port. In consideration of this, Baffinland will invite hunters/travellers to stop in at Steensby Port for sustenance and fuel.

Additional detail is provided in Section 3, and potential effects to existing land uses is assessed in Volume 4, Section 10.

1.5 POTENTIAL FOR FUTURE DEVELOPMENT

The Project involves the development of the ore reserves and resources identified and currently under exploration in Deposit No.1, one of nine known iron ore deposits within Baffinland-held mineral leases (Volume 2, Section 2.1). As the Company develops Deposit No.1, it will continue further exploration programs to identify further ore reserves in the region. Exploration drilling on Deposits No. 2 and 3 was initiated in 2007 and is ongoing. Exploration drilling on Deposits No. 4 and 5 was initiated in 2010. At present these deposits have not been delineated. Deposits No. 6 though 9 have been sampled at surface only. Exploration activities will utilize relevant Project infrastructure such as accommodation, flights and laboratory space. Exploration equipment not owned by the Project will be sourced from companies under contract for exploration work.

The Project under assessment addresses a nominal 21 Mt/a production rate for mining of Deposit No. 1 only. Annual production rates will vary for a number of factors such as market conditions, ore grades and unanticipated events. Although the Project has been designed for a nominal 21 Mt/a of iron ore, provisions to accommodate future expansion from 18 Mt/a to 30 Mt/a have been incorporated into the design of the railway operation, and the road operation at Milne Port could be expanded from 3 Mt/a to 5 Mt/a. Deposits No. 2 and 3 could be readily accommodated within the proposed mining infrastructure. The Railway would accommodate the higher iron ore quantities and required supplies by adding only two additional trains. The ore dock at Steensby Port can accommodate another ore carrier on the other side of the dock. Adequate space is available for larger stockpiles, additional material handling facilities and personnel accommodations. Development of Deposits No. 4 and 5 would require additional rail from the Mine Site to the deposits or could feed the trucking operation in future.

A potential hydroelectric development site has been identified at Separation Lake which could supply up to 32 MW, enough to potentially supply power to Steensby Port and the Mine Site. If developed, the diesel generators would be retained for backup power.

Should Baffinland plan to mine other deposits in the area and/or increase the production rate or mine life, or if feasibility studies determine the hydroelectric project is viable, the Company will submit another package of permit applications to the applicable authorizing agencies for screening by NIRB, in anticipation that another environmental assessment will likely be required.

1.6 CONFORMANCE WITH REGULATIONS AND AUTHORIZATIONS

Baffinland will carry out the Project in conformance with all applicable Nunavut and Canadian laws, regulatory requirements, agreements, permits and licences. The regulatory requirements are detailed in Volume 2, Section 1. In addition to conforming to regulatory requirements, Baffinland is committed to carrying out the Project in accordance with its Sustainable Development Policy. Baffinland's EHS Management System documents commitments and requirements toward achieving the goal of sustainability.

SECTION 2.0 - PROJECT DESCRIPTION - CONSTRUCTION PHASE

2.1 CONSTRUCTION OVERVIEW

Construction of the Project is expected to be carried out over a 4-year period. The construction phase will begin upon completion of approved pre-construction staging activities and receipt of Project approvals to proceed with the Project.

The remoteness of the Project site and the short duration of the open water shipping season are major factors in planning the delivery of equipment, fuel and other materials to facilitate construction. The Project recognizes the eastern arctic marine conditions as the most significant constraint both in peak season capacity and the short duration of an open delivery window.

The following are key parameters that have been addressed in the planning and execution of construction:

- Remoteness of the Project sites;
- Short open water season for annual delivery of equipment and materials;
- Duration and degree of extreme cold and darkness;
- Presence of existing infrastructure at Milne Inlet and the Mine Site;
- Present condition of the Milne Inlet Tote Road;
- Absence of existing infrastructure, variable ground conditions and uneven topography at Steensby Inlet; and,
- Construction on permafrost.

Construction will follow best practices as outlined in the EHS Management System (Volume 10). For example, berms will be constructed to divert waters around construction areas and discharge them into their respective watersheds, fish screens will be installed on all water intakes, and an archaeologist will be available at all times to promptly confirm chance archaeological finds and determine the appropriate mitigation strategy.

2.1.1 Site Capture

The initial focus of construction will be on site capture – establishing the basic infrastructure such as camps, airstrips, docks, fuel storage facilities and laydown areas to allow the construction workforce to expand and focus on construction of permanent Project infrastructure. Existing facilities at Milne Port and the Mine Site, good ground conditions at both locations with established laydown areas, and the connecting all-season Milne Inlet Tote Road will allow for rapid site capture at these sites. Equipment and supplies for the Project will initially be via sealift to the beach at Milne Port.

Site capture at Steensby Port will take longer than at Milne Port and the Mine Site, given the relative absence of existing infrastructure and poor ground conditions. Aggregate, supplies and equipment will have been shipped to Steensby Port during pre-construction to prepare for site capture at this site. Approximately 9 to 10 months will be required to establish the basic infrastructure to provide for the mobilization and support of the large workforce needed for construction at Steensby Port and the Railway. The expected workforce composition and numbers are presented Table 3-1.1.

Railway construction will be staged from both the Mine Site via Milne Port as well as Steensby Port. The railway embankment will be used as a construction access road where possible. Where required, a separate temporary all-season construction access road will be constructed. These roads will allow for multiple work fronts with camp facilities, fuel storage, laydown areas, temporary airstrips suitable for small aircraft (example: Twin Otter) and access to aggregate sources. Site capture for Railway construction activities will begin once basic infrastructure has been established at the Mine Site and Steensby Port.

2.1.2 Mobilization and Re-Supply

During construction, containerized equipment and materials will be shipped to the Milne and Steensby Ports during the open water season, in compliance with applicable arctic shipping acts and regulations (Volume 2, Table 2-2.1). Personnel, equipment and materials will also be flown into the Mine Site, Steensby and Milne Port airstrips, and then to construction camps using temporary airstrips built into the railway construction access road. Items bound for the Mine Site will be transported from Milne Port over the Milne Inlet Tote Road. To facilitate rapid off-loading of ships delivering all supplies other than fuel, e.g. equipment and materials, two temporary docks will be constructed at Steensby Port, and a permanent freight dock will be constructed at Milne Port.

2.1.3 Shipping Activities during Construction

All shipping will be required to conform to the government of Canada's Marine Transportation Security Regulations (SOR/2004-144). Table 3-1.1 presents the estimated number of ships that will arrive at Milne and Steensby Ports each year during construction, as well as the total approximate tonnage of materials to be delivered each year. The estimated number of voyages each year is based on use of conventional sealift ships with cargo capacities of 7,000 to 16,000 deadweight tonnage (DWT) and Panamax ore carriers (75,000 DWT). Larger ships or barges may be used for delivery of supplies and equipment depending on cost and availability.

A freight forwarding team will be responsible for receiving all cargo in the port of discharge, customs documentation, obtaining customs clearance, and inland freight to the consolidation point. Port facilities will be operated in accordance with Canada's Marine Transport Security Regulations for marine facilities. Shipping logistics at the 2 ports will be managed by a Harbourmaster. A Port Superintendent will be onsite at Milne Port during the open water season and year round at Steensby Port. The ports will both be equipped with laydown areas and warehousing. Most materials will arrive in containers and will be stored in laydown areas before overland transport to the Mine Site. Warehousing will accommodate less than load (LTL) materials for consolidation and possible loading into containers.

Hazardous and non-hazardous wastes that will be taken off-site for licensed disposal or recycling will be back-hauled on the supply sealifts.

Sealifts in Years 3 and 4 of construction and Year 1 of operation will be used to demobilize equipment as the construction activity winds down. Ships will not be serviced at either Milne or Steensby Ports. No water, food or fuel will be loaded onto the ships at these locations.

2.1.4 Types of Construction Activities

A dedicated construction team with experienced personnel and equipped with the necessary construction equipment and labour will carry out the following activities:

- Fabrication and erection work of the Project and its facilities (civil, building, building mechanical, steel structure, equipment installation, piping, electrical, instrumentation, insulation, and painting works);

- Inspection of all phases of the work; and,
- Pre-commissioning and commissioning assistance.

The main activities within each of the major works are listed below:

Civil Works

The civil works will mainly comprise:

• General site preparation and construction of temporary facilities	• Surveying
• Earthworks and soil exchange	• Construction of roads, airstrips, the railway, bridges, tunnels, ports and buildings
• Foundation preparation	• Drainage management including construction of ditches and ponds
• Pre-stripping and removal of overburden in preparation for ore extraction	• Ore extraction at a rate of up to 3 Mt/a in the open pit

Mechanical Works

Steel structure, ladders and platforms will be supplied prefabricated to the maximum degree allowable for transport. The mechanical works will mainly comprise:

• Equipment installation	• Construction of steel structures and pipe racks
• Piping installation including prefabrication	• Installation of mechanical systems in buildings
• Ore crushing and screening	

Electrical and Instrumentation Works

Where possible, the prefabrication and assembly of electric system components such as switchboards, light tower, lighting fixtures, cable trays, etc. will be carried out prior to shipping. The electrical and instrumentation works will mainly comprise:

• Construction and installation of electric power distribution systems	• Installation of lighting systems
• Installation of sockets and motive power	• Installation of electricity grounding systems

Instrumentation works will be scheduled to avoid interference with the other activities and to ensure operating continuity.

Pre-commissioning Activities

Pre-commissioning activities will be carried out prior to mine commissioning (start-up), including:

• Hydro testing of fuel tanks	• Flushing of pipelines
• Non-destructive testing (e.g. railway tracks)	• Equipment adjustments
• Cold alignment checks	• Temporary hook ups
• Vendor checks	• Compressed air testing

2.1.5 Equipment Fleet and Fuel Consumption

A large fleet of equipment is required to construct the key Project components, which include expanding facilities at Milne Port, upgrading the Milne Inlet Tote Road, and constructing Mine Site ancillary facilities and infrastructure, Railway and Steensby Port facilities. In addition, equipment will be required for stripping and removal of overburden and ore extraction. A preliminary list of mobile equipment is provided below:

Estimate of the Heavy Equipment Fleet during Construction	
Pick-up Trucks (156)	Portable Generators (120)
Excavators (50)	Dozers (40)
Haul Trucks (20)	Loaders (5)
Drills (30)	Crushers (8)
Water trucks (6)	Miscellaneous work trucks (50)
Grader (12)	Fuel tankers (3)
Transport trucks (25)	Cranes (12)

In addition, during the last 2.5 years of construction the trucking operation will utilize approximately 25 haul trucks to transport ore on the Milne Inlet Tote Road, 12 mine haul trucks operating in the open pit, 2 excavators and 3 dozers, 3 drills, 4 front-end loaders and 15 miscellaneous vehicles supporting the mining operation at the Mine Site.

The estimated personnel requirements during construction are summarized in Section 5.1.1. The quantities of fuel estimated to be consumed during construction are listed in Table 3-1.1.

2.1.6 Strategy for Sourcing Aggregate

Significant quantities of aggregate will be required for construction activities. Aggregate, including crushed rock from quarries as well as sand and gravel from borrow sources, will be required for construction of Project components, mainly for railway construction and upgrades to the Milne Inlet Tote Road.

During the bulk sampling program in 2007 – 2008, Baffinland established 3 large borrow areas (Milne Inlet Borrow Area, the Midway Camp Borrow Area and the Mary River Borrow Area) and 2 rock quarries (Rock Quarry #1 at Milne Port and Rock Quarry #2 at the Mine Site). These aggregate sources form part of the Company's current Commercial Lease with the Qikiqtani Inuit Association (QIA) (Figures 3-2.1, 3-2.2 and 3-2.3). In addition, a number of small roadside borrows were developed during road upgrades at that time (Figure 3-2.2).

To support mine construction, a number of additional aggregate sources have been identified, mainly along the transportation corridors. A total of 21 rock quarries (Q1 to Q16, Q16A, and Q17 to Q20) and 16 borrow areas (P1 to P16) have been identified along the Milne Inlet Tote Road (Figure 3-2.2), and a total of 67 rock quarries (identified by the railway kilometre post measured from the Mine Site; i.e., Q33+500) have been identified along the Railway including the Mine Site and Steensby Port (Figures 3-2.4 through 3-2.8). A complete listing of the proposed aggregate sources is provided in the Borrow Pits and Quarry Management Plan (Appendix 10D-6).

Analyses of select sand and gravel samples from borrow areas have indicated that crushing, screening and/or blending will be required to produce material suitable for structural fill as the unprocessed material has poor compaction characteristics. At rock quarries, portable crushers and screens will be set up within each quarry to prepare aggregate to meet construction specifications.

Representative geochemical testing of proposed aggregate sources has determined the material to be non-acid generating and therefore will not leach metals, as summarized in Volume 6, Section 2 and presented in greater detail in Appendix 6B.

2.1.7 Temporary and Permanent Support Infrastructure

Where possible, permanent support infrastructure will be built at the onset of construction, to be used during both the construction and operation phases of the Project. Temporary infrastructure constructed or positioned at Project sites needed only for the construction phase will be removed once construction is complete. Major components in each area are presented in Table 3-2.1 below, with temporary infrastructure distinguished from permanent facilities.

Table 3-2.1 Major Project Components

Milne Port	
Temporary Facilities	**Permanent Facilities**
• Bulk fuel storage facilities (fuel bladders; to be decommissioned by Year 1) • Temporary power generators	• Beach laydown area for sealift unloading • Laydown areas (existing) • Airstrip (existing and upgraded) • Waste management facilities • Quarries and borrow sources (existing) • Camp facilities (existing and upgraded) • Water supply (existing and upgraded) • Power generation • Ore stockpiles • Bulk fuel tank farm • Explosives storage • Communication systems • Ore dock • Freight dock
Milne Inlet Tote Road	
Temporary Facilities	**Permanent Facilities**
• Construction camp • Power generation • Quarries and borrow sources • Explosives magazines	• Milne Inlet Tote Road (existing and upgraded) • Quarries and borrow sources (existing and new) • Communication towers • Emergency shelters

Mine Site	
Temporary Facilities	**Permanent Facilities**
• Construction camp • Contractor offices • Quarries and borrow sites • Temporary fuel storage (iso-containers) • Aggregate crusher and stockpiles • Concrete batching plants • Temporary power generators • Portable lighting plants • Construction workshops and maintenance shops • Warehouses/stores	• Ore crushing and screening facilities • Ore stockpiling facilities • Railway loading and unloading facilities • Truck loading and unloading facilities • Equipment maintenance facilities • Permanent worker accommodations • Communication systems • Site roads • Laydown areas • Airstrip (existing and upgraded) • Bulk fuel storage and distribution facilities • Explosives manufacturing and storage • Water supply • Power generation • Waste management facilities • Explosives plant
Railway	
Temporary Facilities	**Permanent Facilities**
• Construction access roads • Quarries and borrow sources • Construction camps (4) and airstrips • Refuelling depots at camps • Explosives magazines	• Railway embankment • Train loading and unloading facilities • Communication systems • Tunnels, bridges • Rail sidings • Quarry for ongoing railway ballast during operations (also used in construction)
Steensby Port	
Temporary Facilities	**Permanent Facilities**
• Construction docks (2) • Quarry • Concrete batch plant(s) • Construction workshops and maintenance shops • Warehouses/stores • Temporary power generators	• Ore stockpiling facilities • Ore, freight and tug docks • Ship loading and unloading facilities • Cargo (container) handling facilities • Permanent worker accommodations • Rail shops and maintenance infrastructure • Maintenance facilities

Steensby Port	
Temporary Facilities	**Permanent Facilities**
• Portable lighting plants • Laydown areas/freight storage • Parking areas for construction fleet • Temporary fuel storage (iso-containers) • Construction Equipment maintenance facilities • Explosives plant and magazines	• Buildings and offices • Communication systems • Site roads • Causeway / bridge • Laydown areas/freight storage • Airstrip and related access road • Bulk fuel storage and distribution facilities • Water supply facilities • Waste management facilities • Power plant • Navigational aids (shipping lane and port)

The following figures present layouts of the Project sites:

- Figure 3-2.1 Milne Port
- Figure 3-2.2 Milne Inlet Tote Road
- Figure 3-2.3 Mine Site
- Figure 3-2.4 Railway Layout
- Figure 3-2.5 Railway Construction Potential Development Area (Sheet 1 of 4)
- Figure 3-2.6 Railway Construction Potential Development Area (Sheet 2 of 4)
- Figure 3-2.7 Railway Construction Potential Development Area (Sheet 3 of 4)
- Figure 3-2.8 Railway Construction Potential Development Area (Sheet 4 of 4)
- Figure 3-2.9 Steensby Port

2.1.8 Fuel Supply, Storage and Distribution

Construction of land-based permanent fuel tank farm will begin at Steensby Port within the first year of construction. Fuel will be delivered in double wall iso-containers until this tank farm is ready to receive bulk fuel deliveries. The existing bladder tank farms at Milne Port and the Mine Site will be replaced with permanent steel tanks in the first year of construction.

Once the tank farms have been constructed, diesel and jet fuel will be delivered in bulk to both port locations by tankers. Small quantities of gasoline will be delivered in drums. Fuel destined for the Mine Site, construction camp midway along the Milne Inlet Tote Road and the construction camps along the Railway will be delivered using 30,000 L capacity tanker trucks. Appropriate security will be provided at work sites to restrict access to fuel storage facilities by the public.

The potential for accidental releases during ship to land fuel transfer has been identified as a risk (see Volume 9). A tanker company with arctic experience will be contracted to deliver fuel. Potential spills on land have also been identified as a risk. All fuel transfers will be carried out in areas that are bermed so that spills can be readily contained and managed.

The total estimated annual quantities of fuel to be offloaded at both Milne and Steensby Ports and consumed during construction are listed in Table 3-1.1.

Milne Port

The existing fuel bladders will be replaced with conventional steel fuel tanks prior to initiating mine construction. During early construction, two 30 ML capacity tanks will be constructed on-site. Multiple large size double wall iso containers will be used for fuel storage until the first 30 ML tank is operational. The tank farm will be located inside a containment system properly lined with arctic grade synthetic liner. Additional lined storage capacity will be provided to contain additional bulk lubricating oils and antifreeze delivered by sealift.

Once constructed, each tank will be hydrostatic tested using sea water, which will be discharged back into Milne Inlet. The tank farm will receive fuel from tankers berthed at the freight dock through a pipeline. A conceptual drawing of the Milne Port tank farm is presented in Appendix 3A. An on-land Emergency and Spill Response Plan will govern land-based operations (Appendix 10C-1).

As during the bulk sample program, 10 to 20 ML capacity tankers will enter Milne Port during the open water shipping season. Initially, before the freight dock has been constructed, fuel will be unloaded from tankers into tanks on shore by the floating hose method. This method, which involves connecting a hose or hoses from manifolds on the fuel tanker to connections on shore (manifold) is presently employed for fuel shipments to communities on Baffin Island. As per regulatory requirement, an Oil Pollution Emergency Plan (OPEP) has been developed for Milne Port based on the fuel transfer scenario in the first year of construction (Appendix 10C-2).

The freight dock will be equipped with fuel unloading facilities so that once built, tankers will berth at the freight dock to unload fuel, fixed connectors on ships will connect hoses to fixed connections on shore, eliminating the requirement for floating hose and also addressing issues of potential conflicts between ore dock and freight dock traffic. The fuel unloading facility will conform to the Canada Shipping Act Response Organization and Oil Handling Facilities Regulation, as per the Canadian Coast Guard Oil Handling Facilities Standard TP 12402.

Local fuel use will be dispensed at the tank farm, and remote work sites along the road such as borrow areas will likely be serviced by positioning 20,000 L double-walled iso-containers in small lined containment facilities.

Mine Site Fuel Storage

During the construction phase, fuel will be supplied to the Mine Site from Milne Port using a fleet of up to four 38,000 to 60,000 L capacity tanker trucks capable of self loading and discharging. Once the Railway has been completed from Steensby Port by the fourth year of construction, fuel will be transported by rail to the Mine Site.

The current fuel storage capacity at the Mine Site consists of a single bladder fuel farm with a total capacity of approximately 1.25 ML, including 1.13 ML of diesel and 0.11 ML of Jet-A fuel. The bladder tank farm will be used in early construction, and then replaced once a permanent steel tank fuel farm has been constructed, with no additional temporary fuel storage constructed. It is expected that one 5.2 ML permanent storage tank with dispensing facilities will be available for use early in Year 2 of construction. The Mine Site tank farm will contain a total of three 5.2 ML steel tanks. A conceptual drawing of the Mine Site tank farm is presented in Appendix 3C.

Construction of the tanks will involve preparation of the foundations, impermeable liners and bedding, layout and welding of floor plates, erecting the tank shells and roof, hydrostatic leak testing, installation of interconnecting piping, and installation of dispensing modules for fuel offloading. Hydrostatic testing will involve a single water withdrawal from Camp Lake of up to 6 ML of water to fill each fuel tank and test their integrity. The water will be discharged to nearby Sheardown Lake after test completion.

Fuel spills will be managed as described in the Emergency and Spill Response Plan (Appendix 10C-1) and the Waste Management Plan (Appendix 10D-4).

Steensby Port Fuel Storage

A large volume of fuel will be required at Steensby Port early in the construction phase. The development of fuel storage capacity at the port site will occur in stages.

At the on-set of construction, a limited amount of drummed fuel will be positioned within lined containment. An initial 20 ML bulk fuel storage facility will be constructed. Seawater will be used for hydrostatic testing before being filled with fuel. The 20 ML tank farm will also consist of ISO Certified self contained (double walled) skidded tanks. It will be constructed during Year 1 so that the tanks can be filled in Year 2 of construction. The tank farm will be equipped with dispensing facilities for refuelling vehicles, equipment, and tanker trucks. Temporary storage for Jet A fuel will consist of 2 ML stored in ISO Certified self contained (double walled) skidded tanks. Secondary storage during this period, at quarries and other work areas, will consist of 20,000 L double-walled storage tanks.

A permanent tank farm, consisting of four 40 ML steel tanks with a total capacity of 160 ML, will subsequently be manufactured (i.e., welded in place) to supply the operation phase. A pipeline will be installed from the tank farm to the permanent freight dock to allow for dockside fuel deliveries. Before the freight dock is constructed, the tank farm will be re-supplied from tankers using the floating hose fuel transfer method. A draft OPEP for oil handling facilities at Steensby Port is included in Appendix 10C-3. A conceptual drawing of the Steensby Port tank farm is presented in Appendix 3E.

One 7.5 ML storage tank will be located on Steensby Island to supply the tugs and ice management vessels, and to receive emergency fuel from a vessel berthed at the ore carrier dock as a contingency. Fuel will be delivered to this tank by truck from the main tank farm.

2.1.9 Explosives Manufacture, Storage, Transportation and Use

The use of explosives is essential for the construction activities and the mining operation. Baffinland's Explosives Management Plan (Appendix 10C-4) describes the requirements for the transportation, handing and use of explosives at the Project site. Estimated quantities of explosives are also provided in the management plan.

The Project will require a supply of ammonium nitrate prills and diesel fuel to manufacture ammonium nitrate fuel oil (ANFO) emulsions explosives for blasting as part of construction activities and mining. Explosives and associated items (i.e. detonators, raw products such as ammonium nitrate, etc.) will be handled, stored, transported, used, disposed of, etc. in accordance with Natural Resources Canada (NRCan) requirements which include:

- Blasting Explosives and Initiation Systems - Storage, Possession, Transportation, Destruction and Sale, March 2008
- Guidelines for Bulk Explosives Facilities - Minimum Requirements, July 2010

- Quantity Distance Principles User's Manual
- Storage Standards for Industrial Explosives, May 2001

The above requirements address the appropriate security and restricted access of explosives and explosives materials. Two explosives mixing plants will be constructed early in the construction phase; one at the Mine Site to supply construction activities and mining operations, and another at Steensby Port to supply construction activities at the port and Railway. The mixing plant at Steensby Port will be a temporary structure that will be dismantled following the completion of construction activities.

It will be necessary in the first year of construction to utilize packaged explosives. Packaged explosives will be transported in portable magazines to both port sites. Temporary storage facilities will be positioned at each port site and bermed as necessary to store explosives as they are unloaded from the ship before being transported to areas of use. These facilities have been located in accordance with the D8 set-back requirements outlined in with Natural Resources Canada Quantity-Distance Tables. Packaged explosives will also be stored in a magazine area at the Mine Site which will be set-back from the mine in accordance with the D5 distance criteria applicable to mine site operations from the Natural Resources Canada Quantity-Distance Tables.

Once the Mine Site explosives mixing plant ammonium nitrate storage facility, and truck wash facilities have been constructed have been commissioned, materials to manufacture the explosives will be delivered in bulk via Milne Port (construction phase) or Steensby Port (operation phase).

One the Steensby Port temporary explosives mixing plant, ammonium nitrate storage facility, and truck wash facilities have been constructed, ANFO will be produced for distribution by truck to the construction fronts of the Railway and construction access road. Explosives will be required for rock cuts and tunnelling along the railway alignment and also for quarrying as large quantities of gravel and ballast material will be required for construction of the rail bed and the construction access road. Temporary day-use magazines will be located as required, generally at intervals approximately 5 km apart.

The following figures indicate the location of the explosives manufacture and storage facilities for both the construction and operation phases.

- Figure 3-2.1: Milne Port Layout
- Figure 3-2.3: Mine Site Layout
- Figure 3-2.9: Steensby Port Layout

The ammonium nitrate storage pad will be constructed of crushed fill and berm surrounding the pad. Ammonium nitrate will be stored in Sea Can containers. Sandwiched in the fill and continuing up into the berm will be a geomembrane liner to ensure the facility is impermeable. Water will be allowed to drain to a sump and be pumped out as needed.

2.1.10 Waste Management

The generation and management of solid wastes other than residues from ore extraction are discussed below. The management of residues generated from ore extraction is discussed in Section 2.4.6. Handling, storage, transportation, and disposal of wastes generated by the Project will be conducted in a safe, efficient, and environmentally-compliant manner designed to:

- Limit the risk of adverse environmental effects;
- Protect the health and safety of site personnel;
- Limit the generation of waste; and,
- Reduce costs associated with closure of waste handling, storage, and treatment facilities.

The Waste Management Plan (Volume 10 Appendix D-4) incorporates the waste minimization principles of Reduction / Recovery / Reuse / Recycling.

Permanent waste management handling facilities will be constructed at the Mine Site and each port site, consisting of a heated all season building and adjacent laydown areas that provide the following capabilities, functions and/or facilities:

- A central depot where waste generated across the site will be managed, properly processed, packaged, labelled, inventoried, secured (e.g., on pallets) and stored for sealift or reuse on site;
- The waste management facility has a poured concrete floor with large doors for transferring waste in and out plus an adjacent office for the waste management technician;
- Waste oil storage tank adjacent to facility with waste oil filtering process inside and temporary storage for filtered/unfiltered oil. The filtered waste oil will be used for waste oil burners used to heat select facilities on site which include the waste management facility itself, truck warming shed, etc. Waste oil can also be blended into fuel for certain operations;
- Oil-water separator with holding tanks, typically one m^3 totes;
- Oil filter draining and crushing facility;
- Drum crushing machine;
- Strapping and plastic wrap capabilities; and,
- Label making capabilities.

Where possible and practical, the various waste streams will be sorted at the source. Wastes remaining after application of waste minimization techniques will be treated and disposed of in a practical and environmentally- responsible manner. The following methods will be applied:

- Temporary storage and off-site shipping of hazardous and recyclable waste materials;
- Incineration of non-hazardous combustible wastes;
- Landfilling of inert non-combustible wastes (Mine Site and Steensby Port only);
- Landfarming of contaminated soil, ice, and snow;
- Separation of oil from contaminated water in oil/water separation facilities; and,
- Stockpiling of waste rock and overburden in designated stockpiles.

Waste disposal methods are discussed below. The location of these waste management facilities are shown on Figure 3-2.1 for Milne Port, Figure 3-2.3 for the Mine Site and Figure 3-2.9 for Steensby Port.

Incineration

The main disposal method for combustible non-hazardous wastes generated on-site will be incineration using an appropriately designed variable flow dual chamber incinerator, and ashes from the incineration process will be placed in closed drums and buried within a designated area of the landfill. Incineration diverts putrescible waste from the landfill and thus prevents problems associated with odours which attract wildlife. Only trained personnel will operate the incinerators in accordance with applicable emission requirements. Waste oil will be consumed within waste oil burners in the maintenance shops. Incinerators will be installed at each main camp location.

Landfill

Landfill sites at the Mine Site (an expansion of the existing, approved landfill) and Steensby Port will be used to dispose of only inert solid waste and ashes from the incinerator. An operation and maintenance plan for the landfill will guide operations. Regular cover will be applied, and a cap of native overburden will be placed on top of the landfill before decommissioning, so that the contents of the landfill will remain permanently frozen and isolated. Open air controlled burning of inert combustible materials will be conducted on an as-needed basis to eliminate large quantities of construction related wood waste and cardboard that would otherwise use up landfill capacity.

The land size and footprint will be minimized through planned waste minimization and recycling practices, and volume reduction from the incineration of a portion of the waste stream. The landfill will be operated only by trained personnel who will carry out regular inspection and monitoring of the facility. Expected volumes of waste that will be directed to landfills are summarized in Table 3-1.1.

Hazardous and Recyclable Wastes

Hazardous and recyclable wastes will be temporarily stored in special containers and/or at designated locations on-site and will be respectively shipped to registered hazardous waste disposal facilities or to recycling depots. Manifests will be prepared for all materials shipped off-site and the receivers will be required to maintain chain of custody records. Estimated volumes of hazardous and recyclable wastes will be developed during detailed engineering design.

Hydrocarbon Contaminated Materials

Soil, water ice and snow contaminated by accidental oil spills will be collected and deposited within landfarm treatment facilities for remediation. A landfarm facility will likely be constructed at each of the permanent project sites. The landfarms will be bermed and lined and consist of multiple cells to handle waste generated from several events separately. Soil remediation will occur through volatilization and natural biological processes and once hydrocarbon levels meet the applicable Nunavut remediation standards, the soil will be transferred to the landfill, likely to be used as cover material. Landfarms have been successfully used in the arctic for similar applications, e.g., at the EKATI™ Diamond Mine near Lac de Gras in the Northwest Territories. If treatment is not effective, the material will be disposed of off-site at a licensed disposal facility.

Hydrocarbon contaminated water, snow and ice will be treated within the oily water treatment systems within the truck and railway maintenance shops located at Milne Port, the Mine Site and Steensby Port. Excessive volumes of contaminated snow and ice will be stored within a dedicated cell of the landfarm until the material has melted and can be transported by pump truck to an oily water treatment system in a maintenance shop.

Most of the waste rock generated from construction activities will be used as aggregate with the exception of the waste rock generated from construction of the railway tunnels, which will be incorporated into the railway embankment along Cockburn Lake (Section 2.5.3.4), and operation of the open pit (Section 3.4.2.5).

Soil spoils may be generated during construction of the Milne Inlet Tote Road, Railway, site access roads and temporary roads to access borrow areas. This material will be re-used nearby as general fill if suitable, or will be stockpiled in roadside borrows. Borrows will be reclaimed to provide stable side slopes and restore natural drainage.

2.1.11 Communications

Milne Port

The camp at Milne Port will be serviced by a satellite communications (satcom) system which will link up with the communications infrastructure at the Mine Site via communication towers to be located along the Milne Inlet Tote Road. The communication towers will be powered with diesel generators.

Mine Site

An integrated multifunctional, communications and networking infrastructure will service the mine, the ports and other Project facilities located in Iqaluit, Ottawa and Toronto during construction and operation. The Mine Site will be serviced by a permanent telecommunications satellite dish installation. The option of servicing the Mine Site with its own local cellular phone network is also under consideration. Communications between the Mine Site and Steensby Port and the Mine Site and Milne Port will be provided by communication towers along the Railway and Milne Inlet Tote Road, respectively.

The communications and networking systems will consist of interconnected communication subsystems which will be interfaced and integrated to provide a very reliable, secure and comprehensive telecommunication network capable of providing for all voice and data communication requirements.

Steensby Port

An integrated multifunctional, communications and networking infrastructure will service the Mine Site, Milne and Steensby Ports and other Project facilities located in Iqaluit, NU; Ottawa and Toronto, ON). Communications between the Steensby Port and the Mine Site will be provided by either a second satellite dish installation, or a microwave system. The communications and networking systems consist of interconnected communication subsystems which will be interfaced and integrated to provide a very reliable, secure and comprehensive telecommunication network capable of providing for all voice and data communication requirements.

2.1.12 Security

To protect employees and the public as well as Company assets, access to Project areas containing hazardous materials (e.g. explosives, chemicals) and/or operating equipment (e.g. crushers, conveyors) will be restricted with fencing and warning signs. Trained security personnel will be posted at Milne and Steensby Ports and the Mine Site. Visitors will be required to sign in and to be briefed on safety precautions before being allowed on Project sites. Port facilities will be operated in accordance with Marine Transportation Security Regulations.

2.1.13 Ongoing Geotechnical Programs and Environmental Studies

Detailed geotechnical investigations have been undertaken at the Project sites and will continue through construction. The studies include:

- Geomechanical investigations of open pit slopes, railway rock cuts and tunnels;
- Geotechnical investigations at all Project sites but particularly focused along the Railway; and,
- Physical and geochemical testing of proposed construction aggregate and railway ballast materials and waste rock

The results of these investigations have been incorporated into the planning and design of all phases of the Project and are briefly addressed in the relevant sections below. The results of the investigations to date are summarized in Volume 6, Section 2.

Social and environmental studies were undertaken between 2005 and 2008 and elements of these studies are continuing. Areas of study are discussed in Volumes 4 through 8.

Mineral exploration, geotechnical investigations and socio-economic and environmental monitoring studies during the construction phase will be staged from existing exploration camp facilities, with mineral exploration focusing on Baffinland's nine ore deposits shown on Figure 2-1.2 (Volume 2), along with regional exploration throughout the general area, and geotechnical investigations focused mainly along the railway alignment. Environmental studies will continue around the proposed project infrastructure and new drill locations, moving from a focus on documenting baseline conditions to an emphasis on monitoring.

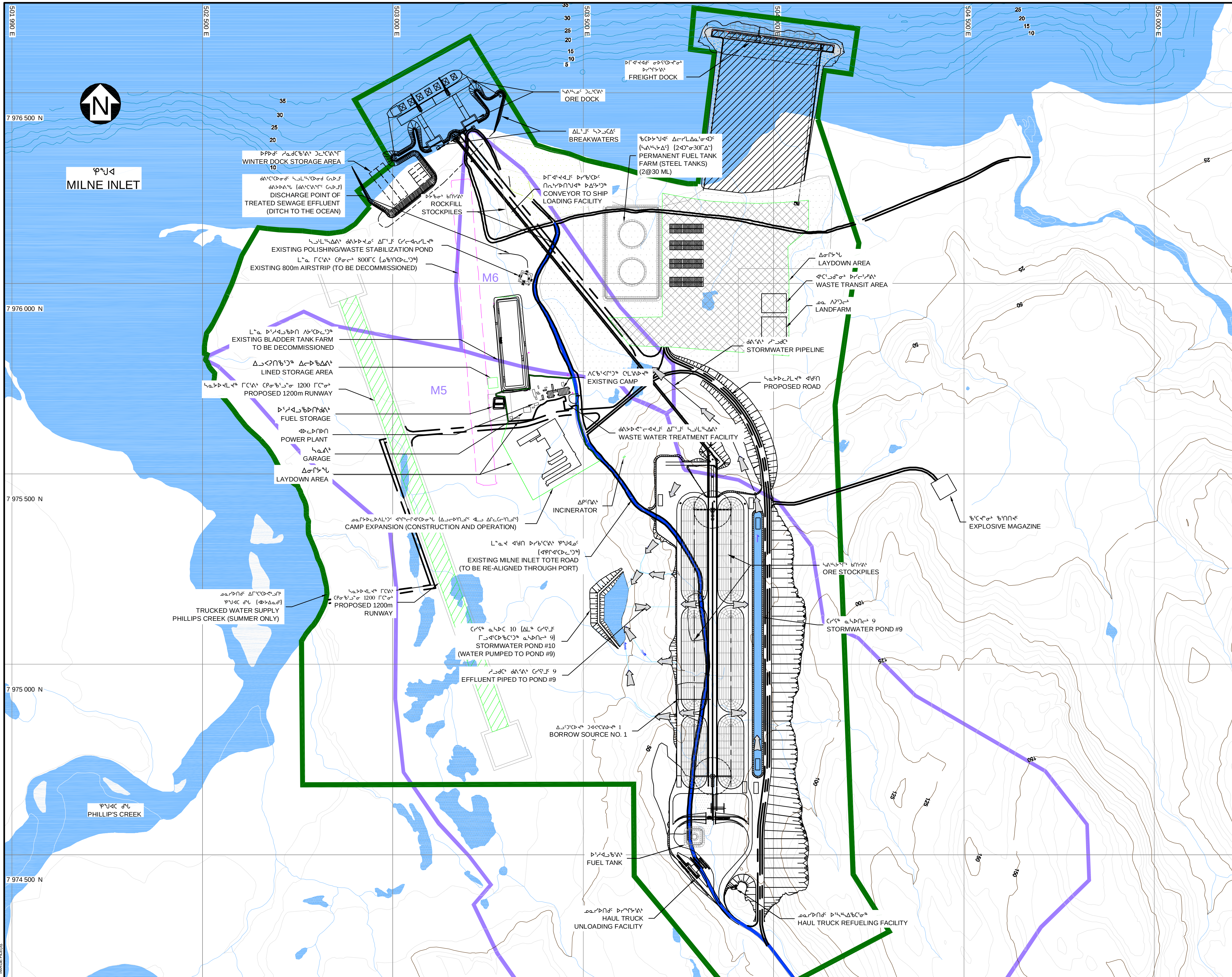
2.2 MILNE PORT - CONSTRUCTION PHASE

Figure 3-2.1 shows the layout of Milne Port. Relevant conceptual drawings of the ore and freight docks, tank farm, ore stockpile and water management facilities are presented in Appendix 3A.

2.2.1 Overview

Milne Port and the Milne Inlet Tote Road will be the main transportation hub for supporting construction at the Mine Site and the north portion of the Railway. These sites are also critical to the transport of 3 Mt/a of iron ore within about 18 months from the start of construction. Equipment and materials will be delivered to Milne Port by conventional sealift during the open water season and transported overland by trucks to the Mine Site over the Milne Inlet Tote Road. The existing facilities at Milne Port will play a key logistical support role for receiving sealift materials at Milne Port and supporting construction of upgrades and operation of the Milne Inlet Tote Road.

The existing Milne Port facilities will be expanded early in the construction phase to prepare for the shipment of 3 Mt/a of iron ore to markets. Existing facilities include: a personnel camp for 60 people, water supply and treatment facilities, mobile diesel generators, a sewage treatment plant, an incinerator, fuel bladder tanks, borrow areas, rock quarries, laydown area, airstrip, and temporary bulk sampling ore stockpile area. Ore stockpile areas, an ore dock and loading facilities will be added to the existing facilities to allow the loading of iron ore onto ships during the open season at Milne Port. A permanent freight dock will be installed to facilitate the timely offloading of equipment and materials from ships and the existing camp will be expanded to accommodate the peak personnel estimated to be needed during the construction phase. Prior to construction of the freight dock, early shipments will utilize barges that will be beached and offloaded. The shipping routes to and from Milne Port are described in Section 3.2.3. The proposed facilities and their locations are shown in Figure 3-2.1.



POTENTIAL DEVELOPMENT AREA (ha)	
MARINE	LAND
20.129	269.487

LEGEND:

- WATER
- LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- MILNE INLET TOTE ROAD
- POTENTIAL DEVELOPMENT AREA
- CATCHMENT AREA
- 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 5 METRES.
4. SITE INFRASTRUCTURE PROVIDED BY AMEC DRAWING NO. A1-165926-000-121-0900, A1-165926-7000-121-GAD-0100.
5. CONTOURED BATHYMETRY PROVIDED BY ENTERPRISES NORMAND JUNEAU INC., DATED SEPTEMBER 9, 2010 (CONTOUR INTERVAL 1m).

SCALE A 100 50 0 100 200 300 400 500 m

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

MILNE PORT LAYOUT

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/25	8

FIGURE	REV
3-2.1	0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

Temporary and permanent facilities are listed in Section 2.1.7, and the construction of the temporary and permanent facilities at Milne Port is discussed below. Replacement of the existing airstrip and its use is described in Section 2.1.11.

2.2.2 Temporary Facilities Additional to Existing Facilities

Laydown Areas

The existing laydown areas developed for the bulk sample operation will be supplemented with additional laydown area within the existing lease (Figure 3-2.1). Approximate laydown area sizes are provided in Table 3-1.1.

Aggregate Sources

Aggregate for construction activities at Milne Port will be obtained from Borrow Source No. 1 and from blast rock generated to establish the pad for the ore stockpiles, in the location of the existing Rock Quarry No. 1. Quantities are provided in Table 3-1.1.

2.2.3 Permanent Facilities at Milne Port

The design of port facilities has incorporated numerous precautions to address the construction and operation of port facilities in the arctic. Examples of precautions include:

- Bathymetric work has been carried out to confirm safe and operationally-practical shipping routes;
- Treated potable water will be stored in an insulated and heat-traced water storage tank;
- The water intake will be located below surface and will be pumped through a heat traced pipeline and a small freeze protection pump will keep water moving if the heat trace system fails;
- Elevated corridors / utilidors will provide access corridors for personnel and contain heating services, piping and electrical trays/conduits; and,
- The ore and freight docks have been located at a distance from each other to facilitate safe port operations.

Site Access Roads

Access roads will be constructed between the laydown area and the freight dock as well as between the beach and the laydown area, and the Milne Inlet Tote Road entering Milne Port will be realigned around the proposed ore stockpiles.

Ore Stockpiles

Ore will be delivered from the Mine Site and will be stored in two main stockpiles totalling 3 Mt (Figure 3-2.1). A 1.5m min. thick granular pad will be constructed on top of bedrock to support the ore stockpiles. The permafrost has been assumed to extend into this layer. Infiltrated water from the ore will reach this frozen layer and work its way out to the edges. A lined ditch will be constructed along the stockpile perimeter to collect runoff water into a lined stormwater pond.

Construction and Operation Camp Facilities

The existing camp will be expanded to accommodate personnel needed for construction activities and for the 3 Mt/a road operation during construction. The expanded personnel camp will also accommodate the personnel needed during operations (see Table 3-1.1).

Power Supply

The number of modular mobile diesel generators in containers, currently used by the existing site facilities, will be increased to accommodate the increase in camp size, to operate ship loading and off-loading equipment and other site requirements. Power capacity, demand and number of generators are provided in Table 3-1.1. These generators will continue to be used during operations.

Water Supply

Two approved water sources are currently used to supply the Milne Port camp depending on the season (Figure 3-2.2). During summer months water is withdrawn by water truck from either nearby Phillip's Creek next to the camp, or from a deeper section of Phillip's Creek at km 12 along the Milne Inlet Tote Road. During winter water is collected from a lake adjacent to the road at km 32. Water is treated by UV and filtration prior to consumption. These sources will supply the expanded camp during both construction and operations. Estimated consumption quantities are listed in Table 3-1.1.

Wastewater Treatment

The existing sewage treatment plant consists of a packaged treatment plant with a peak capacity of 60 people. Treated sewage is discharged to a local drainage ditch which drains to Milne Inlet. A polishing and waste stabilization pond (PWSP) provides for sludge disposal and discharge of treated effluent. This system will be either expanded or replaced by a similar system to accommodate the larger camp occupancy during construction and will remain in place for operations. No sewage will be discharged by shipping vessels while they are at Milne Port.

2.2.4 Freight Dock

The freight dock will handle freight and fuel during construction and operation. It will be located approximately 800m to the east of the ore dock (Figure 3-2.1). Cargo vessels using the freight dock include barges and ocean going vessels. Tug berths will be provided on the two ends of the freight dock. To unload fuel the dock will be equipped with manifolds and a pipeline to the fuel tank farm. Fuel unloading will take place with the tanker berthed at the freight dock, by means of flexible hoses supplied by the fuel tanker vessel connecting to the onshore manifolds. It is expected that the fuel storage capacity of the tankers visiting the dock will be in the order of 10 to 20 ML.

The construction methodology for the freight dock is aimed at reducing construction time which is critical to the project schedule and considers the very short ice-free season. Therefore, the dock will be built of precast concrete cribs/caissons which will be transported to site and sunk in place on the prepared seabed by filling them with dredged material or sand. The planned construction sequence is:

- dredge to EL-22.0 m chart datum;
- install gravel pad;
- float concrete cribs and sink into place;
- fill cribs with dredge material/sand fill;
- place rock-fill behind cribs;
- install capping beams and shiploader girders;
- place riprap (scour protection);

- backfill to grade;
- install civil, electrical and mechanical utilities;
- install sub-base, base & finishing surface; and,
- install fenders, bollards, docking aids and environmental monitoring systems

Based on the available geotechnical information, the upper soils below the seabed are expected to be composed of dense to very dense sands. The soils become medium dense with greater depth, and are also expected to be feasible for dredging. Where excavations extend deeper than elevation -20m, a dense cobble zone is expected.

Dredging may be carried out by a cutter head suction dredger or a clamshell operation. The appropriate dredging equipment will be selected prior to the start of construction based on the additional borings and construction schedule.

Temporary dredge slopes of 2:1 have been assumed. A level terrace will be excavated on the seabed for placement of the precast concrete cribs. The precast cribs will be floated to the site, positioned, then submerged (by filling with water and/or dredge spoils), and set on a gravel pad. The volume of dredge is estimated to be 155,000 m^3. The dredged material will be temporarily stored on a nearby onshore designated zone. It is expected that the entire volume of dredge material will be used on shore as fill for the cribs or as backfill for the freight dock.

The estimated volume of earthwork and shore protection is provided in the table below:

Item	Unit	Quantity
Sand/dredge back-fill	m^3	326,000
Gravel pad	m^3	7,000
Rock fill	m^3	188,000
Riprap	m^3	14,000
Filter layer	m^3	5,000
Base (0.5m thick)	m^3	51,000
Sub-base (0.5m thick)	m^3	51,000

As the volume of back-fill needed for construction of the freight dock is much larger than the volume of dredge generated by preparation of the seabed for the freight dock, the dredged material resulting from the construction of the ore dock and the winter dock storage area may also be used as back-fill for the freight dock. Any further requirement for backfill will be supplied from local onshore sources.

Rocks for the rock-fill and riprap and the aggregate for the gravel pads and the filter layers will be supplied from the nearby quarry.

2.2.5 Ore Dock

The ore dock will consist of a combination of permanent structures that will remain in the seabed and onshore year round and floating structures that will be in use during the open water season and removed and stored during winter. The floating shiploader and barge system includes:

- Two permanently beached (sunken) barges to support the floating infrastructure
- Four floating barges to support the conveyors that transport ore from the shore to the shiploaders
- Two floating barges which support the shiploaders that move the ore from the conveyors into the ore carriers.

All of the structures that are supported on the floating barges as well as the 6 floating barges will be stored over winter in the dock storage area shown in the Milne Port Site Plan (Figure 3-2.1). It is estimated that these temporary ore loading facilities can be moved to and from their open season operating location in 2 to 3 days.

To prepare the seabed for the sunken barges and to anchor the barges will require dredging to level the seabed, installation of a gravel pad on the seabed upon which the sunken barges will rest, driving sheet piles to support the barges and backfilling. In addition dredging and installation of a gravel pad will be required to prepare the docking area for winter storage. Mooring buoys will be placed in the sea and bollards (a short vertical post used for mooring) will be constructed on shore to anchor the ore carriers while they are being loaded.

Part of the dredged material will be used as fill to build the ore dock. The remainder of the dredged material will either be stored onshore and/or used as fill in the construction of the freight dock. No dredged material will be disposed of offshore.

The facilities that will be constructed from onshore to support the floating shiploader and barge system include:

- Sheetpile bulkhead, interfacing with permanently beached barge(s);
- Seabed preparation for the beached barge(s);
- Mooring support for the ore carriers, (a combination of mooring buoys and onshore bollards);
- Winter maintenance dock, a dredged basin providing protection for barges during winter;
- Onshore operating area, which includes area for transfer tower, hoppers, conveyors and access roads; and,
- Breakwaters on either side of the dock.

The construction sequence for the ore dock is aimed at reducing construction time and takes into consideration the very short ice-free season. The planned construction sequence includes:

- Creation of a basin in the sea for storage of the dock during winter, dredging to EL-3.0m chart datum and casting dredged material to the shore;
- Driving sheet piles for the bulkheads from shore, to be used as backfill;
- Back filling behind sheetpiles;

- Installation of walers (steel support beams) and ties;
- Preparation of formwork and casting of sheetpile pilecaps;
- Preparation of formwork and casting bollard foundations;
- Installation of a gravel pad upon which the ore dock will rest;
- Backfilling;
- Installation of civil, electrical and mechanical utilities;
- Installation of sub-base, base & finishing surface;
- Placing RIPRAP (scour protection);
- Installation of fenders, bollards;
- Installation of mooring buoys;
- Towing barge and placing in location in front of sheetpile bulkheads, ballasting and permanently sinking and anchoring the barges, and,
- Towing the floating conveyor and shiploader barges to location, fastening and anchoring.

The upper soils below the seabed are dense to very dense, likely requiring a suction dredger. Because the volume of dredging required for the sunken barges is quite small, a clam shell may be used. A portion of the dredge operation may be possible to perform from shore. Some dredging will also be required for preparing a level basin floor for the winter dock storage area.

The volume of dredged material is estimated to be 130,000 m^3. The dredged material will be temporarily deposited on shore. Some of the dredged material will be used as fill for the ore dock. Any dredged material not needed for fill at the ore dock will either be used as fill at the freight dock or will be contained onshore.

The volume of earthwork and shore protection is provided in the table below:

Item	Unit	Quantity
Sand/dredge backfill	m^3	52,000
Deposit excess dredgate on-shore - permanently	m^3	78,000
Gravel pad	m^3	1,200
Structural steel - walers	m^3	29,000
Reinforces concrete in pile cap	m^3	18,600

The sheetpile bulkhead is the interface with the sunken barges. It is expected that the sheetpiles will be driven from shore, possibly using a pile driving hammer. The total area of sheetpiles to be driven is 1,540 m^3 and over 290 piles will be used. It is estimated that the duration of sheetpile driving will not exceed four weeks. The estimated quantities of construction material for the sheetpile bulkhead are provided below.

Item	Unit	Quantity
Structural steel - in main sheetpiles	Tonnes	137
Tie rods - 44mm dia. - supply and install	Tonnes	21
Structural steel - in anchor sheetpiles	Tonnes	45
Structural steel - walers	Tonnes	13
Reinforces concrete in pile cap	m^3	116

2.2.6 Ore Handling Facilities

A truck unloading hopper and covered conveyors will be constructed to move the ore from the transport trucks to the ore stockpiles. Mobile equipment (front-end loaders and a conveyor) will be provided for loading the ore from stockpiles onto shiploaders. The unloading of ore from trucks onto stockpiles, reclaiming of ore, ship loading and shipping are described in Section 3.2.

2.3 MILNE INLET TOTE ROAD – CONSTRUCTION PHASE

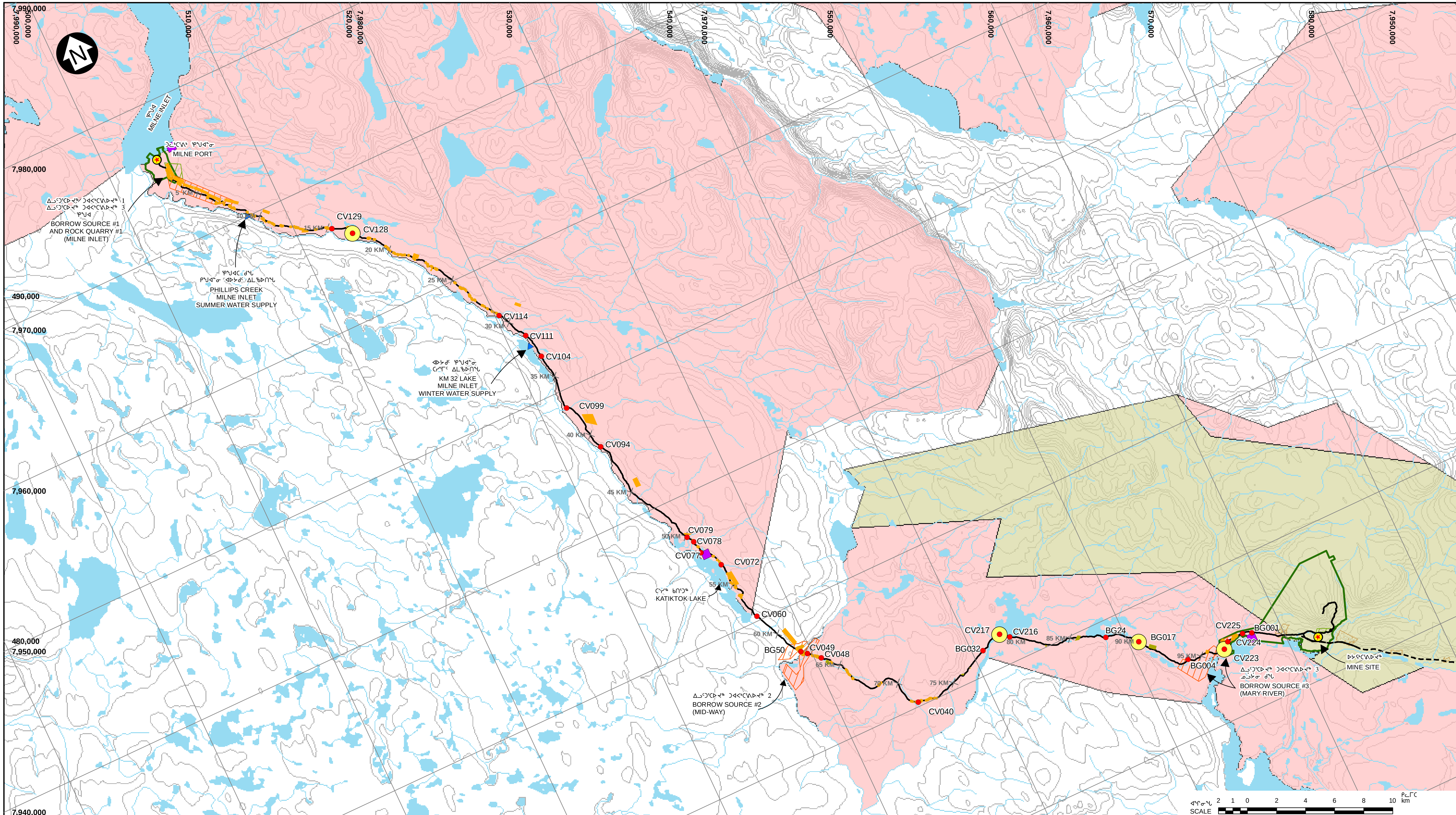
The Milne Inlet Tote Road was upgraded in 2008 from a winter road to an all-season road adequate for transporting equipment and ore using 45-t trucks during the bulk sampling program. The upgraded road follows the original alignment from when the road was constructed in the 1960s. While the road was upgraded over the period of 2007 and 2008, considerable upgrades are required to support the level of traffic proposed with year round ore haulage from the Mine Site to Milne Port using 120-t trucks. The upgrade of the Tote Road will require fuel (Section 2.1.5) and explosives (Section 2.1.9) and will generate wastes (Section 2.1.10).

2.3.1 Proposed Upgrades

Figure 3-2.2 shows the existing Milne Inlet Tote Road, identifying existing and proposed aggregate sources, as well as watercourse crossings subject to an existing authorization under the Fi*sheries Act* and approvals under the *Navigable Waters Protection Act*. The previous road upgrades undertaken for the bulk sample program, while sufficient for transporting the ore sample in 45 t trucks, do not meet the requirements to for the all season haulage of ore. The design criteria for road upgrades include the accommodation of trucks consisting of a tractor and double-trailer with a width of 3.05 m. The minimum required road width is 10.7 m with a crown of 4% and a maximum gradient of 8%. The design speed of the road will be 75 km/hour with a posted speed limit of 65 km/hour.

The following additional upgrades will be carried out during Years 1 and 2 of the construction phase to meet these design criteria:

Culverts - The existing culverts and sea containers along the Milne Inlet Tote Road will be replaced with new culverts that will be designed in general to the 1 in 100 year storm event for streams classified as fish habitat. The final selected storm return period for each crossing will take into consideration factors such as presence/absence of fish habitat, stream size and flow characteristics, physical constraints of the stream profile and substrate, and available site experience gathered during the pre-construction monitoring programs at each location. Fish habitat stream crossings are identified on Figure 3-2.2.



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LEGEND:

- WATER
- RIVER/STREAM/DRAINAGE
- MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- QUARRY AND BORROW LOCATION (PROPOSED)
- QUARRY AND BORROW LOCATION (EXISTING)
- CAMP
- MILNE INLET WATER SUPPLY
- CROSSINGS SUBJECT TO AN AUTHORIZATION UNDER THE *FISHERIES ACT*
- CROSSINGS SUBJECT TO AN APPROVAL UNDER THE *NAVIGABLE WATERS PROTECTION ACT*
- EXISTING BORROW AREA LEASE BOUNDARY (IOL COMMERCIAL LEASE)
- EXISTING ROCK QUARRY LEASE BOUNDARY (IOL COMMERCIAL LEASE)
- IOL SURFACE AND SUBSURFACE INCLUDING MINERALS
- IOL SURFACE ONLY EXCLUDING MINERALS
- POTENTIAL QUARRY DEVELOPMENT AREA
- POTENTIAL DISTURBANCE AREA

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

NOTES:

1. BASE MAP: HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004).
2. COORDINATE GRID IS UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. QUARRY AND BORROW AREA DATA ACQUIRED FROM AMEC DATA EXCHANGE (SEPTEMBER 7, 2010).

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

MILNE INLET TOTE ROAD

Knight Piésold CONSULTING

P/A NO. NB102-181/25 | REF NO. 8

FIGURE 3-2.2 | REV 0

Bridges - The road will be realigned to bypass the existing four sea container crossings. Bridges will be constructed to allow the passage of oversized and very heavy loads (the road alignment with the existing four sea container crossings will continue to be used until the bridges have been constructed). A fifth bridge may be added at a large creek at km72+900 in order to accommodate the flows at that location.

- Minor realignments - A number of turns in the road will be re-aligned to allow for the passage of trucks with oversized loads.
- Roadbed surfacing - Most of the existing road is constructed using thin layers of locally obtained overburden materials placed directly on existing ground. There is a tendency for sections of the thinly constructed road to wash out and a requirement for intensive maintenance. Additional surfacing with locally sourced aggregate will be undertaken to improve the roadbed performance.
- Grade modifications - Approximately two dozen locations have been identified where grades are too steep for the oversized loads.
- Cuts - Grade alignment changes will be made to reduce these grades. Very few of the corrections will be made using cuts.
- Water management - Additional appropriately sized culverts will be installed to maintain drainage across the road and reduce potential ponding, where possible.

In addition, a series of line-of-sight communication towers, likely seven or eight, will be installed along the Milne Inlet Tote Road between Milne Port and the Mine Site. It is not expected that upgrades to the Tote Road or increased road traffic will result in significant barriers to caribou movement and this is addressed in the impact assessment for caribou in Volume 6.

Preliminary engineering drawings showing proposed road upgrades are included in Appendix 3B.

2.3.2 Aggregate Sources

The location of existing and proposed quarries and borrow areas in relation to be used to upgrade the Milne Inlet Tote Road are shown on Figure 3-2.2. Section 2.1.6 describes the overall strategy for sourcing aggregate, with addition detail on the development and management of aggregate sources provided in the Borrow Pits and Quarry Management Plan (Appendix 10D-6). Existing results of geochemical testing for acid rock drainage and metal leaching indicate that quarry materials have low potential for acid generation and metals leaching (Appendix 6B-2).

2.3.3 Temporary Road Construction Camp

Laydown areas and workforce accommodation for the road improvements will be located at Milne Port and the Mine Site. In addition a temporary camp for personnel and laydown area will be established at km 52, midway between Milne Port and the Mine Site, during the first two years of construction. Potable water at this temporary camp will be supplied via truck from the lake at km 32 and wastewater will be collected in local holding tanks and collected via a tanker truck for treatment at the Wastewater Treatment Facility at the Mine Site or Milne Port. Power will be supplied with temporary diesel generators. Waste will be collected and transported for management in the waste management facilities at the Mine Site.

2.3.4 Emergency Shelters

The two emergency shelters set up during the bulk sample program will be positioned approximately mid-way between the temporary road construction camp and each of Milne Port and the Mine Site. The shelters will remain in place throughout the life of the Project.

2.3.5 Road Operation during Construction

The Milne Inlet Tote Road will be an important transportation link for the Mine Site. Equipment and materials delivered by sealift and off-loaded within laydown areas at Milne Port will be transported by truck and trailer. Ore will be hauled from the Mine Site to Milne Port using 120-t trucks. Workers stationed at Milne Port will be flown into the Mine Site and bussed to Milne Port over the road.

The truck and trailer transport of equipment and materials will be highly organized, forming one component of a Materials Management System carried out by a freight forwarding team under the supervision of a Logistics Manager. The use of containers and flat racks will be maximized for safe handling and efficient movement of materials. The truck and trailer program will be concentrated during the open water season. A portion of the sealift will be stored at Milne Port and transported to the Mine Site over the rest of the year, with possible short breaks during significant weather events and when driving conditions are unsafe.

The volume of traffic on the road will vary from year to year and will include traffic from the truck and trailer program, incidental personnel traffic between Milne Port and the Mine Site, road construction related traffic during Years 1 and 2, ore truck traffic beginning in Year 2 and road maintenance traffic in all years of construction. The estimated truck, trailer and personnel traffic is provided in Table 3-1.1.

A Road Management Plan (Appendix 10 D-8) will stipulate the rules of the road, including for example: the safe access and use by the public including hunters, limiting travel speed, yielding the right-of-way to wildlife, reporting wildlife observations, travelling in convoys for safety, emergency and spill response procedures, a safety policy addressing safe discharge of firearms near the road, truck traffic communications and a community notification and update process.

Maintenance and regular inspections of the road will be carried out routinely to provide for safe and efficient road operation. Inspections will be increased during the spring freshet to check culverts and the road for needed maintenance and repairs. Graders and other equipment will operate continuously. Snow fencing will be used to limit the formation of snow drifts and snow banks on the road and snow ploughs will operate continuously during the long winter. Dust suppressants will be sprayed on the road as needed to limit dust raised by vehicle traffic during dry weather. It is expected that anhydrous calcium chloride will be applied at a rate of 6.75 tonnes per kilometre based on a road width of 10 m. This is consistent with current practice in Canada.

Significant snow drifting occurs periodically, making the road impassable for several days, based on Baffinland's experience operating the road year-round over the past several winters. As a result of this experience, emergency response measures will be put in place. Emergency shelters and implementation of protocols regarding maintaining sufficient fuel in vehicles and/ or provision of smaller naphtha heaters in the vehicles will be established.

The relationship of the Milne Inlet Tote Road with existing hunting and traveling routes (including those routes using the road, in its close proximity, or intersecting it) is discussed in Volume 4, Section 10. Access to the road will not be restricted in accordance with the NCLA requirement for a public easement on the road. During the bulk sampling program, few hunters were encountered at Milne Port and along the road.

2.4 MINE SITE - CONSTRUCTION PHASE

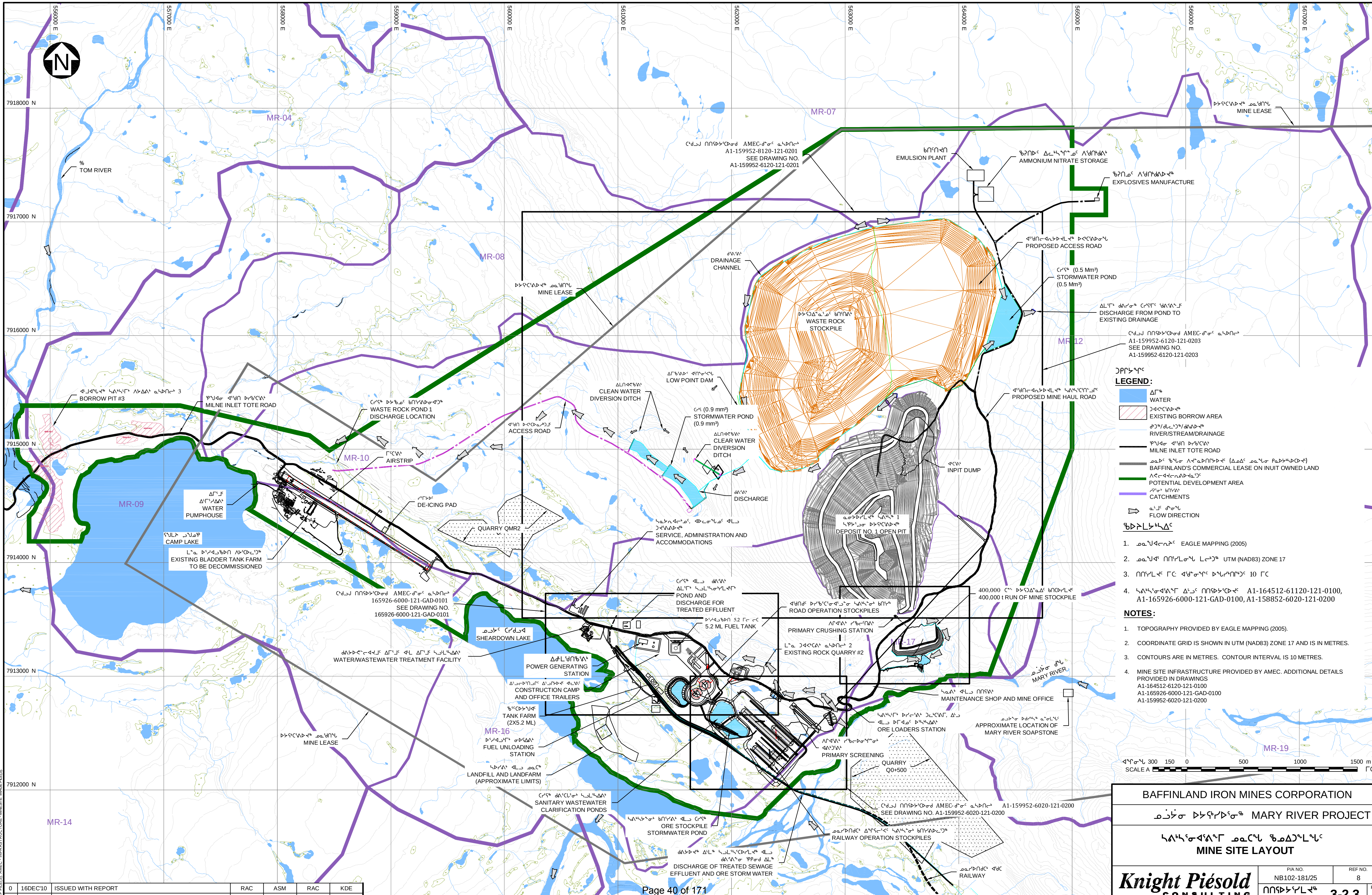
2.4.1 Overview

Construction infrastructure and work areas at the Mine Site during the peak of construction are presented on Figure 3-2.3. At the onset of construction, the Mine Site will utilize existing camp infrastructure from the bulk sample program as follows:

- The 200 person camp for exploration, geotechnical and environmental personnel;
- Related water supply; sewage treatment plant, ponds and outfall; and power supply;
- Existing airstrip;
- Laydown areas;
- Fuel storage in a 1.25 ML bladder tank farm; and,
- Temporary explosives magazines.

Activities at the Mine Site during construction will include:

- Development of existing rock, sand and gravel aggregate sources;
- Upgrading of the airstrip to accommodate Boeing 737s and similar sized aircraft;
- Preparation of additional laydown areas or work areas;
- Expansion of the existing camp and establishment of an additional camp and related infrastructure;
- Construction of a concrete batch plant;
- Construction of site access roads;
- Replacement of existing bladders with steel fuel tanks;
- Construction of bulk explosives plant and magazines;
- Development of mining facilities e.g. crusher, conveyors, stockpiles and ore loading facilities;
- Pre-stripping and removal of overburden at the open pit;
- Mining, crushing and screening of 3 Mt/a iron ore;
- Loading of iron ore onto trucks for transport to Milne Port;
- Construction of the northern section of the Railway;
- Commissioning of mining facilities;
- Ongoing exploration activities;
- Ongoing geotechnical investigations; and,
- Environmental monitoring and sampling.



TOM RIVER
BORROW PIT #3
MILNE INLET TOTE ROAD
WASTE ROCK POND 1
DISCHARGE LOCATION
MR-04
MR-07
MR-08
MR-09
MR-10
MR-12
MR-14
MR-16
MR-17
MR-19
MINE LEASE
SEE DRAWING NO. A1-159952-8120-121-0201
A1-159952-6120-121-0201
EMULSION PLANT
AMMONIUM NITRATE STORAGE
EXPLOSIVES MANUFACTURE
PROPOSED ACCESS ROAD
STORMWATER POND (0.5 Mm³)
DISCHARGE FROM POND TO EXISTING DRAINAGE
A1-159952-6120-121-0203
SEE DRAWING NO. A1-159952-6120-121-0203
DRAINAGE CHANNEL
WASTE ROCK STOCKPILE
LOW POINT DAM
CLEAN WATER DIVERSION DITCH
STORMWATER POND (0.9 mm³)
CLEAR WATER DIVERSION DITCH
DISCHARGE
ACCESS ROAD
AIRSTRIP
DE-ICING PAD
QUARRY QMR2
WATER PUMPHOUSE
CAMP LAKE
EXISTING BLADDER TANK FARM TO BE DECOMMISSIONED
SERVICE, ADMINISTRATION AND ACCOMMODATIONS
PROPOSED MINE HAUL ROAD
INPIT DUMP
DEPOSIT NO. 1 OPEN PIT
400,000 t RUN OF MINE STOCKPILE
165926-6000-121-GAD-0101
SEE DRAWING NO. 165926-6000-121-GAD-0101
POND AND DISCHARGE FOR TREATED EFFLUENT
5.2 ML FUEL TANK
ROAD OPERATION STOCKPILES
PRIMARY CRUSHING STATION
EXISTING ROCK QUARRY #2
SHEARDOWN LAKE
WATER/WASTEWATER TREATMENT FACILITY
POWER GENERATING STATION
CONSTRUCTION CAMP AND OFFICE TRAILERS
TANK FARM (2X5.2 ML)
FUEL UNLOADING STATION
LANDFILL AND LANDFARM (APPROXIMATE LIMITS)
SANITARY WASTEWATER CLARIFICATION PONDS
ORE STOCKPILE STORMWATER POND
DISCHARGE OF TREATED SEWAGE EFFLUENT AND ORE STORM WATER
MARY RIVER
MAINTENANCE SHOP AND MINE OFFICE
ORE LOADERS STATION
APPROXIMATE LOCATION OF MARY RIVER SOAPSTONE
PRIMARY SCREENING
QUARRY Q0+500
SEE DRAWING NO. A1-159952-6020-121-0200
A1-159952-6020-121-0200
RAILWAY OPERATION STOCKPILES
RAILWAY
556000 E
557000 E
558000 E
559000 E
560000 E
561000 E
562000 E
563000 E
564000 E
565000 E
566000 E
567000 E
7918000 N
7917000 N
7916000 N
7915000 N
7914000 N
7913000 N
7912000 N
LEGEND:
WATER
EXISTING BORROW AREA
RIVER/STREAM/DRAINAGE
MILNE INLET TOTE ROAD
BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
POTENTIAL DEVELOPMENT AREA
CATCHMENTS
FLOW DIRECTION
1. EAGLE MAPPING (2005)
2. UTM (NAD83) ZONE 17
3. 10
4. A1-164512-61120-121-0100, A1-165926-6000-121-GAD-0100, A1-158852-6020-121-0200
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 PROVIDED BY AMEC. ADDITIONAL DETAILS PROVIDED IN DRAWINGS A1-164512-6120-121-0100 A1-165926-6000-121-GAD-0100 A1-159952-6020-121-0200
300 150 0 500 1000 1500 m
SCALE A
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT
MINE SITE LAYOUT
Knight Piésold CONSULTING
P/A NO. NB102-181/25
REF NO. 8
FIGURE 3-2.3
REV 0
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REV DATE DESCRIPTION DESIGNED DRAWN CHK'D APP'D

Construction activities will utilize existing Project infrastructure to the extent possible to decrease the land disturbance area, minimize erosion and sedimentation potential, and improve efficiency of construction activities. Fuel storage and distribution facilities are described in Section 2.1.8, explosives storage and handling facilities in Section 2.1.9, waste management facilities in Section 2.1.10, and the communication system in Section 2.1.11. Upgrade of the existing airstrip and its use are described in Section 2.7.

2.4.2 Temporary Facilities

2.4.2.1 Laydown Areas and Shops

A laydown area of approximately 30,000 m^2 will be provided at the Mine Site to store equipment and materials needed for construction and the 3 Mt/a trucking operation. Proposed locations are shown on Figure 3-2.3. Laydown areas have been positioned to cover areas already established as laydown during the bulk sampling program, or at future development areas such as the accommodation complex and ore stockpiles. Additional laydown space will also be established along the existing road where ground conditions will support laydown areas and temporary camps with little to no need for additional grading or fill. A number of shops will also be established for equipment maintenance and indoor storage during construction.

2.4.2.2 Aggregate Sources

Aggregate will be used during construction at the Mine Site as both general fill and structural fill for activities such as site grading, backfill, foundations, embankments of water impoundments, and bedding in lined containment facilities. The aggregate will be obtained from borrow sources along the Milne Inlet Tote Road (Figure 3-2.2) and pit overburden and rock quarries at the Mine Site (Figure 3-2.3). In addition to fill requirements, an estimated 32,000 m^3 of concrete will be manufactured for construction, which is composed of water, sand and gravel and cement. The total estimated volumes of aggregate from each of the borrow sources and quarries identified for the Project are shown in Table 3-1.1. Section 2.1.6 describes the overall strategy for sourcing aggregate, with addition detail on the development and management of aggregate sources provided in the Borrow Pits and Quarry Management Plan (Appendix 10D-6).

Crushed rock will be obtained from an existing rock quarry (Rock Quarry #2) at the Mine Site, supplemented with the proposed quarrying of a granitic (non-ore) outcrop on Deposit No. 1 and other quarry sites along the proposed Railway (Figure 3-2.4).

2.4.2.3 Concrete Manufacture

Volumetric concrete trucks will be used for initial concrete mixing and delivery until a winterized concrete batch plant is operational. Subsequently, the volumetric concrete trucks will be utilized for remote concrete pours, as required. Borrowed and screened sand and gravel (or crushed rock fines) and a large volume of water derived from the potable water supply at Camp Lake (Section 2.4.2.4) will be used for concrete manufacture, together with cement transported via ship and road from Milne Port.

2.4.2.4 Construction Camps and Related Facilities

To accommodate the construction workers, personnel participating in ongoing exploration, geotechnical drilling, archaeological and environmental programs and workforce for the 3 Mt/a operation, a new trailer camp will be located in the mine infrastructure area and the existing 200-person capacity tent camp will be expanded. Camp capacities are provided in Table 3-1.1.

2.4.3 Water Supply

The water supply for the Mine Site will be sourced from Camp Lake located about 3 km from the Mine Site and from Mary River. Camp Lake will supply water for the following uses:

- Potable (drinking) water;
- Exploration and geotechnical drilling;
- Aggregate washing;
- Concrete manufacture;
- Explosives truck wash and explosives manufacture;
- Dust suppression (summer season only);
- Hydrotesting of fuel storage tanks; and
- Other miscellaneous camp uses (small relative volume) such as emergency water supply (fire fighting systems) and steaming of culverts prior to freshet.

Table 3-1.1 summarizes the estimated daily consumption of water uses during the construction phase. Water for exploration and geotechnical drills, and aggregate washing will be sourced from Mary River. These sources will be used during both construction and operation.

The potable water supply system will consist of a pump house, an insulated steel raw water pipeline and potable water storage tanks (also used to store fire protection water). A permanent intake structure, similar to the typical drawing in Appendix B, will be installed in Camp Lake. All water intakes will be equipped with screens of a mesh size to meet Department of Fisheries and Oceans guidelines (DFO, 1995).

The potable water treatment plant will be located near the accommodation/administration/laboratory complex. Water treatment will consist of chemical treatment followed by settlement, filtration, polishing and chlorine or ultraviolet disinfection. Treated potable water will be stored in an insulated and heat-traced water storage tank sized to meet peak requirements.

A water truck will deliver potable water for local consumption in remote areas such as the mine maintenance shop/office, explosives handling facility and other ancillary facilities as needed.

2.4.4 Power Supply

A centralized power plant designed to service the facilities of the entire Mine Site will be located east of the accommodation complex as shown in Figure 3-2.3. The power plant building will be connected to the accommodation complex through an utilidor.

The estimated power demand for the mine and number of diesel generators are provided in Table 3-1.1. One diesel unit will be on standby and one will be a spare unit for maintenance. There will be no transmission lines constructed as part of the Project, only distribution lines from the power plant to points of use throughout the Mine Site.

A built-in waste heat recovery system will circulate recovered waste heat from the generators to the accommodation/maintenance/administration complex and other buildings. A boiler building will be located approximately 20 m to 40 m away from the power plant and close to the accommodation complex. The boiler system will provide a fail-safe system to supply the required building heat from the boilers, in the event of catastrophic failure of the power plant. The boilers will be sized to supply the entire demand of building heat for a one week period.

Alternative energy options to supply power to either or both of the Mine Site and Steensby Port have been considered, focusing on opportunities for hydro-electricity and wind turbines. A candidate hydro-electric site has been identified near Steensby Port and a test wind tower was installed at the Mine Site. Both options could partially off-set diesel use. These alternatives are discussed in Section 6. While these options do not form part of the Project, Baffinland continues to evaluate these energy options for potential longer-term implementation. Separate approvals will be sought if either hydro-electricity or wind were to be developed.

2.4.5 Wastewater Treatment

Two independently operated wastewater treatment facilities (WWTFs) will serve the two camps at the Mine Site during the construction phase. The WWTF currently serving the existing 200-person exploration camp will be modified to accommodate the additional volumes. Another larger WWTF will be located in the vicinity of the accommodation/administration/laboratory complex. Wastewater will be collected within each building and pumped to the WWTF via a main pipe. At remote areas, such as the mine maintenance/mine office, explosives handling facility, wastewater will be collected in local holding tanks and collected via a tanker truck for treatment at the WWTF.

The existing WWTF consists of a modular rotating biological contactor (RBC) design that incorporates: i) a primary settling tank and screen, ii) secondary biological treatment, iii) humus removal in a secondary settling tank, iv) dosing with divalent metal salts to remove phosphorus, v) UV disinfection. The RBC utilizes a series of slowly rotating polyurethane discs that have their bases submerged in the wastewater. Over time a dense biological mass builds up on the surface of the discs which is responsible for breakdown of organics within the wastewater. The operation of the RBC-based system is optimized for nitrate/nitrite and suspended solids (SS) removal. This WWTF will be expanded. Sludge extracted from the secondary settling tank will be dewatered to 25 % (w/w) solids and then incinerated or landfilled.

Treated effluent from the existing exploration camp WWTF will continue to be discharged into the northern section of Sheardown Lake (to the west of the main tributary) through an insulated and heat-traced pipeline (Figure 3-2.3). This existing WWTF has been designed to meet current effluent discharge requirements.

A new larger WWTF will be provided to serve the new construction camp and remote areas such as the construction offices and explosives handling facility. This WWTF will consist of a modular RBC design. Treated effluent will then undergo sand filtration and tertiary polishing before seasonal discharge to Mary River during periods of flow. The new WWTF will operate in accordance with effluent discharge requirements. Additional detail on the existing and proposed WWTFs at the mine site is provided in the Wastewater Management Plan (Appendix 10D-3). The location and configuration of the polishing pond is shown on a drawing in Appendix 3C.

Oil/water separation facilities will be constructed within the maintenance facilities to treat contaminated water and soil.

2.4.6 Mining Facilities

A number of facilities will be constructed or upgraded early in the construction phase that will remain in place through the life of the Project:

- Airstrip;
- Mine haul roads;
- Explosives bulk emulsion plant, ammonium nitrate storage, and explosive magazines;
- Communication systems;
- Fuel storage; and,
- Waste management facilities.

Construction will also be undertaken to build mining infrastructure to support the operations as follows:

- Open pit pre-strip and waste rock stockpile development;
- Ore crushing, screening and conveyor systems;
- Temporary ore stockpiles and related water treatment facilities;
- Truck loading and unloading systems for ore, fuel and containers;
- Upgraded road from open pit to crusher;
- Railway loading and unloading systems for ore, fuel and containers;
- Permanent accommodations, offices and other buildings;
- Permanent power generation, boilers and substations; and,
- Mine maintenance facilities and warehouse.

The siting considerations for the Mine Site have included:

- Limiting environmental effects by reducing the overall footprint;
- Providing a safe working facility, e.g. locating explosives storage areas remotely from camps and other facilities (refer to Section 2.1.9 for description of the explosives management approach and Appendix 10C-4 for the Explosives Management Plan);
- Limiting earthworks;
- Minimizing mining haul distances;
- Providing efficient heat recovery from power plants;
- Providing attractive and effective living accommodation for employees; and,
- Reducing the distance between the accommodation area and work areas to the maximum practical extent.

As is typical for work in permafrost areas, the Mine Site building foundations and major structures such as crushers and other ore handling facilities will, where possible, be sited on bedrock. Where this is not practical, a variety of different pile systems will be utilized in combination with elevated building designs.

Surface pads consisting of locally quarried crushed rock (gravel) will be used for access and laydown areas, parking areas, raising of grade, and generally to protect the permafrost around all of the permanent infrastructure facilities.

Careful consideration was given to the choice and location of ancillary facilities including the incinerator, landfill, water treatment, wastewater treatment, ammonium nitrate storage, explosives mixing and explosive magazines. Most of these facilities will be housed in buildings, and some, such as the explosives storage areas, will be remotely located from other permanent workplace facilities for reasons of health, safety and compliance with government regulations.

Geotechnical and exploration drilling are ongoing and the results from these activities may influence the positioning of site infrastructure. Additional geotechnical drilling could identify important geotechnical constraints that could result in minor changes to the location and design of facilities. Ongoing drilling of Deposit No. 1 could result in minor changes to the pit configuration and therefore volumes and positioning of related waste rock stockpiles, explosives storage, conveyor systems, maintenance shops, access roads, and the primary crusher. In addition, geotechnical and exploration drilling will continue at Deposits No. 2, 3, 3a, 4 and 5.

Surface water drainage diversion associated with the Mine Site infrastructure (e.g. waste rock pile) will utilize best practices that minimize disturbances to terrain thereby minimizing erosion and sedimentation of watercourses and drainages.

2.4.6.1 Buildings

Various buildings, described in Section 3.4.3, will be constructed through the construction phase.

2.4.6.2 Mine Process Facilities

Ore processing facilities including primary and secondary crushers, screens and associated conveyors will be constructed as follows:

- Rough grading and bulk excavations;
- Forming and pouring large foundations;
- Backfilling;
- Perimeter building foundations, floor slabs and minor footings;
- Rough settling of major equipment and large bins;
- Installation of conveyor gallery sections, pulleys, drives and take up mechanisms;
- Structural work, including cladding and roofing; and,
- Mechanical and electrical installation.

Some of the larger pieces of equipment to be delivered to the site for mine processing, including the stacker / reclaimer, will not be delivered until upgrades to the Milne Inlet Tote Road have been completed and quarries and the concrete batch plant have been established.

2.4.7 Stockpile Development

An ore stockpile will be provided for temporary storage of ore waiting to be loaded into the crusher. In addition, two separate stockpile areas will be provided for temporary storage of ore: one for loading of ore onto ore trucks and one for loading of ore into railway cars. A 1.5m min. thick granular pad will be constructed on top of bedrock to support the ore stockpiles. The permafrost has been assumed to extend into this layer. Infiltrated water from the ore will reach this frozen layer and work its way out to the edges. A lined ditch will be constructed along each stockpile perimeter to collect this water and monitor and treat as necessary to meet effluent discharge requirements. Conceptual drawings stormwater management ponds are presented in Appendix 3C.

2.4.8 Site Access Roads

Two categories of roads will be constructed to serve the mining operation. An approximately 13 km long main haul road, suitable for mine haul trucks will connect the open pit, primary crusher, and waste rock stockpile areas. Access and service roads will be constructed to handle light-duty site and commercial traffic. Other light-duty roads include an approximately 6.5 km long road from the mine haul road in the north to the plant and the airstrip, and an approximately 3.5 km long road from the haul road to the explosive magazines, raw water pump house, water treatment plant and conveyors. Existing watercourses on these roads are currently equipped with culvert installations.

Traffic along roads will be managed in accordance with the Road Management Plan (Appendix 10D-8). Roads will be inspected regularly, sprayed with dust suppressants to reduce fugitive emissions and ploughed and repaired as necessary. Runoff collected in stormwater management ponds or treated sewage effluent ponds may be used for dust suppression provided the water quality meets applicable water licence standards.

2.4.9 Operation of 3 Mt/a Mine Facilities during Construction

Drawings showing the mine pit development over time and the progression of the waste rock stockpile are shown in Appendix 3C.

A combination of backhoe excavators and front-end loaders will be utilized for truck loading, earthwork, snow removal, and tire handling work for the 3 Mt/a mining operation during the construction phase. Stripping and overburden removal to access the ore will be carried out using shovelling and explosives.

The pit will be developed to provide sufficient ore exposures to achieve in-pit blending and to ensure that waste stripping occurs in a timely fashion. Two and possibly three, ore faces will be maintained for blending purposes. The intention is to avoid sharp fluctuations in the grades of iron and deleterious elements.

The crusher used in the bulk sampling program will be used for mining during the construction phase and the existing haul road to the pit from the crusher will be upgraded and used for transport of the ore to the crusher. Ore extracted from the open pit at a rate of about 3 Mt/a will be hauled in trucks to the crusher location where it will be crushed and screened and loaded onto the highway trucks for hauling to Milne Port. Approximately two weeks of ore supply will be stockpiled near the crusher in case of unexpected interruption to mining.

Waste rock stockpiles will be developed by placing waste rock on the base elevation (594 m for the West Stockpile, 640 m for the NW stockpile and 620 m for the North Stockpile). Benches will be built on the base elevation to optimize the vertical/horizontal expansion of the stockpiles and haulage distances. All waste storage will be within the mining limits shown in Figure 3-2.3.

The management plan for waste rock and overburden from the open pit is described in Appendix 10D-5. Runoff and precipitation from waste rock stockpiles will be collected in ponds. The ponds will be used to deposit sediment and to monitor effluent quality before discharge to the natural environment. Conceptual drawings stormwater management ponds are presented in Appendix 3C.

2.5 RAILWAY - CONSTRUCTION PHASE

2.5.1 Overview

An approximately 149 km long Railway will be built to transport 18 Mt/a of iron ore from the Mine Site to Steensby Port (Figures 3-2.4 through 3-2.8). The Railway will be constructed to accommodate heavy haul mineral transport. It will also carry some mixed general freight traffic to supply the Mine Site and a passenger train for employees. Along the Railway will be a total of 24 bridges, 7 of which will be major bridges greater than 100 m in length, 2 tunnels of approximately 1000 m and 300 m in length respectively, and more than 200 culvert crossings using 1.5 m and 3.0 m diameter pipes. General arrangement and typical drawings of bridge and culvert structures are presented in Appendix 3D.

The proposed Railway includes:

- Rail line and embankment -including tunnels, bridges and sidings;
- Crossings - across watercourses and drainages;
- Yards and terminals - including loading and unloading (loop) tracks, turning tracks for the locomotives and service and storage track;
- Supporting facilities - including maintenance and emergency facilities;
- Train - including locomotives (engines) and cars; and,
- Signalling and telecommunications.

The activities to construct the Railway include:

- Construction of an access road, including a roadbed and installation of temporary drainage facilities (bridges, culverts, etc.);
- Establishment of quarries;
- Establishment of construction camps;
- Ongoing geotechnical investigations;
- Construction of railway embankment and excavation of tunnels;
- Installation of drainage structures (bridges, culverts, berms, etc.);
- Surfacing the embankment with ballast;
- Placing the rails;
- Installing communication towers and bungalows;
- Placing the locomotives and cars on the rails; and,
- Commissioning the Railway through testing and de-stressing.

The sequencing of these activities is shown on Figure 3-2.4. Construction will be staged from both ends of the Railway at the Mine Site and Steensby Port (Figures 3- 2.5 through 3-2.8).

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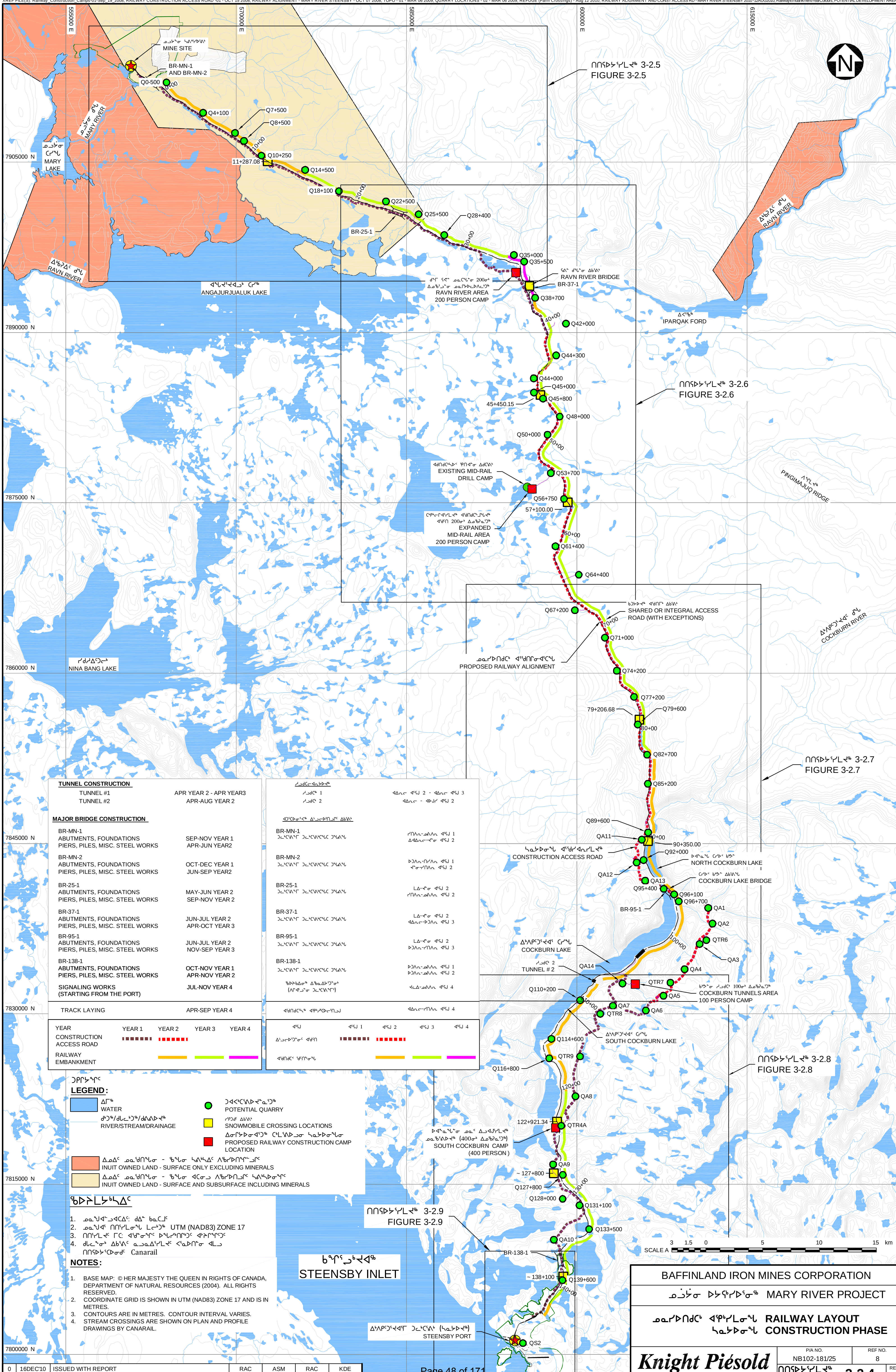
XREF FILE(S): Railway_Construction_Camps-01-Sep_19_2008; RAILWAY CONSTRUCTION ACCESS ROAD -01 - OCT 15 2008; RAILWAY ALIGNMENT - MARY RIVER STEENSBY - OCT 07 2008; TOPO - 01 - MAR 06 2009; QUARRY LOCATIONS - 02 - MAR 06 2009; REFUGE (Farm Crossings) - Aug 12 2010; RAILWAY ALIGNMENT AND CONST ACCESS RD - MARY RIVER STEENSBY 2010-12AUG2010; RailwayEmbankmentYearColours; POTENTIAL DEVELOPMENT AREAS; KP_PD_



TUNNEL CONSTRUCTION	
TUNNEL #1	APR YEAR 2 - APR YEAR3
TUNNEL #2	APR-AUG YEAR 2

MAJOR BRIDGE CONSTRUCTION	
BR-MN-1	
ABUTMENTS, FOUNDATIONS	SEP-NOV YEAR 1
PIERS, PILES, MISC. STEEL WORKS	APR-JUN YEAR2
BR-MN-2	
ABUTMENTS, FOUNDATIONS	OCT-DEC YEAR 1
PIERS, PILES, MISC. STEEL WORKS	JUN-SEP YEAR2
BR-25-1	
ABUTMENTS, FOUNDATIONS	MAY-JUN YEAR 2
PIERS, PILES, MISC. STEEL WORKS	SEP-NOV YEAR 2
BR-37-1	
ABUTMENTS, FOUNDATIONS	JUN-JUL YEAR 2
PIERS, PILES, MISC. STEEL WORKS	APR-OCT YEAR 3
BR-95-1	
ABUTMENTS, FOUNDATIONS	JUN-JUL YEAR 2
PIERS, PILES, MISC. STEEL WORKS	NOV-SEP YEAR 3
BR-138-1	
ABUTMENTS, FOUNDATIONS	OCT-NOV YEAR 1
PIERS, PILES, MISC. STEEL WORKS	APR-NOV YEAR 2
SIGNALING WORKS (STARTING FROM THE PORT)	JUL-NOV YEAR 4
TRACK LAYING	APR-SEP YEAR 4

YEAR	YEAR 1	YEAR 2	YEAR 3	YEAR 4
CONSTRUCTION ACCESS ROAD				
RAILWAY EMBANKMENT				

LEGEND:

- WATER
- RIVER/STREAM/DRAINAGE
- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
- POTENTIAL QUARRY
- SNOWMOBILE CROSSING LOCATIONS
- PROPOSED RAILWAY CONSTRUCTION CAMP LOCATION

1. UTM (NAD83) ZONE 17
2. Canarail

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES (2004). ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. STREAM CROSSINGS ARE SHOWN ON PLAN AND PROFILE DRAWINGS BY CANARAIL.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

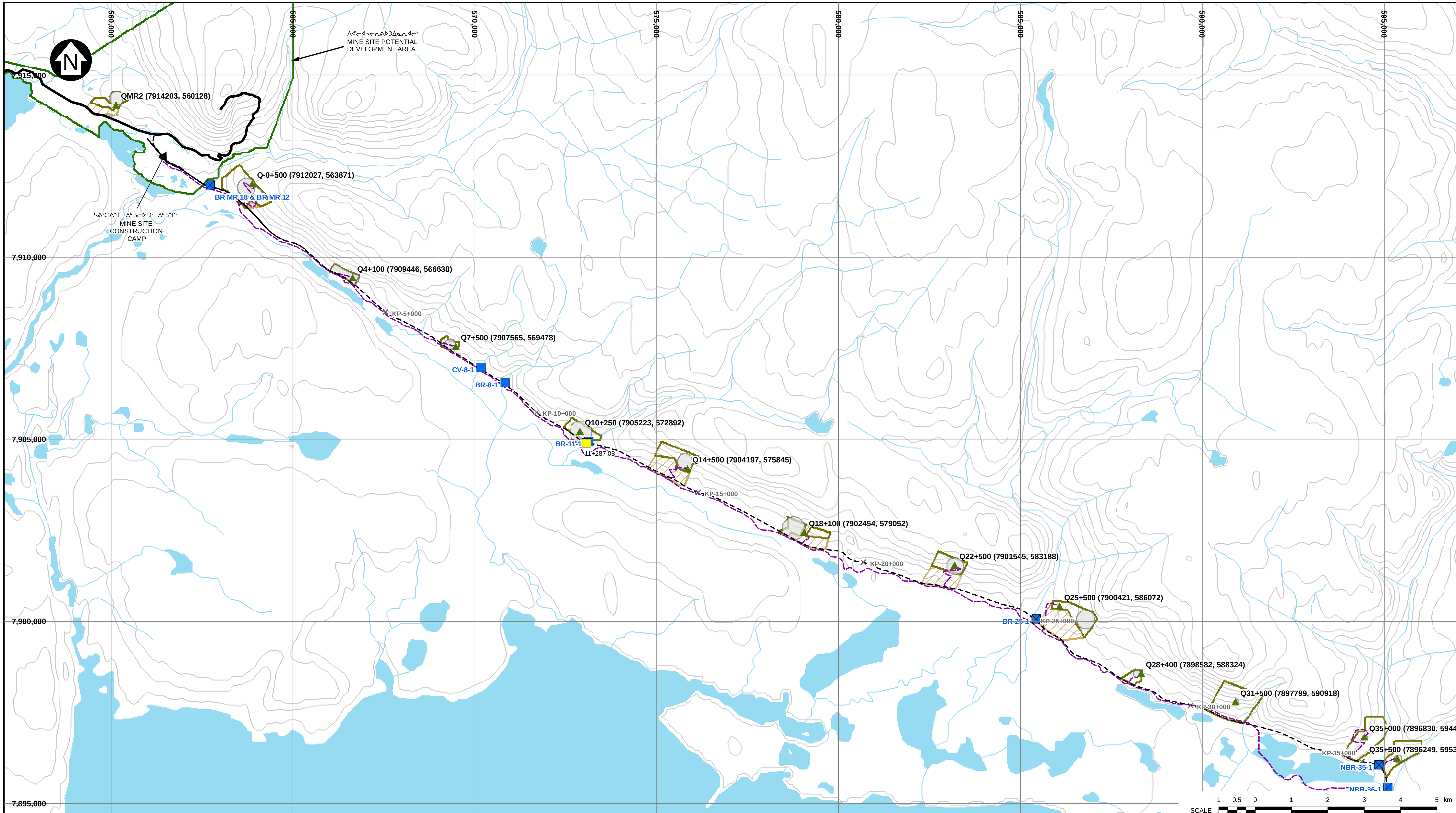
RAILWAY LAYOUT CONSTRUCTION PHASE

Knight Piésold CONSULTING

P/A NO. NB102-181/25 | REF NO. 8

FIGURE 3-2.4 | REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE



LEGEND:

- WATER
- PROPOSED QUARRY LEASE BOUNDARY AREA
- AREA OF POTENTIAL ACCESS (PRELIMINARY)
- POTENTIAL DEVELOPMENT AREA
- RIVER/STREAM/DRAINAGE
- MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- PROPOSED RAILWAY CONSTRUCTION ACCESS ROAD
- QUARRY SITE
- EXISTING CAMP LOCATION
- POTENTIAL RAILWAY CONSTRUCTION CAMP LOCATION
- SNOWMOBILE CROSSING LOCATION
- EXPECTED QUARRY FOOTPRINT (ASSUMED 1-10 m BENCH QUARRY)
- CROSSINGS SUBJECT TO AN APPROVAL UNDER THE *NAVIGABLE WATERS PROTECTION ACT*
- MAJOR BRIDGE LOCATION

NOTES:

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

RAILWAY CONSTRUCTION POTENTIAL DEVELOPMENT AREA (SHEET 1 OF 4)

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/25	8

FIGURE 3-2.5 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

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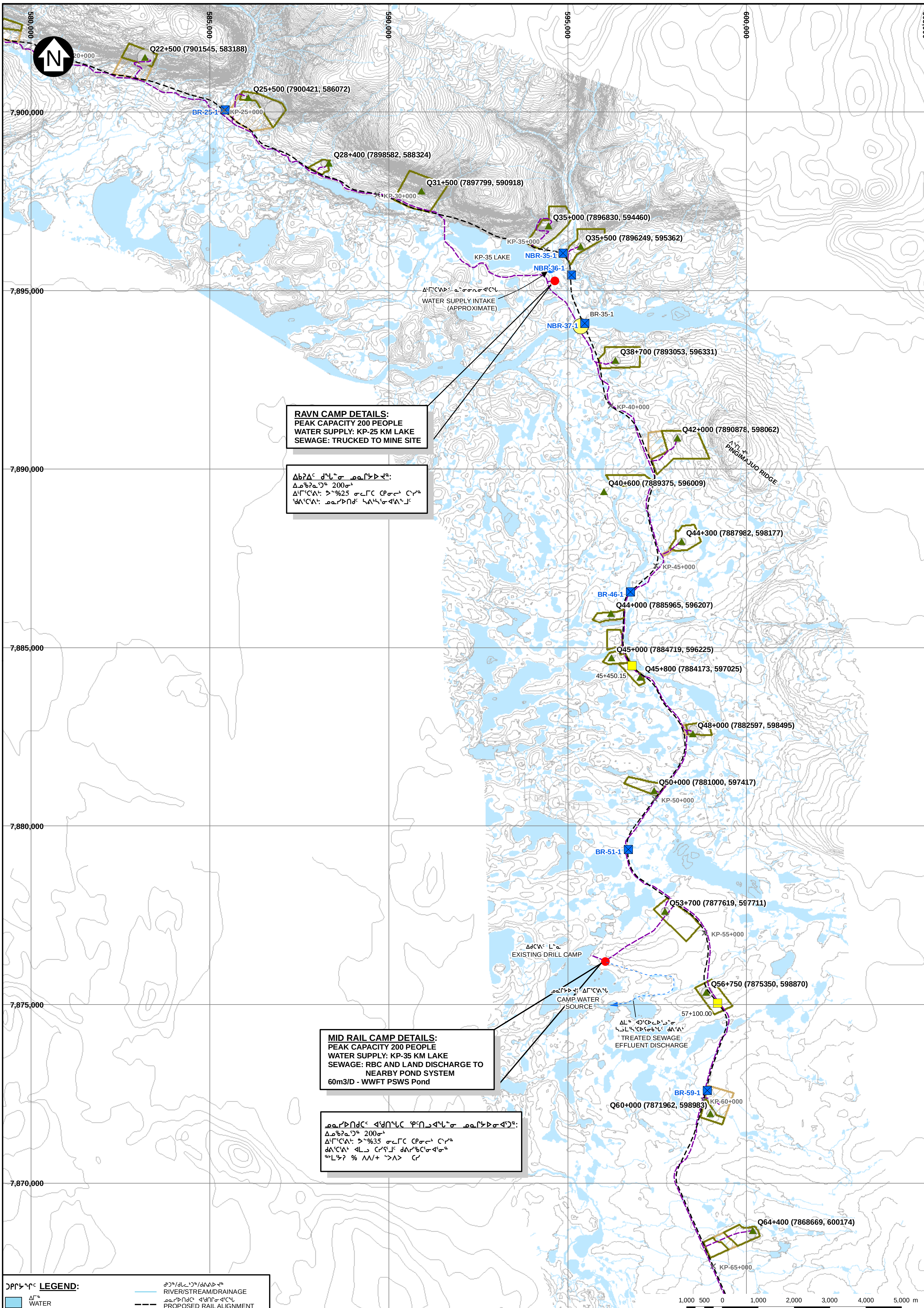

ᑐᑭᓯᔾᔪᑦ **LEGEND**:

- ᐃᒥᖅ WATER
- ᐊᕿᒃᑕᐅᓚᕈᒪᔪᖅ ᑐᐊᐸᒃᑕᕕᒃ ᐃᓗᐊᓂ ᓄᓇᐅᑉ ᐊᑐᕐᑐᐊᕐᑕᑉ PROPOSED QUARRY LEASE BOUNDARY AREA
- ᓄᓇ ᐊᑐᕐᑕᐅᑐᐃᓇᕆᐊᓕᒃ (ᐃᓱᒪᒋᔭᐅᔪᖅ) AREA OF POTENTIAL ACCESS (PRELIMINARY)
- ᓂᕆᐅᒋᔭᐅᔪᖅ ᑐᐊᐸᒃᑕᕕᐅᓚᕆᐊᖓ (ᐃᒪᓇᐃᓂᐊᕐᑐᕆᔭᐅᔪᖅ 1-10 ᒥᑕ) EXPECTED QUARRY FOOTPRINT (ASSUMED 1-10 m BENCH QUARRY)
- ᐃᑳᕕᑦ ᐃᑳᕐᑕᐅᔪᓇᕐᑐᑦ ᐊᖏᕐᑕᐅᓯᒪᔪᑦ ᐃᒪᕐᒥᒃ ᓴᐳᔾᔨᓯᒪᓗᓐᓂ ᒪᓕᒐᖅ CROSSINGS SUBJECT TO AN APPROVAL UNDER THE *NAVIGABLE WATERS PROTECTION ACT*
- ᑯᒃᑑᖅ/ᑯᓚᓚᒃᑑᖅ/ᑯᕕᕕᐅᔪᖅ RIVER/STREAM/DRAINAGE
- ᓄᓇᓯᐅᑎᑯᑖ ᐊᑦᑎᒋᓂᐊᕐᑕᖓ PROPOSED RAIL ALIGNMENT
- ᐊᕐᑎᓕᐊᕆᔭᐅᔪᒪᔪᖅ ᐅᐸᒃᑕᕕᐅᓂᖓ PROPOSED ACCESS ROAD
- ᐱᑕᖃᕐᐸᕆᕐᑐᖅ ᑕᒫᕕᐅᔪᖅ EXISTING CAMP LOCATION
- ᐃᓂᒋᔭᐅᓂᐊᕐᑐᖅ ᑕᒫᕕᐅᓗᓂ ᓴᓇᔭᐅᓂᖓᓂ POTENTIAL RAILWAY CONSTRUCTION CAMP LOCATION
- ᐃᒻᒥᕐᑕᕕᐅᑉ ᓇᐃᓂᓂᕆᓂᐊᕐᑕᖓ WATER INTAKE (APPROXIMATE ONLY)
- ᑐᐊᐸᒃᑕᕕᒃ QUARRY SITE
- ᓯᑭᑐᑯᑦ ᐃᑳᕕᒃ SNOWMOBILE CROSSING LOCATION
- ᐃᑳᕕᓗᐊᑕᐅᑉ ᓇᐃᓐᓂᖓ MAJOR BRIDGE LOCATION

ᖃᐅᔨᒪᔭᒃᓴᐃᑦ

1. ᓄᓇᖑᐊᓗᐊᑕᐃᑦ: ᑯᐃᓐ ᑲᓇᑕᒧᑦ
2. ᓄᓇᖑᐊᑉ ᑎᑎᕐᓯᒪᓂᖓ ᒪᓕᒃᑐᖅ UTM (NAD83) Zone 17.
3. ᑎᑎᕐᓯᒪᔪᑦ ᒥᑕ: ᐊᕐᑯᓂᖏᑦ ᐅᖓᓯᒃᑎᒋᒃᑐᑦ ᐊᔾᔨᒋᖏᑦᑐᑦ
4. ᐸᕐᑎᑯᑕᑉ ᐃᓂᒥᓂᐊᕐᑕᖓ ᐊᕿᕐᑕᐅᔪᖅ ᕿᒍᓴᒍᑭᒍᓂᓗ ᕿᓚᓴᐅᒥᓗᑎᒍᓴᑎᐅ (ᐊᐅᒍᓯ 12, 2010)
5. ᓄᓇᓯᐅᑎᑯᑦ ᐊᒻᒪᓗ ᐊᕐᑎᐅᑉ ᐊᕿᒃᓯᒪᓇᓂᐊᕐᑕᖓᓂᒃ ᐊᕿᒃᓯᐃᓂᖅ, ᐃᓚᒋᓗᓂᐅᒃ ᓇᓂᓂᐊᕐᒪᖓᑦᑕ ᐃᑳᕕᑦ, ᓴᕿᑕᐅᓯᒪᔪᑦ ᐸᓐᓇᒃᑕᐅᓯᒪᓗᑎᒃ ᐊᒻᒪᓗ ᑎᑎᕐᕖᔭᕐᓯᒪᓗᑎᒃ ᑎᑎᕋᐅᔭᕐᑕᐅᓗᑎᒃ ᕿᒍᓴᒍᑭᒍᓂᓗ ᑎᒃᑯᓂ ᓇᓗᓇᐃᑯᑕᕐᑐᓂ 3 ᐃᓚᓕᐅᑎᓯᒪᔪᑦ

NOTES:

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

RAILWAY CONSTRUCTION POTENTIAL DEVELOPMENT AREA (SHEET 2 OF 4)

Knight Piésold CONSULTING

P/A NO. NB102-181/25 | REF NO. 8

FIGURE 3-2.6 | REV 0

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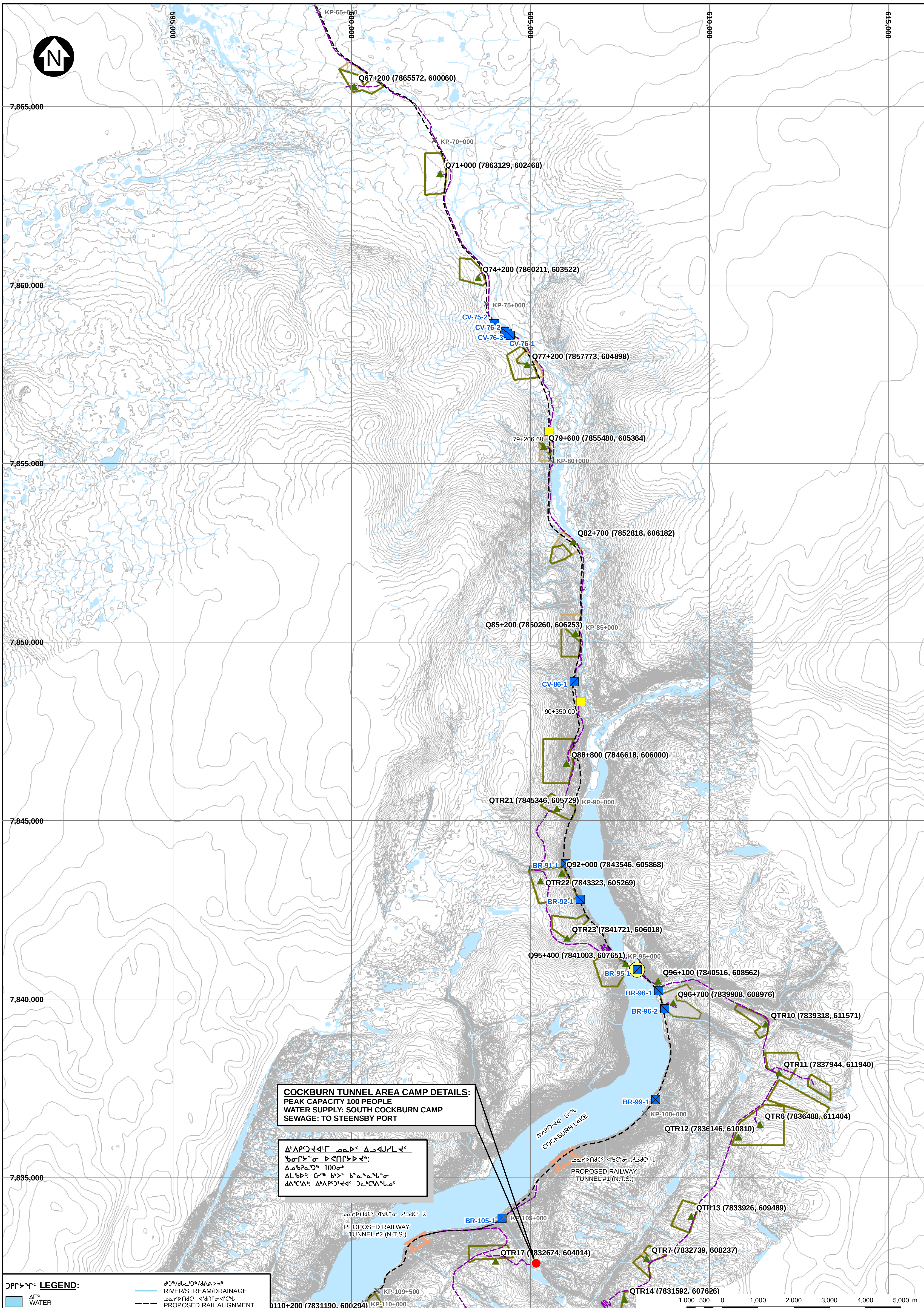

LEGEND:

- WATER
- PROPOSED QUARRY LEASE BOUNDARY AREA
- AREA OF POTENTIAL ACCESS (PRELIMINARY)
- EXPECTED QUARRY FOOTPRINT (ASSUMED 1-10 m BENCH QUARRY)
- CROSSINGS SUBJECT TO AN APPROVAL UNDER THE *NAVIGABLE WATERS PROTECTION ACT*
- RIVER/STREAM/DRAINAGE
- PROPOSED RAIL ALIGNMENT
- PROPOSED ACCESS ROAD
- EXISTING CAMP LOCATION
- POTENTIAL RAILWAY CONSTRUCTION CAMP LOCATION
- WATER INTAKE (APPROXIMATE ONLY)
- QUARRY SITE
- SNOWMOBILE CROSSING LOCATION
- MAJOR BRIDGE LOCATION

NOTES:

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REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

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MARY RIVER PROJECT

RAILWAY CONSTRUCTION POTENTIAL DEVELOPMENT AREA (SHEET 3 OF 4)

Knight Piésold CONSULTING

P/A NO. NB102-181/25 | REF NO. 8

FIGURE 3-2.7 | REV 0

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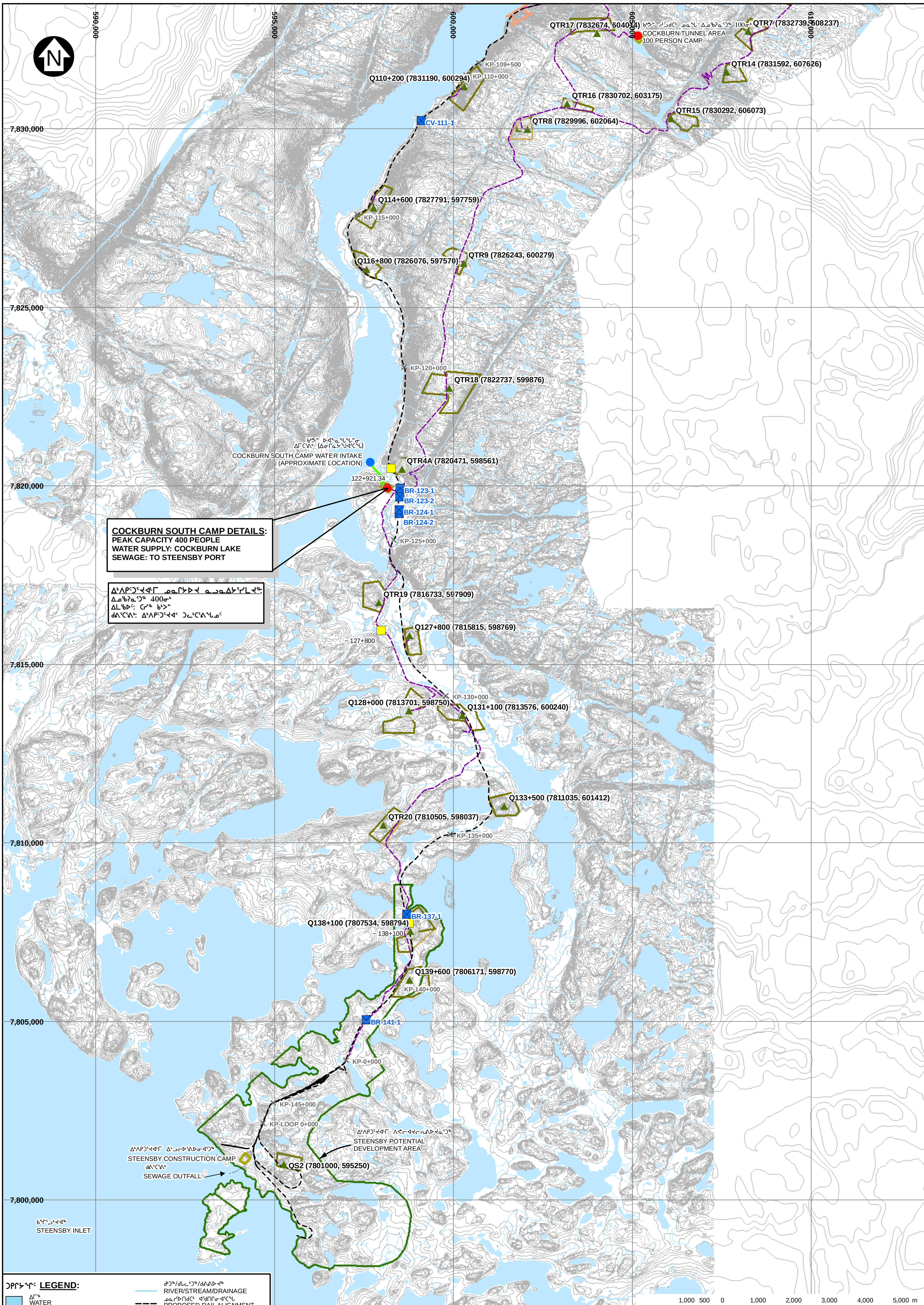

LEGEND:

- WATER
- PROPOSED QUARRY LEASE BOUNDARY AREA
- AREA OF POTENTIAL ACCESS (PRELIMINARY)
- EXPECTED QUARRY FOOTPRINT (ASSUMED 1-10 m BENCH QUARRY)
- CROSSINGS SUBJECT TO AN APPROVAL UNDER THE *NAVIGABLE WATERS PROTECTION ACT*
- RIVER/STREAM/DRAINAGE
- PROPOSED RAIL ALIGNMENT
- PROPOSED ACCESS ROAD
- EXISTING CAMP LOCATION
- POTENTIAL RAILWAY CONSTRUCTION CAMP LOCATION
- WATER INTAKE (APPROXIMATE ONLY)
- QUARRY SITE
- SNOWMOBILE CROSSING LOCATION
- MAJOR BRIDGE LOCATION
- POTENTIAL DEVELOPMENT AREA

NOTES:

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MARY RIVER PROJECT

RAILWAY CONSTRUCTION POTENTIAL DEVELOPMENT AREA (SHEET 4 OF 4)

Knight Piésold CONSULTING

P/A NO.	REF NO.
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FIGURE 3-2.8 — REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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A construction access road will facilitate establishment of temporary construction camps, quarries and airstrips which are necessary to position the large workforce, equipment fleet and fuel required to carry out construction of the Railway from multiple work fronts. The construction technologies and equipment used will be appropriate for arctic conditions and terrain consisting of permafrost, rock and various soil textures. Section 2.5 outlines the multitude of design and construction considerations required for the construction of the railway including all required support infrastructure and supplies. Section 2.1.5 provides a estimate of the types and numbers of equipment that will be required for construction. Plan and profile as well as standard cross-section drawings of the Railway are presented in Appendix 3D.

2.5.2 Design Considerations

The Railway is being designed by Canarail Consultants Inc. of Montreal, supported by Dillon Consulting Ltd. on bridge design. Canarail has worked on the design since 2006 and engineering work continues as additional geotechnical and environmental information becomes available. Air photo interpretation and extensive geotechnical drilling and test pitting along the proposed and former railway alignments have been undertaken by Knight Piésold in association with EBA Engineering Consultants Ltd. (EBA), with about 400 drill holes and 270 test pits put down along the current and previous alignments over a three-year period.

The design has focussed on developing the minimum railway infrastructure necessary for operational viability and safety. Management, operations and maintenance have been centralized in one facility. Sidings have been determined by operational requirements, and wherever possible located to minimise the impact on earthworks.

Wherever possible the alignment design has avoided intrusion into water bodies and avoided multiple crossings of the same watercourse. A stringent evaluation procedure was used to select the appropriate structure for each water crossing, considering technical, geotechnical, cost and environmental conditions (Dillon, 2008a).

The railway loading yard has been sited as close as possible to the ore stockpiles in consideration of the subsurface soils, the foundation stability required for the loading machinery and track and the general topography of the area. The unloading loop has been sited to provide the elevation necessary to install rotary dumping equipment and the nearby railway yard and has been located to provide foundations on bedrock for the maintenance centre while remaining as close as possible to the unloading facilities and the living quarters at Steensby Port.

To the extent possible, experience from railway operations in other northern locations has been incorporated into the design. The Alaskan Railway, the Canadian line to Churchill on Hudson Bay, some of the most northerly lines in Scandinavia and China's Tibet railway all deal with permafrost. They operate in predominantly warm (-1°C) discontinuous permafrost which presents problems that are not typical of the conditions between the Mine Site and Steensby Port.

The major design and maintenance problems in regions of discontinuous permafrost relate either to transitions between zones with permafrost and zones without permafrost or to the very small change in ground temperature that will introduce new permafrost zones or eliminate existing ones. These issues do not have to be dealt with in zones with permanently frozen ground encountered in the deeper cold permafrost (average -9°C) and colder environment on central northern Baffin Island.

The approach to the subgrade design of the Railway is summarised as follows:

- Promote raising the transition zone between the permanently frozen ground and the active layer by using self ventilating embankments;
- Minimise disturbance to natural drainage patterns;
- Minimise exposure to problems presented by thaw sensitive soils;
- Avoid cuts in thaw sensitive soils when the soils themselves cannot be avoided; and,
- Be prepared for remedial works once the Railway is under operation. These could require the use of thermosyphons or the shading of south facing embankments that are not adequately cooled by the natural ventilation.

Railway operating conditions will not be significantly different, in terms of the extremes of climate, from those already experienced by the Quebec North Shore and Labrador Railway when it served Schefferville (as the Tshuetin Transportation Company still does). In the last 30 years of weather records the extreme low at Pond Inlet for example was only 4° colder than the extreme low at Schefferville, and the daily average of the coldest month was only 6° colder than the daily average of the coldest month at Schefferville. What is different is the duration of the coldest period. Schefferville's extremely cold weather lasts for 6 to 7 weeks at most whereas the extreme cold in central northern Baffin Island lasts for six months. This will be demanding of the operating and maintenance crews but will be ameliorated to a large extent by the relatively rapid rotation of crews in and out of the Project site.

Routing

To limit effects on the existing environment, encroachment of the railway track near lakes, rivers and other sensitive natural features has been avoided, where possible. However, the geometric requirements of railway alignment design place particular restrictions upon the selection of the route. For example:

- Railways cannot use curves that are as tight as those used for roads. In addition to issues relating to rail wear and train speed the rigid bodies of the cars and locomotives (particularly the three axle locomotive bodies) cannot successfully negotiate a tight curve.
- For winding 'S' shaped route (e.g. to deviate around natural features), sufficient space must be provided between the two curves to permit the full development of the transitions needed between curved track and straight track, plus a section of truly straight between the transitions themselves.
- Changes in grade are carefully planned to avoid multiple changes in the direction of the railway gradient within a single train length to limit undesirable train action (compression and tension in the couplers) between rail cars.
- Curved sections of track present a physical resistance to the forward motion of the train, resulting in increased power demands upon locomotives. Similarly, increases in grade require increased power output from the locomotives. The net result is that the maximum achievable grade must be decreased if the track is also curved.

The proposed railway alignment is shown on Figure 3-2.4. From the Mine Site the Railway will proceed approximately southeast from the mine for a distance of about 24 km across a long series of sand and gravel terraces that lie at the southern foot of the mountain range which incorporates the Mine Site iron ore deposits. These terraces are often deeply cut by drainage channels from the mountains.

The route then bears slightly towards the south and crosses the Ravn River at around the kilometre post (kp) 37 marker. At the southern end of the plateau, the route enters the Cockburn Lake valley. It continues in a southerly direction until it skirts the western shore of Cockburn Lake at kp 89 before crossing the lake at a natural constriction in the valley (kp 96). The route then follows the east bank of Cockburn Lake for approximately 14 km, through an area requiring tunnelling and benching in bedrock. Two short tunnels will be constructed to permit the Railway to proceed southward, down the east side of the Cockburn Lake Valley.

The route continues along the east side of the lake for another 13 km across well established sand and gravel terraces and benches. At the southern end of the lake, the route works its way towards the southeast, avoiding numerous rocky hills and waterlogged ground around small lakes, until it reaches the port site at Steensby Port at kp 143.

Controls during construction and an additional culvert to ensure no change to the drainage characteristics of an uncommon stand of Richardson's willows have been incorporated in the Railway design to limit the effect of the Railway on the site as well as an important archaeological feature (a wolf trap). Affected watercourse crossings are shown on the detailed Canarail drawings in Appendix 3C and are discussed in more detail in the No Net Loss Plan in Appendix 10H.

A number of routing alternatives were considered early in the feasibility study process, including options to cross the Ravn River downstream of Angajurjualuk Lake; running along the base of the steep cliffs along Tariujaq Arm; as well as hybrid combinations of these two routes with portions of the proposed route (see Section 6). The proposed route was determined to be preferred based on technical, operational cost and environmental factors.

<u>Ground Conditions</u>

Permafrost and ground conditions are factors influencing the design of the Railway, particularly route alignment. The ground on Baffin Island has continuous permafrost, which is defined as ground (rock and/or soil) remaining at or below 0°C continuously for at least 2 years. Above the true permafrost is the so-called active layer of ice, soil and rock, which is subject to seasonal freezing and thawing. In the region of Baffin Island in which the Project is located, the active layer is typically from 1 to 3 m thick. Ground conditions along the Railway alignment vary and site investigations have been undertaken and will continue to define areas with thaw-susceptible soils. The Railway embankment design including drainage facilities has addressed the ground conditions through the following general methods (to the extent possible):

- Maintaining the existing thermal regime by using fill from run of quarry for embankments that allow the embankments to be self ventilating;
- Avoiding cuts into the existing ground in favour of placing additional fill;
- Maintaining current drainage patterns which if altered can change the ground's thermal regime; and,
- Excavating thaw-susceptible and ice-rich soils (in select instances).

For the construction of bridge foundations, special consideration has being given to the potential effects of climate change, which could increase the depth of the active layer. A minimum 2 m high embankment will be provided over thaw-susceptible soils. The general characteristics of the surrounding terrain conditions along the proposed Railway corridor, including surficial materials (thermal condition, ground ice/moisture content, etc.), topography, drainage conditions, and other factors influencing landscape stability are further described in Volume 6, Section 2.1.3.

The potential for freeze-thaw damage along the Railway is predominant in sections where the railway line crosses thaw sensitive ground with ice rich soils. The embankment design has been developed specifically to minimise the effect of the freeze thaw cycle. Use of run of quarry fill results in an open structure within the embankment that is conducive to good natural ventilation.

Experience elsewhere in the arctic has shown that this type of structure responds very slowly to the thaw cycle so that over a period of time the interface between the true permafrost and the active layer rises. With the appropriate embankment configuration the natural ground ultimately remains entirely within the permafrost layer that is permanently frozen and the active layer is lifted into the embankment, which itself is not thaw sensitive and thus not prone to freeze-thaw damage. Results of geotechnical investigations throughout the design and construction of the Railway will be used to determine the appropriate embankment configuration, for the different types and depths of thaw sensitive ground encountered along the Railway.

Drainage Facilities (Drainages, Streams and Rivers)

A number of drainage facilities including crossing structures will be constructed along the route, including large bridges, smaller single-span bridges and culverts. The identification of appropriate engineering options for each crossing was carried out using a systematic decision making process to evaluate each of the 214 drainage crossings. This process considered engineering and environmental factors at each crossing location, to determine the optimum site-specific crossing at each location (i.e. culvert or bridge). Detailed evaluations and screening were performed during the design process. Decision-making criteria included: the need to minimize impacts to freshwater biota and habitat (including required erosion control measures), hydraulic conditions, ease of construction and cost. Further information on mitigation for the protection of aquatic biota and habitat is located in Volume 7, Section 4.

In addition to watercourse crossing structures, other drainage facilities will be provided along the entire railway route to protect against subgrade washout due to surface drainage flow, including ditches, dikes and/or berms and other protection works.

2.5.3 Railway Embankment

The Railway roadbed will consist of subgrade (on embankments or in cuts) and sub-ballast, which is a layer of graded crushed rock that will act as a filter layer between the embankment material and the ballast. The track structure, consisting of ballast, ties and rail, will be laid on top of the sub-ballast. During construction, quantities of sub-ballast and ballast will be sourced from borrow areas located in proximity to the railway route.

Standard cross-sections of the railway embankment are presented in Appendix 3D. Depending upon ground conditions, the rail embankment may be 1.5 m in height where the rail is constructed over rock or other thaw-stable soils, or a minimum 2 m in height in locations of thaw-susceptible soils. Ground conditions have a very large bearing on rail embankment construction. Mitigation of poor ground conditions ranges from avoidance, where possible, to excavation of thaw-susceptible and ice-rich soils, to construction of embankments high enough to insulate underlying soils and minimise or eliminate any disturbing of the thermal regime of the natural ground. The height of the embankment has a large bearing on its width; a 1.5 m high embankment may measure as little as about 12 m toe to toe of embankment, whereas a 4 m embankment will measure about 50 m across. When embankments on ice rich and thaw susceptible soils are high, slopes will be low (5 to1) which will also allow for ready crossings by animals and vehicles and to encourage snow to blow over rather than accumulate on the embankments.

Embankment design has focused on providing stable embankments on very soft thaw sensitive ground where the dead load of the embankment is a challenge. The embankment and sub-ballast layers have been designed to diminish the transmittal of the dynamic loads that are related to the weight and speed of the operating trains. Recommended train speeds have been limited to 70 km/hour and as an additional precaution the railway operation has been designed to facilitate lowered speeds through sensitive areas during the thaw period.

Consideration has been given to facilitating the crossing of the railway embankment by hunters on snowmobile or ATV, and by caribou. Preliminary snowmobile crossings have been identified along the Railway (see Figures 3-2.4 to 3-2.8) and final locations are expected to be finalized in consultation with the communities. Snowmobile crossings will consist of visible signage, finer sized material treatment over the embankment, and wooden timbers next to the rails similar to a road crossing of a railway in southern Canada, so that snowmobiles and ATVs can safety cross the Railway at strategic locations. Caribou crossings have also been designed with similar features, so that caribou can safety climb the blasted rock embankment at key trail locations. Conceptual drawings of both crossing types are provided in Appendix 3D. Volume 6, Section 5 describes the impact assessment specific to caribou crossing of the railway embankment and proposed mitigation.

2.5.4 Rock Cuts and Tunnels

A number of rock cuts will be required across the length of the Railway. Geomechanical investigations have provided the railway engineers with information about stable slope angles and conceptual designs for various rock cut scenarios have been produced. Rock cuts are shown on the Railway plan and profile drawings in Appendix 3D.

Two tunnels, measuring 1,300 m (Tunnel 1) and 250 m (Tunnel 2) in length and approximately 7.8 m high and 5.5 m wide, will be bored into the side of the mountain along the east shores of Cockburn Lake. The location of the tunnels is indicated on Figures 3-2.4 and 3-2.8 and in greater detail on drawings attached in Appendix 3D.

Tunnels are necessary at this location to avoid cutting back the entire slope of the mountain. The tunnel design will be based upon the American Railway Engineering and Maintenance-of-Way Association guidelines (AREMA, 2010). Construction of the two tunnels will involve a large amount of drilling and blasting through solid rock. Tunnels will be built by first removing loose rock and soil at the portal entrances, establishing the portals, tunnelling from one end, constructing the second portal, and then completing the tunnelling. The tunnelling process will consist of repetitive cycles of drill, blast, muck, and consolidate (rock bolts, wire mesh, or shotcrete) carried out on a 24 hour basis. Drilling will be carried out using a semi-automated multi-core 'Jumbo' drill rig to blast 70 to 80 holes into the full face. Tunnelling progress is estimated at 4 m each drill blast or each day, requiring about one year to complete tunnel works.

During hard rock drilling a drill fluid is required to prevent the drill head from overheating. Due to the permafrost conditions, it is currently anticipated that brine (solution containing sodium chloride) will be used as the principal drill fluid to prevent drill rods from freezing in the rock. The face and muck pile may also require washing down with brine. There will be a net loss of brine in the muck and hence salt and water replenishment will be required. Water consumption during tunnelling is estimated at 16,000 m^3 over the one year duration of tunnelling, sourced from Cockburn Lake. A brine plant will be provided at the tunnel portal linked to the temporary service pipe system which will run down one side of the tunnel wall. The brine will be re-circulated by locating sump stations within the tunnel and pumping the water directly back to the brine plant. In this manner as little brine as possible will be lost. Total sodium chloride requirement is estimated at 1,400 t. Once tunnelling operations are completed, any remaining waste brine may be applied as a dust suppressant on the construction access road.

Runoff from tunnel construction activities will contain some brine, cementitious residues, and fugitive petroleum products. Provisions for water treatment such as carbon dioxide gas dosing for the cementitious alkalinity and oil water separation will be identified during design. Sediment basins will be used to retain suspended solids and will be periodically cleaned out and the sludge disposed. At the portals surface water runoff will be directed away from the tunnel to a sump located at a low point in the portal area. This water will pass through sedimentation tanks before disposal to any nearby creeks or water courses.

2.5.5 Disposal of Waste Rock and Soil Spoils

The majority of the cuts will be into rock, most of which will be used as fill in the Railway embankment. Approximately 1 million m^3 of rock generated at the tunnels will not be used as fill and will be disposed of nearby within the railway ROW south of the tunnels and alongside Cockburn Lake.

One of the fundamental criteria for the railway design was to stay away from cuts in ice rich soils to avoid inducing thermal changes and causing geotechnical stability issues. The cuts in ice rich soils that were unavoidable were mostly at the approaches to crossings to avoid excessive pier height for the bridges or excess fill over culverts so this comment applies to those crossing areas. Cuts that are not near crossings are more likely to be in rock than ice rich soils.

Ice rich soils when thawed will be wet and prone to slumping and considerable quantities of sediment-laden water may be released. 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 disposed of in exhausted quarries as a preferred option, particularly low-lying areas or below grade excavations within quarries. Quarries represent a disturbed footprint with no future use and therefore make ideal disposal sites, provided their use for disposal has been satisfactorily reconciled with the proposed use of exhausted quarries as explosive storage areas during the progress of construction.
- In all instances, disposed overburden materials will be placed >33 m from a surface water body, as a standard condition of land use approvals.
- 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.
- Local depressions or low relief areas will be selected, not slopes where the material will run-off easily.
- 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.
- Sediment and erosion control measures will be identified in the Water Management Plan to prevent runoff of sediment, and possibly divert runoff into the disposed material.
- Overburden soils will be transported directly to the disposal site, without short-term storage and re-handling.

Disposal sites will be identified early in the construction phase once the main locations where spoils will be generated are located.

2.5.6 Watercourse and Drainage Crossings

A number of crossing structures will be constructed along the route, including large bridges, smaller single-span bridges and culverts. General arrangement and typical drawings of bridge and culvert structures are presented in Appendix 3D. A hydraulic design study was carried out to assess suitable hydraulic design criteria for culverts and bridges in order to avoid flooding of the railway infrastructure or any unexpected damage to the adjacent ground (Dillon, 2008b). Culvert capacities and bridge locations were assessed using a river hydraulics analysis software package assuming a 200 year return period with an allowance made for ice accumulation (Dillon, 2008c).

The identification of appropriate engineering options for each crossing was carried out using a systematic decision making process to evaluate each of the 214 crossings presented in the Mary River Development Proposal (Baffinland, 2008b). This process took into account engineering and environmental factors at each crossing location. Screening and detailed evaluations were performed to aid in determining the optimum site-specific crossing at each location (i.e. culvert or bridge). Decision-making criteria which were used included: potential effects on freshwater aquatics, hydraulic conditions, ease of construction and cost.

Preliminary assignments of crossing structures for each drainage crossing along the Railway are presented in the Fish Habitat Compensation and Monitoring Plan in Appendix 10D-7. At the majority of locations corrugated steel pipe (CSP) culverts will be used. Alternatively, corrugated structural plate pipe (CSPP) culverts will be used, as required. Erosion protection will be provided using rip rap. Culverts have been designed in accordance with AREMA (2010) guidelines. In general, a minimum of 1-m cover will be provided above all culverts.

In addition to major bridges, several shorter bridges will be required over smaller watercourses. These short bridges will be simple single-span structures, with a length of 15 m and varying vertical clearances. Standard arctic foundation construction techniques similar to those used in northern Canadian mining and infrastructure projects, such as embedding piles in bedrock or the use of ad-freeze piles, will be used. Additional geotechnical investigations will facilitate the final foundation designs. Special consideration, especially for foundations, has been given to the potential effects of global warming, which could increase the depth of the permafrost active layer.

2.5.7 Construction Access Road

The construction access road, if built in its entirety, will be about 162 km long and will consist of a main access road with secondary arteries leading to quarry sites, camps, etc. To the extent possible, the access roads will be within the railway right-of-way and either constructed integral to the railway embankment (integral access roads), adjacent and with a nominal separation between the road and the railway embankment, or separate from the railway right-of-way (independent access roads). Depending upon construction execution, the length of construction access road built may be less than 162 km in length. A number of factors influence whether the access road is integral or independent, such as steep topography, number of rock cuts, avoiding disturbance of the ground thermal regime, avoiding instances where two consecutive long culvert lengths (from the railway crossing and the access road crossing) may create a barrier to fish movement. About 65% of the access road will need to be separate from the railway right-of-way.

The main construction access road and its arteries located within the railway alignment have been designed to accommodate trucks of up to 100 t capacity and will have a minimum road surface width of 8 to 12 m. Other related access roads (e.g. to explosive magazines) have been designed to accommodate 50 t trucks and to have a minimum road service width of 8 m. The road surfaces will consist of a 50 mm thick base (minus 50 mm) and a 150 mm thick sub-base (minus 150 mm). An embankment of approximately 0.9 m thickness may be placed over thaw-sensitive ground to preserve the thermal regime. Typical construction access road cross-sections and plan and profile drawings of the construction access road are presented in Appendix 3D.

A number of bridges and culverts will be installed along the length of the railway construction access road. Both culverts and bridges will be designed for a one in 10-year hydrological event. Culverts will be fabricated out of corrugated steel pipe (CSP) with a minimum diameter of 1.6 m. Bridges have been designed to support a 100 t load and a minimum deck width of 8 m. Drawings of typical culvert installations along the construction access road are included in Appendix 3D. Because the hydrological return period for the construction access road is shorter, and the crossing location in some instances is different from the Railway, there will be locations where a bridge along the Railway will be matched by a culvert along the road. In many locations the culvert for the access road will be an extension of a culvert needed for the Railway and will be cut back to the desired length when the access road is decommissioned.

As much of the road(s) as possible will be constructed during winter to avoid disturbing bird nests. In general, roads will be constructed to avoid cuts on thaw sensitive ground. No major diversions of water courses are required for construction of any of the roads for the Project. In some locations, to channel sheet flow, a channel may be excavated and water diverted through culverts under the roads. Soil spoils may be generated during road construction. This material will be re-used nearby as general fill if suitable, or will be disposed of in roadside borrows. Borrows will be reclaimed to provide stable side slopes and restore natural drainage. Water may be used for dust suppression, and this water may be derived from stormwater or treated sewage effluent provided the water quality meets applicable water licence standards.

2.5.8 Temporary Airstrips and Air Traffic

Air access for workers and materials for railway construction will be via the airstrips at either the Mine Site or Steensby Port, and possibly from small temporary airstrips suitable for the landing and take-off of small aircraft such as Twin Otter aircraft. The small temporary airstrips may be constructed by widening small portions of the construction access road near each construction camp. Exact locations of these small temporary airstrips will be determined during construction.

2.5.9 Aggregate Sources

The aggregate is needed to construct both the construction access road and the railway embankment will be derived mostly from rock derived from quarries and to a lesser extent cobbles and boulders.

Ongoing identification and verification of quarries have identified 63 potential quarries to date (Figure 3- 2.4). Quarry locations and bounds have been screened against environmental constraints such as a 500 m buffer from known raptor nests, and a minimum 30 m setback from watercourses. The results of this screening exercise is presented in Appendix 3D.

Some of these quarries have undergone geotechnical site investigations, and additional work will confirm the sites to actually be used and the estimated volumes and the boundaries to be quarried. Existing results of geochemical testing for acid rock drainage and metal leaching, (see the geochemical evaluation report in Volume 6, Appendix 6B-3) have not identified any materials that are expected to generate acid or leach metals. The tested and untested quarries will be subject to additional geotechnical and geochemical investigation as the Project proceeds. Preliminary access road locations and quarry bounds are shown on the access road and quarry access road drawings in Figure 3-2.4. Expected quantities of aggregates are presented in the Borrow Pit and Quarry Management Plan (Appendix 10D-6).

2.5.10 Explosives Storage and Use

A large quantity of explosives will be required to quarry rock for the construction access road and railway embankment, for rock cuts and the two tunnels to be excavated alongside Cockburn Lake. Explosives for Railway construction will be sourced from the bulk emulsion plants at the Mine Site and Steensby Port. Magazines will be located along the Railway, most often within former quarries no longer being used. The magazines will be positioned and bermed as required to meet applicable government storage requirements. Refer to Section 2.1.9 for the overall Project explosives management approach.

2.5.11 Construction Camps and Related Facilities

Railway construction camps will be located at the following locations (all distances are kilometres along the railway route from the Mine Site):

- Ravn River area (km 35) - 200 person camp;
- Mid-Rail area (km 55) - 200 person camp;
- Cockburn Lake tunnels area (km 105) - 100 person camp; and,
- Cockburn South Camp (km 125) - 400 person camp.

The location of these camps, distributed along the length of the Railway, is shown on Figure 3-2.4 and Figures 3-2.5 to 3-2.8. These camps will be established once the construction access roads reach these areas, and will likely operate at some level of occupancy for the remaining duration of the construction phase. The occupancy numbers provided above are expected peak occupancies.

Each of the camps is expected to be trailer style and will be equipped with modular power generators. Water treatment will consist of chemical treatment followed by settlement, filtration, polishing and chlorine or ultraviolet disinfection, with treated potable water stored in insulated and heat-traced water storage tanks. Only the Mid-Rail camp will have a dedicated sewage treatment plant. Sewage at the Ravn River camp will be collected and trucked to the Mine Site WWTF, and sewage from the Cockburn camps will be trucked to the Steensby Port WWTF. Combustible wastes generated at each of the construction camps will be either incinerated on-site or trucked to the Mine Site for incineration. Inert waste will be trucked to the landfill sites at either the Mine Site or Steensby Port. Hazardous wastes generated from Railway construction will be stored at the Steensby Port and taken offsite by sealift to licensed disposal facilities in the south. Communications between the construction camps and other Project sites will be provided by the use of temporary satellite communications (satcom) systems. Specific details about each camp including siting considerations are provided below.

Ravn Area Camp

This camp will support construction of the major bridge crossing over the Ravn River as well as the Railway in this general area. This area is characterized by rolling terrain of large deposits of glacio-fluvial deposits spotted by small, shallow lakes that have made identification of a suitable water supply and receiving water for sewage difficult. The nearby Ravn River freezes to the bottom. The lake to the immediate north of this camp (Figure 3-2.9) has been identified as the tentative water supply for this and possibly the Mid-rail area camp, subject to bathymetric survey, with an intake structure installed in the source lake (Appendix 3C). Alternatively, water will be taken from the main water source at the Mine Site (Camp Lake). In the absence of a suitable receiving waterbody nearby, treated sewage will be trucked to the Mine Site for treatment. A relatively large area of laydown will be established at this camp location (about 29,000 m^2).

Mid-rail Camp

An existing 40-person drill camp at this location will be expanded to accommodate a portion of the Railway construction workforce. This camp will minimize travel distances between the Ravn River area camp and the camps further south at Cockburn Lake. The general area throughout this section of Railway is flat, wet and uneven, and full of boulders. Lakes are generally small and shallow, providing few options for ideal siting of a camp. Therefore the existing drill camp is proposed to be used as the Mid-rail Camp. Its advantages include an existing footprint of disturbance and an adequate water supply source, despite being located several kilometres from the railway alignment and construction access road. Water will be drawn from the adjacent lake through a temporary intake structure and treated. Sewage will be treated in an RBC treatment facility followed by sand filtration and year-round land discharge to a nearby drainage system. In winter, a frozen mass of ice will accumulate, gradually thawing in the spring to be released during freshet.

Cockburn Tunnels Camp

Excavation of the two tunnels along Cockburn Lake will take a specialized team approximately one year to complete. In the absence of sufficient area for a camp lakeside, this camp will be located on the plateau above the worksite. The ground in this area is extensive exposed bedrock with water channelled in crevasses. Water will be derived from Cockburn Lake, either by a dedicated intake pipeline or by trucking water from the larger camp to the south. Sewage will be collected in holding tanks and trucked to the Steensby Port WWTF. While this camp may be required for about one year for tunnel construction, the camp will continue to be used in constructing the railroad north of the tunnels in order to minimize travel times for the construction workforce.

Cockburn South Camp

This is the largest of the camps. The camp will be located on an outwash plain next to a stream that flows into Cockburn Lake. The camp water supply will be drawn from an upstream location on Cockburn Lake (water intake structure presented in Appendix 3C). Sewage will trucked to Steensby Port for treatment. A large laydown area of approximately 39,000 m^2 will be provided.

2.5.11.1 Fuel Storage and Distribution

The primary fuel storage facilities for railway construction will be located at the large tank farms at the Mine Site and Steensby Port. Temporary tank farms, consisting of multiple 20,000 L capacity double-walled iso-containers within lined containment, will be established at construction camps, quarries and major bridge sites. These iso-containers will be re-supplied using tanker trucks. Equipment at the railway construction fronts will be refuelled using smaller fuel trucks. Refer to Section 2.1.8 for a description of the overall Project fuel storage and distribution facilities.

2.5.11.2 Laydown Areas and Shops

Shops and office facilities to support railway construction will include:

- Mine Site - Office, shop and welding shop, aircraft receiving, maintenance office and dry shack and warehouse.
- Construction camps - Warehouse / shop and maintenance office and dry shack.
- Steensby Port - Office, main shop, maintenance office and dry shack, welding shop and warehouse.

In addition to the laydown areas at each of the construction camps, smaller laydown areas will be established at small bridges (about 1,500 m^2) and large bridges (about 4,000 m^2).

2.5.11.3 Emergency Shelters

Emergency shelters consisting of up to four mobile trailer camps, will be positioned at strategic locations along the construction access road and relocated as appropriate throughout the construction period.

2.6 STEENSBY PORT - CONSTRUCTION PHASE

2.6.1 Overview

Facilities at Steensby Port will be located on the mainland as well as nearby Steensby Island in Steensby Inlet (Figure 3-2.9). Construction at Steensby Port will include a longer site capture phase than at Milne Port, owing to more difficult ground conditions that result in limited pre-existing laydown area, difficulty in accessing quarry sites and the absence of an airstrip to mobilize a large workforce at the onset. To address this, Baffinland plans to pre-position about 30,000 m^3 of sand and gravel on a barge at the Steensby Port prior to the start of construction. The barge containing sand and gravel will overwinter in the ice, so that at the start of construction the fill can be used to establish equipment access from the sealift beach to the first quarry to be developed.

Development of this initial quarry will, in turn, allow for the establishment of access roads and laydown areas to receive the very large volume of equipment, materials and fuel that will be delivered by sealift in the open water season of Year 1 of construction, and for access to additional quarries to construct the airstrip. Construction and use of the airstrip is described in Section 2.7. Site capture, involving the establishment of basic infrastructure (i.e., camps, airstrips, docks, etc.) to allow full construction to proceed, will take an estimated 6 to 9 months.

Concrete caissons, to be built into temporary docks for use during construction, will also be pre-positioned in the open water season before construction. Unloading of materials and equipment in Year 1 of construction can only be facilitated by the installation of these temporary docks early in the open water season in Year 1 of construction, prior to the arrival of major sealift deliveries.

Figure 3-2.9 shows the layout during the construction phase. Activities at Steensby Port during the construction phase will include:

- Build access road to initial quarry;
- Construct laydown areas, work areas, and access roads;
- Construct the airstrip, beginning with a starter airstrip;

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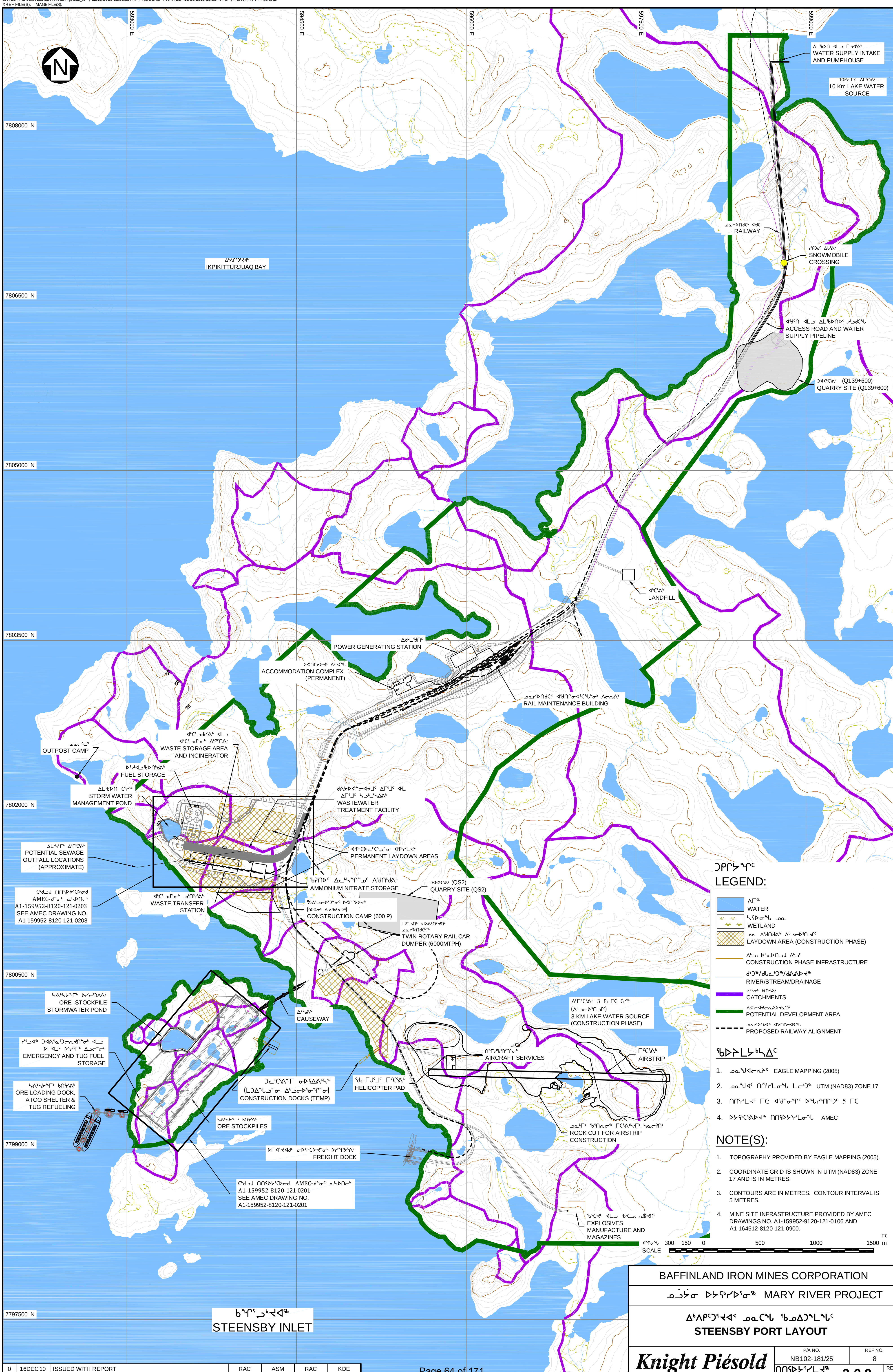

- Install construction docks on the island and mainland;
- Receive Year 1 of construction sealift deliveries of equipment and materials;
- Establish construction camps and related infrastructure;
- Construct the railway construction access road;
- Establish railway construction camps;
- Construct a concrete batch plant at Steensby Port; and,
- Build permanent port infrastructure, including permanent ore and freight docks, permanent accommodations, and railway/port ore handling facilities

Once the first local quarry has been established, additional roads, pads and laydown areas will be developed to receive the large volumes of equipment and materials arriving by sealift. Two temporary construction docks will be built, one on the mainland near the previous sealift landing and one on the island. A starter airstrip will be provided to receive the additional workers needed for construction.

Fuel storage and distribution facilities are described in Section 2.1.8, the explosives storage and handling facilities in Section 2.1.9, the waste management facilities in Section 2.1.10, and the communication system in Section 2.1.11. Airstrip construction and use is described in Section 2.7.

Efforts have been made to make the Steensby Port site as compact as possible, and to ensure that construction areas overlap with the same lands to be used during the operation phase.

2.6.2 Siting Considerations

The siting objectives for the Steensby Port infrastructure are similar to the Mine Site, i.e.:

- Limit environmental effects;
- Provide a safe working facility;
- Reduce the amount of earthworks;
- Provide efficient heat recovery from power plants;
- Provide attractive and effective living accommodation for employees; and,
- Minimize the distance between the accommodation area and work areas to maximum practical extent.

The location of important archaeological resources has had a considerable bearing on the location of port infrastructure. Several years of archaeological surveys have identified a number of archaeological sites, some of which have been deemed significant due to the age, condition or their uniqueness in the currently limited regional archaeological record. A major reconfiguration of the Steensby Port layout was undertaken following the 2008 archaeological field program to avoid those areas expected to be archaeologically significant. As construction at the Steensby Port proceeds, final detailed archaeological surveys will be carried out within the revised site layout, sites within the Project footprint will be documented and mitigated as necessary through excavation and systematic data recovery. Nearby archaeological sites outside of the Project footprint will be protected to restrict access into these areas and/or mitigated as necessary.

The ground conditions at the Steensby Port site consist of exposed rock or bedrock relatively close to the surface. As a result, foundations for the majority of structures will be founded directly on rock. For facilities that cannot be located on rock, short rock socketed steel piles will be used.

2.6.3 Port Facilities

The design of port facilities has incorporated numerous precautions to address the construction and operation of port facilities in the arctic. These precautions are described in the following subsections of Sections 2.6.4 and Section 3.6. Examples of precautions include:

- The concrete plant will be winterized;
- The dock design uses caissons instead of a solid structure to allow brash ice to accumulate between the caissons and help ice to move past the dock structure;
- Bathymetric work has been carried out to confirm a safe and operationally-practical route to deal with ice conditions;
- An ice study and marine assessment were carried out to support the selection of Steensby Port as a port location, to define shipping lanes and determine the ice class of the vessels;
- Ore will be shipped to markets on icebreaking carriers;
- Ballast water to be discharged from vessels will be warmed through heat recovery;
- A bubbler system will be installed around the dock;
- Ice -reinforced tugs will be available to break up ice, load it into ice crushers and move it away from the port;
- The freight dock has been located not only to avoid important archaeological resources, but also to provide for improved ship navigation in the expected ice and wind conditions;
- Treated potable water will be stored in an insulated and heat-traced water storage tank;
- The water intake will be located below surface and will be pumped through a heat traced pipeline and a small freeze protection pump will keep water moving if the heat trace system fails; and,
- Elevated corridors/utilidors will provide access corridors for personnel and contain heating services, piping and electrical trays/conduits.

2.6.4 Construction Docks

To provide rapid and efficient unloading of a large volume of equipment and materials at Steensby Port early in the construction phase, two construction docks will be installed during the open water season in Year 1 of construction (Figure 3-2.9). One dock will be situated on the island to facilitate construction of the ore dock and ore handling systems, and the other on the mainland to support all other construction activities at Steensby Port.

The docks will be constructed by placing a concrete caisson out into the water, and backfilling a ramp or causeway to the caisson. Concrete caissons will have been mobilized to Steensby Port during the previous open water season. A level pad will be prepared for the caissons by placing aggregate, the caissons will be moved into place and ballasted (backfilled) with local aggregate. The ramp to the caissons will be constructed by placing and compacting local aggregate. Appendix 3E presents drawings of the two construction docks at Steensby Port in plan and cross-section.

The docks will allow barges and shallow draft ships to go dockside and mobile handling equipment and cranes to operate from the dock. At the end of construction, the ballast will be removed from the caissons and the caissons removed for re-use at another location or disposal on land. The ramp will be left in place permanently, adding structure to the seabed and improving fish habitat.

2.6.5 Aggregate Sources and Concrete Production

Quarry materials, including rock, sand, and gravel, will be required for construction of the Steensby Port including the airstrip, as well as the Railway. Lists of aggregate sources, locations and estimated in-situ volume requirements is presented in the Borrow Pit and Quarry Management Plan (Appendix 10D-6). Proposed quarry sites at Steensby Port are shown on Figure 3-2.11. At Steensby Port, local bedrock knolls will be initially quarried to establish basic roads and laydown areas, starting with QS2 and QS3 (Figure 3-2.9). The bulk of the aggregate for construction at the Steensby Port will come from the cut and fill operations needed to produce a level site.

A winterized concrete batch plant will be set up and operated at Steensby Port to manufacture concrete for foundations and footings at the port site. Volumetric concrete trucks will be used for initial concrete mixing and delivery until the concrete batch plant is operational. Subsequently, the volumetric concrete trucks will be utilized for remote concrete pours, as required.

2.6.6 Construction Camps and Related Facilities

A construction camp will be installed at a central location at Steensby Port early in construction. The camp will consist of hard-shell trailers connected together, serviced by piped potable water, sewage treatment facilities, and modular mobile power supply. The camp will be delivered to Steensby Inlet in Year 1 of construction. The camp size and estimated workforce at Steensby Port are provided in Table 3-1.1.

2.6.7 Water Supply

Water will be used for the following activities at the Steensby Port during construction:

- Potable (drinking) water;
- Geotechnical drilling;
- Aggregate washing;
- Concrete manufacture;
- Explosives truck wash and explosives manufacture;
- Dust suppression (summer season only);
- Hydrotesting of fuel storage tanks; and
- Other miscellaneous camp uses (small relative volume) such as emergency water supply (fire fighting systems) and steaming of culverts prior to freshet.

The estimated daily and annual consumption of the above water uses during the construction phase, as well as the proposed water source are presented in Appendix 10D-2. Water for the Steensby construction camp will be initially obtained from a small unnamed lake dubbed "3-km Lake" (Figure 3-2.9), where the current seasonal drill camp obtains its water. A standard water supply intake structure will be installed at this location to draw water year-round, and an insulated pipeline will run overland to the camp. This lake will be sufficient to meet the growing demands of the early construction camp.

Once an access road has been constructed, a larger unnamed lake called "10-km Lake" will be accessed for the potable and industrial uses listed above. An intake will be installed in the lake at the location shown on Figure 3-2.9 and an insulated pipeline will be installed alongside the road. The intake will be equipped with a screen to prevent fish entrainment in accordance with Department of Fisheries and Oceans guidelines (DFO, 1995). The potable water supply system during construction will consist of a pump house, an insulated steel raw water pipeline and potable water storage tanks. Water treatment will consist of chemical treatment followed by settlement, filtration, polishing and chlorine or ultraviolet disinfection. Treated potable water will be stored in an insulated and heat-traced water storage tank sized to meet the peak requirements. "10-km Lake" is a large lake that has sufficient capacity to supply all potable and industrial water requirements during both the construction and operation phases. In some cases, water used to hydrotest (leak test) the fuel storage tanks may be drawn from the ocean.

2.6.8 Power Supply

Temporary power will be provided through modular gensets in shipping containers, until the centralized power plant is built for the operation phase. The future power plant building will be connected to the accommodation complex through an utilidor. The estimated demand and number of diesel generators are provided in Table 3-1.1.

2.6.9 Wastewater Treatment

Sewage from the construction camp, as well as the future permanent camp, will be treated using RBC wastewater treatment followed by sand filtration and discharge to the ocean via an outfall that is directionally drilled through the bedrock to a point north of the Steensby Island with a water depth of at least 35 m, so that the effluent will mix well within the water column. The approximate proposed location of the sewage outfall is shown on Figure 3-2.9. Estimated sewage volumes are provided in Table 3-1.1. The effluent will be treated to meet effluent requirements for discharge to marine waters.

2.6.10 Ore Dock

The location of the ore dock is shown in Figure 3-2.9. The ore dock will consist of a dock structure on discrete caissons, connected to Steensby Island by a trestle on caissons. Drawings of the dock design in plan and profile are presented in Appendix 3E.

The dock will be constructed by blasting and dredging level pads for each of the caissons, placing and backfilling the caissons, and completing the dock superstructure and a trestle to the island. Levelling the seabed at the -25 m contour through blasting and dredging will involve eventual removal of approximately 104,000 m^3 of material. Dredged materials are likely to be contained on barges until used as backfill. Concrete caissons will be floated into place and then backfilled with dredged and excavated materials as well as local aggregate. No disposal of dredged material will be required.

In-water blasting will be carried out by an experienced contractor following a blasting plan to be developed and filed with the Department of Fisheries and Oceans, meeting their published overpressure guideline of 100 kilopascals (KPa) (Wright and Hopky, 1998). In-water blasting will likely be carried out during late winter with ice cover, as marine mammals present will be limited to ringed seals reducing disturbance to marine wildlife. Winter blasting will also ease the construction schedule. The approach to in-water blasting will likely involve the following activities and steps:

- Drilling the blast holes from the ice during late winter;
- Divers installing the charges and blast decks under ice;
- Using a sonic device to repel the seals, possibly in combination with harvesting of seals in the immediate area by local Inuit hunters;
- Divers installing a bubble curtain around the blast area;
- Additional use of the sonic device or another deterrent to scare fish from immediate area prior to activating the bubble curtain; and,
- Initiating the blast sequence.

Because blasting will be preferentially carried out during ice cover, but removal of the material will only take place during the following open water season, it will be necessary to over-blast up to 1 m deeper than the target elevation to be certain the required elevation is achieved during the blasting.

The design and location of the dock has changed since the Development Proposal (Baffinland, 2008b). The original dock was a sheet-pile design built against the outer Steensby Island. A review of alternative dock locations and dock designs was subsequently undertaken to arrive at the proposed ore dock design and location (Section 6). The preferred location will minimize the amount of in-water blasting required during construction due to its design. In addition, locating the dock on the rocky knoll has eliminated the need to blast high spots along the approaches and departures to the dock. A key operational benefit of the discrete caisson design is that more space is provided to accommodate for ice that will accumulate during ice-breaking operations, compared to a solid straight face type structure.

2.6.11 Freight Dock

A freight dock to support the Project during the operation phase will be constructed at the location shown on Figure 3-2.9. The freight dock will allow for the safe and efficient unloading of the large volumes of fuel, ammonium nitrate to manufacture explosives, and other consumables and replacement equipment to be delivered each year of operations.

The freight dock will be constructed by installing a row of four caissons for the dock face and backfilling behind the caissons to provide a large dock for turnaround of equipment. The dock will be constructed by placing fill to form level pads for each of the caissons, placing and backfilling the caissons with locally quarried aggregate, and completing the dock superstructure and backfilling the land side. Unlike the ore dock, construction of the freight dock will not involve underwater blasting.

The dock will have a minimum draft of approximately -13 m below the low water level. In addition to a large working area for vehicles and cranes for off-loading, a fuel off-loading manifold will be located on the dock to allow for dock to shore fuel transfers.

The design and location of the permanent freight dock has changed since the Development Proposal (Baffinland, 2008b). The original dock was to be located near the entrance to Ikpikitturjuaq Bay to the north of Steensby Port but was relocated to the current location to avoid important archaeological resources that were identified during the 2008 archaeology field program. The preferred location also has technical advantages in that ice and wind conditions are better for ship navigation than the original location.

2.6.12 Crossing to Island

A combination bridge-causeway structure will be constructed to provide the necessary link between the ore dock, stockpiles and ship loading facilities on Steensby Island, and all other infrastructure on the mainland. The crossing structure will support conveyors that will move ore from the railway car dumper to the ore stockpiles on the island. The structure will also allow for the movement of vehicles between the island and the mainland.

A drawing of the proposed structure is attached in Appendix 3E. The crossing structure will be built from both directions by placing fill that is appropriately sized to withstand ice loading. Construction of the causeways will take place during the open water season, and no blasting will be required during its construction.

2.6.13 Site Roads

Site roads will be constructed using aggregate from locally quarried and crushed rock. Most of these roads (with the exception of the road to the water supply intake in 10-km Lake) will be integral to the Railway or will be decommissioned early in the operation phase. Traffic along roads will be managed in accordance with the Road Management Plan (Appendix 10-U). Roads will be constructed as described in Section 2.5.7.

2.6.14 Laydown Areas and Shops

Laydown areas have been identified at various locations at the Steensby Port where future infrastructure will be located (Figure 3-2.9). A total of about 70 ha of laydown area has been identified on the mainland and 4.5 ha on the island. Because of the typically wet and soft ground conditions up to one metre of crushed rock will be placed within the proposed laydown areas.

2.6.15 Ore Stockpile

An ore stockpile will be provided for temporary storage of ore waiting to be loaded onto ships. A 1.5m min. thick granular pad will be constructed on top of bedrock to support the ore stockpile. The permafrost has been assumed to extend into this layer. Infiltrated water from the ore will reach this frozen layer and work its way out to the edges. A lined ditch will be constructed along each stockpile perimeter to collect this water and monitor and treat as necessary to meet effluent discharge requirements. A conceptual drawing of the stockpile and associated water management structures is presented in Appendix 3E.

2.7 AIRSTRIPS AND AIR TRAFFIC

Due to the remote location of the site relative to the workforce, and initially the lack of transportation infrastructure, movement of mainly people as well as supplies will be important throughout the life of the Project. A description of Project airstrips and traffic is provided below. Regional air traffic patterns are shown on Figure 3-2.10, and estimated air traffic is provided in Table 3-1.1.

Milne Port

The existing 850 m long gravel airstrip at Milne Port will be reoriented from a north-south direction to a north-northwest to south-southeast direction and will be lengthened to 1,200 m. The airstrip will be maintained through the life of the Project. The Dash-8 aircraft is the basis of the airstrip design and this aircraft or similar will be used during the construction phase. During the operation phase, with the Milne Inlet Tote Road fully operational, it is expected workers will be flown to the Mine Site and bussed over the road. A helicopter pad located near the accommodation complex will provide emergency use.

LEGEND:

- COMMUNITY
- EXISTING TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- 737 FLIGHT
- DASH-8 FLIGHT
- SMALL FIXED-WING AIRCRAFT (DURNIER, TWIN OTTER, CARAVAN, ETC.)
- HELICOPTER

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA DEPARTMENT OF NATURAL RESOURCES (2009.) ALL RIGHTS RESERVED.
2. CO-ORDINATE GRID IS IN METRES. DATUM:NAD83 PROJECTION: UTM ZONE 17

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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

PROJECT AIR TRAFFIC PATTERNS

Knight Piésold CONSULTING

P/A NO. NB102-181/25 | REF NO. 8

FIGURE 3-2.10 | REV 0

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The airstrip, if not used to transport personnel and materials, will be maintained for emergency purposes throughout the operation phase. The estimated air traffic is provided in Table 3-1.1.

Mine Site

The airstrip at the Mine Site will be a primary air access point throughout the Project life. Due to the number of operating personnel at the mine and the requirement for year-round accessibility by air, the existing gravel runway will be upgraded to accommodate jet aircraft (Boeing 737 – 200) and L-382 Super Hercules turboprop aircraft. The existing airstrip will be extended from 1,600 m in length to 2,000 m with a graded area consistent with the dimensions detailed in the Aerodrome Standards and Recommended Practices document (Transport Canada, 2005). Additional fill will be placed to build up the runway surface. Surface watercourses that would otherwise traverse the runway will be diverted and routed through culverts around the end of the airstrip to avoid problems of thermal degradation. These diversions around the ends and away from the airstrip will be placed sufficiently far away from the embankment fill to prevent settlement problems. Diverted waters will be discharged into their respective watersheds. The existing temporary airstrip lighting will be replaced with upgraded lighting that will include: runway and taxiway edge, threshold/end (Category 1), approach (two approaches Category 1), and apron lights. Aircraft warning, obstruction, runway and approach lighting will conform to the requirements of Transport Canada.

Parking, loading, unloading and other services will be developed within the apron area. The Boeing 737 airplanes regularly servicing the site will not normally re-fuel at the Mine Site and will instead refuel in Iqaluit. No large fuel storage will be provided at the airstrip. Jet fuel for fixed wing aircraft, when required, will be provided by fuel truck. De-icing facilities at the airstrip will consist of a portable discharge unit for application of the de-icing fluid. De-icing will be carried out in a defined area to the side of the runway using propylene glycol, a biodegradable fluid which requires no treatment. A polymer will be used as a dust suppressant on the airstrip as needed. Accident reporting with respect to air traffic will follow procedures in the Emergency and Spill Response Plan, Volume 10, Appendix 10C-1.

Estimated air traffic during construction is provided in Table 3-1.1. Dash 8 flights will transport personnel to and from surrounding point of hire communities. Only personnel and no goods will be transported in these aircraft. Personnel will be flown from the Mine Site to Milne Inlet and Steensby Port via helicopter and/or Dash 8 aircraft.

Helicopters will also be used for ongoing exploration activities, geotechnical drilling along the railway route and for environmental monitoring and archaeological activities. One to three helicopters will be in use daily during the summer and as needed during the winter.

Regional air traffic patterns (flight impact zones) are shown on Figure 3-2.10. A zone of influence has been delineated at the Mine Site that encompasses lower level helicopter traffic between the camp and drilling sites, where achieving the minimum flight altitude is not possible, and also including the approach and take off of fixed-wing aircraft at the airstrip.

The following commitments have been made with respect to air traffic:

- The number of flights will be minimized;
- A 610 m flight altitude minimum; 1,000 m near concentrations of birds will be maintained;
- Caribou calving grounds will be avoided between May 15 and July 15. After July 15, post calving areas known to have aggregations of caribou will be avoided;

- Large concentrations of wildlife, (i.e., Migratory Bird Sanctuaries, breeding colonies and caribou calving grounds), will be avoided and alternate routes will be taken;
- Routes that are likely to have least occurrences of wildlife will be planned;
- Small aircraft rather than large aircraft will be used when possible;
- Hovering or circling will be avoided to the extent possible;
- Fixed-wing aircraft rather than helicopters will be used whenever possible;
- Pilots will be informed of the wildlife sensitive areas; and,
- Pilots will be required to report caribou movements and locations during calving and post-calving periods, so that these areas can be avoided.

Steensby Port

To facilitate port re-supply and personnel transportation, Steensby Port will include an airstrip capable of supporting Code C aircraft such as the Boeing 737-200. This will require an airstrip with proposed dimensions of 1,830 m long by 45 m wide, which will be designed to operate on a 24 hour a day, year-round basis, weather permitting. Prevailing westerly and north-westerly winds mandate an airstrip oriented in an approximate west or northwest to east or southeast to minimize take off and landings being affected by cross winds. To accommodate helicopter travel to and from the site a helipad will be established adjacent to the airstrip. Helicopters will be in use for geotechnical drilling along the Railway and for environmental monitoring.

Surface watercourses that would otherwise traverse the runway will be diverted and routed through culverts around the end of the airstrip to avoid problems of thermal degradation. These diversions around the ends and away from the airstrip will be placed sufficiently far away from the embankment fill to prevent settlement problems and will be routed into their respective watersheds. In addition, two ponds will be filled to accommodate the airstrip.

The airstrip design will comply with all relevant Transport Canada standards and recommended practices. The airstrip will be equipped with edge lighting, runway end, threshold lighting and Precision Approach Path Indicator lights. Omni Directional Approach Lighting Systems will be installed at both ends of the runway. Parking, loading, unloading and services will be conducted within the apron area. Aircraft will be refuelled directly from a tank truck. De-icing facilities, provided at the airstrip, will consist of a portable discharge pump for the application of de-icing fluid from 200 L drums. De-icing will be carried out to the side of the runway, with propylene glycol, a biodegradable fluid which requires no treatment.

Construction of the airstrip will involve cut and fill operations and development of a large quarry identified as QS3A. A starter airstrip for landing twin otter aircraft will be constructed first so that reliance on helicopters for workforce movements to and from Steensby Port can be minimized as soon as possible. Completing the full sized airstrip will be a priority in Year 1 to support movement of the full construction workforce at the port site and the southern portion of the Railway.

A polymer dust suppressant will be used on the airstrip as needed. Accident reporting with respect to air traffic will follow procedures in the Risk Management and Emergency Response Plan, Volume 10, Appendix 10C-1. Estimated air traffic is provided in Table 3-1.1. Regional air traffic patterns (flight impact zones) are shown on Figure 3-2.10.

SECTION 3.0 - PROJECT DESCRIPTION – OPERATION PHASE

3.1 OPERATION SUMMARY

The following major activities characterize the operation phase:

- Open pit mining of iron ore in Deposit No. 1;
- Crushing, screening and stockpiling of ore at the Mine Site;
- Loading of ore, railway transport of ore to Steensby Port, offloading to stockpiles;
- Loading of ore, truck transport to Milne Port, offloading to stockpiles;
- Loading of ore carriers (ships) at Milne and Steensby Ports;
- Shipping (including ice breaking) of the iron ore from Steensby Port to customers;
- Shipping during the open water season from Milne Port; and,
- Annual re-supply for operations by ship during open water to Steensby Port and Milne Port, Railway and truck transport of supplies from ports to the Mine Site.

The process flow of the ore production process for the railway operation, inclusive of the Mine Site and Steensby Port, is presented as Figure 3-3.1. The ore production process for the road operation is shown separately for the Mine Site and Milne Port on Figures 3-3.2 and 3-3.3. Mining and ore processing will occur at an established rate. Ore stockpiles at the Mine Site have been sized to consider the mining rate and the Road and railway schedules, including shut-down periods for extreme cold and repairs. The ore stockpiles at Steensby Port are sized according to the rate at which ships are loaded and considering that a portion of the annual ore production may be moved by non-project charter ore carriers during the brief open water season. Ore stockpiles at Milne Port are sized to store one years' worth of production from the 3 Mt/a operation.

All other ancillary activities, such as operating camps, the supply of consumables such as fuel, ammonium nitrate for explosives manufacture and other materials, will allow for mining and transportation facilities for the Project to operate effectively and reliably.

The Project will produce a nominal 21 Mt/a of ore for about 21 years, based on current ore reserves and areas under exploration in Deposit No. 1. Ore will be trucked to Milne Port for shipment during the open water season and, ore will be transported by rail to Steensby Port for year round shipping. The Project areas during operations are shown on Figures 3-2.1 through 3-2.9 in Section 2. Key project facts are summarized in Table 3-1.1.

3.2 MILNE PORT- OPERATION PHASE

During operations the Milne Port infrastructure will consist of:

- Ore Management Facility:
  - Ore stockpiles and conveyor systems;
  - Secondary screening plant; and,
  - Ore loading dock for Panamax ships.

- Port Site Facilities:
  - Freight loading/unloading dock;
  - Freight laydown area;
  - Sunken barge dock for barge traffic;
  - Power supply;
  - Communications system;
  - Service/administration/accommodation buildings;
  - Maintenance shop/main office;
  - Potable water treatment system;
  - Wastewater treatment system;
  - Tank farm;
  - Incinerator;
  - Airstrip;
  - Navigational aids as required by the Canadian Coast Guard; and,
  - Site roads.

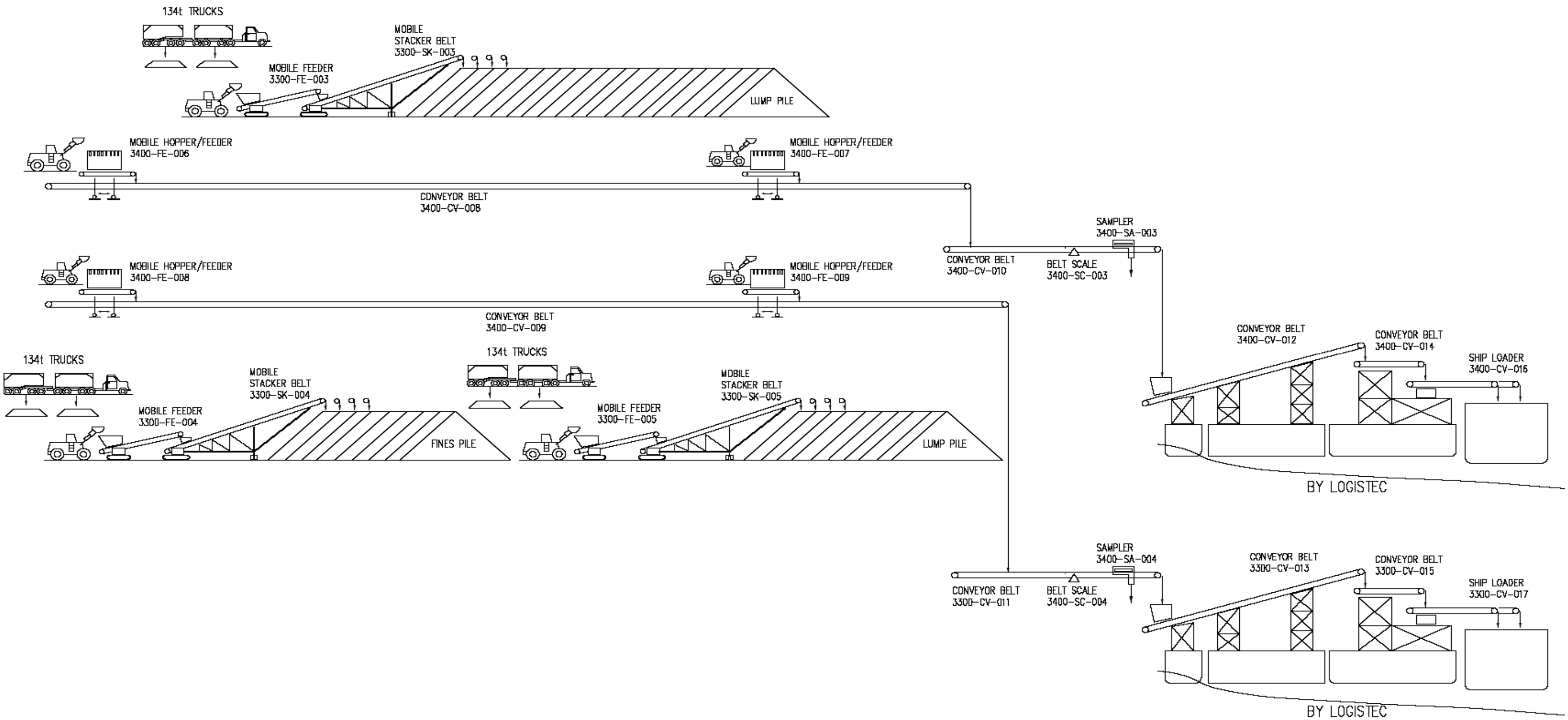
An estimated 3 Mt/a of ore will be transported from the Mine Site to Milne Port over the Milne Inlet Tote Road on a year round basis, with possible short breaks during significant weather events and when driving conditions are unsafe. The ore will be stored in stockpiles at Milne Port ready for loading onto ships and transport to customers during the open water season. Personnel for Milne Port will be airlifted into the Mine Site and transported to and from the Mine Site over the Milne Inlet Tote Road.

Most resupply sealifts for the Mine Site will be delivered to Steensby Port for transport over the Railway to the Mine Site. Fuel to support the trucking operation will continue to be delivered to the tank farm facility at Milne Port each year. Milne Port will likely continue to receive periodic sealift deliveries of oversized equipment (equipment that cannot pass through the tunnels on the Railway) during the operation phase on an as-required basis. The freight dock established during the construction phase will continue to be used. Freight will be handled from this dock unless size restrictions necessitate offloading equipment to barges delivery to the beach.

The camp, bulk fuel storage, and related facilities constructed and used during the construction phase will remain in place for the operation phase. The airstrip will remain fully operational during the operation phase. Estimated air traffic is provided in Table 3-1.1.

3.2.1 Ore Handling Operations

Ore handling operations consist of an ore stockpile, conveyors to transfer ore to the ore dock, and ship loading facilities at the ore dock.



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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

ROAD OPERATION PROCESS FLOW DIAGRAM
MILNE PORT

Knight Piésold CONSULTING

P/A NO. NB102-181/25

REF. NO. 8

FIGURE 3-3.1

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3.2.1.1 Ore Stockpiles

Ore stockpiles will be constructed at Milne Port to store both lump and fine ore (Figure 2-3.1). The total stockpile size will be 3 Mt. Construction of the ore stockpile area is described in Section 2.2.3.2.

Ore will be unloaded from the side of haul trucks onto a truck-unload-hopper and staked with front-end loaders onto the two stockpiles. Efforts will be made to minimise drop points on the stockpile. Minimal to no reclaiming will be required to ensure a consistent lump or fine mixture.

Runoff will be collected in lined ditches along the perimeter of the stockpiles and will report to stormwater management (SWM) ponds located on either side of the stockpile. Both ponds have been sized based on twice the mean annual discharge, and will operate seasonally because of the climate. Runoff will be treated in the east SWM pond and will be discharged via a pipeline to a ditch that drains to Milne Inlet (Figure 3-2.1). The predicted water quality of the stormwater runoff from the ore stockpile as well as preliminary treatment options are described in Section 3.4.4. A conceptual drawing of the Milne Port ore stockpile and associated SWM ponds is attached in Appendix 3A.

3.2.1.2 Ore Dock and Ore Handling Facilities

The ore dock will receive the ore carriers during the open water season. The design and construction of the ore dock is described in Section 2.2.5. Operationally, the ore dock design is based on the following criteria:

- Safe approach and departure routes for ships accessing the ore carrier berth;
- Safe berthing for the ore carriers with adequate water depth and moorings;
- Ship loading facilities for loading the ore carriers;
- Access to shore for conveyors, maintenance vehicles and operating personnel;
- Cost-effective construction and operation; and,
- No bunkering, fresh water or fuelling to be provided to the ore carriers.

The location of the ore dock is shown in Figure 3-2.1.

Lump and fine ore stockpiles will be loaded on shiploaders through mobile equipment (front-end loaders) and a conveyor. The conveyor will be covered and equipped with dust control equipment at all transfer points. Ships will be loaded at a maximum capacity of 3,000 to 5,000 tonnes per hour with minimal trimming of the cargoes. The shiploader will operate at an average rate of 2,000 to 2,500 t/hr for 20 hours per day, providing a daily capacity of 40,000 to 50,000 t depending upon the ship being loaded.

After the shipping season has concluded the barges will be moved to shore or to a safe designated area until the start of the following year's shipping season. Ore carriers will not be refuelled at Milne Inlet.

3.2.2 Shipping and Port Operations

Shipping to Milne Port will occur during the approximately 90-day ice-free period of July 15 to October 15. During the operation phase, the port will continue to be used to ship ore as part of the road operation, as well as for resupply. Ships will follow the nominal shipping route shown on Figure 3-1.1 within the Nunavut Settlement Area and will continue to two main destinations:

- Ore carriers will sail to the Project's customers ports (primarily Rotterdam / European Ports); and
- Sealift vessels will sail to and from a southern Canadian port for re-supply of materials, fuel and equipment.

Bathymetric work has been completed by the Canadian Hydrographic Service (CHS) throughout Eclipse Sound and Milne Inlet and is presented in CHS Chart 7212 Bylot Island and Adjacent Channels, produced in 1985 and corrected through Notices to Mariners 2006-03-31 (Canadian Hydrographic Service, 2006). The chart shows water depths in Milne Inlet ranging from 100 m to 400 m, with 50 m of water depth less than 50 m from shore at the head of the Inlet.

Milne Inlet has semi-diurnal tides. From August 2007 through to September 2007, the lowest tide ranged from 0.1 to 0.3 m. The highest tide for this period ranges from 2.2 to 2.4 m. The average maximum difference in tides during this period is 2.1 m (Department of Fisheries and Oceans, 2006). These tide height level fluctuations are low relative to some other parts of the Canadian coast, including the South Baffin Island which experiences some of the highest tides in the world.

There are no pilotage requirements applicable to the arctic. Nevertheless, as a prudent measure for safety and efficient operations, ore carriers arriving at Milne Inlet will be provided with ice pilots, and docking pilots will be used to shift the ore vessels from anchorages onto and off the dock. Pilotage services could be relaxed once experience has been gained operating the port.

Requirements for navigational aids are determined by the Canadian Coast Guard (CCG). It is not expected that any additional navigational aids will be required for shipping into Milne Port, since this an existing shipping lane that operators have navigated safely, although it is possible CCG could indicate otherwise.

3.2.2.1 Ore Shipment

Handymax (~50,000 DWT) to Panamax (~75,000 DWT) vessels will be chartered and operated by an established Canadian ship owner with extensive arctic shipping experience. An experienced stevedoring company will be used for loading the iron ore onto the and ore vessels. Approximately 70 effective ship loading days during the ice-free period have been assumed to be available. About 40 to 50 ore shiploads will be scheduled during this period. Ships will be scheduled to arrive every second day, with a ship arriving just prior to the completion of loading of the previous ship. Each round trip of a ship from Milne Port to a port in Europe is estimated to take 25 to 27 days.

Ore vessels arriving at Milne Port will either proceed directly to an open loading dock, or to one of the designated anchorages shown in Appendix 3A. A specialist contractor will be hired to provide marine services during the ice-free season. This contractor will act as harbour master and will be in charge of vessel traffic control, towage, line handling and berthing. A fleet of four tugs and a line boat will arrive at the beginning of the season and return south at the end of the season. From an anchorage an ore carrier will be assisted by two tugs and a docking pilot to berth at the ore dock. The two tugs will stand-by in rough weather and will assist vessel undocking. A second pair of tugs will bring the next vessel onto the ore loading dock; once the loaded vessel departs. The tug boats will be refuelled directly from the vessels delivering fuel to Milne Port. At the end of the season the tugs will assist in the de-installation of the floating loading dock and positioning them into their winter lay-by berths.

Shipping companies are responsible for compliance with Canadian regulations with respect to the type of fuel used by their vessels (Benzene in Gasoline Regulations, 1997; Contaminated Fuels Regulations, 1991; Gasoline Regulations, 1990; Fuel Information Regulations, No. 1, 1999; Sulphur in Diesel Fuel Regulations, 2002; Sulphur in Gasoline Regulations, 1999). The chartered vessels will comply with the requirements of the Arctic Shipping Pollution Prevention Regulation (ASPPR).

3.2.2.2 Sealift Re-supply Operations

Equipment and supplies for a full year of Project operation, including fuel, ammonium nitrate to manufacture explosives, and other consumables and replacement equipment, will be delivered during the open water season to either Milne Port, or Steensby Port (Section 3.6.3). Fuel to supply the road operation will be delivered by tankers as described in Section 2.1.8, and estimated fuel volumes are provided in Table 3-1.1. Recyclable and hazardous wastes will also be back-hauled to approved disposal facilities in the south. Conventional sealift vessels of 10,000 to 17,000 DWT capacity that operate in the area will be used. Both dry cargo ships and fuel tankers will dock at the freight dock in a reliably safe and efficient manner (drawings in Appendix 3A). The dock will have a minimum draft of -13 m below the low water level and a large working area for vehicles and cranes for off-loading and a small intermodal yard for container handling.

Goods will be stored in the Milne Port laydown areas for transfer to vehicles that will transport the goods to the Mine Site along the Milne Inlet Tote Road. Most goods will be transported in containers that will limit spills and facilitate transfer from ship to shore and transport to the Mine Site.

3.2.2.3 Ship Waste Management

The vessels will be equipped with a sewage treatment plant and an incinerator for solid and liquid wastes. All tanks containing oil or oily waste will be placed in a location in the ship that will keep them separated from clean areas. A diesel fired incinerator for incinerating oil waste and sludge from the sewage plant will be installed in the incinerator room on board. No untreated sewage will be discharged from the vessels. The vessels will not discharge effluent from treated sewage while in Milne Port. Inert and/or hazardous solid wastes will be stored and unloaded for disposal in approved facilities in southern locations.

3.2.2.4 Ballast Water Management

Ballast is water taken on in chambers of vessels mainly to stabilize sea-going vessels, by adding weight to the vessels and maintaining a certain draft (the depth a vessel sits in the water). Empty vessels take on much more ballast than a fully laden ship.

The Ballast Water Control and Management Regulations require ships have a ballast water management plan, and either exchange or treat their ballast prior to discharge in waters under Canadian jurisdiction (Transport Canada, 2010). Ships calling on Milne Port will operate in compliance with the regulations. The majority of the ships are expected to use ballast water exchange as the proposed method of ballast water management.

Ballast water exchange involves the exchange of ballast water (discharge of ballast and taking on new ballast water) in deep seas away from coastal zones, to limit the potential for foreign harmful aquatic organisms or pathogens to be released in Canadian waters where they may colonize. Ballast water will be exchanged in the mid-north Atlantic Ocean, which is part of the same ocean regime as Milne Port. Upon arrival at the port, the ore carriers will discharge ballast water to allow for filling the ship with ore. The ships can discharge ballast water before arriving at the dock so that only a partial load of ballast in the order of 70,000 m^3 will be discharged at the ore dock. The dispersion of ballast water has been modelled and results are reported in Appendix 8B-2.

3.2.3 Port Site Support Facilities

3.2.3.1 Port Site Buildings

The accommodation complex will consist of a combination of prefabricated modular units supported on pile foundations. The facility will accommodate personnel in two, two-story dormitory wings. A central core area will contain kitchen/dining facilities, recreational facilities and general service space. The accommodation building will be located near to the power plant, wastewater treatment facility and the water supply source. Waste heat will be recovered from the power plant to feed heat into the accommodation building via an utilidor.

3.2.3.2 Power Supply

A centralized power plant designed to service the entire port will be located near the accommodation complex. The estimated capacity and demand are provided in Table 3-1.1. The port power plant features will be similar to the Mine Site power plant as described in Section 3.4.4.2. The power plant building will be connected to the accommodation complex through an utilidor.

3.2.3.3 Corridors/Utilidors

Elevated corridors/utilidors will connect all buildings in the port area. Besides providing access corridors for personnel, they will also contain heating services, piping and electrical trays/conduits. Utilidors will be constructed with prefabricated modular units on a structural steel framing system and pipe piles.

3.2.3.4 Water Supply

The water supply system will be the same as during the construction phase, scaled down to manage the smaller capacity required during operation. Estimated volumes are provided in Table 3-1.1.

3.2.3.5 Wastewater Treatment

The port wastewater treatment system will be the modular system used during the construction phase, scaled down to manage the smaller capacity required during the operation phase.

3.2.3.6 Runoff Management

Runoff at the site will be managed in accordance with the Surface Water and Aquatic Ecosystems Management Plan (Appendix 10D-2). Runoff management associated with the ore stockpiles at Milne Port is discussed in Section 3.2.1.1.

3.2.3.7 Waste Management

Wastes will be managed in the same manner as during construction (Sections 2.1.7). Expected waste quantities are provided in Table 3-1.1. The Waste Management Plan is located in Volume 10, Appendix 10D-4.

3.2.3.8 Fuel Storage and Distribution

The tank farm established during construction will be used throughout the operation phase. The fuel system will distribute fuel to the following locations:

- Power plant;
- Heavy and light equipment fuel pumps;

- Incinerator building;
- Heating boiler building; and,
- Fuel trucks for transport to the Mine Site.

In addition to the tank farm, a number of day tanks will be located within and outside of the power plant, boiler building, at fuel dispensing stations for light vehicles, and the incinerator. The tank farm will contain bulk storage tanks for both unused and waste oil.

3.2.3.9 Ammonium Nitrate Storage

Ammonium nitrate (used for making explosives) will be securely stored in a storage facility located south of the freight dock at the location used during the construction phase (Figure 3-2.1).

3.2.3.10 Site Roads

Site roads established during the construction phase will remain in place during operations and will be maintained as outlined in Baffinland's Road Management Plan (Appendix 10D-8).

3.2.3.11 Communications

The communications infrastructure is described in Section 2.1.7.

3.2.3.12 Port Security

Port security will be managed as described in Sections 2.1.7.

3.3 MILNE INLET TOTE ROAD – OPERATION PHASE

3.3.1 Milne Inlet Tote Road Operation

During operations ore trucks will travel round trip between the Mine Site and Milne Port daily on a year round basis, conditions permitting. Workers starting or finishing their on-site rotations will be shuttled over the road to and from the Mine Site airstrip. The road will also be used to resupply the Mine Site and remove wastes, and for the occasional transport of oversized equipment. Estimated traffic is provided in Table 3-1.1. A maintenance shop for haul trucks and other mobile equipment will be located at the Mine Site and Milne Port to service equipment for the Tote Road operations.

Road operations during the operation phase will be similar to that of the construction phase, described in Section 2.3.5, including the use of a Material Management System, regular maintenance and inspections for safe operation, snow clearing, and the application of dust suppressants. Ore handling and spills response is included in the Environmental Health and Safety Management System in Volume 10, including the Emergency and Spill Response Plan (Appendix 10C-1). As described in Section 2.3.5, 120 t trucks will be used to haul ore to Milne Port. Photographs of a similar truck are presented on Figure 3-3.2.

The Road Management Plan (Appendix 10 D-8) will stipulate the rules of the road, including for example: the safe access and use by the public including hunters, limiting travel speed, yielding the right-of-way to wildlife, reporting wildlife observations, travelling in convoys for safety, emergency and spill response procedures, a safety policy addressing safe discharge of firearms near the road, truck traffic communications and a community notification and update process. The emergency shelters and emergency response measures established during the construction phase will remain in place.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

ROAD OPERATION
EXAMPLE ORE TRUCK

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FIGURE 3-3.2 REV 0

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3.4 MINE SITE - OPERATION PHASE

During the operation phase, the Mine Site will consist of the following infrastructure:

- Open pit mine and related facilities:

• Mine haulage roads;	• Primary crusher;
• Run of mine (ROM) ore stockpile;	• Secondary crushing and screening;
• Ore stockpiles (lump and fines) including stacker/reclaimer system;	• Stormwater management and treatment facilities
• Waste rock stockpiles;	• Explosives magazines and emulsion plant;

- Mine site support facilities:

• Power generating station;	• Water treatment system;
• Main office, service, administration and accommodation buildings including existing exploration camp;	• Wastewater treatment system;
	• Mine water treatment system;
	• Bulk fuel storage facilities;
• Warehouse and storage yard;	• Incinerator;
• Communications system;	• Landfill;
• Drill hole core storage;	• Railway line terminus and loading facilities;
• Airstrip;	• Truck loading facilities.
• Geological and environmental laboratories;	• Site roads and parking;
• Maintenance shop mine, equipment ready line and mine office; and	

A plan view of the Mine Site facilities is shown on Figure 3-2.3. Drawings related to the Mine Site facilities, runoff management, mine pit progression and waste rock management are presented in Appendix 3C.

Mining operations will include:

- drilling and blasting within an open pit to remove overburden and access the ore;
- loading of ore into mine haul trucks;
- delivery of the ore to a series of crushers and screens;
- movement (conveying) of the ore by conveyors to stacker/stockpiles; and,
- reclaiming of stockpiles for loading into railway cars and ore trucks.

These operations are described further below. Figure 3-3.3 present the process flow for ore handling at the Mine Site related to the road operation, and Figure 3-3.4 presents the overall process flow for ore handling for the railway operation at both the Mine Site and Steensby Port.

3.4.1 Open Pit Operations

Overburden will be removed by blasting and will be placed in the waste rock stockpile. The open pit will then be excavated using a conventional bench configuration with access via ramps, using conventional open pit mining equipment. Blast holes will be drilled, an explosives truck will deliver and dispense explosives into the holes, blast sequences will be established and the open pit cleared of all personnel, and the blasts detonated. Blasting at the open pit will be carried out using ammonium nitrate and fuel oil emulsion (ANFO) product manufactured on site.

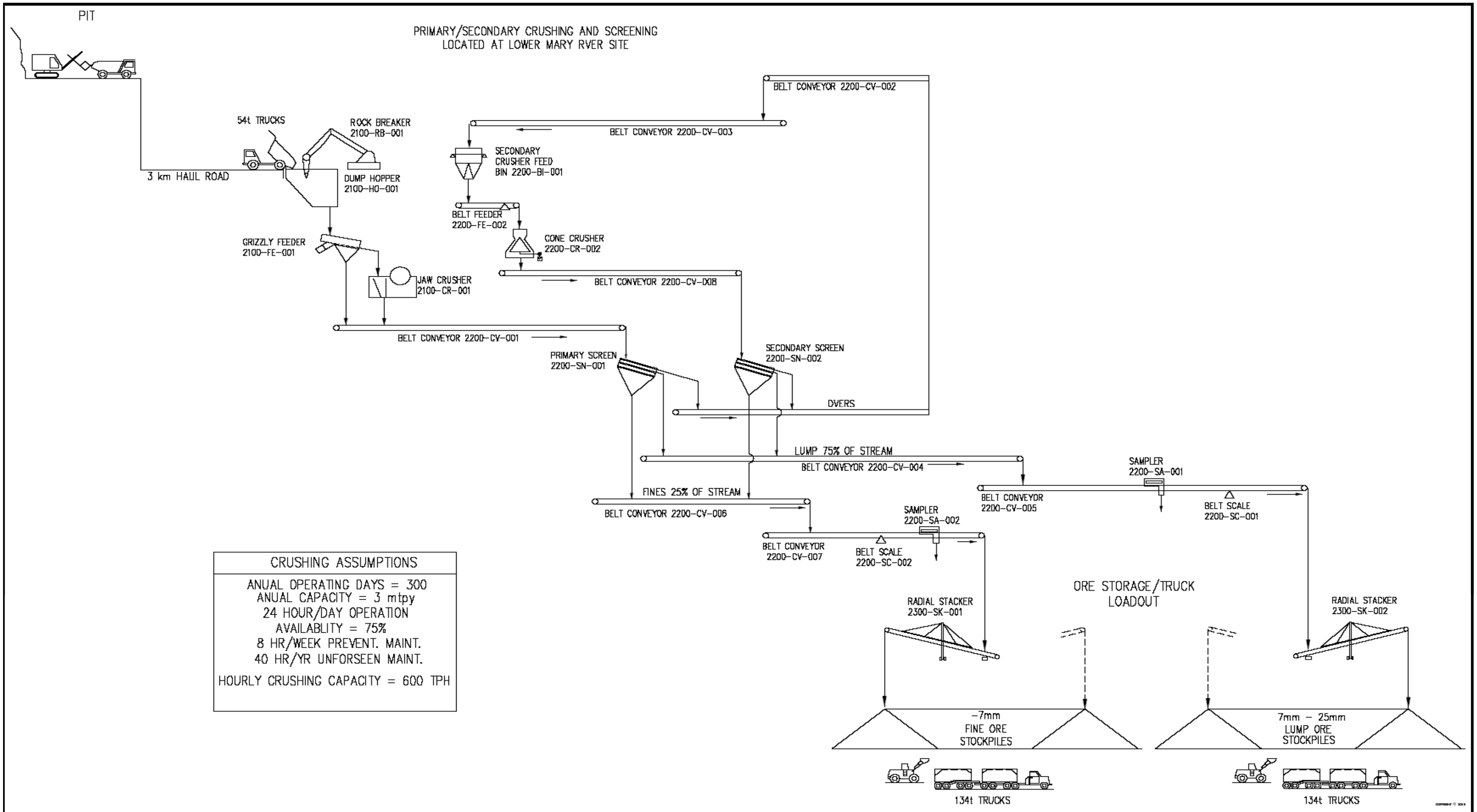
Diesel-hydraulic face shovels backed up by front-end loaders will load mine haul trucks to transport ore to the primary crusher next to the ore stockpiles for the road operation and to the run-of-mine (ROM) stockpile for the railway operation. Waste rock will be hauled to the waste rock stockpiles. Movement of vehicles within the pit will be monitored by a central dispatching system to ensure worker health and safety and operational efficiency.

Backhoe excavators will be utilized for general earthworks, snow removal, and limited mining activity where the larger equipment may have limited access. Wheel and track bulldozers will be used for cleanup around mining activities and for control of rock on the benches. Graders and water trucks will be used for main haul road maintenance.

Mining will generally occur in 15-m benches. The general dimensions of the final open pit are approximately 2 km in length, 1.2 km in width at its maximum, with a depth ranging from 465 m (northern side) to 195 m (southern side). Inter-bench pit slopes angles are expected to range from 60-70% with benching and interramp angles of approximately 45%. Final pit design will optimize stability, health and safety, and mineral economics.

Geotechnical investigations have included the drilling of a 400 m deep drill hole that was instrumented with thermistors along its length. The thermistors report ground temperatures at various depths within the hole. Extrapolation of temperature gradients with depth suggests that permafrost conditions (i.e., below zero degrees Celsius for two consecutive years) extend to approximately 610 m, well below the planned mine depths, even when climate change is taken into account. The geotechnical factors and geological characteristics (e.g. permafrost and related seasonal thawing and seepage conditions) considered in the design of the open pit, including ramps, high walls, slopes (with kinetic analysis of slope stability), as well as other features in the open pit are discussed in Volume 6, Section 2.

Water inflows into the pit are expected to be minor, consisting of shallow seasonal groundwater flows in the active layer that thaws each year and direct contribution from precipitation events. As necessary, snow will be removed by ploughing within the pit to access active mining areas. Inflow water during spring freshet may also require removal by pumping if water inflow exceeds expected volumes. Ploughed snow and pumped inflow water will be directed to the ROM stockpile. Runoff from the stockpile is directed to sedimentation ponds and treated as required and monitored prior to release to the receiving environment.



BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

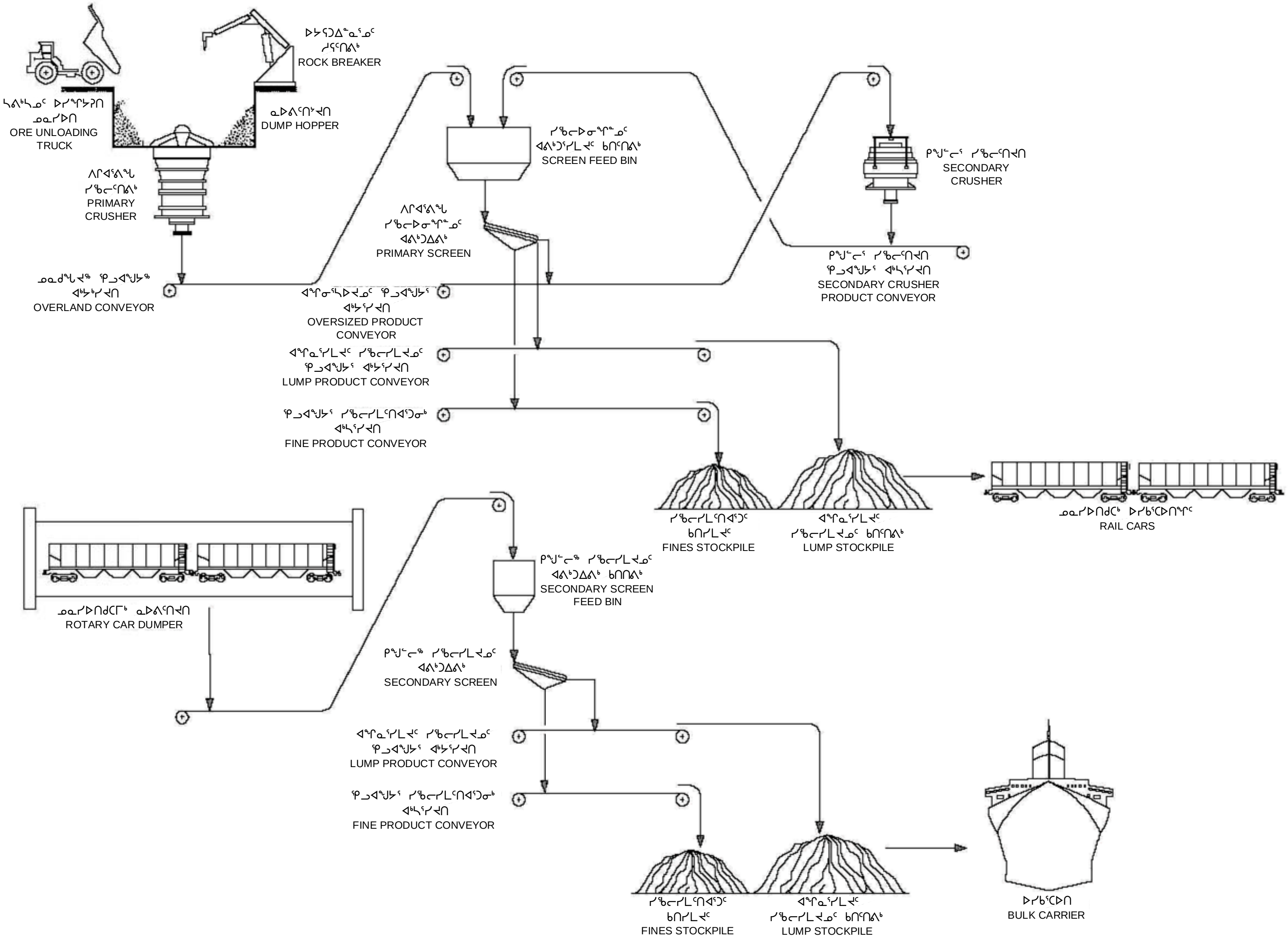
ROAD OPERATION PROCESS FLOW DIAGRAM
MINE SITE

Knight Piésold
CONSULTING

P/A NO.	REF. NO.
NB102-181/25	8

FIGURE 3-3.3 REV 0

0	16DEC'10	ISSUED WITH REPORT	CAD	RAC	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
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BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

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RAILWAY OPERATION
OVERALL PROCESS FLOW DIAGRAM

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/25	8

FIGURE 3-3.4 REV 0

3.4.2 Explosives Manufacture and Storage

Ammonium nitrate and fuel oil emulsion product (ANFO) will be manufactured on site for use in the open pit. The emulsion plant and magazines to support mining will have been built early in the construction phase to support construction (Section 2.1.7). The explosives facility will include:

- Bulk ammonium nitrate outdoor storage area;
- Bulk fuel area;
- Magazine for storage of detonators, detonating cord, boosters etc.; and,
- Emulsion manufacturing facility.

The explosives facility has been located to the north of the open pit at some distance from the rest of the Mine Site, as shown on Figure 3-2.3, in accordance with the regulatory requirements for safe storage of explosives.

3.4.3 Ore Crushing/Screening and Conveyance

The road and railway operations will have separate material handling processes (Figures 3-3.3 and 3-3.4, respectively). Ore supplying the railway operation will be brought out of the pit to a run-of-mine (ROM) stockpile, to feed a crushing and screening process train, with a dedicated lump ore and fine ore stockpile area equipped with rail car loading facilities. Ore supplying the road operation will be transported directly to the crusher using mine haul trucks.

Ore from the open pit or a ROM stockpile will be processed by crushing and screening, to produce lump product and ore fines to specifications required by the steel mills. The proposed location of the crusher system is shown on Figure 3-2.3. The primary objective of crushing is to maximize the production of lump product (less than 31.5 mm and greater than 6.3 mm), while at the same time, keeping the amount of ore fines (less than 6.3 mm) generated at a minimum, since lump product has a greater sale value. The processing plant includes a primary crushing station, a primary screening station, a secondary crushing station, and conveyors to transfer the ore to two distinct stockpiles.

The ore is then reclaimed from either stockpiles and loaded on the rail cars. The ore destined to be shipped from Milne Port is stockpiled separately.

The crushers and screens will be installed inside buildings to reduce dust and noise exposures. Material handling equipment, including reclaimers, stackers and conveyors will be installed outdoors. Conveyors will be covered and equipped with wind hoods to reduce wind exposure and the potential for ore fines to be blown off the conveyors. Dust collectors will be installed at transfer points and other required areas to limit fugitive dust emissions.

Dust suppression techniques may consist of spraying of dust suppressants to control fugitive dust in the open pit, mine access and haulage roads, ore and waste rock stockpiles. Conveyors will be covered and equipped with wind hoods and dust collectors will be installed at ore screening and crusher transfer points. The various steps of mining are described below.

3.4.4 Ore Stockpiles

Ore will be stored in a ROM stockpile located near the crusher or fed directly into the primary gyratory crusher. The capacity of the ROM stockpile is expected to be in the order of 400,000 t.

Following secondary crushing and screening, four other temporary ore stockpiles will be used for storing lump ore and fines for the railway operation, with an expected combined total capacity on the order of 1.4 Mt. A separate 500,000 t ore stockpile will serve the road operation.

Each stockpile will be constructed of a 1.5 m thick granular pad base with a lined perimeter ditch to direct runoff to a stormwater pond. Periodic maintenance of ditching may be required to account for the melting of ice lenses or other factors that reduce the integrity of the ditching side walls. Permafrost will limit downward migration of runoff beneath the ore stockpiles. Separate SWM ponds manage runoff from the 400,000 t ROM stockpile, the 500,000 t ore stockpile supplying the road operation, and the 1.4 Mt stockpile supplying the railway operation (Figure 3-2.3). Conceptual engineering drawings of the SWM ponds are included in Appendix 3C. Ore stockpile stormwater management (SWM) ponds were sized to retain one year of runoff for the stockpile drainage areas. Given the variability in annual runoff flows, and to allow for years with higher precipitation, the capacity of each pond has been sized to twice the mean annual discharge from the stockpile areas. Further detail on Project interactions with hydrologic quantities can be found in Volume 7, Section 2.

Water quality modelling carried out as part of the geochemistry program predicted that the runoff from ore stockpiles will be high in suspended solids, circum-neutral to mildly acidic (pH 5.5 to 6) with low dissolved metal concentrations below limits established under the applicable Metal Mining Effluent Regulations (MMER) (Appendix 6B). Treatment may be required to reduce suspended solids below the MMER average criteria of 15 mg/L, and to potentially adjust pH to above 6. An aquatic environmental effects monitoring (AEEM) program will be designed and implemented under the MMER to monitor the environmental effects of effluent discharges. The results of the AEEM can trigger additional adaptive management actions such as further treatment of pond effluent, if required. The Metal Mining Technical Guidance Document (TGD) for Aquatic Environmental Effects Monitoring (Environment Canada, 2002) provides technical guidance on how to design, implement, and conduct an AEEMP for metal mines.

Preliminary treatment options were evaluated by AMEC (2010). Elevated total suspended solids (TSS) in the stormwater ponds can potentially be treated by adequate retention time. Lime addition can be used to adjust pH and remove metals, and coagulation/flocculation can settle out the solids if simple retention is not adequate. Treatment can be accomplished by either the in-ditch addition of reagents as runoff enters the pond, or with a treatment plant drawing from the pond and discharging. Both approaches are technically appropriate, and the final treatment system will be selected at detailed design. Schematics of both options are presented on Figures 3-3.5 and 3-3.6 below.

Treatment facilities will be provided at the SWM ponds for the ROM stockpile and the 1.4 Mt ore stockpile, and collected stormwater from the SWM pond at the road operation stockpiles will be pumped to the railway operation stockpile SWM pond. The final effluent will be pumped in a pipeline alongside the railway embankment and will be discharged to the Mary River at approximately the railway bridge location. Flows from the sewage treatment polishing pond will also be discharged from the same pipeline and outfall. The final location and configuration of the outfall will be determined during final design. The sludge generated within the ponds will be disposed of within a designated location within the waste rock stockpile.

Figure 3-3.5 In-ditch Treatment of Ore Stockpile Runoff

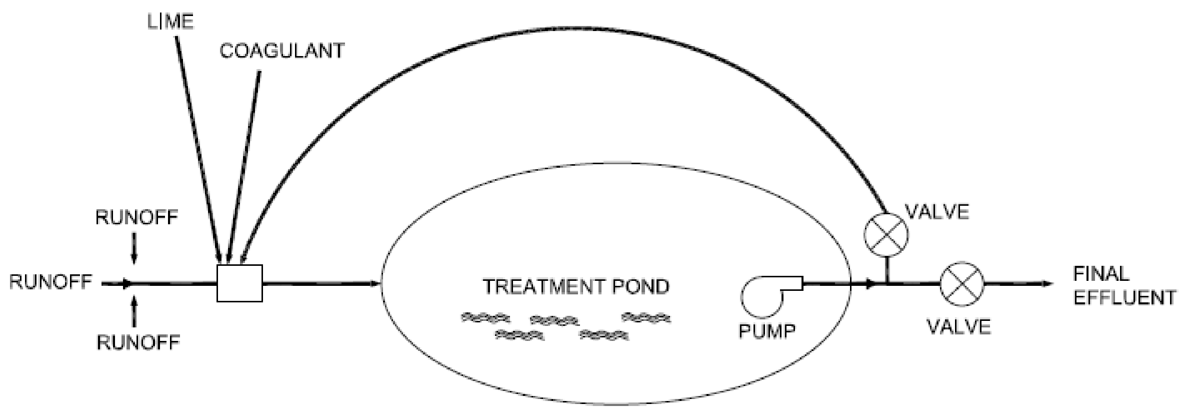
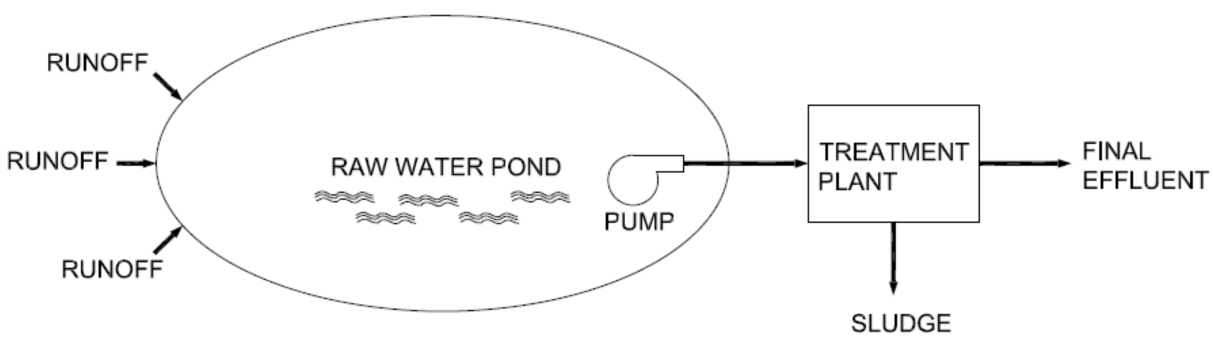


Figure 3-3.6 Treatment Plant for Ore Stockpile Runoff



3.4.5 Waste Rock Stockpile

A waste rock stockpile will be located adjacent to the north of the open pit (Figure 3-2.3). The waste rock stockpile will be used for permanent storage and has been designed for long term stability including consideration of rock heaves and localized settlement (Volume 6, Section 2). The waste rock to be produced from the mine has been interpreted on the basis of the hanging wall and footwall zones of the deposit. It is estimated that approximately 640 Mt of waste rock will be produced. Additional details are provided in the Waste Rock Management Plan (Appendix 10D-5).

A total of 270 waste rock samples collected from drill cores were submitted for Acid-base Accounting (ABA) testing (Appendix 6B-1). Results of this testing has determined that approximately 86% of the waste rock samples are unlikely to generate acidic drainage in the future. The remaining 14% of waste rock samples were classified as potentially acid generating (PAG) materials. Based on the proportion of PAG samples from the geochemistry study, the current mine plan includes encapsulation of the PAG rock within the core of the waste rock stockpile. Due to its northern location, it is likely that the majority of waste rock area material will be permanently frozen, and that only the upper surficial material will be subject to seasonal freezing and thawing. The frozen material is expected to form an effective barrier for acid forming reactions since no liquid water is available and its solid form will limit the potential for exposure to oxidation. Additional geochemical studies including further kinetic testing are continuing to evaluate and refine this option results.

Rates of metal leaching from the waste rock materials are expected to be low. Drainage quality expected at the site, based on monitoring of existing ore stockpiles, is expected to be circum-neutral to mildly acidic (pH 5.5 to 6) with generally low metal concentrations. Some elevated metal concentrations observed on site, and particularly manganese, may be related to manganese-bearing siderite that is present in some of the ore stockpiles.

Table 3-3.1 Preliminary Schedule of Waste Rock Production

Period	Non-PAG Waste Rock (Mt)	Overburden (Mt)	PAG Waste Rock (Mt)	Waste Rock Total (Mt)
PPM	0.4	-	0.1	0.5
1	7.9	-	3.0	10.9
2	6.7	0.5	2.5	9.7
3	18.1	0.3	5.2	23.6
4	17.4	1.8	6.1	25.3
5	24.0	1.3	7.2	32.5
6	21.4	2.1	6.3	29.8
7	26.0	2.8	7.8	36.6
8	31.4	2.5	9.6	43.5
9	25.8	4.7	7.6	38.1
10	27.9	2.6	8.2	38.7
0	132.0	13.2	41.3	186.5
16-21	126.8	0.7	39.8	167.3
Total	**465.80**	**32.50**	**144.70**	**643.00**

NOTE(S):
1. PPM: PRE-PRODUCTION MATERIAL.
2. OB: OVERBURDEN.
3. PAG: POTENTIALLY ACID GENERATING ROCK.

The runoff management system, consisting of berms around the stockpile perimeter and two appropriately sized settlement ponds, has three objectives. First, “clean” or non-contact water will be diverted away from the waste rock stockpile to minimize the volume of water that comes into contact with the waste rock (contact water). Maintenance activities to ensure the integrity of ditching and berms will be required to account for the melting of ice lenses or unforeseen slumping of ditching or berms. The non-contact waters will be discharged (drain) into their respective watersheds. The system will collect runoff and settle out suspended solids, particularly during the spring melt. Both ponds are sized at twice the mean annual discharge. The largest “west” SWM pond, located west of the open pit and southwest of the waste rock stockpile, will decant water to an existing drainage that leads to a tributary of Camp Lake. The smaller “east” SWM pond will discharge to an existing drainage that reports to a tributary of the Mary River.

The pond collection system will be monitored for runoff quality and compared to MMER criteria. Batch treatment of the water can be implemented within the pond(s) if necessary. It is not expected that treatment of nitrates will be required. Further details on water quality can be found in the water quality impact assessment in Volume 7, Section 3. Berms rather than ditches will be used to provide drainage diversions in consideration of the challenges in the arctic, e.g. ice rich soils and lenses. Further details about waste rock runoff water are provided in the Waste Rock Management Plan (Appendix 10D-5). Similar to the effluent discharge from the SWM ponds for the ore stockpiles, an AEEM program will be designed and implemented under the MMER using the to monitor the environmental effects of effluent discharges from the waste rock SWM ponds. The results of the AEEM can and trigger additional adaptive management procedures actions such as further treatment of pond effluent, if required. The Waste Water Management Plan is located in Volume 10, Appendix 10D-3.

3.4.6 Mine Site Support Facilities

3.4.6.1 Mine Site Buildings

To the extent possible, buildings have been consolidated into a single accommodation / administration /maintenance / laboratory complex to reduce outside travel of in-building workers. The accommodation building will consist of a prefabricated modular unit supported on pile foundations, and will accommodate personnel in four 2-story dormitory wings. A central core area will comprise: kitchen/dining facilities, recreational facilities, and general service space. Administration, laboratory, maintenance and warehouse facilities will also be attached to the accommodation complex, constructed of structural steel with a pre-finished metal roof and wall cladding supported on a pile supported foundation. Waste heat will be recovered from the power plant to feed heat into the accommodation building via an utilidor.

The assay laboratory will house the metallurgical office and will be used for ore sample storage, preparation and analyses. The maintenance area will be equipped with oil/water separators in areas associated with the steam-cleaning facility

Elevated corridors/utilidors will connect all buildings in this area. In addition to providing corridor access for personnel, they will also contain heating services, piping and electrical trays/conduits. The corridors/utilidors will be constructed using prefabricated modular units, supported on a structural steel framing system and pipe piles.

The fire protection system will include a primary fire pump (and backups) and sprinkler systems for the accommodation, administration, laboratory and warehouse facilities, and a dry sprinkler system for the plant maintenance complex. Fully-equipped hose cabinets will be available in heated buildings.

3.4.6.2 Power Supply

The centralized power plant and waste heat recovery system established during construction will service the entire Mine Site. Estimated power demands and fuel consumption are provided in Table 3-1.1. Generators within the boiler building will continue to provide a back-up system to supply the required building heat in the event of catastrophic failure of the power plant.

3.4.6.3 Water Supply

The water supply will continue to be sourced from Camp Lake (potable water and most other uses) and Mary River (water for exploration drilling; summer only). Table 3-1.1 summarizes the estimated water consumption for the operation phase, and a detailed breakdown of water uses and sources for the operation phases is provided in Appendix 10D-2.

3.4.6.4 Wastewater Treatment

The Wastewater Treatment Facility (WWTF) will be a subset of the modular packaged sewage treatment plant used during the construction phase, scaled down to meet the smaller peak flow requirements during the operation phase.

Wastewater will be collected within each building and pumped to the treatment plant via a pressurized main pipe. At remote areas, such as the mine maintenance/mine office, explosives handling facility, wastewater will be collected in local holding tanks and collected via a tanker truck for treatment at the WWTF. Wash water from the garage and rail maintenance shop will be directed through the oily water treatment systems within the maintenance shop. Estimated quantities are provided in Table 3-1.1.

3.4.6.5 Site Water Management

Site water will be managed in accordance with the Surface Water and Aquatic Ecosystems Management Plan (Appendix 10D-2). Due to the arid climate, significant volumes of surface runoff will not normally be generated except during the spring freshet. Runoff from ore stockpiles will be collected and treated as necessary. Runoff from the waste rock stockpiles will be collected in one or more ponds for settlement of sediment and subsequent release to the receiving environment (see Waste Rock Management Plan - Appendix 10D-5).

Water inflows into the open pit are expected to be minor and related to incoming precipitation and a limited amount of seepage from the active layer around the pit perimeter. In the event that pit dewatering is required (albeit on an intermittent basis), the water will be collected in sumps located in the pit. This water will be transferred by pump truck to the ROM stockpile SWM pond. As a contingency, should the mine water volumes be significantly larger than estimated, excess water will be pumped to the waste rock stockpile and treated as necessary in the stockpile sedimentation pond.

Precipitation leading to runoff that could be contaminated with oil will be treated in the oil-water treatment facility in the truck/rail maintenance shops. Contaminated snow will be placed into a cell in the landfarm and allowed to thaw in summer, for treatment as above.

3.4.6.6 Waste Management

The Mine Site will be equipped with both a landfill and incinerator for disposal of non-hazardous wastes, as well as a landfarm unit to handle hydrocarbon contaminated soils, ice and water. Handling, storage, transportation, recycling and disposal of wastes generated by the Project will be managed in accordance with the Waste Management Plan (Appendix 10D-4). The expected types and quantities of wastes are identified in this plan. The cumulative volume of waste entering the two landfills (Mine Site and Steensby Port) from all camps during both construction and operation phases is provided in Table 3-1.1. Hazardous wastes will be stored and secured and shipped off site for disposal in appropriate southern facilities.

3.4.6.7 Fuel Storage and Distribution

The Mine Site tank farms will store quantities required for 4 months of operation. The main tank farm, consisting of two 5.2 ML tanks, will be located near the railway load-out and will be re-supplied from Steensby Port on a weekly basis via railway fuel cars. The fuel unloading facility will facilitate quick unloading of fuel tanker cars, five at a time. This unloading facility will be mounted on a concrete spill containment pad equipped with a collection sump to contain fuel spills.

Another tank farm, consisting of one 5.2 ML tank, will be located near the road operation loading area to supply trucks. This tank will be re-supplied from Milne Port. The tank farms will be equipped with a containment system lined with arctic grade synthetic liner. Day-to-day refuelling of vehicles will be carried out at a fuel filling depot. Additional tanks will store Jet A fuel required for fixed-wing and rotary aircraft.

Aircraft and the equipment in the pit will be refuelled using a fuel truck.

Various diesel fuel day tanks ranging in size from 1,000 L to 40,000 L will be located across the Mine Site as required, such as the power plant, boilers, mine day tanks, water intake pump house, incinerator, and explosives emulsion plant. With the exception of remote locations such as the water pump house and explosives plant, the diesel day tanks will be supplied by the fuel distribution pipeline from the main tank farm.

Bulk antifreeze and heating glycol fluids will be stored in the power plant and maintenance complex. The storage capacities will be based on the anticipated consumption required for a minimum operating period of 12 months. The annual antifreeze inventory will be stored in the same area as the lubricant storage tanks, based upon the following estimated requirements:

- antifreeze (coolant) tank capacity: 50,000 L ;
- power plant glycol initial fill of heat recovery and distribution systems: 14,000 L ; and,
- building heating circuit initial fill: 100,000 L.

The premixed glycol solution will be transported to Steensby Port by sea and then by rail to the Mine Site where the system will be filled directly.

Lubricating oils for the power plant and maintenance shop will be stored in bulk in tanks ranging in size from 12,000 L to 200,000 L. Waste oil will be collected in a common sump linked to a receiving tank from which it will be pumped to waste oil storage tanks. Approximately 1 ML of used lubricating oil will be produced annually. It will be burned in dedicated government-approved waste oil burners that will recover heat will for use in space heating.

3.4.6.8 Truck Parking and Maintenance

There will be designated parking areas for trucks and other mobile vehicles. A mobile vehicle maintenance shop will provide routine maintenance for haul trucks and other mobile equipment at the Mine Site.

3.4.6.9 Airstrip and Air Traffic

The airstrip at the Mine Site, upgraded and lengthened during construction to accept the Boeing 737, will service the mine for shift rotations (Section 2.4.3.2). The runway will have a minimum length of 1,829 m and will include aircraft warning, obstruction, runway and approach lighting conforming to the requirements of the *Aeronautics Act*. Parking, loading, unloading and services will be conducted within the apron area.

Aircraft traffic during the operation phase is summarized in Table 3-1.1 and presented conceptually on Figure 3-2.10. The airstrip at the Mine Site will be the primary airstrip used during operations; workers at Steensby Port will travel to and from the Mine Site via the Railway for flights home. Workers at Milne Inlet will travel to and from the Mine Site via the Milne Inlet Tote Road. Alternatively, if weather conditions allow, the airstrips at Steensby Port and Milne Port may be used for crew rotations.

No fuel will be stored at the airstrip. A tank truck will be used to dispense Jet A fuel to aircraft and helicopters. De-icing facilities, provided at the airstrip, will consist of a portable discharge pump for the application of de-icing fluid from 200 L drums. De-icing will be carried out to the side of the runway, with propylene glycol, a biodegradable fluid which requires no treatment.

Flight patterns will be the same as during construction (Section 2.3.3.2). Estimated air traffic is provided in Table 3-1.1.

3.4.6.10 Site Roads

Graders, snowploughs and other equipment will operate as needed during the operation phase. Snow fencing will be used to limit the formation of snow drifts and snow banks on the roads. Dust suppressant will be sprayed on the roads as needed to limit dust raised by vehicle traffic. Inspections will be more frequent during the spring freshet to check culverts and roads for needed maintenance and repairs. Traffic will be managed in accordance with the Road Management Plan (Appendix 10-U).

3.4.6.11 Railway Terminal

The Mine Site yard will include a track for loading the iron ore, a run-around track, two industrial tracks for the handling of containers and one for unloading tank cars, a Maintenance of Way (MoW) or railway maintenance building, and a track for the employee train service between the Mine Site and Steensby Port.

3.4.6.12 Communications

The integrated, multifunctional, communications and networking infrastructure installed during construction will continue to be used during operations.

The various sub-systems will include the following:

- Satellite land stations;
- Telephone exchange switching systems (complete with voice message and plant internal PA capabilities);
- Trucked, VHF radio systems including base stations and vehicle and handheld portable radio equipment;
- Integrated multi-use fibre-optic network with Ethernet TCP/IP network infrastructure; and,
- Optional cellular phone system

3.4.6.13 Aggregate Sources

Aggregate requirements for the Mine Site during operations will be limited to sand and gravel requirements for maintenance of access roads. The existing borrow area west of the Mine Site, used during the bulk sample program and to be used during construction, will be sourced throughout the operation phase by leaving an active face open in the borrow area.

3.5 RAILWAY - OPERATION PHASE

3.5.1 Overview

The Railway will transport a nominal 18 Mt/a of ore from the Mine Site to Steensby Port. It will also transport personnel between the Mine Site and Steensby Port for crew changes, and will take annual consumables and equipment arriving at Steensby Port to the Mine Site.

The main components of the operating Railway include:

- Railway embankment and track;
- Locomotives and cars (ore, fuel, passenger and general freight cars);
- Bungalows - small sheds along the Railway containing signalling equipment and power supply sources;
- Communication towers - approximately 8 to 10 towers positioned line of sight from each other along the railway alignment;
- Ore and freight loading/unloading facilities at the Mine Site and Steensby Port;
- Railway maintenance yard at Steensby Port; and,
- Quarry near Steensby Port to obtain rock for ballast replacement for railway maintenance.

Design and construction of the Railway is described in Section 2.5. The Railway Management Plan, covering environmental, health and safety aspects, is located in Appendix 10D-9. The railway alignment is shown on Figure 3-2.4 and preliminary engineering design drawings are presented in Appendix 3D. Each of these components is described further below.

3.5.2 Railway Components

3.5.2.1 Railway Embankment

The railway mainline will be about 149 km in length from loading station to unloading station. The railway embankment will be comprised of sub-ballast and ballast materials, with wood ties and steel rails.

3.5.2.2 Trains and Rail Cars

Three train sets, each consisting of two diesel-electric locomotives towing between 110 and 130 rail cars, will operate to transport ore in open top ore cars. Fuel tanker cars will be used to transport fuel, and most freight will be transported in containers to facilitate handling from ship to shore to rail. Bulk materials will be hauled in tank cars or containers. Dedicated tank cars will be used to transport diesel and Jet A fuels to the Mine Site. Flat cars will be used to transport containers and large sized equipment and machinery. A regular passenger train service to move employees between the port and the Mine Site. This will include a passenger car, baggage car, and a generator car.

The total fleet required has been estimated at 11 locomotives, (6 used for ore transport, 2 used for general freight and passenger (employee) train service, along with 3 spares), and 433 cars (including 42 spares). A photograph of the type of locomotive and ore cars to be used is shown on Figure 3-3.7. Each train will travel about 1,824 km over a 66 hour period, after which it will be subjected to a detailed safety inspection. Two car movers (switchers) will be used within the Steensby Port to shuttle rail cars within the port area, to facilitate loading of fuel, general freight and explosives without using locomotives.

The new North American standard heavy haul locomotives will be used. The locomotives are approximately 23 m long, weigh 190 tonnes and are powered with AC diesel generators. To address operation in a cold climate, all locomotives will be equipped with "arctic packs", i.e. special control systems (electronics) that account for the climate. They will also have supplementary heaters within the fuel tanks to ensure that fuel is delivered to the generators at an optimum temperature. The whole fuel tank is not heated, only a small reservoir within the tank, with the supply to the generators coming directly from the small reservoir. A similar pre-heating arrangement will be used in the supply tanks to fuel the locomotives. At any given time there will be six locomotives operating on the ore trains and they will have their engines running continuously, even through the loading and unloading process.

Two other locomotives that run freight or passenger services for 36% of the time will run their engines at idle speed during loading and unloading.

There are four spots in the heated maintenance shop for locomotives during routine maintenance and inspections, which means that there will sometimes be one locomotive that is not being used and that cannot be in the shop due to lack of space. It will stand in the yard and, depending on the temperatures and length of time out of use, it will either sit with its generators running on idle (as many of the diesel pickup trucks do in the north) or it will be plugged into "wayside power" (the railway equivalent of plugging in a block heater. Experience will tell at which temperature the wayside power approach becomes ineffective and it becomes necessary to fire up the engine to be sure that it will run when necessary.

3.5.2.3 Railway Sidings and Bungalows

Three mainline sidings, approximately 2 km in length, large enough for ore trains to pass will be located at strategic locations along the Railway. A fourth siding near Steensby Port will provide access to the ballast quarry. Bungalows, a railway term to describe small sheds containing power switching and signalling systems, will be located at each siding, within the railway right-of-way.

The equipment in the bungalows will include a power source, which will consist of a solar panel and/or wind turbine with a back-up diesel generator and fuel tank.

3.5.2.4 Communication Towers

Up to 12 communication towers will be positioned along the length of the railway line-of-sight from one another. The towers will form a microwave communication system between the dispatcher, trains and trackside equipment. Final locations will be selected based on a propagation study, but most will be trackside with the exception of two locations: one near the Mine Site on the south side of the Railway and east of the Mary River bridge crossing, and the other just south of the Cockburn Lake bridge. The communication towers will also be accompanied by a bungalow to provide power utilizing a solar panel and/or wind tower and a back-up diesel genset. The bungalows for the remotely located towers will be re-fuelled by helicopter or snowmobile.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

EXAMPLE RAILWAY LOCOMOTIVE AND ORE CAR

Knight Piésold CONSULTING

P/A NO.	REF. NO.
NB102-181/25	8

FIGURE 3-3.7 REV A

REV	DATE	DESCRIPTION	PREP'D	CHK'	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	RAC	MTP

3.5.2.5 Railway Terminal at Mine Site

A conceptual layout of the railway terminal at the Mine Site is shown on Figure 3-3.8, the main functions of which include:

- Loading of ore;
- Safe loading and unloading of passengers (Steensby Port personnel); and,
- Unloading of freight and fuel, and backhauling of wastes.

Ore Loading

The Mine Site yard will include a track for loading the iron ore, a run-around track, two industrial tracks for the handling of containers and one for unloading tank cars, a Maintenance of Way (MoW) or railway maintenance building, and a track for the employee train service between the Mine Site and Steensby Port. Ore will be loaded at the Mine Site into the uncovered cars at an estimated rate of 6,000 tonnes per hour, while the cars are in motion (through the open top of the gondola car). The train crew will control train speeds during loading and the loading equipment operator will be in continuous communication with the train crew during the loading process. The train crew may control the train directly from the locomotive cab with a wireless link to the loading equipment operator or a train crew member may control the train remotely from the cabin of the loading equipment.

Freight Offloading

The railway terminal at the Mine Site will feature a load-out station for loading ore into cars. It will also have a fuel unloading station for unloading fuel (diesel, Jet A fuel) into the tank farm (Section 3.4.6.7), and for unloading of general freight and ammonium nitrate.

3.5.2.6 Railway Terminal at Steensby Port

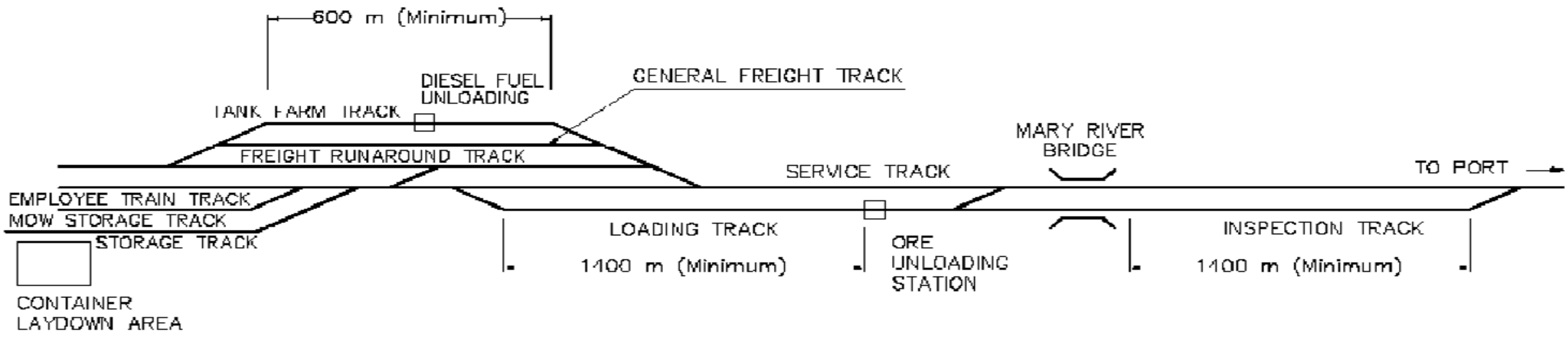
A conceptual layout of the railway terminal at Steensby Port is shown on Figure 3-3.8, the main functions of which include:

- Unloading of ore;
- Safe loading and unloading of passengers (Steensby Port personnel); and,
- Loading of freight and fuel, and unloading of backhauled wastes.

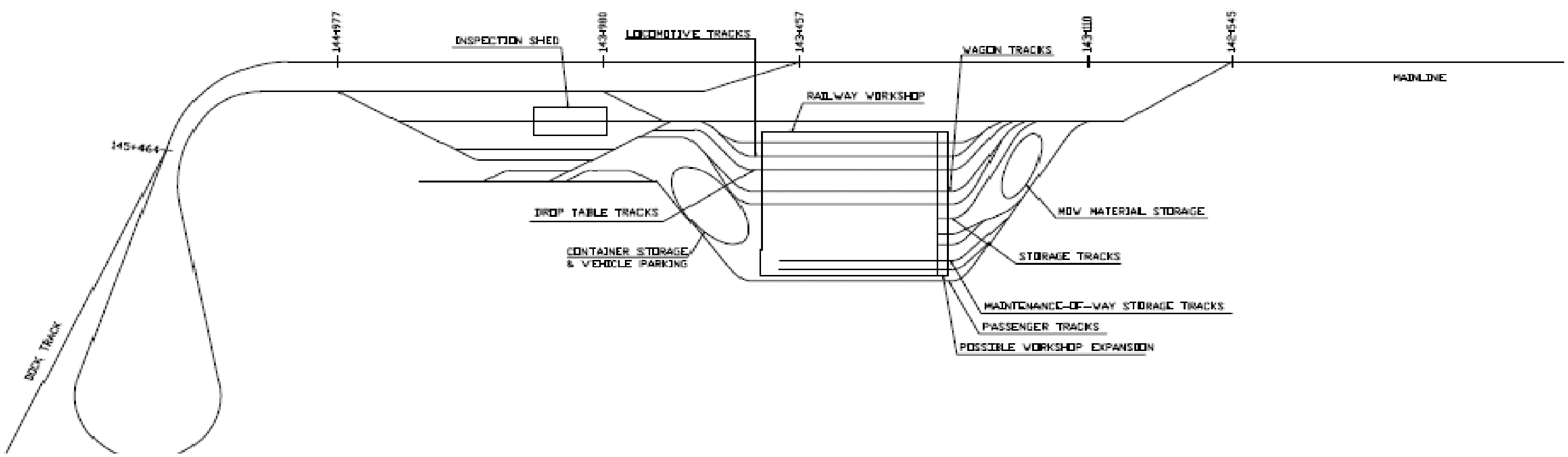
Ore Unloading Facilities

The cars will be unloaded at Steensby Port using a rotary dumper, in which 3 cars are turned upside down simultaneously to empty the ore into unloading bins, without any requirement to uncouple the cars from the rest of the train. Material will be withdrawn from the bins at an average rate of 6,000 t/h by two variable speed apron feeders. The material will then be conveyed from the rail unloading area to the secondary screening area. The material will be passed through a splitter above the screen feed bin. The purpose of the splitter is to bypass the fines product around the screening circuit, allowing it to go directly to the stockpiling area. The lump product, which will have generated a small amount of fines (fine particles) due to handling, will be fed into a screen feed bin. The lump product will be withdrawn from the bin and conveyed to the stockpiling area, with the resultant fines being conveyed to the fine ore stream.

MINE SITE RAILWAY TERMINAL LAYOUT



STEENSBY PORT RAILWAY TERMINAL LAYOUT



BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

RAILWAY TERMINAL LAYOUTS

Knight Piésold CONSULTING

P/A NO.	REF. NO.
NB102-181/25	8

FIGURE 3-3.8 REV 0

0	16DEC'10	ISSUED WITH REPORT	CR	RAC	MTP
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Freight Loading Facilities

Rail access at the Steensby Port terminal will include a spur to the freight dock for general freight unloading, run-around tracks to provide service for the tank farm and for a small intermodal yard for container handling.

3.5.2.7 Railway Maintenance Facility and Yard

A railway maintenance facility at Steensby Port will include maintenance shops, management offices, welding and machine shops, a warehouse and an inspection shed. This facility will allow for locomotives and cars to be brought indoors for inspections, maintenance and cleaning. A shop for the maintenance of track maintenance equipment and motor vehicle maintenance and a general storage area for spare parts and consumables to support a minimum of 12 months of operation will also be included. A wheel and axle spot repair area will be used for the replacement of wheels and traction motors on locomotives and for the re-profiling of wagon wheels and locomotive wheels. Locomotives will be moved into and out of the shop by a railcar mover, and will be fuelled at one end of the sheltered area using a 400,000 L fuel tank located next to the track. The track maintenance crews will be housed at Steensby Port.

3.5.2.8 Ballast Quarry for Railway Maintenance

The railway embankment will require periodic maintenance, including the replacement of ballast beneath the rails. Quarry BAL-1A near Steensby Port has been identified as a suitable source of rock with the correct rock qualities for ballast. A railway siding will be constructed to the ballast quarry to access the quarry throughout the operation phase.

3.5.3 Railway Operation and Maintenance

The trains will be staffed with experienced 2-person crews, with the possibility of reducing to a 1-person experienced crew in the future. A single dispatcher will control main line and yard operations. Canadian railways are to a large extent self regulating, subject to federal regulations. Railways set their own internal standards for the level of knowledge and competence required for any operating position, subject to regulatory audits of safety including the manner in which safety critical positions are qualified or licensed.

Ore trains will not operate on the same section of track at the same time (i.e. not within the same signal block). General freight and other trains will be dispatched to follow ore trains to avoid meeting on the mainline. Combined signal and telecommunications systems will be used to safely manage the operation of mineral trains along with freight trains and passenger trains. Track occupation by any vehicle, train or road-rail equipment will be based on the vehicle operator receiving exclusive authority to occupy the block, or specific section of track, by the Dispatcher. In ‘dark territory’, where there are no fixed signals, blocks are not fixed but defined as needed by the dispatcher using clearly identifiable physical features such as wayside kilometre posts, yard limit signs (which permit a train to occupy part of the mainline at a siding to set off a bad order car) or points of switch at a siding.. A Computer Assisted Manual Block System (CAMBS) will assist the Dispatcher to verify that any authority issued is not in conflict with any other active authority. Sidings have been strategically located along the Railway to provide meeting trains with the ability to pass each other.

The maximum design speed for the Railway will be 75 km/h. The initial maximum operating speed is expected to be 60 km/h under all conditions, staying at 60 km/h loaded and moving to 70 km/h while travelling empty.

Safety systems will be used to assist in detection of malfunctioning railway stock or rails. These systems will likely include track circuits (to detect broken rails), wayside detectors (to monitor passing trains for defects, such as hot bearings/wheels and dragging equipment), wheel impact detectors (to identify defective wheels) and rock fall detectors.

Other than the construction of a stable embankment, no technologies that are solely specific to vibration damping are employed by the Railway. In general noise and vibration are not considered an issue for low speed operations, even in urban environments, except in the vicinity of yards where tight curves can result in wheel "squeal" and shunting and train building produces a lot of noise as cars bang into each other. The iron ore trains, which constitute the majority of the Railway's traffic, will be operated as unit trains and will not be subject to regular shunting activities.

To some extent ballasted track (particularly with timber ties) absorbs vibration. Homogeneous soft soils are the best transmitters of vibration, and their influence will be limited to the active layer during the thaw period and by the level of non homogeneous inclusions in the soils themselves. Additionally many of the maintenance activities such as rail grinding; wheel truing; and track lining; which will be carried out on a regular basis as cost effective preventive maintenance practices, will also correct many of the small irregularities that are the major noise and vibration generators in a railway system.

Track circuits will be used to continually monitor for broken rail and the line will be equipped with automatic detection devices for hot boxes, hot wheels and dragging equipment. Loaded trains will be subject to a visual safety inspection at the start of every trip. Cars will undergo a standing inspection every sixth round trip, and locomotives will be subjected to varying levels of daily inspection based on the distances travelled.

Standard North American railway operating rules relating to earthquakes will be respected. In the event of an earthquake and depending upon its severity, slow orders or no operation whatsoever will be permitted over bridges until safety inspections have been completed. The frequency of normal track inspections will increase during the freshet to ensure that all culverts are free flowing and bridge freeboard is maintained. Areas exposed to potential rockfall will be protected with alarm fencing, not designed to stop the rock fall but to alert the signalling system that a fence has been broken and that debris may be on the track. This alert will automatically stop trains until an inspection is carried out. The Railway Management Plan is located in Appendix 10D-9.

3.5.3.1 Movement of Cargo and Passengers

Ore

Typically three train sets, each with 2 locomotives and between 110 and 130 ore cars, will each make about two round trips per day, or 5-6 round trips per day total to transport the 18 Mt/a of ore from the Mine Site to Steensby Port. Total ore train length will be between 1,096 and 1,201 m depending on maximum axle load.

The mainline transit time for ore trains between terminals will normally be 7 hours 33 minutes, and total terminal times to load, unload, safety inspection, fuel and crew change will be 3 hours 36 minutes. The total cycle time will be 11 hours and 35 minutes during the winter and 13 hours 29 minutes during the summer (due to reduced travel speeds in spring).

Fuel

There will be 19 tank cars in the fleet to transport fuel to the Mine Site, and fuel trains each will run once a week, dispatched whenever possible to minimize mainline meets. The projected volumes of materials that will be transported by rail are provided in Table 3-1.1. Contingency planning for spills is outlined in the Emergency and Spill Response Plan (Appendix 10C-1).

Passengers

A passenger train for employees travelling between Steensby Port and the airstrip at the Mine Site will operate an estimated three times a week, coinciding with aircraft arrivals/departures.

General Freight

General freight trains will operate approximately twice weekly and will normally be dispatched between ore trains in a pattern that minimizes mainline meets.

Dangerous and Hazardous Materials

The transport of dangerous or hazardous materials using rail cars will abide by all applicable labelling, environmental, health and safety regulations. The Waste Management Plan is provided as Appendix 10D-4, and the Emergency and Spill Response Plan is located in Appendix 10D-1.

3.5.3.2 Railway Equipment Inspections and Maintenance

A rigorous schedule of equipment inspections and maintenance will be implemented during the life of the operating Railway. Locomotives will be subject to daily inspections during crew changes, along with a 90-day, bi-annual, annual locomotive scheduled maintenance shop visit. Cars will be subject to detailed inspections every sixth trip (1,824 km), with major scheduled maintenance on brakes, wheels and couplers at other regular intervals, based on the distance travelled. Inspection activities will be performed at Steensby Port in the inspection shed and the fully equipped maintenance facility.

Maintenance of railway equipment will be carried out throughout the life of the Project. Locomotive maintenance will be scheduled, based on regular inspections. Typical inspection cycles will be daily, 90 day, annual and biannual. Car maintenance will be based on the results of the trip inspection carried out every 1,824 km. Brake tests and the replacement of brake hoses will also be scheduled activities.

All railway equipment and rolling stock inspection and maintenance activities will be performed at Steensby yard, in the maintenance centre, which consolidates most of the facilities required for railway operations into a single building.

Railway maintenance will focus on cold temperature operation. Trains will not be operated when the temperature drops below 49°C.

3.5.3.3 Railway Track Inspection and Maintenance

The following summarizes the inspections and maintenance to be carried out on the railway track:

- Regularly scheduled line inspections at different levels of detail and at different frequencies;
- Daily minor maintenance;
- Re-welding broken rails as required;
- Rail grinding - three times a year, for 4 to 5 days each time;
- Ultra-sonic rail inspection - three times a year for 2 to 3 days each time;
- Track surfacing program - 2-3 months per year (planning and extent dependent upon observations from the scheduled line inspections;

- Rail replacement - approximately 17 km of track rerailed every second year after 12 years; and,
- Tie replacement - approximately 7% of timber ties replaced every year after year 9.

Track inspection will allow for spot replacement of defective components on a daily basis and renewal of the infrastructure. Programmed maintenance over specific track segments will include such activities as rail grinding and the replacement of worn or defective components throughout a designated track section.

Track maintenance will be planned on the basis of a series of specific types of inspection carried out at regularly-defined periods. These include general visual inspections, detailed safety inspections, ultrasonic scanning for rail flaws and measurements of the track geometry.

Railway bridges and culverts will be subject to the following inspections and maintenance:

- Annual inspections of condition and structural integrity;
- Thawing of ice-blocked culverts;
- Maintenance of scour protection around piers and culvert inverts;
- Adjustment of bridges to compensate for subsidence if the necessary adjustment cannot be accommodated by the ballasted deck; and,
- Safety inspections after seismic events.

Additional ballast, generated from a designated quarry near Steensby Port (Section 3.5.2.8) will be used in the track surfacing program identified above.

3.5.3.4 Snow Removal

At most locations and times, regular train passage will be generally sufficient for keeping the mainline sufficiently free of snow. Remote switches at sidings will be provided with snow blowers to prevent the switch points from becoming blocked with snow and track maintenance equipment will “broom” turnouts in yards. Sites identified early during operations as susceptible to drifting will be protected with snow fencing and subject to regular observation by the track maintenance crews.

3.5.3.5 Waste Management

Sewage wastes generated in passenger cars will be held in holding tanks and offloaded at Steensby Port for treatment in the Steensby Port wastewater treatment facilities.

Solid waste generated on board will be sorted and disposed of at either the Mine Site or Steensby Port waste management facilities.

3.6 STEENSBY PORT SITE – OPERATION PHASE

During operations the Steensby Port infrastructure will include:

- Service and tug docks;
- Ore management facility which include:
    - Rotary rail car dumper;
    - Ore stockpiles and rail-mounted stacker / reclaimer system;
    - Secondary screening plant; and,
    - Ore loading dock.

- Port site facilities which include:
  - Power generating station;
  - Communications system;
  - Service/administration/accommodation buildings;
  - Maintenance shop/main office;
  - Potable water treatment system;
  - Wastewater treatment system;
  - Tank farm;
  - Incinerator;
  - Airstrip;
  - Navigational aids as required by the Canadian Coast Guard;
  - Site roads;
  - Railway maintenance facility and offices; and,
  - Rail yard.

Figure 3-2.9 shows the Steensby Port layout. An estimated 18 Mt/a of ore will be transported from the Mine Site to Steensby Port via the Railway on a year-round basis, with possible short breaks during significant weather evens and scheduled maintenance shut-downs. The ore will be stored in stockpiles at Steensby Port ready for loading onto ice breaking ore carriers. Shipping and port operations will be year-round.

Most resupply sealifts for the Mine Site will be delivered to Steensby Port during the open water shipping season only (approximately mid-July through mid-October) for transport over the Railway to the Mine Site, including fuel required for the 18 Mt/a railway operation. Some freight and oversized equipment that cannot pass through the tunnels on the Railway will be directed to Milne Port.

The construction camp at Steensby Port will be decommissioned early in the operation phase, but other infrastructure built during construction will remain in place during the operation phase. During operations, Steensby Port personnel will be transported over the Railway in personnel cars to and from the port site.

The airstrip will remain fully operational and will be available for incidental and emergency use. A helicopter pad located near the accommodation complex will provided emergency use.

3.6.1 Ore Handling Operations

3.6.1.1 Ore Stockpiles

Railway ore car unloading at the dumper pit using a rotary car dumper is described in Section 3.5.2.6. The ore from the dumper pit is screened and then conveyed to the ore stockpiles on Steensby Island.

A ore stockpile pad, runoff collection ditches and a SWM pond will store ore and manage runoff in the same manner as described for the Mine Site ore stockpiles (Section 3.4.4). Ore fines will be stacked onto a 1.3 Mt temporary stockpile, and the lump product will be stacked in stockpiles totalling 3.2 Mt (0.9 ant 2.3 Mt, respectively). The runoff from the stockpiles on the island will be collected, and treated if runoff quality exceeds MMER effluent discharge quality guidelines.

3.6.1.2 Ore Dock and Ore Handling Facilities

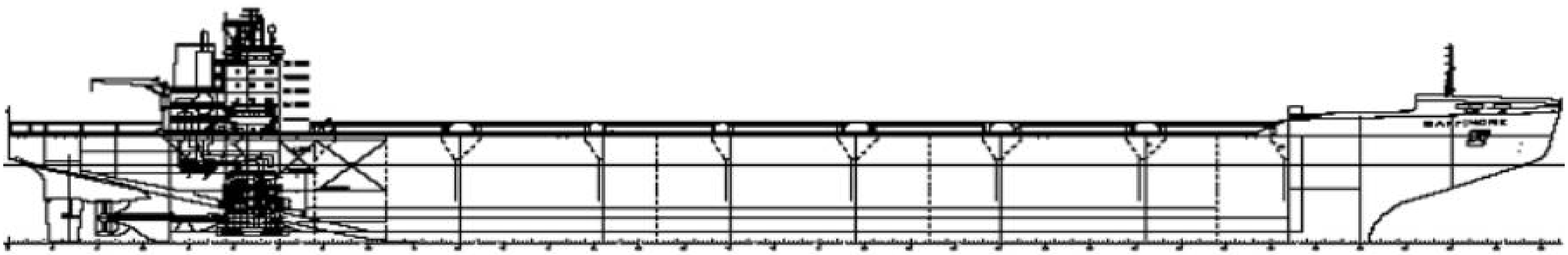
The ore dock and associated ore handling facilities are an important component of the transportation link to move ore from the Mine Site to market. The ore dock will receive ice-breaking ore carriers as well as lower ice class ships during open water. The ore dock design is based on the following requirements:

- Safe approach and departure routes for ships accessing the ore carrier berth;
- Safe berthing for the ore carriers with adequate water depth and moorings;
- Ship loading facilities for loading the ore carriers;
- Access to shore for conveyors, maintenance vehicles and operating personnel;
- Mooring and fuelling capabilities for ice breaking vessels and tugs;
- Discrete dock foundations that help facilitate effective ice management;
- Cost-effective construction and operation;
- Capable of withstanding significant ice loading;
- A design that can be build within a short construction season; and,
- No bunkering, fresh water or fuelling to be provided to the ore carriers.

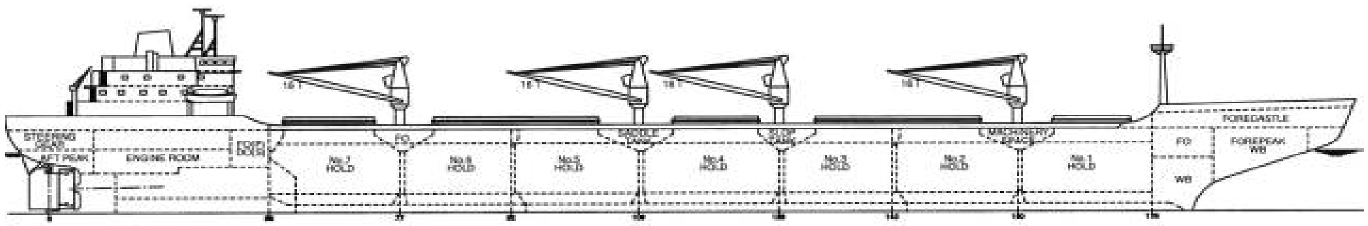
The ore dock will receive an average of 12 ore carriers per month on a year-round basis and up to 17 vessels per month in summer open-water season when non-icebreaking ships will be chartered to ship additional ore. The dock has been designed to accommodate cape-size ore loading carriers with a draft of 20 m.

Ore will be reclaimed from the temporary ore stockpiles using one stacker-reclaimer (capacity 6,000 t/h) and one reclaimer (capacity 7,200 t/h) to give an average reclaiming rate of 13,200 t/h. The units will feed onto a series of conveyors, each having a design capacity of 13,200 t/h and an average capacity of 12,000 t/hour, which will convey the ore over the trestle from the ore dock to the island and a traveling ship loader will load the holds of the ship.

Proposed ±190,000 DWT Capacity Ice-breaker



28,000 DWT Capacity MV Arctic (Owned and Operated by Fednav)



	Mary River	MV Arctic	Difference
Length Overall (m)	329.0	220.8	149%
Beam (m)	52.0	22.9	127%
Depth (m)	27.0	15.2	78%
Draft (m)	20.0	11.5	74%
Displacement (mt)	248,000	41,300	500%
Ore Cargo (mt)	±190,000	28,500	595%

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

ICE BREAKING ORE CARRIER
CONCEPTUAL DESIGN

Knight Piésold CONSULTING

P/A NO.	REF. NO.
NB102-181/25	8

FIGURE 3-3.9 REV A

0	16DEC'10	ISSUED WITH REPORT	CAD	RAC	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

3.6.2 Ore Shipping Fleet

A dedicated fleet of 10 to 12 ice class cape-size vessels with a nominal capacity of 160,000 to 190,000 dead weight tonne (DWT) cargo capacity will operate on a 12 month a year basis to transport most of the annual ore production to market.

Currently it is anticipated that ore carriers will complete about 102 round trips from Steensby Port to its customers across the Atlantic Ocean each year (i.e. 204 transits to and from Steensby Port). This equates to a ship moving through the shipping lane roughly every 1.8 days (43 hours). This shipping frequency will increase during the open water shipping season when sealifts will provide annual re-supply and supplemental market vessels to ship additional ore.

These vessels will be supplemented by chartering additional ships from the open market during the open water season, which to Steensby Port based on Baltic ice class designs is approximately August 10 to about the third week of October. The number of additional ship voyages during the open water season will vary from year to year in the order of one additional ship per month or 12 additional voyages during the open water shipping season. Some factors that influence the number of additional open water voyages using chartered ships include the dry docking maintenance schedule for the dedicated fleet and the productivity of shipping through the winter. The chartered vessels will be similar to those used for the existing annual sealift operations and will comply with the requirements of the Arctic Shipping Pollution Prevention Regulation (ASPPR).

Icebreaker ore carrier designs have been and continue to be evaluated. The currently envisioned 160,000 to 190,000 DWT capacity icebreakers will be designed as Polar Class 4 vessels, which relate to Canadian classification is between a CAC 3 and CAC 4 design (Consulting and Audit Canada, 1993). A conceptual sketch of a 190,000 DWT ice breaking ore carrier, scaled in comparison to the MV Arctic which has shipped to Polaris and Nanisivik Mines and now the Raglan Mine in Nunavik, is shown on Figure 3-3.9.

Additional detail on vessel ice classes is provided in Appendix 3F-1. These ships will have approximate dimensions of: length – 329 m; beam – 50 to 53 m and will have a maximum draft of 20 m when fully loaded. Currently, it is anticipated that the ore carriers will have the following design features:

- Twin nozzle propellers (7.5 to 8.0 m diameter);
- Twin rudders (one behind each propeller) - approximately 11 m high by 6 m wide;
- Full power: 42,500 hp per shaft with engine running at constant 78 rpm; and,
- Shaft centreline approximately 6.5 to 7.0 m above vessel baseline.

The service speed of the dedicated ice-capable ore carriers and other vessels in open water at full draught is about 14.5 knots and the maximum speed is over 18.5 knots. Ship speed is governed by a number of factors including weather, ice conditions, observance of other vessels and marine mammals. In ice conditions and at full power, 1.2 m thick level ice can typically be broken at over 7 knots speed; 3 knots in 2 m thick ice. The duration of a round trip from Steensby Port to a destination port in Europe in open water is around 20 days. In the heaviest ice conditions during a severe winter, the sailing time may be over 45 days.

The ability of a ship to transit ice-covered waters is determined by the vessel's ice class, a notation applied to the vessel's class certificate based on the amount of ice strengthening. The International Association of Classification Societies (IACS), as well as governments including Canada and Russia, have set rules to classify ships based on the amount of ice strengthening contained in the vessel. The IACS Unified Requirements for polar vessels will be the standard by which all IACS members will classify Polar Vessels built after July 1, 2007, including the vessels built for the Project. The Polar Class 4 vessels identified for the Project are classed by IACS for "year-round operation in thick first-year ice with old ice inclusions."

Transport Canada regulates an Ice Regime Shipping Control System (IRSCS) as part of Arctic Shipping Pollution Prevention Regulations - ASPPR. The IRSCS defines "Ice Regimes", as regions of generally consistent ice conditions based on a simple arithmetic calculation that produces an "Ice Numeral" that combines the ice regime with the vessel's ability to navigate in the region. Every ice type (including open water) has a numerical value that is dependent on the ice category of the vessel. This number is called the Ice Multiplier. The value of the Ice Multiplier reflects the level of risk or operational constraint that the particular ice type poses to each category of vessel. The ASPPR Zones that are transited to reach Steensby Port are Zones 15 and 8, with Zone 8 that covers Foxe Basin as the limiting zone with the higher ice regime designation of the two zones.

The IRSCS is based on previous vessel ice classification nomenclature, for which there are no established equivalencies to the new polar class standard. In the selection of the Polar Class 4 vessels as appropriate for the Project, Enfotec used the parameters of the ASPPR and the Arctic Ice Regimes Shipping System (AIRSS; Transport Canada, 1998) to determine estimated access dates by ice class.

Because the vessels for the Mary River Project will be of modern construction and specifically designed for project operational conditions, features can be designed into the ships to mitigate air, noise and water interactions. Fuel for shipping will be purchased only from accredited suppliers that can provide assurance that the fuel used for shipping conforms to Canadian regulations (Benzene in Gasoline Regulations, 1997; Contaminated Fuels Regulations, 1991; Gasoline Regulations, 1990; Fuel Information Regulations, No. 1, 1999; Sulphur in Diesel Fuel Regulations, 2002; Sulphur in Gasoline Regulations, 1999).

3.6.3 Shipping and Port Operations

The long term viability of the Project depends upon a constant supply of iron ore to customers. Customer facilities do not have significant ore storage capabilities, necessitating shipping on a 12 month-per-year basis. To ship ore to market, Baffinland has engaged Fednav to manage the shipping operations for the Project. Fednav intends to form a consortium of ship owners to design, build, and own the ships that will be used to carry the iron ore from Steensby Port to markets in Europe. Baffinland will charter the ships from the shipping consortium.

The dedicated fleet of icebreaking cape-size ore carriers will transport most of the ore from Steensby Port to market, supplemented by the use of ships chartered on the open market during the open water season. The ships will operate in accordance with two primary legal instruments regulating ship traffic in the Canadian arctic: the *Canada Shipping Act*, and the *Arctic Waters Pollution Prevention Act*, and their associated regulations.

There will be two main shipping routes from Steensby Port:

- Steensby Port to the Project's European customer base, for the movement or ore; and,
- Southern Canadian port to Steensby Port, for re-supply of materials and some fuel and equipment by conventional sealift over the open water

The nominal shipping route through Foxe Basin in and out of Steensby Port is along the east side of Koch and Rowley Islands to where it joins with the established shipping lanes in southern Foxe Basin accessing Hall Beach and Igloolik (Figure 3-1.1). Two shipping routes through Northern Foxe Basin were considered initially: the selected route and a more westerly route that departs from the existing shipping lanes near to Igloolik and Hall Beach and runs west of Rowley and Koch Islands (Figure 3-6.1). Bathymetric surveys were carried out over two years (2007 and 2008) on behalf of Baffinland by Kivalliq Marine Ltd. These surveys fleshed out cursory hydrographic surveys that had been completed in the area by the Canadian Hydrographic Service (CHS) about 40 years ago. The results indicated that, while both routes were viable, the easterly route was operationally preferable. Baffinland's Mary River Inuit knowledge Study (MRIKS) in Igloolik, Hall Beach and three other North Baffin communities provided a volume of information that spoke to the reliance on the waters of the westerly route and a relative absence of use of the marine waters along the preferred shipping route east of Rowley and Koch Islands. This information, along with feedback from public meetings Baffinland held in the communities of Igloolik and Hall Beach in 2007 and 2008, indicated a clear community preference for the selected eastern route.

The bathymetric surveys were carried out for the Project to meet CHS standards, and the surveys will be provided in the future to the CHS for approval and for the development of navigational charts for use by the public including Baffinland. The preferred route and the navigational charts have been studied by experienced ship masters at Fednav who have practical knowledge of ice interpretation and navigation in ice conditions.

Ships passing through Hudson Strait will remain within the Nunavut Settlement Area (NSA) and are not expected to pass through the Nunavik Marine Region of Northern Quebec or the area of shared Nunavut-Nunavik occupancy, under normal circumstances. In public meetings in Cape Dorset, community representatives requested Baffinland to put as much distance between its ships and the community as reasonably possible and as safety allows. The Company has modified its proposed nominal shipping route at this request. While better ice conditions are found closer to the Baffin coast, ships will pass to the south of Mill Island (between Mill Island and Salisbury Island) to the extent possible (Figure 3-1.1; or Option D on Figure 3-6.1). The Company has stated that ships will likely need to pass to the north of Mill Island (Option C on Figure 3-6.1) when ice conditions are very poor, to maintain safe and reliable passage.

3.6.3.1 Navigation and Navigational Aids

Experienced ship captains will be responsible for commanding the ore carriers on the Project. The ships will be equipped with the most advanced navigational equipment appropriate for ice navigation. Requirements for navigational aids will be determined by the Canadian Coast Guard and may include some type of beacons to be located on the islands in Foxe Basin.

There are no pilotage requirements applicable to the arctic. Nevertheless, as a prudent measure for safety and efficient operations, vessel docking will be assisted in the ice-free period by harbour tugs and lines personnel on the docks. Two to four ice-capable harbour tugs will be available. It may be necessary as part of normal shipping operations for ships to wait until the port is clear of other ships and to stage and anchor. This could occur within Steensby Inlet or along the shipping lane. Within northern Foxe Basin the ships will remain within the sounded shipping lane and will avoid staging near the islands and shoreline entering Steensby Inlet, where the potential to encounter marine wildlife such as walrus is higher. During winter, ships will preferentially wait in the mobile pack ice rather than the landfast ice.

3.6.3.2 Ice Conditions Along Ice Breaker Shipping Route

Enfotec Technical Services, the ice navigation consulting arm of Fednav, conducted an ice and marine shipping assessment in support of the Project. The complete Enfotec report is attached in Appendix 3F-1.

The study included a detailed analysis of the series of winter ice atlases of the region compiled by the Canadian Ice Service since 1990 as well as numerous satellite images, to delineate areas of old ice concentration, ridged and pressured ice, as well as shear zone locations. The ice study supported the selection of Steensby Port as a port location, defined the proposed shipping lanes, and determined the appropriate ice class of the proposed vessels.

Ice conditions along the shipping route (extracted from Enfotec, 2010) are as follows:

- The waterway in the access to Steensby Port develops shore fast ice each winter. The southern anchor of the shore fast ice reaches Koch Island. The boundary between the shore fast ice and the mobile pack ice of the northern Foxe Basin represents a diverging ice edge over the winter with the result that an open water lead is usually always present off the fast ice edge. The additional benefit of this diverging condition is that no shear ridge occurs along the fast ice edge in winter. There is an average of 35 nautical miles of shore fast ice leading to Steensby Port.
- The thickness of the fast ice of Steensby Port was recorded during geotechnical drilling to be generally in the order of 2 m (Knight Piésold, 2008). However, the closest ice thickness measurement station in the region at Hall Beach to the southwest of Steensby Port has recorded average ice thickness at the end of the winter's growth of 192 cm with extremes of over 250 cm. These thicknesses average 5% to 10% more than those recorded at Pond Inlet. The shore fast ice appears very level with few ridges or leads and no possibility that old ice can become entrained in the ice over as is the case in Eclipse Sound.
- The first sign of the spring break-up is the widening of the leads found in northern Foxe Basin and along the south coast of Baffin Island during the month of April and May as solar radiation increases in the region.
- Ice reduction is slow and gradual during the months of June and July as Hudson Strait clears of sea ice and the ice edge in the Foxe Basin retreats northward
- The fast ice of Steensby Port fractures during the second and third week of July. The fracture begins with the fracture of the lower portion of the fast ice in late June and this is followed by the complete fracture of the Inlet by the fourth week of July.
- The pack ice of the Foxe Basin continues to reduce during the months of August and September as strips and patches of ice in the basin gradually melt. In rare cool summers some of this remnant pack ice will remain in the Foxe Basin to become second year ice by October 1.
- Sea ice can commonly occur in the access channels into the month of September before clearing. The incidence of first year ice surviving the summer's melt has reduced in recent years and now only occurs approximately in 10% of summers. The occurrence of remnant ice in the Foxe Basin does not preclude the use of market vessels during the late summer period for the Project. Some measures such as using an owner familiar with navigation in sea ice and experienced Ice Navigators would provide mitigation.
- Freeze-up starts in late October with new/young ice expanding southward from northern Foxe Basin and extending eastward through Hudson Strait in December

The estimated 204 transits (102 round trips) by the icebreaking ore carrier fleet to Steensby Port each year correspond to some 180 transits that will occur during the period of November through June, when air temperatures result in the formation of ice within the ship track. Evidence of the ship track in the mobile pack ice south of the Steensby Port fast ice edge will quickly disappear due to the movement of the ice by winds and tide. Evidence from the MV Arctic's (another ore transport ship providing winter transport through Hudson Strait) transit of Hudson Strait in winter indicates that the ship track is indiscernible in the pack ice within six hours of the ship passing. Within the fast ice of Steensby Port, the ship track will remain throughout the winter. Due to the extreme cold, the ship track will quickly begin to refreeze following the passage of the vessel. Due to the frequency of transit through the track, ice formation will be continuous resulting in the build-up of rubble in the track over time. Consequently, the width of the track will gradually widen from the initial width of 100 metres to 1.5 km or more by late winter.

3.6.3.3 Ice Management at the Dock

Ice breaking activities around the dock will result in an accumulation of broken brash ice around the dock. The dock construction of individual caissons will allow ice to accumulate between the caissons, helping ice to move past the dock structure, an advantage over a flat dock structure for ship docking.

The winter ice cover is expected to remain stable in the area, even if it is repeatedly broken because of rapid refreezing of ship tracks. The dock may be subjected to substantial ice forces and also ship impact forces. In this case, partially-frozen backfill will provide a strong stratum against these forces.

Additional measures will assist in reducing the growth and accumulation of ice around the dock. Approximately 200,000 m^3 of ballast water from each ship will be discharged at the same rate as the ship is loaded with iron ore. The ballast water will be warmed through heat recovery from the ship engines. A bubbler system may be installed around the dock. Contingency measures being considered include positioning two to four ice-reinforced tugs at a dock along the trestle of the ore dock. Ice management vessels may be chartered for the first winter of operation to determine if they are necessary to assist in breaking up the ice around the dock for the ice breaking ore carriers to approach the dock.

3.6.3.4 Tug and Ice Management Vessel Docking

The trestle portion of the dock from the ore dock to the island will be used to dock tugs during open water, and any ice management vessels. These vessels will be refuelled from facilities on the island. The docking facility has been designed to accommodate the movement of oils, lubricants, waste products, fuel, potable water and personnel.

3.6.3.5 Island Fuel Storage

Ore carriers will not be re-fuelled at Steensby Port, and fuel will be delivered to the freight dock as part of normal operations. One of the ore carriers in the fleet will be equipped with a diesel fuel tank suitable for delivery of fuel to the ore carrier dock on an emergency basis. One 7.5 ML storage tank will be located on Steensby Island to supply the tugs and ice management vessels, and to receive emergency fuel from a vessel berthed at the ore carrier dock as a contingency (Figure 3-2.9). Fuel will be delivered to this tank by truck from the main tank farm. Refuelling procedures for the tug boats will be covered under the Steensby Port OPEP (Appendix 10C-3).

3.6.4 Sealift Re-supply Operations

Each year, fuel, ammonium nitrate to manufacture explosives, consumables and replacement equipment will be delivered at Steensby Port. The dedicated dock will allow conventional sealift vessels and fuel tankers to berth and unload during the open water season in a reliably safe and efficient manner. Estimated quantities are provided in Table 3-1.1.

All re-supply operations will follow the nominal shipping route and will take place during the open water season. Conventional sealift vessels that operate in the area, 10,000 to 17,000 DWT capacity will deliver dry freight.

Approximately 130 ML of fuel will be delivered to the freight dock to be offloaded dockside. About 3 to 5 voyages per year will be made using double-hulled tankers that are 30 to 50 ML capacity. A fuel off-loading manifold on the dock will allow for dock to shore fuel transfers, with a pipeline to the tank farm. The facility will be an Oil Handling Facility (OHF), and fuel transfer and spill prevention and response plans will be outlined in an Oil Pollution Emergency Plan (OPEP) approved by Transport Canada pursuant to regulations under the *Canada Shipping Act*. A conceptual OPEP for Steensby Port is in Appendix 10C-3.

Design and construction of the freight dock is described in Section 2.6.11. The dock will have a minimum draft of -13 m below the low water level in addition to a large working area for vehicles and cranes for off-loading and a small intermodal yard for container handling.

3.6.4.1 Ballast Water Management

Ballast is water taken on in chambers of vessels mainly to stabilize sea-going vessels, by adding weight to the vessels and maintaining a certain draft (the depth a vessel sits in the water). For icebreakers, ballasting is also used to keep the ice draft of the vessels constant, and to stabilize the ship, thereby optimizing stresses in different loading conditions.

The Ballast Water Control and Management Regulations require ships have a ballast water management plan, and either exchange or treat their ballast prior to discharge in waters under Canadian jurisdiction (Transport Canada, 2010). The dedicated fleet of ice breaking ore carriers that will ship ore from Steensby Port are expected to use ballast water exchange as the proposed method of ballast water management. Charter ships calling on Steensby Port during the open water will operate in compliance with the regulations; it is expected the majority of these charter vessels will use ballast water exchange as the proposed method of ballast water management.

Ballast water exchange involves the exchange of ballast water (discharge of ballast and taking on new ballast water) in deep seas away from coastal zones, to limit the potential for foreign harmful aquatic organisms or pathogens to be released in Canadian waters where they may colonize. Ballast water will be exchanged in the mid-north Atlantic Ocean, which is part of the same ocean regime as Milne Port.

Upon arrival at the port, the ships will discharge ballast water to allow for filling the ship with ore. During winter the full ballast is required to assist in ice breaking and so the entire amount of ballast water (approximately 200,000 m^3) will be discharged at the ore dock. During summer, the ships can discharge ballast water before arriving at the dock such that only a partial load of ballast in the order of 70,000 m^3 will be discharged at the ore dock. The dispersion of ballast water for Steensby Port has been modelled and results are reported in Appendix 8B-1.

3.6.4.2 Vessel Waste Management

The vessels will be equipped with a sewage treatment plant and an incinerator for solid and liquid wastes. All tanks containing oil or oily waste will be placed in a location in the ship that will keep them separated from clean areas. A diesel fired incinerator for incinerating oil waste and sludge from the sewage plant will be installed in the incinerator room on board. No untreated sewage will be discharged from the vessels. The vessels will not discharge effluent from treated sewage while in Milne Inlet or Steensby Port. Inert and/or hazardous solid wastes will be stored and unloaded for disposal in approved facilities in southern locations.

3.6.5 Port Site Support Facilities

3.6.5.1 Port Site Buildings

The accommodation complex will consist of a combination of prefabricated modular units supported on pile foundations. The facility will accommodate personnel in two, two-story dormitory wings. A central core area will include kitchen/dining facilities, recreational facilities and general service space. The accommodation building will be located near the power plant, the WWTF, the railway maintenance facility and the water supply source. It will be well removed from the railway ore unloading facilities and docks. Waste heat will be recovered from the power plant to feed heat into the accommodation building via an utilidor.

3.6.5.2 Power Supply

A centralized power plant designed to service the entire port will be located near the accommodation complex. The capacity of the power plant, running load and annual energy consumption are provided in Table 3-1.1.

Elevated corridors / utilidors will connect all buildings in the port area. In addition to providing access corridors for personnel, they will also contain heating services, piping and electrical trays/conduits. Utilidors will consist of prefabricated modular units on a structural steel framing system and pipe piles.

3.6.5.3 Water Supply

The potable water supply will be obtained from 10 km Lake. The water intake design will be the jetty structure to be used in Camp Lake at the Mine Site. A conceptual drawing of the jetty intake is included in Appendix 3C.

The water intake will be located 7 m below surface and water will be conveyed to shore through a pipe buried in the lake bed. Onshore pumps will be used to propel the water through a heat traced pipeline to Steensby Port. As an added precaution, a small freeze protection pump will be installed to keep water moving in the pipeline in the event that the heat trace system fails.

3.6.5.4 Wastewater Treatment

The wastewater treatment plant will be the modular system used during the construction phase, scaled down to manage the smaller capacity required during the operation phase and will conform to effluent discharge requirements.

Treated effluent will be discharged to the ocean via an outfall that is directionally drilled through the bedrock to a point north of the Steensby Island with a water depth of at least 20 m, so that the effluent will mix well within the water column. The location of the sewage outfall is shown on Figure 3-2.9.

3.6.5.5 Runoff Management

Site runoff will be managed in accordance with Baffinland's Surface Water and Aquatic Ecosystems Management Plan (Appendix 10D-2).

3.6.5.6 Waste Management Facilities

Solid and hazardous wastes will be managed in accordance with Baffinland's Waste Management Plan (Appendix 10D-4). Waste management facilities will include an incinerator, a landfill for inert, non-combustible and non-hazardous wastes, and, waste oil burners. A landfarm, consisting of a lined containment area with multiple cells, will be used for temporary storage and treatment of hydrocarbon contaminated soil, water, ice and snow, with final treatment of contaminated water in a treatment unit within the railway maintenance facility. Designated temporary storage areas will store hazardous and recyclable wastes that will be backhauled on sealifts to disposal or recycling facilities in the south.

Estimated quantities to be stored in the landfill and quantities to be incinerated are provided in Table 3-1.1.

3.6.5.7 Fuel Storage and Distribution

The main diesel tank farm at Steensby Port will have a total storage capacity to account for storage needed for refuelling of the tank farm at the Mine Site, as well as the nature of ship re-supply, with large re-supply during summer by tankers. Tank volumes and estimated fuel consumption during operation are provided in Table 3-1.1.

An additional single 7.5 ML diesel storage tank located on Steensby Island will act as a storage/transfer tank to receive emergency fuel deliveries from one of the ore carriers with additional tankage, as well as to re-fuel tugs and ice management vessels. One of the ore carriers in the fleet will have a 5 ML fuel tank that can be used to deliver fuel to the Project throughout the year, if necessary. The 7.5 ML tank on the island will be equipped with a refuelling manifold to the ore dock and dispensing equipment for the tugs and ice management vessels, but will not be piped to the main tank farm. Fuel transfers between this tank to the main tank farm will be by tanker truck.

Based on a transfer rate from the ship to the storage tank of 1,760 US gpm (6,660 litres per minute), the fuel unloading facility at the freight dock is designated as Level 2, according to the Canadian Coast Guard Oil Handling Facilities Standard TP 12402. A fuel response plan will be in place in accordance with a Level 2 Oil Handling Facility (refer to Steensby Port OPEP, Appendix 10C-3).

The distribution pumps located at the tank farm closer to the power plant will be a self-contained and skid-mounted module in a pump house. The distribution pump module will be mounted on a concrete pad and attached to a fully-equipped instrumentation and control room positioned to monitor, record and control the unloading and distribution operations. Fuel will be loaded to the rail tank cars for transportation to the Mine Site. Five railcars will be loaded at a time via loading arms and loading platforms.

The main tank farm fuel system will distribute fuel to the following locations:

- Power plant;
- Heavy and light equipment fuel pumps;
- Incinerator building;
- Heating boiler building; and,
- Railcar fuel loading station.

In addition to the main tank farm and the island tank, a number of day tanks will be required within the port site, ranging in size from 2,000 to 50,000 L in capacity and located within and outside of the power plant, boiler building, at fuel dispensing stations for light vehicles, and the incinerator. The railway maintenance building will contain bulk storage tanks for both unused and waste oil.

3.6.5.8 Ammonium Nitrate Storage

Ammonium nitrate (used for making explosives) will be securely stored in a storage facility located close to the freight dock, where the temporary explosives plant was located during the construction phase (Figure 3-2-9).

3.6.5.9 Site Roads and Causeway

The portion of the road to the water supply intake at 10-km Lake will be maintained throughout the operation phase. Graders, snowploughs and other equipment will operate continuously during the operation phase. Snow fencing will be used to limit the formation of snow drifts and snow banks on the road. Dust suppressants will be sprayed on the road as needed to limit dust raised by vehicle traffic. Inspections will be more frequent during the spring freshet to check culverts and the road for needed maintenance and repairs. Traffic will be managed in accordance with the Road Management Plan (Appendix 10D-8).

The bridge-causeway crossing to the island will provide road access for light vehicles, fuel tankers accessing the 7.5 ML tank on the island, and heavy equipment working the ore stockpiles. Two conveyors over the bridge-causeway will convey ore from the dumper pit to temporary ore stockpiles on the island.

3.6.5.10 Port Security

Port security will be managed as described in Sections 2.1.7.

3.7 OFF-SITE FACILITIES SUPPORTING THE PROJECT

In addition to facilities constructed on-site, Baffinland will maintain a logistic and administrative office in Iqaluit and the head office in Toronto. Ottawa will be a point of hire.

SECTION 4.0 - PROJECT DESCRIPTION – CLOSURE AND POST-CLOSURE

4.1 OVERVIEW

The Territorial Land Use Regulations regulates activities related to mineral exploration and mining in Nunavut. This regulation requires that the proponent prepare a Closure Plan for its activities. The Mine Site Reclamation Policy for Nunavut (INAC, 2002a) and the Mine Site Reclamation Policy for the Northwest Territories (INAC, 2002b) also require that contingency measures be established in the Closure Plan for both Temporary Closure and Long Term Closure of a mine site. A Preliminary Mine Closure and Reclamation Plan has been prepared to address this requirement (Appendix 10G). The plan incorporates progressive rehabilitation during the course of the Project to limit the work required after cessation of operations and to limit the environmental effects during the Project life. It addresses temporary and long-term closure as well as final cessation of operations. Public health and safety will be considered throughout all stages of progressive rehabilitation, closure and post-closure.

For final closure, materials and equipment will either be removed from site or disposed of in on site landfills, and all hazardous materials and wastes will be removed from site to licensed disposal facilities. The open pit and waste rock stockpiles will be inspected for physical and chemical stability. Roads (with the exception of the public Milne Inlet Tote Road), airstrips and development areas will be re-contoured as required to provide long-term stability and reduce the potential for erosion. Steel rails will be removed from the rail line, and tunnels will be backfilled and plugged. The closure phase is expected to be 3 years, followed by a minimum of 5 years of post-closure safety and environmental monitoring and treatment, as and if required.

The Plan is a “living” document. It will be reviewed and revised during water licensing, and regularly throughout the operation phase to reflect the progress of the Project as well as changes in technology and/or standards or legislation. The Plan is subject to review and approval by the Nunavut Water Board. Future revisions will also consider input from consultations with communities and other stakeholders on methods to be used, and potential uses for project infrastructure, etc.

The main objectives of closure activities are to:

- Return the Project affected and viable sites (mine site, Milne Port and Steensby Port) to “wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and human activities” (NRCan, 1994).
- Where practicable, undertake progressive reclamation to reduce the environmental risk once the mine ceases operation (INAC, 2002; INAC, 2002a; Northwest Territories Water Board, 1990; and QIA, 2009).
- Provide for the reclamation of affected sites and areas to a stable and safe condition. Where practical, affected areas will be returned to a state compatible with the original undisturbed area (Territorial Land Use Regulations).
- Reduce the need for long-term monitoring and maintenance by designing for closure and instituting progressive reclamation, as possible.
- Provide for mine closure using the current available proven technologies in a manner consistent with sustainable development.
- Return altered water courses to their original alignment and cross-section (Territorial Land Use Regulations).

4.2 PROGRESSIVE REHABILITATION

Reclamation will be accomplished using a progressive approach throughout the life of the mine. This allows for the development of solutions to problem areas, adjustments and modifications to reclamation techniques, implementation of mitigation measures and assessment of reclamation performance. For the duration of the Project, progressive rehabilitation will be implemented as follows:

- Laydown areas - unused areas or areas no longer needed during operations will be regraded and contoured to prevent pooling of water and facilitate natural drainage.
- Camps - following the construction phase, construction camps will be removed and/or downsized. Associated structures and infrastructures not required for the on-going operation will be removed from the site. The affected area will be regraded and contoured to facilitate natural drainage.
- Quarries and borrow Pit - once exhausted or no longer required, sites will be graded to maintain safe side slopes and where practicable to maintain the natural drainage of the area. Closure and reclamation of these sites will be carried out in accordance with the Borrow Pit and Quarry Management Plan (Appendix 10D-6).
- Landfills - landfills will be progressively covered with an interim cover consisting of overburden to allow the contents of the landfills to remain permanently frozen.
- Landfarms – hydrocarbon contaminated soils will be excavated and treated in the landfarms throughout the life of the Project.
- Facilities not in use during the operations phase will be demolished and removed from the site and disposed of in site landfills or off-site disposal facilities.
- Roads – roads no longer required during operations, such as the railway construction access road, will be decommissioned. Stream crossings will be removed and establishing drainage channels that are stable in the long term.
- Open Pit - a boulder fence or equivalent will progressively be placed around the open pit perimeter as material becomes available.
- Waste rock stockpile - management practice will ensure containment and coverage of PAG rock within the confines of the waste rock stockpile.

In addition to progressive closure activities, research studies will be undertaken during operations to examine the revegetation of disturbed areas using local vegetation trials. Pending the outcome of these studies, the findings from the vegetation trials may be incorporated into updates of the Mine Closure and Reclamation Plan.

4.3 TEMPORARY CLOSURE AND LONG TERM CLOSURE

Under the Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories (NWTWB, 1990) temporary closure is the planned shutdown of a mine site for a period of less than one year. In the event of temporary closure, the Project sites will be maintained in a secure condition through the implementation of a “care and maintenance plan”. As a result a number of operational maintenance staff and other support personnel will be onsite. Access to the Project sites, buildings and structures will be restricted to authorized persons only, as during operations. Buildings where potential hazards exist will be locked or otherwise secured. The schedule of activities to be undertaken for Temporary Closure is described in the Preliminary Mine Closure and Reclamation Plan (Appendix 10G).

The Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories (NWTWB, 1990) define Long-Term Closure as the state of inactivity resulting from economic considerations or a reduction in ore reserves for a period greater than one year. During Long-Term Closure the Project sites will be maintained in a secure condition. Site personnel will conduct periodic general inspections. Initial site inspections will be conducted once a month and may decrease in frequency if the site inspections indicate that the site infrastructure is stable. The site personnel will maintain a record of these inspections. The names of contact persons will be provided to the pertinent associations such as Indian Northern Affairs Canada (INAC) and QIA for their information and to facilitate their access to the site if and when necessary. Although protective measures will be in place the Project will no longer be monitored on a continuous 24 hour basis. The Project could reopen when the circumstances requiring the closure change, e.g. when economic considerations are no longer of concern. The schedule of activities to be undertaken for Long Term Closure is described in the Preliminary Mine Closure and Reclamation Plan (Appendix 10G).

4.3.1 Final Closure

Final closure occurs when the ore deposit is exhausted and requirements of the Mine Closure and Reclamation Plan have been completed. Within 60 days of completion of closing out the site a Final Closure Plan will be issued to the Land Use Engineer of INAC (Territorial Land Use Regulations; Sections 33 and 35). The schedule of activities to be undertaken for Final Closure is described in the Preliminary Mine Closure and Reclamation Plan and is summarized in the following paragraphs.

4.3.2 Open Pit

Following completion of operations the pit walls of the open pit will be inspected by a qualified professional to assess the physical stability. The open pit walls will be inspected for indicators of acid rock drainage (ARD) and/or Metal Leaching (ML).

The open pit will be allowed to naturally flood to create a pit lake. It is anticipated that the open pit will take an estimated 85 to 150 years to passively fill with water from natural sources such as seepage into the pit, direct precipitation and surface runoff (Appendix 10G). Once the open pit fills to the point of overflow, pit drainage will enter the natural environment from the southeast corner of the open pit.

Other activities to close out the open pit will include:

- removal of any dewatering infrastructure (i.e., pumps, surge box and pipelines);
- clean up of any soil contamination (i.e. hydrocarbon);
- barricading access ramps into the open pit; and
- placing of boulder fencing and signage as necessary.

At closure inert wastes may be disposed of in the open pit. All wastes in the open pit will be covered with a minimum of 3 m of overburden or waste rock.

4.3.3 Removal of Buildings and Infrastructure

The water supply, sewage treatment plants, buildings and infrastructure will be removed and either:

- transported to Milne Port or Steensby Port for shipment to the mainland for disposal and/or salvage
- disposed of in onsite landfills; or
- disposed of in the open pit.

The ore stockpiled at the Mine Site, Milne Port and Steensby Port will be shipped out and the ore stockpile pads will be recontoured following final shipment of the ore.

4.3.4 Removal of Machinery, Equipment and Storage Tanks

Salvageable machinery, equipment and other materials will be dismantled and taken offsite for sale or reuse if economically feasible. Alternatively, these items will be cleaned of oil and grease, where appropriate, and deposited within either onsite landfills or the open pit. Gearboxes or other equipment containing hydrocarbons that cannot readily be cleaned will be removed from the equipment and machinery and sent to either Milne Port or Steensby Port for sealift to the mainland and disposal at an approved facility.

Empty fuel storage tanks, drums and other fuel storage containers will be drained and removed from the Mine Site, Milne Port and Steensby Port for disposal at an approved facility. Secondary containment structures such as liners will also be removed, tested for hydrocarbon content and sent to an approved offsite facility for disposal, as required.

4.3.5 Transportation Corridors and Facilities

Bridges, culverts and other water crossings along the Milne Inlet Tote Road will remain in place. This road is part of the Inuit Owned Lands referenced in the Nunavut Land Claims Agreement (Section 21.4.1) and is designated for public use and as such will be left intact for public use.

The bridges, culverts and other water crossings associated with the Railway will be decommissioned and drainage channels restored to be stable in the long-term. The steel rails will be removed from the Railway and transported to Steensby Port for sealift and offsite salvage. The wooden ties and embankment will remain.

The docks located at Steensby Port will be left in place. The causeway connecting Steensby Port and Steensby Island will be demolished and either shipped to the mainland for offsite disposal, disposed of in the onsite landfills or disposed of in the open pit. Once the causeway has been demolished the natural flow between Steensby Port and Steensby Island will be restored.

The lighting associated with the airstrips located at the Mine Site, Milne Port and Steensby Port will be removed. The airstrips will be abandoned, but left in good working order unless otherwise directed by regulatory agencies, to provide emergency/rescue landing spots for regional aircraft, when no other options are available.

4.3.6 Concrete Structures

Concrete foundations will be demolished and exposed rebar will be cut to prevent safety hazard. Concrete and rebar will be disposed of in the open pit, waste rock stockpile or landfill, and the concrete foundation areas infilled with non acid generating mine rock or overburden and as needed covered with overburden.

The area will be regraded to restore the natural drainage. Any remaining concrete piles will be cut to below grade and covered with overburden.

4.3.7 Removal of Chemicals

The stock of explosives will be depleted towards the end of the operations phase and any remaining explosives will be securely contained and shipped from the site by a licensed contractor to an approved facility for disposal or reuse.

Oil, grease and chemicals will be transported offsite for disposal at an approved facility or where applicable for reuse. Batteries and hazardous waste will be removed and disposed of or recycled at an approved facility.

4.3.8 Soils Testing

A site investigation will be conducted at the onset of closure to identify soils that may be contaminated with hydrocarbons or chemicals. Soil materials found to exceed the appropriate cleanup criteria for hydrocarbons will be remediated onsite in the landfarm units; or alternatively contaminated soils will be removed offsite to a licensed waste management facility.

If there is reason to suspect an area of soil has been contaminated by chemicals other than hydrocarbons (such as explosives), samples will be collected and the soil will be tested. If the applicable regulatory requirements are exceeded, an appropriate method of disposal will be sought in consultation with the appropriate authorities.

4.3.9 Waste Management

Combustible non-hazardous wastes will be incinerated at the Project incinerators. Once the incinerators are no longer required, they will be managed as described in Section 4.4.3. The onsite landfills will be reclaimed by capping the landfill with 1.5 m of overburden or equivalent material.

Sewage treatment plants will also be managed as described in Section 4.4.3. Liners will be removed from polishing ponds and SWM ponds and berms will be re-graded and levelled.

4.3.10 Stabilization of Stockpiles

The waste rock stockpile at final closure is expected to have a total volume of about 640 Mt with average side slopes of 2H:1V. At closure the waste rock stockpile may undergo minor recontouring. The physical and chemical stability of the waste rock stockpile will be investigated at the onset of closure. Following recontouring and stabilization investigations, the waste rock stockpiles will be considered closed.

Borrow areas and quarries will be progressively reclaimed maintaining stable side slopes. At the onset of closure the borrow areas will be investigated to assess potential thermal damage and instability due to thaw impacts. At closure minor recontouring and filling with overburden may be undertaken as needed to ensure slope stability and restore the natural drainage due to thermal disruptions.

4.3.11 Watercourses and Drainage Ways

The bridges, culverts and other water crossings will be decommissioned and the drainage channels restored to be stable in the long-term.

Disturbances to the surrounding areas of the Project may cause thermal disruptions to the permafrost zone resulting in ponding, settlement and/or subsidence due to changes in the active layer (approximately the upper 1 to 2 m of soil). During closure these areas will be drained of excess water, filled with clean material to re-establish the active layer and graded, restoring the natural drainage of the area as necessary.

4.3.12 Reclamation Schedule for Final Closure

Once the decision has been made to permanently close the mine, and considering the progressive reclamation undertaken over the mine life, it is anticipated that final closure activities will be carried out over a period of three years.

4.4 CLOSURE AND POST-CLOSURE MONITORING

Monitoring and follow-up inspections will be conducted of the Project areas to assess the physical and chemical stability of various components after closure and reclamation of the facilities.

Ongoing monitoring and management of ARD and ML (if any) is expected to be required until such time as it can be demonstrated that site drainage does not pose a threat to downstream receiving waters. This includes an assessment of long-term water quality of the future pit lake.

Monitoring of various site aspects such as water quality are expected to continue over an extended period of time until such time that the monitoring is no longer required.

A post-closure monitoring program compliant with the applicable guidelines and regulations will be implemented to ensure the reclamation measures remain effective and continue to provide a high level of protection for the public and the environment.

SECTION 5.0 - WORKFORCE AND HUMAN RESOURCES

Baffinland is committed to developing a Project that provides sustainable benefits to the people of Nunavut. The success of Baffinland depends upon the combined capabilities of its employees, technology, resources, and customers. Human Resources management activities are guided by the following commitments to the workplace and people:

- Strive to achieve a workplace for our employees and contractors free from occupational injury and illness;
- Respect human rights, and the traditional culture, values and customs of the Inuit people;
- Report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents; and,
- Foster and maintain a positive culture of shared responsibility based on participation, behaviour and awareness.

Baffinland's commitments and employment policies with respect to its workforce are described in the Human Resource Management Plan (Appendix 10F-3).

The Company is working in cooperation with stakeholders in Nunavut to establish education and training programs that will provide opportunities for employment of local residents in the Project and equip them with skills that will sustain them beyond the life of the Project.

5.1 WORKFORCE REQUIREMENTS

Workforce requirements have been estimated for both the construction and operation phases of the Project and are presented in Table 3.-1.1. These estimates provide a guide to the general size of the workforce during the construction and operation phases. Personnel requirements during the closure and reclamation phase are a subset of the operational requirements, and as such are not discussed separately.

5.1.1 Workforce – Construction Phase

The construction workforce ranges is size over the four year construction period from about 3,000 to 5,700 persons (Table 3-1.1). The estimated site workforce includes the workers on shift at each of the Project sites but excludes the approximate 150 workers expected to be involved in ongoing exploration. Staff located in Iqaluit, Ottawa and Toronto is also not included, nor are workers on ore carriers, sealifts and tanker vessels. The estimates are approximate and will vary seasonally through the year and between each year.

The work week will consist of 12-hour days, 7 days per week. The planned scheduled work rotation for most contractors during the construction phase will be 4 weeks on / 2 weeks off. Workers hired from northern communities will work 2 weeks on / 2 weeks off during construction.

Successful completion of the construction phase is dependent on the quality and commitment of the workforce. The accommodation camps will offer comfortable quarters and recreational and entertainment facilities to promote a safe, healthy, and inviting worker environment, and to encourage workers to remain within the accommodation boundaries during leisure time. The capacity and number of accommodation camps during construction are provided in Table 3-1.1.

Employee transportation to the Project site during the construction phase will be provided by the Company. Flights will operate between the five North Baffin community points of hire, including (listed in alphabetically order): Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet. This transport will be via small aircraft operated by northern air carriers on a charter basis. Larger aircraft such as a Boeing 737 will be chartered to transport workers from Ottawa and Iqaluit to the Mine Site or Steensby Port.

5.1.2 Workforce - Operation Phase

The total estimated workforce during the operation phase is 1,057 persons, including both on-site and off-site personnel, and Baffinland and contract personnel. This estimate does not include staffing required for any ongoing exploration work throughout the operations phase. Most on-site staff will work on a scheduled rotation of 2 weeks working at site and 2 weeks off. The projected distribution of the workforce by skill level is provided in Table 3-5.1. Approximate total payroll numbers will be double those in the table to account for the staff rotations. These estimates reflect direct employment required for operations.

Table 3-5.1 Estimated Operation Phase Workforce by Skill Level

	Management	University	College	Superintendents	Fore-persons	Trades	Equipment Operators	Clerical	Semi/ Unskilled	Total
Corporate Total	**11**	**6**	**7**					**31**		**55**
Toronto	6							10		16
Sales & Shipping	4							3		7
Iqaluit	1	6	7					18		32
18 Mt/a Total	**9**	**41**	**115**	**8**	**36**	**141**	**151**	**30**	**160**	**691**
Mine Site	4	14	89	4	14	75	123	10	68	401
Steensby	2	6	4		12	30	18	4	34	110
Railway	1	2	22	4	10	36	10	6	58	149
3 Mt/a Total	**20**	**8**	**4**	**1**	**4**	**44**	**194**	**8**	**28**	**311**
Mine Site	2	12	9	7	14	65	203	9	41	362
Milne Port	2	2	2	2	12	20	122	2	16	180
Totals	**40**	**55**	**126**	**9**	**40**	**185**	**345**	**69**	**188**	**1,057**

5.1.3 Closure and Reclamation Phase Workforce

The expected duration of the closure phase is three years, during which time a small fraction of the operation phase workforce will be retained to carry out reclamation activities at project development areas. The details of the size and composition of the closure and reclamation workforce will be developed during the operation phase, no later than two years prior to the planned commencement of closure and reclamation activities.

5.2 HUMAN RESOURCES

5.2.1 Project Education and Training

Baffinland has been actively pursuing education and training partnerships and initiatives. In 2008, the Company accomplished the following:

Inuit Training Program Memorandum of Understanding

Baffinland, the Qikiqtani Inuit Association, Qikiqtaaluk Corporation, and Kakivak Association signed a Memorandum of Understanding (MOU) on May 31, 2008 agreeing to develop and promote the delivery of mine-related training, training related to economic and community development, labour market research, curriculum development, career development, and other related activities for the benefit of Inuit in the communities associated with the Project. The activities being developed under the MOU built on existing training initiatives underway at the Project such as heavy equipment operator training, job-shadowing programs and cultural orientation seminars. Encouraging education and training programs for students, coordinating of work placements, and reducing barriers to Inuit participation are critical to the success of the program. Funding is anticipated to involve both private and public sector sources. The initial term of the MOU is three years with an expectation that the success of the program will be reviewed and next steps identified.

Government of Nunavut & Arctic College Training Program Memorandum of Understanding

A MOU similar to the above was established with the Government of Nunavut and Arctic College, focusing on trades programs. A trade school will open in Rankin Inlet, Nunavut in 2011 to serve Nunavut. In the meantime, the MOU will allow for the start of apprenticeship training using the Arctic College facilities in the local communities.

Nunavut Community Skills Inventory System

The Nunavut Community Skills Inventory System (NCSIS) was developed by the Government of Nunavut, Department of Education to address the needs of Article 23 of the Nunavut Land Claims Agreement. The program is designed to capture the skill sets of individuals, including but not limited to their academic achievements, and to match them with the skill sets needed for a particular job, thus allowing them more access to jobs in industry.

The system is comprised of four parts:

- The individual’s essential skills assessment;
- The employer job listing, broken down into the essential skills needed to perform that job;
- A process to match the individual's skill set against the job bank; and,
- A process that generates various reports for the individual, business, and the Ministry of Education.

The system can be delivered in four languages with "voice over" capabilities. NCSIS will provide a system that links employment / training data at a community / regional level or territorial level. These data will be important to plan for training initiatives and educational requirements which in turn will offer individuals the skill development programs needed to qualify them for work opportunities in their communities and / or at other locations.

NCSIS will become the basis for the development of Nunavut's Labour Force Management System. Baffinland has become a partner in the rollout of this initiative to develop an understanding of who is available for work and their skills sets, as the Company prepares for the construction phase of the Mary River Project. Baffinland will put all its work positions into the data bank and cross reference these with the individuals from its affected communities, allowing the Company to develop a comprehensive training plan to cover the next three years.

SECTION 6.0 - ALTERNATIVES

6.1 CONTEXT

The need and purpose of the Mary River Project were outlined in Section 1.4. Due to the remoteness of the site, arctic climatic conditions, and, the absence of infrastructure (ports, transportation, energy supplies), the development of a major project in the North Baffin Island Region is extremely costly. For any industrial operation, economies of scale are required to overcome the technical challenges associated with the adverse climatic conditions, the absence of infrastructure, and, to ensure that the project is economically feasible.

6.1.1 Iron Ore

Iron ore is an abundant commodity. Grades of known iron deposits range from a low of 15% Fe to a high of approximately 71% Fe. A high grade iron ore with specific physical properties can be used as direct feed (lump) by steel makers. Otherwise the ores are crushed to less than 10 mm in size to be used to make sinter. Sinter is the agglomeration of iron ore fines that are fused but not melted to form a coarser mass that can be charged to the blast furnace. Low grade (below 60% Fe) iron ores requires additional processing (concentrating and/or pelletization) for upgrading prior to its use by steel makers for the production of sinter or pellets. Therefore, higher grade and quality iron ores command a premium.

The iron ore commodity market is a high volume, low margin operation. Therefore, the ability to produce the ore and provide a consistent and reliable ore supply is required in order to successfully compete on world markets.

6.1.2 The Steel Industry

The steel industry is the primary customer for iron ore. This industry is rapidly expanding in Asia in order to satisfy the ever increasing demand for steel which is driven by the strong growth of many Asian countries. Meanwhile, demand for steel in Europe is stabilizing and growth follows economic activity. Over the last decade, the rapid growth of the Asian economies has progressively diverted the higher grades (higher quality) iron ores from traditional steel makers in Europe. European customers are now in a position where they need to secure long term supply of high quality iron ore.

Steel making is also a capital and highly energy intensive and competitive industry. Production costs are largely driven the quality of the raw material inputs (iron ore, coking coal, fluxes) treated and the associated energy consumption. With higher the iron ore quality, the energy demand for steel making is reduced.

6.1.3 The Mary River Setting

The Mary River Deposit was discovered in 1962. It is a high grade deposit which will command a premium on world iron markets.

Within the region, there is a relatively low diversity of species. The soil profile comprises primarily sand and gravels with limited organic material. The growing season is short resulting in low biological productivity. Permafrost covers the entire region. This region receives nearly 24 hour of sunlight in the summer season and 24 hr darkness during the winter months. To date, access to the site is limited to air transport and the open water shipping season via Milne Inlet.

The productive arctic marine environment supports an abundant marine mammal population which in turn has been an important food supply for the subsistence economy of the region.

6.1.4 Land Use

The Nunavut Land Claims Agreement (NLCA) establishes the requirements and expectations for development activities occurring in Nunavut. The mining leases at Mary River predate the May 25, 1993 NLCA, but are surrounded by Inuit-owned surface and mineral (sub-surface) rights. Inuit owned surface rights in the area are administered by the QIA while Inuit-owned mineral rights are administered by the Inuit birthright corporation Nunavut Tunngavik Incorporated (NTI). The Mary River mineral leases are administered by INAC under the Canadian Mining Regulations of the *Territorial Lands Act* on federal (Crown) land. Access to the surrounding surface lands is provided through land use permits and leases issued by QIA or INAC.

6.1.5 Social Considerations

The communities of north Baffin Island in the immediate vicinity of the Mary River Deposit (listed in alphabetical order) are: Arctic Bay (280 km), Clyde River (415 km), Hall Bay (192 km), Igloolik (155 km) and Pond Inlet (160 km). These communities have historical socio-economic and/or ecosystemic ties to the Project area.

These communities have a subsistence economy and have experience dramatic population growth over the last 20 years. Over 70% of the population is under the age of 25. Underemployment and lack of opportunities is causing social stress. There is recognition by community elders that the communities must position themselves to enter the wage economy. In the absence of the Project, new economic and employment opportunities in the foreseeable future are limited.

6.1.6 The Proponent

Baffinland Iron Mines Corporation (TSX: BIM) is a Canadian publicly-traded junior mining company that was formed pursuant to Articles of Incorporation under the *Business Corporation Act* (Ontario) on March 10, 1986. The Company is a mineral exploration and development company. Its purpose is to seek investment opportunities and generate an acceptable rate of return for its share holders.

Baffinland's activities are focused on the development of its 100%-owned Mary River iron ore deposits in the Mary River area. The Company is committed to developing the Mary River Project (the Project) in an environmentally and socially sustainable manner that will benefit the Company and the people of Nunavut.

6.2 FACTORS TO CONSIDER FOR PROJECT DEVELOPMENT IN NUNAVUT

The development of a major mining project in a remote location of Nunavut faces several important challenges.

6.2.1 Revenues Depend on the World Commodity Prices for Iron Ore

The cost of developing the Project must be borne by the Proponent. The Proponent's source of revenues will be the sale of high quality iron ore to steel companies.

6.2.2 Capital Expenditure

There is a high cost associated with the construction and operation of mining operations, ancillary facilities, and, the associated transportation infrastructure in the arctic. The facilities required include:

- The mine and its support facilities (mobile equipment, maintenance facilities, power and water supply, etc.);
- Dedicated accommodation for the worker and support facilities;
- Transportation links to and from the Mine Site to a port facility for shipment of ore;
- A port facility; and
- A specialized fleet of ore carriers to navigate arctic water during all seasons.

In some regions of the world where other iron ore projects are currently being developed (Brazil, Liberia, Guinea and Australia) climatic conditions make it possible to operate without interruption through the year. Infrastructure is a key component to the development of iron ore deposits. The last Greenfield iron ore development (with new port and rail facilities to be developed) was at Carajas in Northern Brazil started in 1982/83. Furthermore, for most of these developments, there is existing transportation infrastructure (ports, roads, railway, and necessary utilities). In some regions of the world, a pool of qualified and non qualified workers is readily available in close proximity of the Project site, thus eliminating the requirements for workers accommodation on the Project site.

6.2.3 Logistic of Construction in the Arctic Environment

The implications of an arctic climate, the limited seasonal access to the site, and the shortage of worker accommodations are important considerations for project construction. Due to the absence of transportation infrastructure, site capture and mobilization must take place during the arctic open water season. Construction materials and supplies, fuel and equipment must be transported to the site by sea lifts between July and September. Large temporary camps are necessary for the work force.

The long winter season also impacts on the efficiency of the construction crews and limits their ability to work during the extreme cold winter period. The spring freshets during June/July may also limit construction activities.

6.2.4 Technical Challenges and Operation of a Mine in the Arctic

The difficult geotechnical conditions (permafrost, ice lenses, et.) require specialize design and construction techniques to ensure stability of the works constructed. The extreme cold also requires special consideration.

In terms of operation of the mine, the challenges are associated with the logistics of timely and cost effective supply of goods and services required for the mining operation throughout the year. Mining in the arctic has proven history, therefore, these challenges are well understood.

6.2.5 Need for All Season Shipping

The competitive nature of the steel making industry demands a steady, consistent and secure supply of iron ore. Because of the tonnages involved, seasonal shipping is not a viable option. Seasonal shipping would require the establishment of massive ore stockpiles both at the shipping port and at the receiving ports. Virtual all steel mills attempt to use consistent and predictable sources of raw materials, particularly iron ore. The steel making process requires a constant and consistent balance of inputs and outputs to ensure that costs and productivity are carefully managed to maintain economic viability. Steel mills are generally located in proximity of urban centres where land is at a premium. Furthermore, the competitive nature of the steel business forces this industry to maintain minimal stockpiles of raw material.

Because of the frequency of shipping associated with the Project (i.e., one ship calling at Steensby Port approximately every two days, throughout the year including the ice covered period), a reliable shipping operation is required. This includes a fleet of ice breaking ore carriers that are capable of reliably and consistently meeting the tight shipping schedule, and selection of a shipping lane with consistently reasonable ice conditions. Potential mitigation measures relating to shipping interactions with marine mammals is provided in the Shipping and Marine Mammal Management Plan (Appendix 10D-10).

6.2.6 Benefits for the Local Communities

The Project must provide tangible benefits for Baffinland as well as the Inuit land owners and local communities and land users.

6.3 PROJECT FEASIBILITY

After years of exploration to define the ore reserve, in 2007, Baffinland undertook a "Definitive Feasibility Study" to establish the conditions and parameters for which the development of the Mary River Deposit No. 1 would be technically, environmentally, socially and economically viable (Baffinland, 2008a). The aim of the DFS was to confirm the economies of scale required to achieve long term economic viability taking into account the context and constraints identified in Section 6.1 and 6.2.

The DFS was completed in early 2008. Subsequent to the completion of the DFS, further economic scenarios and sensitivity analyses have been undertaken.

Based on current and long term forecast for iron prices and economic analyses, it is concluded that a minimum iron ore production rate of 21 Mt/a would be required to ensure long term economic viability of this mining operation. On the basis of this DFS and subsequent sensitivity analyses, in addition to an open pit mine and support facilities, the "Mary River Project" would include the following key components:

- All season ore shipping;
- All season port facility;
- Transportation link to and from the Mine Site to the port;
- On-site accommodation for workers; and
- Air strip and improved air access.

The capital cost of the Project is estimated at C$4.1 billion which includes over C$1 billion for the Steensby Port, C$ 1.9 billion for the Railway, C$ 100 million for the Milne Inlet Tote Road upgrade, over C$ 200 million for the workers accommodation facilities, and, C$ 150 million for the airstrips. Not included in the capital estimate are the capital cost of the Milne Port construction and the cost of the ice breaking ore carriers.

The operating costs were estimated at C$ 14.62/t which includes an estimated C$ 1.50/t for rail transportation of the ore. As a comparison, truck transportation of the ore is estimated at C$ 17 to C$ 22/t based on current fuel prices.

6.3.1 Project Go / No-Go Decision

The economic analyses enabled Baffinland to evaluate the environmental, social and financial risks associated with the development of the "Mary River Project". On the basis of this information, Baffinland had a choice of three possible decisions regarding for the development of the Mary River Deposit No. 1:

- Proceed with mine development in the near term, as proposed herein;
- Delay the project until circumstances are more favourable; or,
- Abandon the Project.

Recognizing that long term economic viability is highly sensitive to current and expected long term iron ore prices, Baffinland opted to proceed with the Project at this time (Baffinland, 2008a).

To assist in the cost of the design, construction and operation of the ice breaking ore carrier fleet, Baffinland decided to enter into a long term contractual agreement with Fednav. Fednav would build and operate a dedicated fleet of ice breaking ore carrier to transport the iron ore from Steensby Port to European markets. The cost of 10 ice breaking vessels (160,000 to 190,000 DWT) is estimated at C$ 175 million apiece.

If the Project does not proceed, the mineral resource will not be developed, and the potential effects and benefits predicted in this EIS will not be realized. The expected socio-economic trends in the absence of the Project are described in Volume 4. The Project is expected to bring a multitude of benefits to local communities supporting both traditional pursuits (hunting is expensive and requires financial resources) and the generational shift that is occurring within the Inuit community as youth show an interest to participate in the wage-based lifestyle.

6.3.2 Decreased Production Rates

The facilities are designed for an optimum production rate which requires a minimum capacity for the associated Project infrastructures (railway, port, roads). Reducing the production rate will not result in a lower fixed capital investment for these facilities. Once the Project is operational, there is the need to repay the capital borrowed to finance the construction of the Project. This approach provides more flexibility for the Company to make decision related to production volumes and potential plant shutdowns during market downturn. For this reason, as long as the iron market remains buoyant, Baffinland intends to operate its facilities at maximum capacity. A decrease in production rate would likely result in a decrease in shipping frequency depending on the duration of reduced production rates.

6.3.3 Increased Production Rates

Mineral resources for Baffinland's mining leases are not completely delineated. Exploration activity during 2010 confirmed the presence of additional deposits (refer to Volume 3, Section 1.5). The locations of all currently identified deposits known are shown on Figure 2-2.1. Should there be a need to increase production, Baffinland would accelerate the development of another deposit.

Although the Project has been designed for a nominal capacity of 21 Mt/a of iron ore, due to the flexible nature of the mining equipment and transportation facilities that will be constructed, no additional infrastructure would be required to increase production up to 30 Mt/a. An increase in production rate would likely result in a increase in shipping frequency depending on the duration and magnitude of increased production rates. Consideration for increased shipping frequency would require consultation to relevant aspects of the Project's Environmental, Health and Safety Management Plans.

6.4 METHOD OF ASSESSING ALTERNATIVES WITHIN THE PROJECT

Alternatives within the Project have been evaluated according to the following criteria:

- Technical feasibility
- Cost implication in terms of implementation

- Potential impacts to the environment
- Community acceptability or preference
- Enhancing socio-economic effects, and
- Amenability to reclamation.

Technical Feasibility - Relates to the appropriateness of an alternative from an engineering or operational perspective and incorporates aspects of known performance, reliability, and operational ease for the Project. Given both the cold climate and relative remoteness of the Project, an important consideration in evaluating technical applicability includes proven northern performance. Rankings of technical feasibility are described as follows:

- "2" is the preferred alternative. The approach, technique and/or method are technically effective and reliable with contingencies, in terms of the ability of the alternative to service the project.
- "1" represents the next best acceptable alternative. It appears effective based on modelling / theoretical results and contingencies are available if the alternative does not perform as expected, and
- "0" represents an unacceptable approach / technique / method. The effectiveness appears uncertain or unproven and relies on unproven approaches.

Cost Implication - Relates to the overall Project costs including capital, operating and maintenance, and closure/reclamation costs of an alternative. Rankings relates to the ability of the Project to support a given alternative as follows:

- "2" is the preferred alternative which will yield the most favourable return on investment for the investor
- "1" represents an acceptable alternative, which can be supported by the Project, but will result in a lower profitability, and
- "0" represents an unacceptable alternative in terms of return on investment and therefore, cannot be supported by the Project as currently defined.

Each alternative under evaluation can have adverse effects on the environment. Potential residual effects on the environment look at the expected severity of residual effects on the environment of one alternative relative to the other. The potential residual effects are ranked as follows:

- "2" represents the alternative that has the least impact on the environment without mitigation
- "1" represents an acceptable alternative which minimizes adverse impacts to the environment with mitigation, and
- "0" represents an alternative that is the least environmentally acceptable due to severity of impacts or residual effects.

The "environment" in this context refers to both the natural and socio-economic environment, focusing on valued ecosystem components (VECs) and valued socio-economic components (VSECs) identified in the impact assessment (Volume 2).

Alternatives are ranked in terms of community acceptability or preference as follows:

- "2" represents the option that is deemed to be the "preferred option" by the community, that is, a clear preference for a given alternative by multiple stakeholders
- "1" represents an option which is also acceptable to the stakeholders. Little to no indication of preference has been received, or a balance of perspectives has been heard on a given subject, and
- "0" represents an option that is the least acceptable or completely unacceptable, that is, substantial opposition has been expressed by most or all stakeholders to date.

This criterion is by nature subjective, both in terms of the community perspectives that have been expressed as well as the interpretation and weighing of those perspectives. Nevertheless, effort has been given to synthesizing and incorporating viewpoints and desires expressed to Baffinland thus far through its consultation efforts. For alternatives where feedback has not been obtained, this criterion is not included in the evaluation.

With respect to enhancing socio-economic effects, it is recognized that some alternatives may provide tangible and intangible benefits to local communities and the region. Rankings for this objective are described as follows:

- "2" indicates the preferred alternative which provides the most socio-economic benefit in relation to the other alternatives, and
- "1" indicates the next best alternative which provides less socio-economic benefit than the preferred alternative.

Since this objective is focused on enhancement of positive benefits, and negative socio-economic effects are addressed in the preceding objective, there is no unacceptable rating.

Certain project alternatives are assessed against their amenability to reclamation. Alternatives are ranked against this criterion as follows:

- "2" is the preferred which requires limited reclamation with certain effectiveness
- "1" is the alternative which requires moderate to extensive reclamation within tolerable limits of effort, reliability and effectiveness, and
- "0" is an alternative which requires reclamation that is not practical or feasible.

This objective relates to the decommissioning or reclamation of various aspects at eventual Project closure. It is relevant to those aspects of the Project that alter the landscape (i.e., roads and stockpiles) and/or require dismantling and either removal from site or disposal on site (e.g., buildings).

For each Project alternative, once an option is judged "technically feasible", objectives can be qualitatively evaluated on the basis of professional judgement and previous experience with similar Projects or situations. Objectives are meaningful attributes that are essential for Project success, and the ranking of these objectives provides the basis for distinguishing between various options. Each option is assigned a

TABLE 3-6.1
EVALUATION OF ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative	Technical Feasibility		Cost Implication		Impacts on Natural Environment		Community Acceptance or Preference		Enhancing Socio-economic Benefits		Amenability to Reclamation		Overall Ranking	
Production Rate														
Less than 21 Mt/a rate	Option is technically feasible	1	Does not provide competitive return on investment	0	Slightly reduced project footprint, but longer duration of effect on environment	1	No feedback received on production rates	1	Project benefit period is longer than the 21 Mt/a base case	2	Equal reclamation requirements to 21 Mt/a	2	7	Unacceptable - not financially viable
21 Mt/a (21 year mine life)	Option is technically feasible	2	Provides an acceptable return on investment	1	A balance between other options	1	No feedback received on production rates	1	Project benefit period is shorter than for the lower production rate	1	Can be reclaimed	2	8	**Preferred** - Minimum size of Project for a viable operation; Optimizes financial, social & environmental, and technical considerations
Greater than 21 Mt/a rate	Option requires development of other deposits; mineral resources not adequately defined	0	Higher economies of scale likely to provide a superior return on-investment, but evaluation not completed	2	Slightly greater project footprint	1	No feedback received on production rates	1	Project benefit period is unknown	0	Greater reclamation requirements based on development of additional open pit(s)	1	5	Unacceptable - relies on the development of mineral resources that have not been confirmed to date.
Mining Methods														
Open Pit	Ore geometry favours open pit operation	2	Most cost-effective means of mining Deposit No. 1	2	Largest but acceptable footprint	1	Communities have not indicated a preference	1	Socio-economic benefits remain unchanged	1	An open pit will remain, eventually forming a pit lake. Reclamation to focus on physical stability and safety (preventing access)	1	7	**Preferred** - the only cost-effective and technically viable option
Underground	Not technically feasible - ore body is at the surface	0	Not technically feasible, so not assessed		Not technically feasible, so not assessed		Not technically feasible, so not assessed		Not technically feasible, so not assessed		Not technically feasible, so not assessed		0	Unacceptable - not technically feasible
Open Pit & Underground combination	Not technical feasible - ore body is at the surface.	0	Not technically feasible, so not assessed		Not technically feasible, so not assessed		Not technically feasible, so not assessed		Not technically feasible, so not assessed		Not technically feasible, so not assessed		0	Unacceptable - not technically feasible
Power Supply														
Diesel generators	Most reliable and efficient in the Arctic environment	2	Lowest cost as all other options require diesel use either partially or as standby	2	Air and noise emissions	1	Equally acceptable	1	Skills training and employment opportunities	1	Standard reclamation practices	2	9	**Preferred** - Optimizes cost and reliability of power supply
Solar	Not proven in arctic conditions; cannot provide power during long periods of darkness	0	High initial construction cost	0		N/A	Equally acceptable	1		N/A		N/A	0	Not proven for arctic conditions
Wind	Not reliable as a single source of power - only produces power between 25 - 35 % if the time; limited proven use in arctic conditions	0	High initial construction cost	0	Minimal footprint	2	Equally acceptable	1	Additional skills training with limited employment opportunities	1	Low reclamation requirements	1	5	Unacceptable as a stand alone source of power
Hydro-electricity	Viability of hydro-site require additional study	0	High initial construction cost	1	Disturbance of aquatic life and habitats and largest environmental footprint	1	Equally acceptable	1	Additional skills training and employment opportunities	1	Permanent structure	0	4	Viable option but requires more study and time to assess economic and technical feasibility
Closure and Reclamation Alternatives														
Reclaim and remove from site	Provides for long-term physical stability and public safety	2	Added cost of removal from site	1	Has the least effect on the environment	2	Community will revert easily to original land use practices	1	Revert easily to original cultural way of life	1	Amenable	1	8	Acceptable - Cost of off-site removal may be high
Other uses (leave in place)	Facilities require on-going maintenance	1	Least cost for reclamation since equipment and facility will not be removed but rather left in place	2	Responsibility lies with end users - environmental management cannot be guaranteed	1	Community may be pleased to have possession of facilities for use	2	Additional socio-economic opportunities for recreation, hunting and other land uses	2	Amenable	1	9	Acceptable - If end-user does not manage environment appropriately, closure and post-closure responsibility may lie with project proponent

TABLE 3-6.1
EVALUATION OF ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative	Technical Feasibility		Cost Implication		Impacts on Natural Environment		Community Acceptance or Preference		Enhancing Socio-economic Benefits		Amenability to Reclamation		Overall Ranking	
Port Location														
East Baffin Port Sites and Rail Routes	Port sites not technically viable due to prohibitive shipping conditions (ice shear zone and narrow fiords)	0	Not a significantly greater cost when compared to the preferred route to Steensby Port.	1	Not a significantly greater environmental footprint compared with route to Steensby Port	1	Preferred based on distance of activities from communities	2	No socio-economic advantage over other port locations	1	Requires reclamation within tolerable limits.	1	0	Unacceptable - technically not feasible due to ice conditions
West Coast Port Sites	Port sites not technically favourable due to ice shear zone	1	Cost prohibitive. More than twice the length of railway to Steensby Port	0	Rail route is twice the distance compared with rail route to Steensby Port and therefore twice the environmental footprint	1	Preferred based on existing infrastructure	2	No socio-economic advantage over other port locations	1	Requires reclamation within tolerable limits.	1	0	Unacceptable - cost cannot be supported by the Project
Iqaluit Port	It is not known if a railway to Iqaluit is technically feasible	0	Cost prohibitive - 1,000 km is more than 5 times the length compared to Steensby Port	0	Environmental footprint is the greatest compared to all alternatives	1	Recommended alternative by communities.	2	No socio-economic advantage over other port locations	1	Requires reclamation within tolerable limits.	1	0	Unacceptable - cost cannot be supported by the Project
South Steensby Port Alternative	Technically viable for year-round shipping	1	Cost prohibitive. More than twice the length of railway to Steensby Port	0	Rail route is twice the length compared to Steensby Port, and therefore twice the environmental footprint	1	Recommended alternative by communities	2	No socio-economic advantage over other port locations	1	Requires reclamation within tolerable limits.	1	0	Unacceptable - cost cannot be supported by the Project
Milne Port	Technically feasible for open water shipping. Not viable for winter shipping due to ice conditions.	1	Cost effective for road haulage operation and low tonnages, not for rail operation and shipment of high tonnages	2	Least distance from Mine Site. Smallest terrestrial environmental footprint with no significant residual effects to natural environment.	1	An acceptable alternative for trucking option	1	No socio-economic advantage over other port locations	1	Requires reclamation within tolerable limits.	1	7	**Preferred** - feasible for open water shipping but not year-round shipping
Steensby Port	Technically feasible for year-round shipping	2	Cost effective; can be supported by the Project	2	No significant residual effects on natural environment	1	An acceptable alternative for railway option	1	No socio-economic advantage over other port locations	1	Requires reclamation within tolerable limits.	1	8	**Preferred** - only feasible option for year-round shipping
Ore Transport Method														
Conveyor	Distance to port is too far - technically challenging in this environment	0	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	0	Unacceptable - not technically feasible
Slurry pipeline	Not technically feasible due to coarseness of ore	0	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	Not technically feasible, so not assessed	N/A	0	Unacceptable - not technically feasible
Trucks	Technically feasible	2	Cost effective for lower tonnage operations only	2	Higher but acceptable impact compared to railway	1	Acceptable alternative	1	More employment opportunities for Inuit	2	Lower reclamation effort required	1	9	**Preferred** - for lower tonnages only (not feasible for high production tonnages)
Rail	Technically feasible	2	Cost effective for high tonnage operations only	2	Low impact except for footprint	2	Acceptable alternative	1	Acceptable socio-economic benefits	1	Higher but acceptable reclamation effort required	1	9	**Preferred** - for higher tonnages only (not feasible for low tonnages)
Railway Routing Alternatives to Steensby Port														
Eastern route	Technically feasible - makes use of best ground conditions, maximizing construction on rock and shallow soils	2	Lowest cost alternative	2	Avoids archaeological sites and wildlife areas associated with western route and routes D-A and D-B	2	Acceptable alternative	1	No socio-economic advantage over other alignments	1	Acceptable reclamation effort required	1	9	**Preferred** - based on technical feasibility, cost and environmental considerations
Western route	Area of complex hydrology and difficult ground conditions	1	Moderate cost relative to alternatives	1	Route passes through archaeological sites and active wildlife areas	1	No feedback received	1	No socio-economic advantage over other alignments	1	Shortest route - lowest reclamation effort	2	7	Acceptable alternative
Route D-A	Technically feasible - avoids worst of western route; high exposure to rock fall	1	Moderate cost relative to alternatives	1	Route passes through archaeological sites and active wildlife areas	1	No feedback received	1	No socio-economic advantage over other alignments	1	Acceptable reclamation effort required	1	6	Acceptable alternative
Route D-B	Technically feasible - most exposed to remnant glacial ice	1	Moderate cost relative to alternatives	1	Route passes through archaeological sites and active wildlife areas	1	No feedback received	1	No socio-economic advantage over other alignments	1	Acceptable reclamation effort required	1	6	Acceptable alternative
Route C	Technically feasible - operational issues with short radii turns	1	Highest but acceptable cost	1	Avoids archaeological sites and wildlife areas associated with western route and routes D-A and D-B	1	No feedback received	1	No socio-economic advantage over other alignments	1	Acceptable reclamation effort required	1	6	Acceptable alternative

TABLE 3-6.1
EVALUATION OF ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative	Technical Feasibility		Cost Implication		Impacts on Natural Environment		Community Acceptance or Preference		Enhancing Socio-economic Benefits		Amenability to Reclamation		Overall Ranking	
Steensby Port Site Configuration														
Steensby Port Mainland	Feasible with extensive blasting for depth or construction of lengthy causeway or pier to deep water	1	Very high cost	1	Largest footprint in marine environment	1	No feedback received	1	No socio-economic advantage	1	No expected difference between options	1	6	Acceptable - largest cost and greatest environmental footprint
Adjacent to Steensby Island (Option 1 through 3)	Technically feasible, not preferred in terms of blasting needs during construction and ice management performance	1	Acceptable cost	1	More blasting and disturbance than Option 4; no significant residual effects on natural environment	1	Acceptable alternative	1	No socio-economic advantage	1	No expected difference between options	1	6	Acceptable - ice management performance not high; more blasting disturbance
Off Shore from Steensby Island (Option 4)	Technically feasible. Preferred construction method, ice management performance, and ability to dock ships on either side of dock	2	Acceptable cost	1	Blasting needs minimized; no significant residual effects on natural environment	2	Acceptable alternative	1	No socio-economic advantage	1	No expected difference between options	1	8	**Preferred** - best option based on technical, cost and environmental considerations
Steensby Ore Dock Design and Construction														
Steel, concrete or hybrid caissons	Technically preferred - ease of construction and performance	2	Moderate cost with shorter installation period	2	Less blasting and no pile driving required by larger physical in-water footprint	1	No feedback received	1	No socio-economic advantage	1	No expected difference between options	1	7	**Preferred** - Optimizes cost and structural stability
Sheet piled cells	Technically acceptable	1	Least cost	2	Requires blasting and pile driving - acceptable disturbance	1	No feedback received	1	No socio-economic advantage	1	No expected difference between options	1	6	Acceptable - Optimizes cost and environment protection
Piled jacket structures with stifflegs	High structural stability	1	Highest cost - jacket and stiffleg installation are expensive	1	Requires blasting and pile driving - acceptable disturbance	1	No feedback received	1	No socio-economic advantage	1	No expected difference between options	1	5	Acceptable - Cost of installation is high but provides high structural stability
Piled structures with stifflegs	Structurally stable - may require dredging and in-filling	1	High cost of installing piles and stifflegs	1	Requires blasting and pile driving - acceptable disturbance	1	No feedback received	1	No socio-economic advantage	1	No expected difference between options	1	5	Acceptable
Work Scheduling During Operation														
2 and 2	Most efficient rotation schedule	2	Higher cost - larger workforce requirement	1	Not applicable	0	Communities indicated a preference for 2 and 2 rotation	2	More employment opportunities for Inuit	2	Not applicable	0	7	**Preferred** - due to community acceptance and cost effectiveness
More time on site, same time off site (i.e., 3 and 3)	Moderately efficient rotation schedule	1	Lowest cost - workforce requirement is lower	2	Not applicable	0	This option is not the expressed preference of communities	1	May be less desirable in terms of effects of fly-in/fly-out operation	1	Not applicable	0	5	Acceptable
More time on site, less time off site (i.e., 4 and 2)	Workforce rotation challenging; less consistency within work teams	1	Lower cost - workforce requirement is lower	1	Not applicable	0	This option is not the expressed preference of communities	1	Fewer employees to fill the same person-hours	1	Not applicable	0	4	Acceptable
Worker Sourcing (Direct Points of Hire)														
Worker commuter flights to and from the 5 North Baffin communities	Commuter aircraft can be used to shuttle workers from nearby communities	1	Acceptable cost to operate direct hire flights to closest communities to the Project	1	Not applicable	0	The preference of the most affected communities	2	Benefit of direct hire practice will accrue to most affected communities	2	Not applicable	0	6	**Preferred** - effects and benefit matching is optimized
No direct hire from the region (workers are hired from Iqaluit or Ottawa only)	Worker flights simplified but more dependence on scheduled aircraft in the region could make shift changes difficult	1	Lowest cost workforce; jet service from the south only	2	Not applicable	0	Potentially affected communities stated benefits should accrue to them, and employment is a requisite benefit	0	Least amount of socio-economic benefit	0	Not applicable	0	3	Unacceptable - the proportion of benefits will not accrue to communities most affected by the Project
Shipping Route through Foxe Basin														
Easterly shipping route through Foxe Basin (Option B, Figure 3-6.1)	Technically feasible, with a slight operational advantage (avoids one difficult turn)	2	No meaningful difference in cost	1	Avoids main areas of concentration of marine mammals	2	Preferred by local communities	2	Not applicable	0	Not applicable	0	5	**Preferred** - avoids areas of marine wildlife concentration and key harvesting - preferred by communities
Westerly shipping route through Foxe Basin (Option A, Figure 3-6.1)	Technically feasible	1	No meaningful difference in cost	1	Passes through main areas of concentration of marine mammals	1	Not preferred	0	Not applicable	0	Not applicable	0	2	Unacceptable - not considered acceptable by local communities

TABLE 3-6.1
EVALUATION OF ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative	Technical Feasibility		Cost Implication		Impacts on Natural Environment		Community Acceptance or Preference		Enhancing Socio-economic Benefits		Amenability to Reclamation		Overall Ranking	
Length of Shipping Season at Steensby Port														
12-months a year	Technically feasible with ice breaking ore carriers	1	Meets customer requirements of the Project	2	Noise, marine mammals and habitat disturbances	1	Acceptable alternative	1	Large project with greater socio-economic benefits	2	Not applicable	0	7	**Preferred** - viability of the project depends on the ability to ship ore to the market all year round
8-months a year	Technically feasible with ice breaking ore carriers	1	Not cost effective due to customer demand, increased port infrastructure, and the need for a larger fleet of dedicated ice breaking ore carriers that would sit idle for part of the year	0	Noise, marine mammals and habitat disturbances. Larger stockpiles are required resulting in larger footprint	1	Preferred by local communities	2	Less socio-economic benefit than year round shipping	1	Not applicable	0	5	Unacceptable - requires ice breakers that are not fully utilized - excessive cost
4-months a year (open water only)	Technically feasible	1	Cannot meet customer demands and support costs of high tonnage railway operation	2	Expected to have lowest impact on the natural environment	2	Preferred by local communities	2	Expected to have lowest impact on the land use; but smaller operation with fewer jobs	1	Not applicable	0	8	Acceptable for lower tonnage operations by road only
Ballast Water Treatment														
Exchange ballast water at sea	Currently accepted practice	2	Acceptable cost	2	Expected to provide adequate protection	1	Communities expressed the need for appropriate ballast water management	2	Acceptable socio-economic benefits	1	Not applicable	0	8	**Preferred** - currently accepted practice; low risk
Treatment of ballast water at port	Requires complicated treatment and knowledge of the targeted organism	0	Higher cost than other alternatives	1	Expected to provide a high level of environmental protection, if successful targeting organisms for treatment	2	Communities expressed the need for appropriate ballast water management	2	Acceptable socio-economic benefits	1	Not applicable	0	6	Acceptable - requires complicated treatment and knowledge of what the water is being treated for
Dump ballast water at port	Not a legal option	0	Acceptable cost	2	May create major changes to local marine ecosystem if invasive species are introduced	0	An expressed concern of communities	0	Effects to the natural environment may have unforeseen socio-economic effects	0	Not applicable	0	2	Unacceptable - risk of introduction of invasive species

ranking of 0, 1 or 2 as defined above. For each Project component, the alternative with the highest overall ranking (highest score) has been selected.

A summary of the various alternatives evaluated within the Project is presented in Table 3-6.1. A more detailed discussion of the most important alternatives evaluated follows in Section 6.5.

6.5 DISCUSSION OF MAJOR ALTERNATIVES WITHIN THE PROJECT

6.5.1 Production Rate

The preferred ore production rate is 21 Mt/a, which results in a 21 year mine life based on current ore reserves in Deposit No. 1. This alternative provides an acceptable return on investment and is environmentally and technically the most practical alternative.

On the basis of the capacity of the equipment and infrastructure required, a lower production rate will not provide an acceptable return on investment. A higher ore production rate may provide a higher rate of return based on increased economies of scale but this would require additional ore bodies to be mined. While geological drilling on Deposits No. 2 and 3 to date is encouraging, insufficient drilling has been carried out to confirm the amount and grade of the ore bodies to a level sufficient for investment. Baffinland has expressed an interest in increasing the production rate, at some time in the future, if ore resources justify this.

6.5.2 Mine and Support Facilities

6.5.2.1 Mining Methods

The geometry of the ore body of Deposit No. 1 is suited for open pit mining. Underground mining (or a combination of open pit and underground mining) is not technically feasible since the deposit is at surface. The only proven method for extracting ore from a deposit with such a geological configuration is open pit mining, the mining method selected for the Project.

Overburden will be removed by blasting and will be placed in waste rock stockpiles. The open pit will then be excavated using a conventional bench configuration with access via ramps, using conventional open pit mining equipment. Blast holes will be drilled, an explosives truck will deliver and dispense explosives into the holes, blast sequences will be established and the open pit cleared of all personnel, and the blasts detonated.

The only practical method for excavating the ore released by blasting is mechanical shovels. Diesel-hydraulic face shovels will be used, backed up by front-end loaders to load mine haul trucks to transport ore to the primary crusher or run-of-mine (ROM) stockpile and waste rock to the waste rock stockpiles. Movement of vehicles within the pit will be monitored by a central dispatching system to ensure worker health and safety and operational efficiency.

Backhoe excavators will be utilized for general earthworks, snow removal, and limited mining activity where the larger equipment may have limited access. Wheel and track bulldozers will be used for cleanup around mining activities and for control of rock on the benches. Graders and water trucks will be used for main haul road maintenance. All equipment is operated by an operator located in a heated, enclosed cabin that is an integral part of the equipment.

6.5.2.2 Power Supply

Diesel generated power supply will provide the required capacity to meet power demands of the Project at the lowest cost. This source of supply is also the most reliable in arctic conditions.

Solar power has not been proven for commercial use in the arctic. Wind, solar and hydro-electricity would all need transmission lines from energy generation location to Project sites and would require diesel backup at sites in likely periods of inadequate wind or solar energy. Geothermal energy is not feasible due to depth of permafrost.

Hydro-electric with back up diesel could potentially be attractive once the Project is in operation. The technical feasibility of a hydro-electric generation facility remains to be assessed and is not considered part of this Project.

6.5.2.3 Closure and Reclamation Alternatives

In accordance with regulations, Baffinland is planning for the closure of the facilities at the end of the mine life. The current Closure Plan (Appendix 10G) calls for the decommissioning of facilities, removal off-site of materials and equipment that can be reused or recycled and on-site disposal of remaining materials. Hazardous materials will also be removed off-site for shipping and processing at licensed facilities. The public Milne Inlet Tote Road will be left in place but not maintained after the end of Project life. At the end of Project life, Baffinland will consider transferring the facilities to a third party should a third party express such an interest. Changes to regulatory requirements and consultation with communities or stakeholders throughout the life of the Project could be reflected in subsequent updates to the Closure Plan if required.

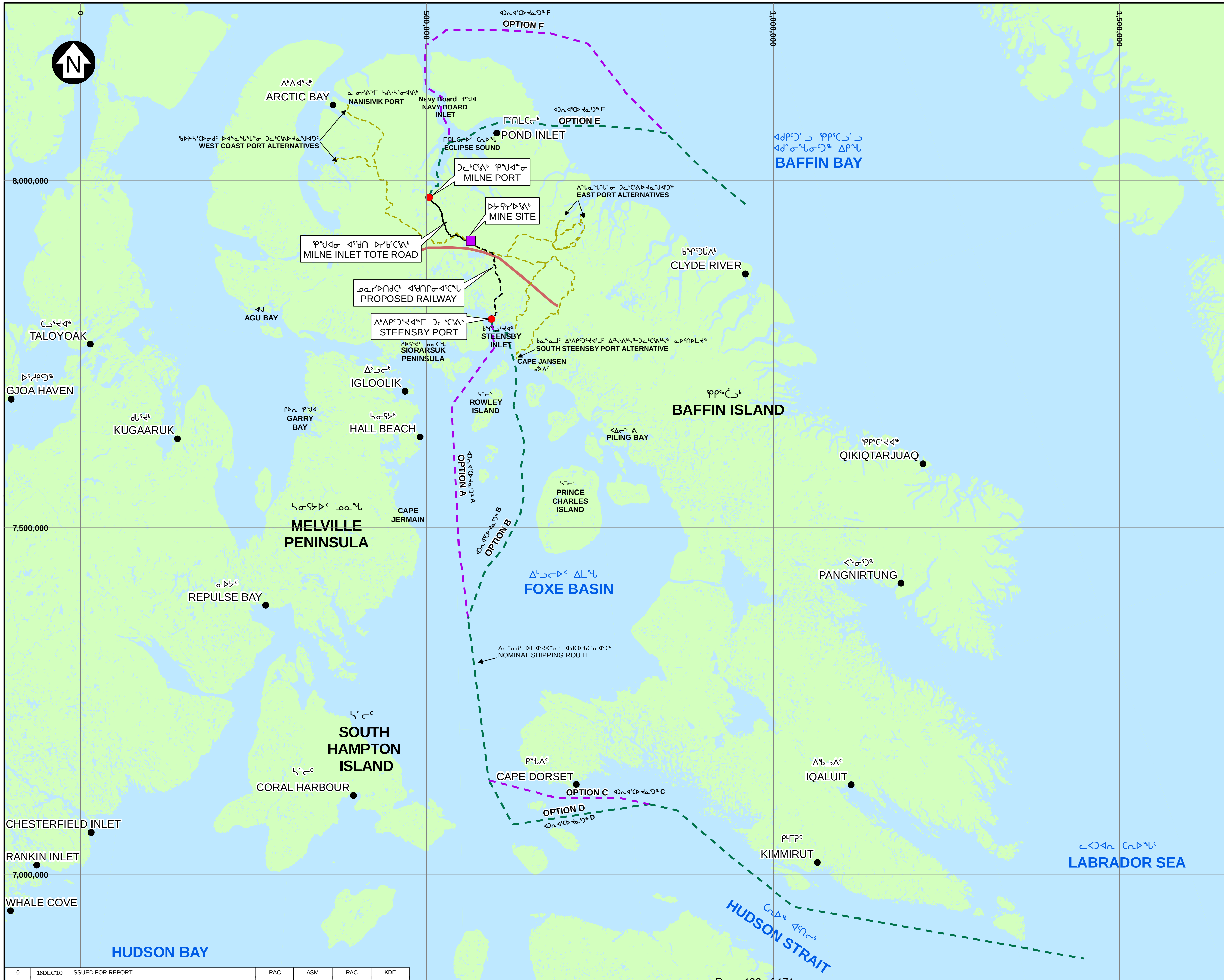
6.5.3 Port Location

Transportation of iron ore from the Deposit No. 1 ore body to potential customers in Europe requires overland and ocean transportation. Selection of the Port Location requires assessment of the marine and the overland transportation routes together since they are integrally linked. If overland transportation to the preferred ship terminus is not possible, then the shipping route is also not possible. Similarly the large ore carrier ships must be able to access the selected Port site, making it a viable Port for the Project.

While the viability of the road operation and seasonal shipping via Milne Inlet is under study, the viability of the railway operation depends on the ability to provide steel producers with ore 12 months a year. Shipping 12 months of the year is the only commercially viable alternative for the production rates associated with the railway operation.

The potential Port sites considered for the Project are listed below and are shown on Figures 3-6.1 and 3-6.2:

- East Coast Port Sites (7 alternatives; Ports A to G);
- West Coast Port Sites (2 alternatives; Ports H and I);
- Iqaluit Port;
- South Steensby Port;
- Milne Port; and,
- Steensby Port.



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LEGEND:

- COMMUNITY
- PROJECT FACILITY LOCATION
- MINE SITE
- PORT LOCATION ALTERNATIVE
- MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- ALTERNATIVE RAILWAY ALIGNMENT
- PREFERRED SHIPPING ROUTE
- SHIPPING ROUTE ALTERNATIVE
- NORTH BAFFIN PLANNING REGION BOUNDARY
- WATER

NOTES:

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SCALE 50 25 0 50 100 150 200 250 km

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED FOR REPORT	RAC	ASM	RAC	KDE

BAFFINLAND IRON MINES CORPORATION

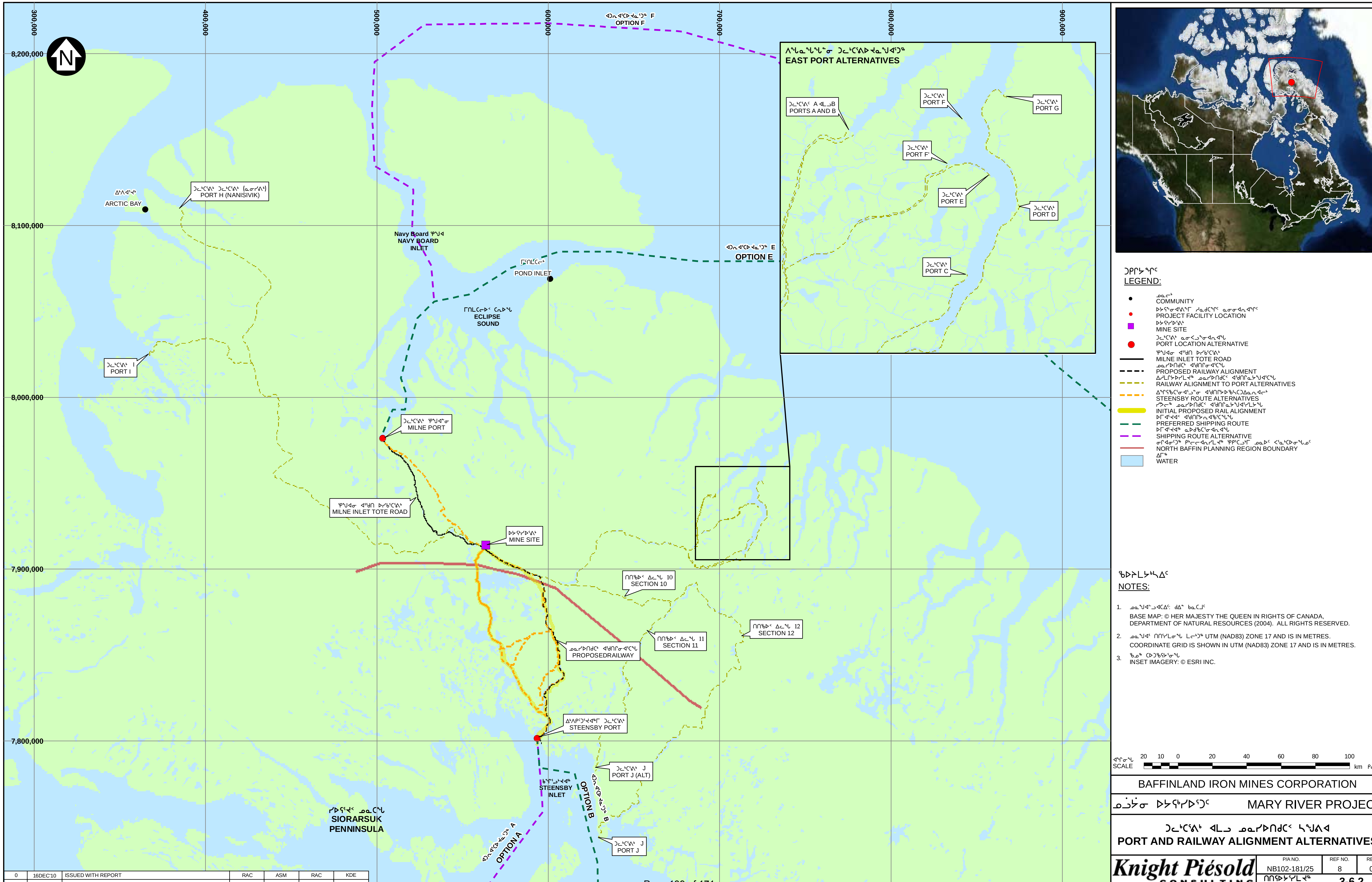
MARY RIVER PROJECT

TRANSPORTATION ROUTE ALTERNATIVES

Knight Piésold CONSULTING

P/A NO.	REF NO.	REV
NB102-181/25	8	0

FIGURE 3-6.1



REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

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LEGEND:

- COMMUNITY
- PROJECT FACILITY LOCATION
- MINE SITE
- PORT LOCATION ALTERNATIVE
- MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- RAILWAY ALIGNMENT TO PORT ALTERNATIVES
- STEENSBY ROUTE ALTERNATIVES
- INITIAL PROPOSED RAIL ALIGNMENT
- PREFERRED SHIPPING ROUTE
- SHIPPING ROUTE ALTERNATIVE
- NORTH BAFFIN PLANNING REGION BOUNDARY
- WATER

NOTES:

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SCALE 20 10 0 20 40 60 80 100 km

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

PORT AND RAILWAY ALIGNMENT ALTERNATIVES

Knight Piésold CONSULTING

P/A NO.	REF NO.	REV
NB102-181/25	8	0

FIGURE 3-6.2

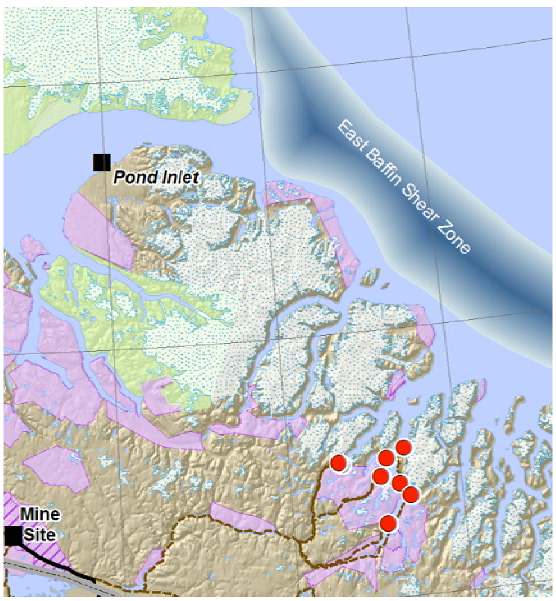
Two technical studies were carried out in support of evaluating these options. Enfotec (2010) reviewed the viability of shipping options with respect to transiting ice breakers to potential port locations. Canarail (2010) reviewed potential railway route alternatives to these port locations. These studies are attached as Appendices 3F-1 and 3F-2, respectively.

6.5.3.1 East Baffin Port Sites and Rail Routes

Seven potential east coast port sites (A-G) were considered between Pond Inlet and Clyde River. The Port sites are shown on Figure 3-6.2. Shipping from a location on Baffin Bay (between Pond Inlet and Clyde River) would require the construction of both a new port and a new overland transportation route. The overland transportation route for all 7 assessed Port sites would originate from the Mine Site and follow the south bank of the Ravn River upstream to access Sites A and B at the foot of Quernbiter Fiord and sites C - G along Cambridge Fiord as far north as the Rannoch Arm. Port sites F and G were not retained as feasible sites as they are at 500 and 800 meter elevation above sea level respectively and are completely inaccessible with no possible site near sea level for loading. However, and alternative site F' in Omega Bay was added as an alternative.

Railway routes to the two east coast port alternatives are only slightly longer and higher cost than the Steensby Port base case for the Project (Appendix 3F-2). However, problematic ice regimes in Baffin Bay limit the feasibility of the east coast Port sites (Appendix 3F-1). In particular, the East Baffin Shear Zone (Figure 3-6.3), develops between the mobile ice of Lancaster Sound and Baffin Bay and creates a shear zone along the north and east coast of Baffin Island as well as Bylot Island. This shear ridge at the boundary of the fast ice zone can accumulate to over 20 meters in thickness. Other ice zones in Baffin Bay are also problematic for winter shipping due to old ice that flows down into Baffin Bay during the fall months and then freezes into new ice. Shipping through Baffin Bay to the east coast Port sites would require at least a Polar Class of PC 3, but more likely a PC 2.

Figure 3-6.3 East Baffin Shear Zone



Additional issues associated with the east coast Port sites are due to high cliffs and very narrow fiords. The narrow fiords would make shipping difficult, especially considering the accumulation of rubble ice during winter months. Finally, it is not possible to build a railway down to sea level at the head of a fiord or down the cliffs at the coast, so material handling and ship loading would be challenging.

6.5.3.2 West Coast Port Sites

The use of the existing Nanisivik Port (Port H) near Arctic Bay was considered, since it would avoid the cost and disruption of building a new port. A second potential Port (Port I) was also considered on the north coast of Moffat Inlet between David's Island and Bartlett Inlet. Both Port locations are shown on Figure 3-6.2, along with the associated railway routes to these port sites.

Both land transportation routes to the west coast Port sites follow an alignment to the north west of the Mary River and then turn west to cross a tributary of the Ravn River. The route then generally follows the river valley of the East Magda and North Magda Rivers until the Moffat River and then follows it north until the valley turns to the west. At this general location the route splits with one route heading north west towards Nanisivik and the other heading westward and terminating about 7 km north west of Bartlett Inlet.

Since the distance to both these potential ports is approximately 300 km, which is more than twice the distance to Steensby Port (and three times the distance to Milne Inlet), the environmental footprint of the land transportation route would also be more than double. From a cost perspective, the assessed rail routes to Ports H and I are prohibitive in comparison to a shorter rail route to Steensby Inlet. The existing port at Nanisivik would require extensive upgrades to accommodate the larger cape size ice breaking ore carriers associated with this Project.

Winter ice conditions further diminish the viability of the west coast Port sites. To access Lancaster Sound and Admiralty Inlet, a vessel of minimum ice class PC 3 would be required for year-round access. In addition, there can be an extensive shear zone across Lancaster Sound that could only be avoided by transiting past Pond Inlet into Eclipse Sound and through Navy Board Inlet. Additionally, the shipping route through the landfast ice in Admiralty Inlet would have some effects to Inuit use of the landfast ice and the floe edge located at the entrance to the inlet.

In conclusion, the benefits of utilizing an existing Port site at Nanisivik are outweighed by the capital cost and environmental disturbance of constructing a new overland transportation route. Port I, is less attractive than H as Port I would require the construction of a new Port and a new transportation corridor.

6.5.3.3 Iqaluit Port

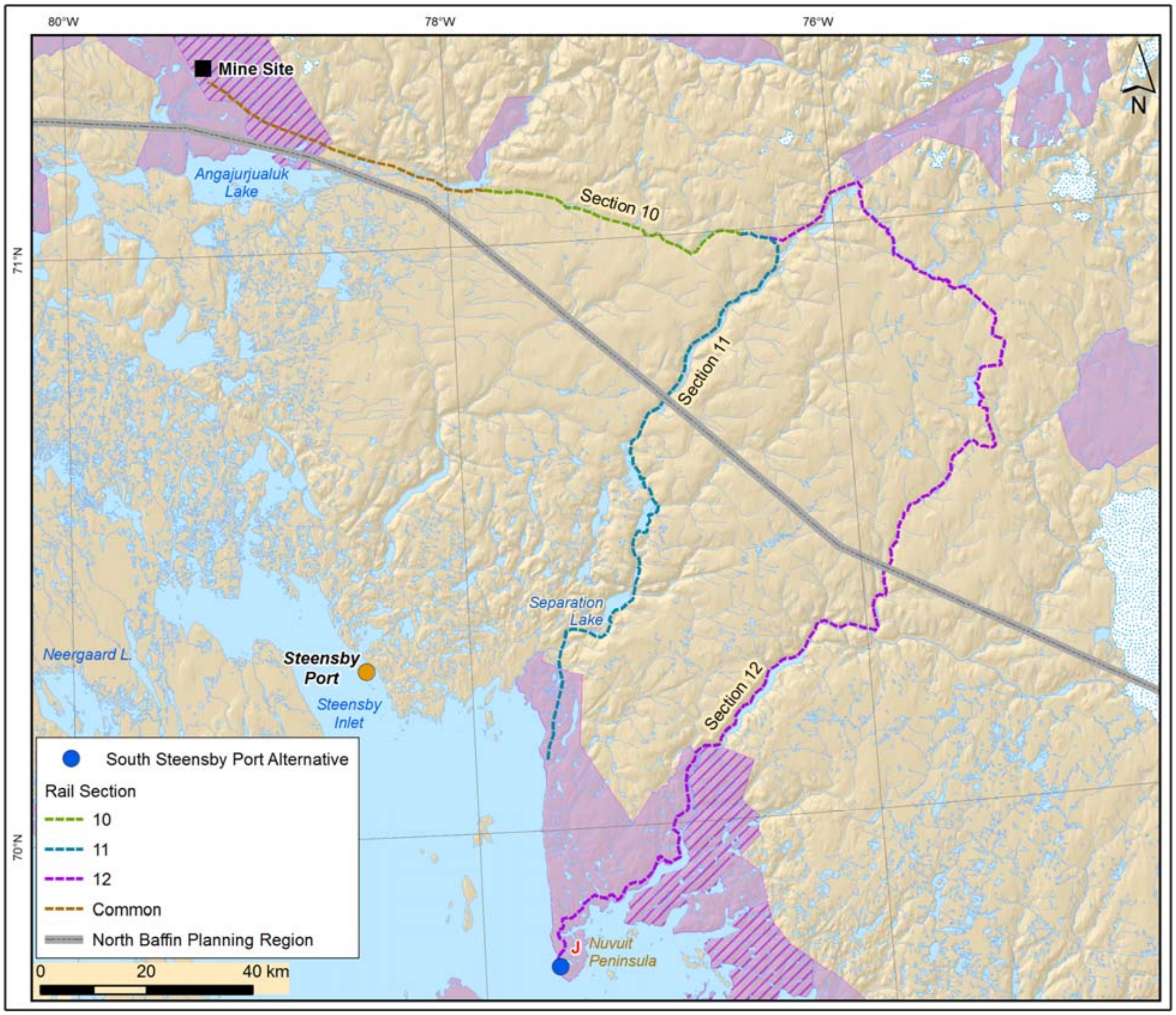
Shipping from Iqaluit has been suggested by local community members, and would have the advantage of using an existing port facility, however an overland transportation route of over 1,000 km would be required. Construction of an overland transportation facility, such as a railway, across the Great Plain of the Koukdjuak, which would be the more direct route from Mary River, would not be possible due to the instability of the ground and numerous wetlands and lakes. Although shipping from Iqaluit would involve better ice conditions, construction of the overland transportation corridor would be cost-prohibitive to the project and possibly technically infeasible.

6.5.3.4 South Steensby Port Alternative

A Port location was assessed south of Steensby Port which is closer to existing shipping lanes and deeper water (Port J on Figures 3-6.2 and 3-6.4). Although this Port location appears more attractive from a marine shipping perspective, the land transportation corridor would be approximately twice the length compared with the preferred alternative (base case) at Steensby Port, with a resulting cost which would make the project unviable. The environmental footprint of a land transportation corridor to the south Port would also be much greater due to the increased length.

A shorter rail portion (Section 11 on Figure 3-6.4) was also considered, however a Port location at this location would be problematic. A causeway was then considered to transport ore to Port J, however from a technical standpoint, this causeway was also considered to be not viable.

Figure 3-6.4 South Steensby Port Alternative



6.5.3.5 Milne and Steensby Inlet Port

The primary alternative shipping routes considered originate from either Milne Inlet or Steensby Inlet. Both port sites would require the construction of an overland transportation corridor.

The shipping route to Milne Inlet is well established in open water; extending from Baffin Bay and passing through Pond Inlet, Eclipse Sound and to the head of Milne Inlet.

The shipping route from the North Atlantic Ocean to Steensby Inlet extends along established shipping routes through Hudson Strait and southern Foxe Basin, and then through northern Foxe Basin to Steensby Inlet, either east or west of the Spicer Islands, Rowley and Koch Islands.

6.5.3.6 Milne Port

A port site at Milne Inlet would require the upgrading of approximately 100 km of the existing tote road. Initially, Milne Inlet was the proposed year round port. However as further information became available it became apparent that the size of the ore carriers were too large to manoeuvre in ice within the narrow width of Milne Inlet.

Inuit concerns related to the close proximity of the shipping route to Pond Inlet and winter shipping activity could interrupt important flow edge activities. Therefore the current project proposal considers open water shipping to Milne Inlet. As the project evolves additional information will be assembled and continued consultation will be undertaken to address Inuit concerns.

Figure 3-6.2 shows the location of Milne Port, the potential railway alignment and the existing Milne Inlet Tote Road.

6.5.3.7 Steensby Port

A port site at Steensby Inlet would require overland transportation facilities of approximately 150 km, 50% longer than the distance to Milne and therefore 50% more costly. However, from a construction perspective, ground conditions are more favourable for a railway construction.

The Steensby Port site is a superior site from a winter shipping perspective. There is much lower concentrations of multi-year ice found along the shipping route to Steensby Inlet than is the case for Milne Inlet. Due to more preferable ice conditions in Foxe Basin and Hudson Strait, a lower Polar Ice class ship of PC 4 would be required. Steensby is a wide open inlet, with room to move with ice breakers and larger size ore carriers.

The shipping route to Steensby does not pass in full view of a community and is less intrusive on land use. The ships will not be visible to communities, only to hunters at the reaches of their travel. Although the Shipping route passes Cape Dorset and Kimmirut, the ships will not likely be visible from these communities. The ships would have a sky draft of 35 metres. Someone standing at sea level would be able to see the ships from about 12 nautical miles (22 kilometres) on a perfectly clear day. Figure 3-6.5 indicates the proposed shipping routes for Milne (open water only) and Steensby Port. The Steensby shipping route is not within the NBRLUP.

6.5.3.8 Conclusion for Port Site Selection

Table 3-6.2 summarizes the Port Location Assessment. The shipping route from Steensby Port is preferred based on a number of land transportation factors and marine shipping considerations such as the difficulty of ice navigation. Milne Inlet is relatively narrow and represents operational uncertainty with respect to winter navigation of large ore carriers. There are also environmental sensitivities such as the potential for interactions with Inuit use of the landfast ice in the area and proximity to the community of Pond Inlet during winter months.

Table 3-6.2 Summary of Port Location Assessment

Port Location	Overland Transport to Port Location	Marine Shipping to and from Port Location	Viable Port
East Baffin Port Alternatives (A to G)	Rail	Prohibitive due to ice and space	No
West Coast Port Alternatives (H and I)	Rail	Prohibitive due to ice. Open water only.	No
Iqaluit Port	Prohibitive	Yes - year round	No
South Steensby Port (Cape Jensen; Port J)	Prohibitive	Yes - year round	No
Milne Port	Road only	Open water only; uncertainty related to winter navigation of large ore carriers	Open water season only
Steensby Port	Rail	Yes - year round	Yes

Selection of the Steensby Port site on Steensby Inlet was primarily based on ship and rail access. The preferred ore dock location is off of the island at the preferred Port site. This island allows access to deep water, and provides a natural protected port site. Steensby Port is one of the closest points to access by rail from Mary River. Finally, with the exception of the South Port alternative, Steensby Port is the only port location that can support year round shipping due to preferred ice conditions in winter months.

Shipping from Milne Inlet would be feasible during the open water season.

6.5.4 Overland Alternative Route Selection

Various overland transportation methods were considered to transport ore from the Mary River Mine Site to Steensby or Milne Port, the two ports selected from the assessment above. The potential overland methods are listed below:

- Conveyor
- Slurry pipeline
- Road trucking
- Conventional railway

All four methods require construction of linear infrastructure, including utility roads with various materials, slope and ground stability requirements.

6.5.4.1 Conveyor

A conveyor system, while similar to a rail system, was studied and determined to be not technically feasible due to the extreme climate conditions. In this environment, conveyor maintenance over a distance of 100 or more kilometres would be extensive. A conveyor would require very large trestles to deal with the sharp grade changes along the Mary River-Steensby route. A conveyor system could potentially be a barrier to caribou since the conveyor would be suspended at a level higher than a railway embankment.

6.5.4.2 Slurry Pipeline

Slurry pipelines are effective for moving materials of small particle size. The iron ore produced will be up to 60 mm in size which make slurry transfer not technically feasible.

6.5.4.3 Trucking of 21 Mt/a to Steensby Port

Trucks transportation of large quantities of material is employed in Australia. The relative transportation costs of trucking versus rail are presented in Section 6.3.

Moving 21 Mt/a would require a very large fleet of trucks. To ship this quantity of ore, an average of 60,000 tonnes per day would need to be transported to Steensby Port. Assuming use of conventional highway trucks carrying 50 tonnes per load, moving 60,000 t/day would require 1,200 truckloads per day. Assuming 4 trips per day at 3 hours each way (a distance of 150 km), a 300 truck fleet would be required, involving 2,400 passes a day. This translates to 100 passes per hour, or two passes per minute. This rate is very intense, exacerbating the already high potential for collisions with other trucks and wildlife. During the summer months, dust generation could be considerable.

Such a large fleet of trucks will have huge maintenance requirements. The cost of purchasing, transporting to site and maintaining such a large fleet of trucks would be prohibitive. In addition, the operation of a truck fleet is highly sensitive to fuel prices, which introduces another element of risk in the Project's economic viability.

6.5.4.4 Trucking of 3 Mt/a to Milne Port

Although trucking of 21 Mt per year to Steensby Port is not a feasible alternative, trucking of a smaller tonnage (3 Mt/a) to Milne Port is considered feasible. A trucking option to Milne Port with use of the upgraded existing road corridor is being considered as a option to supplement the transport of ore to Steensby Port. Trucking ore to Milne Inlet was undertaken in 2008. The upgrade of the Milne Inlet Tote Road coupled with buoyant iron ore prices makes this option feasible.

As discussed in Section 6.5.3.6, Milne Port is a feasible port option that would support shipment of 3 Mt/a of iron ore during the open water season.

6.5.4.5 Railway

Rail transportation is the conventional means of transportation for large volumes of iron ore over long distances. For the Project, it is the only practical method for moving 21 Mt/a. Due to economies of scale rail transportation is the only practically and economically viable option.

6.5.4.6 Railway and Road Haulage Alternatives

Based on the land transport alternatives, railway transport was selected as the preferred method for transporting ore to Steensby Port. The feasibility for upgrading and using the existing road for haulage of 3 Mt/a from the Mine Site to Milne Inlet will be determined in January 2011. Until this time it is considered a feasible option to supplement the railway corridor to Steensby Port.

The following section summarizes the land transportation alternatives for transport of ore to Steensby and Milne Port.

Table 3-6.3 Overland Transportation Alternatives

Transportation Type	Technically Feasible	Cost-effective	Viable Transport
Railway	Yes	Yes	Yes
Truck	Yes	Yes[1]	Yes - to Milne Port only
Conveyor	No	No	No
Slurry pipeline	No	No	No

NOTE(S):
1. BASED ON CURRENT IRON ORE PRICES.

6.5.5 Railway Routing Alternatives

6.5.5.1 Rail transport to Milne Port

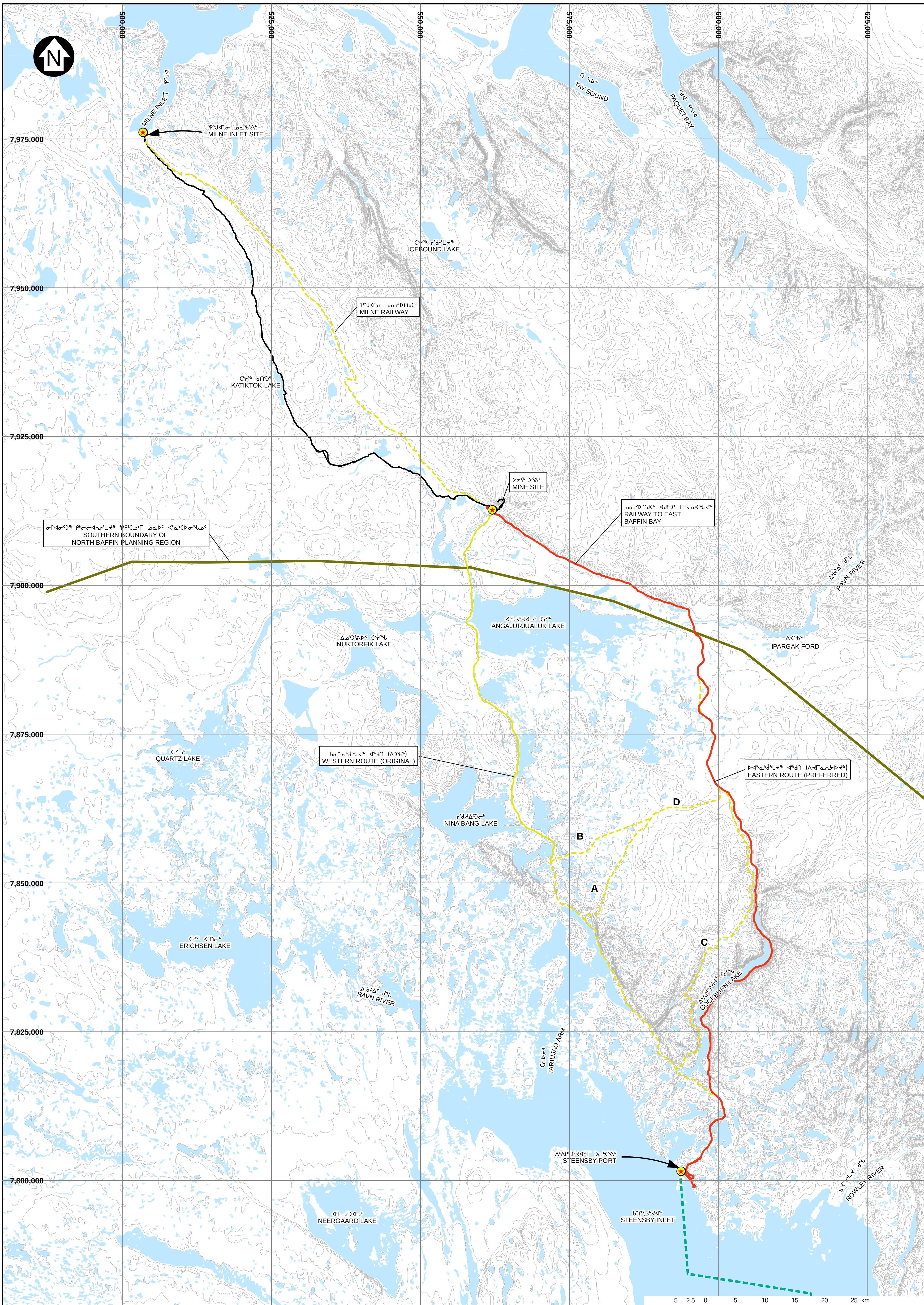
As discussed in Section 6.5.4.6, with the usage of large tonnage ore carriers, there is uncertainty related to the capability of Milne Port to support a year round shipping activity.

In addition, the route to Milne Inlet primarily followed the valley to the east of the Phillips Creek valley where preliminary geotechnical investigations indicate that ground conditions are less favourable for the construction of a railway. Due to the large capital investment required for the construction of a railway in the arctic (approximately $7 million per km), a railway must operate on continuous basis in order to be economically viable.

Due to the uncertainty associated with winter shipping via Milne Port, construction and operation of a railway to link Milne Port to the Mine Site was abandoned. Rail transport to Milne Port was assessed to be not viable due to technical issues related to year round shipping into Milne Port.

6.5.5.2 Rail Transport to Steensby Port

The two broad rail corridors were evaluated from the Mine Site to Steensby Inlet during feasibility studies: one to the west of Angajurjualuk Lake (the Western Route, the original alignment studied), and another to the east (the Eastern Route, and current "base case") (Figure 3-6.5). The ground conditions along the northern portion of the route west of Angajurjualuk Lake and south of the Ravn River crossing at the outlet of Angajurjualuk Lake were extremely poor. The alignment closely skirted three large areas of tundra polygons, which present continuously wet soil conditions in the summer and ran alongside large lakes which present a high risk of being associated with taliks (unfrozen zones of permafrost induced by the lakes). Poor soil conditions also exist on the Eastern Route around Angajurjualuk Lake but the Eastern Route was evaluated to be the better of the two. Further south, the Western Route was confined between the steep walls of a prominent escarpment and the north east coast of Tariujaq Arm, with frozen saline soils as well as talus slopes (rockfall hazards). Additionally, the route along the cliff base of the Tariujaq Arm was observed to be rich in archaeological resources, and the abundant water cover in the area means that snow geese and other migratory birds congregate in this area in the spring when other areas are snow-covered. Finally, this area appeared to be a relatively confined corridor used by caribou traveling in a northwest-southeast direction. Further south the Western Route would need to cross the Cockburn River downstream of Cockburn Lake, at a location where a long viaduct would be needed. Bridge foundations would present challenges due to the presence of ice rich soils with undetermined depth to bedrock. These issues, combined with cost and technical concerns related to poor ground conditions at the north end of the route, were the basis for the Western Route being eliminated from further consideration



LEGEND:

- RIVER/STREAM/DRAINAGE
- EXISTING MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- RAILWAY ALIGNMENT ALTERNATIVES
- SOUTHERN BOUNDARY OF NORTH BAFFIN PLANNING REGION
- WATER

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES (2004). ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOUR INTERVAL VARIES. CONTOUR INTERVAL IS IN METRES.
4. PROPOSED RAIL ALIGNMENT PROVIDED BY CANARAIL OCTOBER 2008.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

ALTERNATIVE RAIL ROUTES BETWEEN MINE SITE AND STEENSBY PORT

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/25	8

FIGURE 3-6.5 REV 0

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The main Eastern Route (the preferred route), follows the eastern side of Angajurjualuk Lake and slowly climbs the plateau to the Cockburn River watershed. The alignment then descends down the western side of the upper Cockburn Lake to cross it at its narrowest point and continue south on the eastern side of the lake with two tunnels. This route is superior in terms of overall length, geotechnical conditions, and avoidance of areas of environmental sensitivity. The route avoids poorest ground conditions associated with the western route and maximizes the proportion of the railway on rock or over shallow soils with no topsoil. Three variations of the main route were also evaluated: two routes bearing west from a point north of Cockburn Lake and then south east between the escarpment and Tariujaq Arm (Routes D-A and D-B), and a route bearing south down the valley immediately to the west of Cockburn Lake and crossing Cockburn River at the outflow of Cockburn Lake (C). Routes D-A and D-B, while avoiding the poorest ground conditions to the west of Angajurjualuk Lake, shared the western route section along the poor ground conditions (frozen saline soils and talus slopes) of the Tariujaq Arm. Section B stays high across the plateau and avoiding lakes descends to the western route. Although this option is the more direct compared with section A, it joins the Western Route in a region with difficult soil and hydrological conditions exposing the alignment to an area subject to possible solifluxion. Option A is the more southern of the two branches and traverses more difficult topography around hills and steep escarpments to join with the Western Route. This option would have more operational difficulties due to the short radii curves needed to negotiate the difficult topography compared with Option B, but has the advantage of avoiding permafrost problems and unstable soils where it joins to the western route. Ultimately, Routes D-A and D-B were eliminated on the basis of the poor geotechnical conditions common to the southern portion of the western route at Tariujaq Arm and the Cockburn River crossing.

Route C diverges west at the north end of Cockburn Lake. It generally passes north of the mountain ridges surrounding the northern half of Cockburn Lake and then moves to the hillsides on the western bank of the Lake . The alignment deviates west around small mountains at the south end of the lake and then crosses the Cockburn River at its narrow point and reaches a junction with the South Base Route. While route C avoided the tunnels associated with Cockburn Lake, construction costs were not reduced since some significant rock cuts were required. It is not a better operational choice due to the many short radii curves needed in the alignment. In addition, the Cockburn River crossing of Option C has the same problems as the crossing needed for the western route. It is wider with less stable soil conditions than the crossing taken by the base case, which crosses Cockburn Lake towards the northern end of the lake. Environmentally, neither route have the issues related to archaeology, birds and caribou that were identified for the Tariujaq Arm. The Cockburn Lake route was selected over route C on the basis of favourable construction conditions, cost and operational advantages based on fewer short radii curves and better grades.

Combining the ratings for physical parameters with the environmental ratings, the preferred rail route is the route along the eastern side of Cockburn Lake followed by the route with segment “C” and then the route with segment “D-A”. The technical and economic pros and cons for each alternative are summarized as follows:

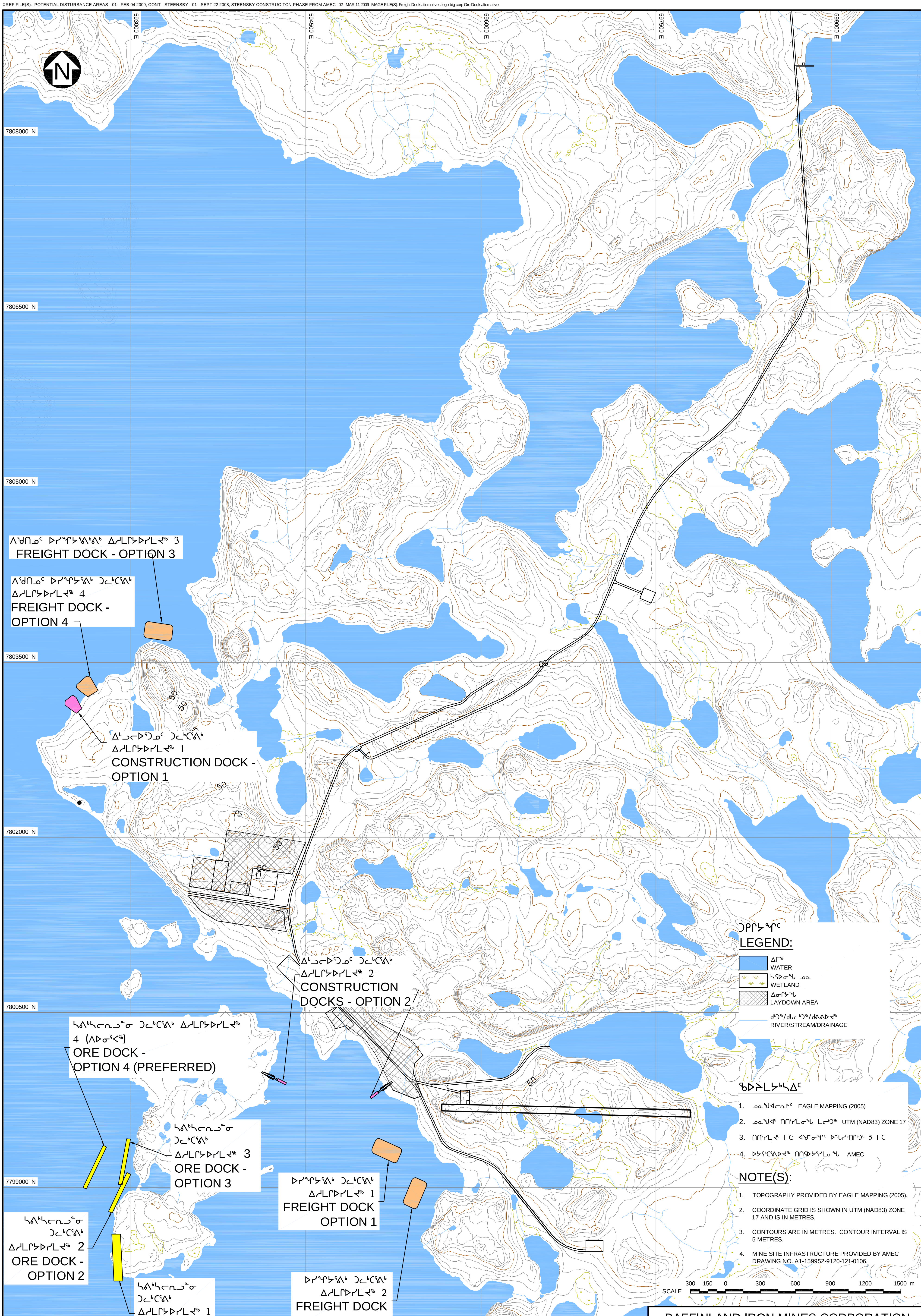
Table 3-6.4 Comparison of Railway Routing Alternatives to Steensby Port

Route	Length (km)	Capital Cost	Advantage	Disadvantage
Eastern Route (preferred)	148.3	Base	• Shortest (only slightly longer than Western Route) • Lowest cost • Least bridgework • Least exposed to glacial ice and solifluxion; greatest amount of construction on rock/shallow soils	• Most exposed to rockfalls • Adjacent to Cockburn Lake (fisheries and raptor nests)
Western Route (original)	146.6	Base + 2.5%	• Shortest • Cost competitive with preferred alignment	• Poorest ground conditions • High archaeological potential • Expected interactions with wildlife (birds, caribou)
D-A	153.3	Base + 8.5%	• Moderate length and slightly higher than main alternatives • Avoids a portion (but not all) of poor ground along Western Route	• Poorest ground conditions • Includes difficult Cockburn River crossing • High archaeological potential • Expected interactions with wildlife (birds, caribou)
D-B	167.0	Base + 11%	• Moderate length and slightly higher than main alternatives • Avoids a portion (but not all) of poor ground along Western Route	• Poorest ground conditions • Includes difficult Cockburn River crossing • High archaeological potential • Expected interactions with wildlife (birds, caribou)
C	151.7	Base + 38%	• Least exposed to taliks • Fewest interactions with raptor nests • Lower archaeological potential	• Highest cost • Significant fill volumes • Short radii turns (operational issues)

Based on this analysis, the selected rail transportation corridor to Steensby Port is the eastern (Cockburn Lake) route shown on Figure 3-6.5.

6.5.5.3 Rail transport to South Steensby Port

The rail transport corridor to the South Steensby Port option, just south of Steensby Inlet, was considered as an alternative because its location avoids the most of the landfast ice of Steensby Inlet. However, the construction of a railway to this location would be more technically challenging than the corridor to Steensby Port and would be significantly longer at either 291 km or 356 km; twice the length of the proposed railway



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0	16DEC'10	ISSUED WITH REPORT	RAC	ASM	RAC	KDE

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

ALTERNATIVE DOCK LOCATIONS AT STEENSBY PORT

Knight Piésold CONSULTING

P/A NO. NB102-181/25

REF. 8

FIGURE 3-6.6

REV 0

to Steensby Port. These alignments are twice the cost and twice the environmental footprint of the base case. For these reasons the assessed rail corridor is not viable.

6.5.6 Conclusions Related to Overland Transportation Corridor

For the Mary River Project to be commercially viable, the ability for marine shipment of ore to customers in Europe will be required 12 months of the year. Therefore the selection of a Port requires a location that not only could be reliably accessed 12 months of the year by marine vessels, but also could be accessed by a land transportation alternative that can transport up to 21 Mt/a of iron ore.

Based on these project fundamentals, a thorough assessment of Port and land transportation alternatives indicate that a Port at Steensby Inlet is a favourable alternative over all other port sites for 12 month marine shipping. A Port at Milne Inlet is also a feasible option although there is uncertainty related to navigation of large ore carriers during the winter months.

Steensby Port was selected as the preferred port location primarily based on preferable ice conditions for marine shipping and the most feasible rail transportation corridor from the Mine Site. To reach Steensby Port, two general transportation corridors have been assessed within the North Baffin Region, one to the west of Angajurjualuk Lake and one to the east. The Eastern Route to the east of Angajurjualuk Lake and along Cockburn Lake was selected as the preferred route based upon environmental, geotechnical, cost and constructability considerations.

The proposed railway transportation corridor is removed from communities, and does not present major conflicts with land use, though accommodating general land use (mostly overland travel while hunting) is appropriate with all options. The preferred alternative does not affect any key wildlife habitat. The corridor is inland, rather than on the scenic coast, and avoids known archaeological sites to the extent possible.

6.5.7 Steensby Port Site Configuration

Selection of the Steensby Port site on Steensby Inlet was primarily based on ship and rail access. The alternative dock locations (Freight Dock Option 1 through 4, Ore Dock Option 1 through 4 and Construction Dock Option 1) considered are presented on Figure 3-6.6. The preferred ore dock location (Option 4) is off of the island at the preferred Port site. This island allows access to deep water, and provides a naturally protected port site. The preferred site is one of the closest points to access by rail from Mary River.

Another option assessed was to build a large pier or causeway out into the ocean and another point along the shore of Steensby Inlet, however this would produce a larger footprint in the marine environment, would likely cost more to build, and would not provide any advantage, such as being significantly closer to Mary River.

6.5.7.1 Ore Dock Location and Structure at Steensby

Three potential areas for the ore dock were identified; on the mainland, one located off Steensby Island (preferred Option 4) and locations adjacent to Steensby Island. The mainland location would require extensive blasting and dredging to meet the depth requirements suitable for the draft of the ore vessels and was therefore rejected as an option. The location along the southern portion of Steensby Island would meet the depth requirements, but would interfere with more archaeological sites. Since it would be located along the island, only 1 vessel could dock at a time. The area off Steensby Island was selected as the preferred location because it allows for 2 vessels to dock at a time and avoids more archaeological sites.

Dock designs include continuous dock structure which can only be built in-shore, and discrete caisson structures that may be built in-shore or off-shore (Table 3-6.5).

Table 3-6.5 Evaluation of Steensby Ore Dock Location

Option 1 (DFS continuous shoreline structure)	
Advantages	• More capacity reserve against berthing or ice loading • Short distance to deep water • No trestle required
Disadvantages	• Difficult foundation construction on steep slope • Not suitable for discrete structures as backfill needs to be retained with a continuous wall • Arrangement is not good for effective ice management • Likely that significant consolidated brash ice will accumulate in front of the dock • Potential for damage to the dock and carrier during berthing with accumulated consolidated brash ice • Ore carrier would need to berth further off the berth face requiring a larger shiploader with a longer boom • Ore carrier berthing and departure operations will take longer • Difficult to safely moor and align the vessel • Requires a causeway/bridge to connect to the south end of the Island • Dredging of the shoal area northwest of the berth is needed for vessel turning manoeuvres • Large volume of rock dredging required for foundation with 190,000 DWT carriers • Require significant new construction to provide a second berth for 30 Mt/y throughput • Requires a separate dock for tugs and ice breaking vessels
Option 2 (Open/Discrete caissons-inshore)	
Advantages	• Ice can be cleared and partly pushed between the discrete caissons prior to ore carrier arrival • Shorter time for ore carrier berthing and departure operations • Smaller volume of rock dredging for the foundations • Tugs and ice breaking vessels can be moored on the east side of the dock or along the trestle
Disadvantages	• Requires a causeway/bridge to the south end of the Islands • Dredging of the shoal area northwest of the berth is needed for vessel departure manoeuvres • No access for ice breakers to manage ice behind the berth • A trestle is required • Dock would need to be lengthened to provide a second berth for 30 Mt/y as there is insufficient water depth on the east side of the dock for mooring carriers
Option 3 (Open/discrete caissons-inshore)	
Advantages	• Good for ice management with area behind the cells for cleared ice • Ice can be cleared and pushed between the caissons prior to ore carrier arrival • Shorter time for ore carrier berthing and departure operations • No dredging for caisson foundations • No causeway/bridge is required to the south end of the Island • Tugs and ice breaking vessels can be moored on the east side of the dock or along the trestle
Disadvantages	• Dredging of the shoal area west of the berth is needed for vessel departure manoeuvre • Require relatively thicker sub grade fill under the caissons which is susceptible to scouring • A trestle is required • Dock would need to be lengthened to provide a second berth for 30 Mt/y as there is insufficient water depth on the east side of the dock for mooring carriers

Option 4 (Open/Discrete caissons-offshore)	
Advantages	• Deep water at either side of the dock provides two berths to assist with summer and 30 Mt/y throughput • Good for ice management with larger area behind the cells for cleared ice • Ice can be cleared and pushed between the caissons prior to ore carrier arrival • Shorter time for berthing and de-berthing • Reduced dredging for caissons foundation as shoal dredging is needed for all locations • Caissons likely supported on rock. • No causeway/bridge required to the south end of the Island • Tugs and ice breaking support vessel berths can be provided along trestle • Nearer to stockyard so conveyor length is reduced
Disadvantages	• Dredging of the shoal area west of the berth is needed • A trestle is required

The following dock design approaches were also evaluated:

- Steel, concrete or hybrid caissons;
- Sheet piled cells;
- Piled jacket structures with stiff legs; and,
- Piled structures with stiff legs.

Open / discrete caissons constructed offshore at L4 (see Table 3-6.5) are recommended for the following reasons:

- Superior in terms of ice management;
- Provides an optional second carrier berth;
- Requires the least underwater blasting and dredging;
- Provides moorage for tugs and support vessels along the trestle; and,
- Minimizes on site construction.

6.5.7.2 Freight Dock Location at Steensby

A number of potential freight dock locations were considered and evaluated at Steensby Port and are shown on Figure 3-6.6. Potential dock locations on the northeast tip of the mainland facing Ikpikitturjuaq Bay were rejected due to the extensive number of nearby archaeological sites. A major reconfiguration of the Steensby Port layout was undertaken following the 2008 archaeological field program to avoid those areas expected to be archaeologically significant.

A more southerly location opposite Steensby Island was selected as the preferred location for the freight dock.

6.5.8 On-site Accommodations and Worker-Related Issues

6.5.8.1 Work Scheduling during Operation

The preferred worker rotation during operation is 2 weeks of site work followed by 2 weeks in their resident communities. While this is not the most cost-effective schedule, it has been found by decades of experience at remote mines to be the preferred work schedule in terms of worker safety, separation from family members, having a consistent workforce that shares the same rotation, and ultimately for the retention of the mine's workforce.

6.5.8.2 Worker Sourcing (Direct Points of Hire)

The five North Baffin Communities of Arctic Bay, Clyde River, Hall Beach, Igloolik and Pond Inlet (listed in alphabetic order) will be direct points of hire, where Project aircraft will commute workers. Workers will also be hired from Iqaluit given that Project aircraft from Ottawa will be stopping to re-fuel and the community has the largest population in the territory. This proposed arrangement, which still allows workers from other communities to participate in the Project without direct flights, is the preferred alternative because it offers the best "effect – benefit" matching opportunities to the Project and the communities. The five communities are the closest to the Project with traditional land ties and will be most affected by the activities of the Project. Selecting these communities as preferential points of hire optimizes benefits from the Project in view of Inuit land use constraints imposed on these communities.

6.5.9 Airstrip Locations

The existing Mine Site airstrip will be adequate to meet Project needs with minor upgrades without additional environmental concerns. There is no reason to relocate the airstrip.

The existing airstrip at Milne Port will be relocated the west of the existing airstrip to allow for a runway approach that avoids shipping lanes and freight and ore loading and unloading activities. The airstrip will also be extended.

The community of Pond Inlet has expressed a desire for a jet airstrip as a community benefit from the Project. However, an airstrip at or near Pond Inlet would not replace the need to have an airstrip at the Mine Site since there is no land based transportation corridor between this community and the Project.

There is no existing airstrip at the Steensby Port. During construction an airstrip is critical for positioning and rotating the very large workforce required at that location, and during operation the airstrip will be needed for emergencies. An engineering study identified five alternative locations with relatively equivalent environmental footprint. The selected airstrip is closest to the port, with preferred ground conditions, the shortest required access road and least construction cost.

6.5.10 Shipping

6.5.10.1 Shipping Route through Foxe Basin

Two shipping corridors were assessed through northern Foxe Basin into Steensby Inlet, and eastern and a western, as shown on Figure 3-6.1. The ships will pass through southern Foxe Basin following established shipping lanes accessing Hall Beach and Igloolik. In northern Foxe Basin, the ships will pass either to the east or the west of the Spicer Islands, Rowley Island and Koch Island.

The more westerly route departs from the existing shipping lanes near to Igloolik and Hall Beach and runs west of Rowley and Koch Islands. The easterly route departs from the existing shipping lanes south of the Spicer Islands, and runs along the east side of Rowley and Koch Islands. Based on the results of 2007 surveys, both routes are viable for the Project, but the eastern route is operationally preferable. The communities of Igloolik and Hall Beach have indicated preference for the more easterly route during public meetings held by Baffinland in September 2007, on the basis that this route was more removed from primary land use areas by the communities.

The eastern route is the preferred alternative, as it is considered less intrusive to local land users. The communities of Igloolik and Hall Beach have indicated a clear preference for the eastern route. The Nunavut Wildlife Harvest Study shows harvest locations concentrated near the communities of Igloolik and Hall

Beach with virtually no harvests reported along the eastern route. Marine Mammal workshops and individual interviews from Inuit knowledge study show that the western route has a higher use level than the eastern route. The use is limited to Steensby Inlet which is fairly removed from the community. Additional detail is provided in the resource and land use impact assessment (Volume 4, Section 10).

6.5.10.2 Shipping Route through Hudson Strait

Ships passing through Hudson Strait will remain within the Nunavut Settlement Area (NSA) and are not expected to pass through the Nunavik Marine Region of Northern Quebec or the area of shared Nunavut-Nunavik occupancy, under normal circumstances. Based on Fednav's experience shipping to the Raglan Mine in Deception Bay in Nunavik, the best ice conditions in Hudson Strait exist closer to the Baffin coast.

In public meetings in Cape Dorset, community representatives requested Baffinland to put as much distance between its ships and the community as reasonably possible and as safety allows. The Company has modified its proposed nominal shipping route at this request. While better ice conditions are found closer to the Baffin coast, ships will pass to the south of Mill Island (between Mill Island and Salisbury Island) to the extent possible (Option D on Figure 3-6.1). The Company has stated that ships will likely need to pass to the north of Mill Island (Option C on Figure 3-6.1) when ice conditions are very poor, to maintain safe and reliable passage.

6.5.10.3 Length of Shipping Season

Shipping season length was considered, examining the case for open water shipping only (4 months), ice breaking of early season ice only (8 months) or ice breaking all winter (12 months). The viability of the Project depends on the ability to provide smelters with ore 12 months a year. Shipping 12 months of the year is the only commercially viable alternative. As a result, the Steensby Port option is the only economically viable alternative for a production rate of 18 to 21 Mt/a. The Milne port option offers only a 3 to 4 month shipping season without ice breaking increasing the ocean freight cost significantly for 18 to 21 Mt/a of ore production. The Project would not be commercially competitive with iron ore suppliers in Brazil with only an open water shipping season.

Shipping from Milne Inlet is potentially feasible for a smaller quantity of ore that could reach markets sooner after the start of construction than year round shipping from Steensby Port. The feasibility of shipping about 3 Mt/a from Milne Inlet is currently under study. It could potentially supplement year round shipping and would offer an opportunity to produce revenues about two years sooner than shipping from Steensby Inlet.

6.5.10.4 Ballast Water Treatment

The Ballast Water Control and Management Regulations, pursuant to the *Canada Shipping Act*, require ships have a ballast water management plan, and either exchange or treat their ballast prior to discharge in waters under Canadian jurisdiction (Transport Canada, 2010). The need of ships to contain and discharge ballast water is described in Sections 3.2.2 (Milne Port) and 3.6.3 (Steensby Port). The dedicated fleet of ice breaking ore carriers that will ship ore from Steensby Port are expected to use ballast water exchange as the proposed method of ballast water management. It is anticipated that the majority of charter ore carriers calling on both Milne and Steensby Ports in the open water shipping season will also utilize exchange as the method of ballast water management.

The alternative to ballast water exchange is ballast water treatment. Not exchanging ballast water at mid-sea in Canadian waters is against the law, and is therefore not an option.

In terms of treatment, there are a number of possibilities. However, the determining factor in the selection of a ballast treatment system is to determine the alien target invader. The range of treatment alternatives has been succinctly described in a Fact Sheet prepared by the Prince William Sound Regional Citizens' Advisory Council in Alaska (2005). The International Maritime Organization (www.imo.org) has found that treatment of ballast water should be 1) safe; 2) environmentally acceptable; 3) practicable; 4) cost effective; and, 5) biologically effective. In the IMO's opinion, few technologies meet all five criteria and most technologies are under development. So far the most effective technologies consist of a combination of primary treatment (filtration or cyclonic) followed by an additional chemical or mechanical treatment.

Because ballast water exchange is accepted as an effective ballast water management method, water treatment is not proposed, and therefore it has not been necessary to evaluate ballast water treatment options.

6.5.10.5 Alternatives for antifouling coatings of ore ships

The dedicated ore carriers (160,000 to 190,000 DWT) will have no antifouling, but if the Project is supported by market ships, there may be (regulatory compliant) coatings in use. Smaller ore carriers will be taken from the market and will comply with international regulations prevailing at the time.

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SECTION 8.0 - DEFINITIONS AND ABBREVIATIONS

8.1 GLOSSARY

Active Layer	Layer of ice, soil and rock which is subject to seasonal freezing and thawing above the true permafrost. In the region of Baffin Island in which the Project is located, the active layer is typically from 1 to 3 m thick.
Aggregate	Crushed rock from quarries as well as sand and gravel from borrow sources.
Aggregate Sites	Quarries and borrow sources.
Archaeology	The scientific study of prehistoric people and their cultures.
Arctic Packs	Special control systems (electronics) used in locomotives that account for the climate.
Ballast	Water taken on in chambers of vessels mainly to stabilize sea-going vessels, by adding weight to the vessels and maintaining a certain draft (the depth a vessel sits in the water). Empty vessels take on much more ballast than a fully laden ship. For icebreakers, ballasting is also used to keep the ice draft of the vessels constant, and to stabilize the ship, thereby optimizing stresses in different loading conditions.
Baseline	Environmental settings in the Project area as they exist naturally or pre-development, against which changes in the environment from a project can be assessed.
Bathymetry	Measurement of the elevations of the sea bed, with respect to the top of the water.
Best Practice Methods	A technique, method, process, or activity which conventional wisdom regards as most effective at delivering a particular outcome.
Bladder Tank Farm	Fabric fuel tanks situated in lined containment that are highly portable and can be constructed and filled very quickly.
Bollard	A fixture on a wharf used to fasten a line from a ship.
Borrow Source	Source of sand and gravel.

Bulk Sample	A large ore sample extracted as a test for the purpose of demonstrating the quality of an ore and/or the economic viability of mining the ore.
Bungalows	A railway term to describe small sheds containing power switching and signalling systems
Canada's Northern Strategy	Strategy to strengthen Canada's sovereignty, protect the country's environmental heritage, promote economic and social development and improve Northern governance.
Canadian Sovereignty	Canada having supreme, independent authority over a geographic area, such as Nunavut.
Civil Works	Includes foundation preparations; earthworks and soil exchange; general site preparation and construction of temporary facilities; pre-stripping and removal of overburden in preparation for ore extraction; surveying; construction of roads, airstrips, the railway, bridges, tunnels, ports and buildings; drainage management including construction of ditches and ponds; and ore extraction at a rate of up to 3 Mt/a in the open pit
Closure Plan	The plan incorporates progressive rehabilitation during the course of the Project to limit the work required after cessation of operations and to limit the environmental effects during the Project life. It addresses temporary and long-term closure as well as final cessation of operations. The main objective is to return the Project affected and viable sites (mine site, Milne Port and Steensby Port) to "wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and human activities"
Combustible Wastes	Waste which can be incinerated.
Communication and Networking System	Consists of interconnected communication subsystems which will be interfaced and integrated to provide a very reliable, secure and comprehensive telecommunication network capable of providing for all voice and data communication requirements.
Concrete Caissons	A type of foundation for docks that are hallow and constructed of concrete. Once placed, the hallow caissons are backfilled with local rock or iron ore to make a highly stable dock base.

Conformance	Ensuring that all applicable Nunavut and Canadian laws, regulatory requirements, agreements, permits and licences are followed
Construction Phase	Defined by the length of the construction phase of the railway.
Consultation	Information exchange.
Contact Water	Water that comes into contact with the waste rock.
Cut and Fill Operations	The process during earthworks construction of cutting or excavating high ground to fill lower ground, to make a level surface. Used to construct roads and laydown areas.
Dark Territory	Where there are no fixed signals along a section of the Railway.
Dedicated Tank Cars	Rail cars used to transport diesel and Jet A fuels.
Definitive Feasibility Study	See feasibility study. Definitive refers to the estimated level of accuracy of cost estimates - generally accepted to be +/- 15%.
Demobilize Equipment	Remove equipment from a work area (for this Project from Baffin Island) and return back to the equipment owner's home.
Development Proposal	Proposal to initiate the regulatory review of a project based on currently defined iron ore reserves.
Distribution (of an Effect)	The boundaries or ranges within which effects are found.
Dust Suppressants	Suppressants sprayed on the road to limit dust raised by vehicle traffic.
Ecosystemic	Relating to the complex of a natural community of living organisms and its environment functioning as an ecological unit in nature.
Electrical and Instrumentation Works	Includes construction and installation of electric power distribution systems; installation of lighting systems; installation of sockets and motive power; and installation of electricity grounding systems.
Environmental Assessment Process	A planning process to predict the environmental effects of a proposed development before it Is carried out.

Environmental Effect	A positive or negative change in the biophysical and/or socioeconomic environment caused by or directly related to a proposed activity.
Environmental Impact Statement	A statement of an evaluation of the predicted environmental and socio-economic effects of a proposed undertaking or project.
Exploration	The act of searching a terrain for the purpose of discovering resources.
Feasibility study	A technical analysis of the basic geology, operations, environmental considerations and economics of constructing and operating a mine.
Final Closure	Occurs when the ore deposit is exhausted and requirements of the Mine Closure and Reclamation Plan have been completed.
Fine Ore	A smaller sized ore product, pea sized.
Fish Entrainment	To pull or draw fish into water intake structures.
Flat Cars	Rail cars used to transport containers and large sized equipment and machinery.
Floating Hose Method	A method which involves connecting a hose or hoses from manifolds on the fuel tanker to connections on shore (manifold). It is presently employed for fuel shipments to communities on Baffin Island.
Footwall Zones	Rock masses consisting primarily of a Gneissic rock mass that locally grades to Schist.
Freshet	A rapid temporary rise in stream discharge and level caused by heavy rains or rapid melting of snow and ice.
Fuel Farm	A bulk fuel storage facility, consisting of multiple steel tanks within a lined containment area.
Fuel Tanker Cars	Rail cars used to transport fuel.
Hanging Wall Zones	Rock masses consisting primarily of Tuffs, Amphibolites and Schists.
Hazardous Materials	Explosives or chemicals

Hydrocarbon Contaminated Materials — Soil, water, ice, and snow contaminated by accidental oil spills.

Ice Multiplier — Every ice type (including open water) has a numerical value that is dependent on the ice category of the vessel. The value of the Ice Multiplier reflects the level of risk or operational constraint that the particular ice type poses to each category of vessel.

Ice Regimes — Regions of generally consistent ice conditions based on a simple arithmetic calculation that produces an "Ice Numeral" that combines the ice regime with the vessel's ability to navigate in the region.

Ice Rich Soils — Soil with a high ice content.

Ice-Free Season — The summer to early fall period when sea ice is at its minimum.

Incineration — The main disposal method for combustible non-hazardous wastes generated on-site using an appropriately designed variable flow dual chamber incinerator, and ashes from the incineration process will be placed in closed drums and buried within a designated area of the landfill. It diverts putrescible waste from the landfill and thus prevents problems associated with odours which attract wildlife.

Inuit-Owned Land — Land identified in the Nunavut Land Claims Agreement (NLCA) as being held by a designated Inuit Organisation. May include ownership of surface rights only or both surface and sub-surface (i.e. mineral) rights.

In-Water Blasting — Specialized blasting under water.

Key Project components — Includes Milne Port, Milne Inlet Tote Road, Mine Site, Railway and Steensby Port facilities.

Landfarming — Facility for the remediation of hydrocarbon contaminated soil, water, ice, and snow. The landfarms will be bermed and lined and consist of multiple cells to handle waste generated from several events separately. Soil remediation will occur through volatilization and natural biological processes and once hydrocarbon levels meet the applicable Nunavut remediation standards, the soil will be transferred to the landfill.

Landfast Ice — Sea ice that is anchored to the shore or ocean bottom.

Landfill	Used to dispose of only inert solid waste and ashes from the incinerator. Contents will remain permanently frozen and isolated.
Laydown Area	The place where equipment, supplies, and material are put before building begins.
Leads	Leads are narrow, linear cracks in the ice that form when ice floes diverge or shear as they move parallel to each other.
Long-Term Closure	the state of inactivity resulting from economic considerations or a reduction in ore reserves for a period greater than one year.
Lump Ore	An iron ore product in which pieces are all about golf ball sized.
Magnitude (of an Effect)	The amount or degree of change in a measurable parameter or variable relative to existing conditions (the exposed population).
Mainline Sidings	Sections of track that allow trains to pull off the "mainline".
Mean Annual Discharge	The mean annual flow of a river.
Mechanical Works	Includes equipment installation; piping installation including prefabrication; ore crushing and screening; construction of steel structures and pipe racks; and installation of mechanical systems in buildings.
Mineral Exploration	The systematic practice of searching for mineral resources (i.e. gold, iron ore, etc.).
Mineral Leases	A long-term form of permission to explore (i.e. drill) and mine mineral resources (subsurface rights).
Minority Strategic Partner	An investment partner who owns a minority interest in a project and does not have a controlling interest.
Mitigation Measures	Management actions or strategies applied to minimize or eliminate negative environmental effects. They are also used to reduce or eliminate the potential residual effects of the Project and are identified in each of the effects assessments, along with potential residual effects of the Project.
Monitoring	Systems that will be put into place to document the adequacy of each mitigating action in reducing impacts to insignificant levels.

Negotiation	Face-to-face discussions with the intent of reaching agreement.
Non-Contact ("Clean") Water	Water that does not comes into contact with the waste rock.
Nunavummiut	The indigenous inhabitants of Nunavut.
Nunavut Community Skills Inventory System	A program designed to capture the skill sets of individuals, including but not limited to their academic achievements, and to match them with the skill sets needed for a particular job, thus allowing them more access to jobs in industry.
Old Ice Concentration	A measure of the amount of sea ice that has firmed in the previous winter (i.e. not "new" ice).
Open Water Shipping Season	The summer to early fall period when sea ice is at its minimum. There are established dates for open water shipping for different areas of the Arctic and different ice-class ships.
Operation Phase	Open pit mining of iron ore in Deposit No. 1 and the related processing and transportation of the iron ore.
Pack Ice	Sea ice that is not landfast; it is mobile by virtue of not being attached to the shoreline or something else.
Packaged Explosives	Explosives that are packaged to be ready to use after detonators are applied.
Passenger Cars	Rail cars used to transport employees between Steensby Port and the Mine Site.
Permafrost	Ground (rock and/or soil) remaining at or below 0°C continuously for at least 2 years.
Permanent Support Infrastructure	Infrastructure built at the onset of construction to be used during both the construction and operation phases of the Project.
Person Years of Employment	The number of years that it would take one person to do task; it is used as a measure of how much labour is required to perform a task.
Pit Dewatering	Removal of water from an open pit that might result from groundwater inflows or precipitation.
Point-of-Hire Locations	Communities where the company currently operates and plans to operate direct flights to and from the Project sites.

Polishing and Waste Stabilization Pond	Place for sludge disposal and discharge of treated effluent.
Post-Closure Monitoring Program	Program to ensure the reclamation measures remain effective and continue to provide a high level of protection for the public and the environment.
Potential Development Areas	A boundary established to encompass a Project component, where future development is expected to occur.
Potential Effects	Refers to potential changes in the VC that result from interactions between Project activities and the environment.
Pre-Commissioning Activities	Activities which will be carried out prior to mine commissioning (start-up).
Public Easement	The right of the general public to use certain streets, highways, paths or airspace.
Quarries	Source of crushed rock
Rate of Return	The amount returned per unit of time, expressed as a percentage of the cost.
Return Period	An annual maximum even has a return period (or recurrence interval) of *T* years if its magnitude is equalled or exceeded once, on the average, every *T* years. The reciprocal of *T* is the exceedance probability of the event, which is the probability that the event is equalled or exceeded in any one year.
Rock Fall Detectors	Safety systems to identify rock falls along the Railway.
Rotary Dumper	3 cars are turned upside down simultaneously to empty the ore into unloading bins, without any requirement to uncouple the cars from the rest of the train.
Royalties	Usage-based payments made by one party and another for ongoing use of an asset.
Satellite Communications (Satcom) System	System which links up with the communications infrastructure at the Mine Site via communication towers to be located along the Milne Inlet Tote Road.
Sea Ice	Ice formed by freezing of seawater.

Semi-Diurnal Tides	Two tidal cycles a day (i.e. two high waters and two low waters each day).
Shareholders	One who owns shares of stock in a corporation.
Sinter	The agglomeration of iron ore fines that are fused but not melted to form a coarser mass that can be charged to the blast furnace.
Site Capture Phase	Establishing the basic infrastructure such as camps, airstrips, docks, fuel storage facilities and laydown areas to allow the construction workforce to expand and focus on construction of permanent Project infrastructure.
Snow Fencing	Fencing used to limit the formation of snow drifts and snow banks on the road.
Socio-Economics	Includes demographics, workforce experience, health, social services, youth, education, economic development, opinions, perceptions, and the spiritual aspects of archaeology.
Splitter	Used to bypass the fines product around the screening circuit, allowing it to go directly to the stockpiling area.
Stakeholders	The Inuit communities proximate to the Project sites the public, local and regional Inuit organizations, the Government of Nunavut, and federal agencies with a mandate relevant to the Project.
Staking of Claim Blocks	The legal marking and granting of permission by the government of multiple "claims" - the rights to explore the mineral potential of sections of land.
Subsistence Economy	An economy based on production for consumption rather than exchange.
Surface Leases	Permission to use and place infrastructure and equipment on surface lands (does not include the right to explore or develop minerals in the sub-surface).
Tank Cars or Containers	Rail cars used to transport bulk material.
Tank Farm	See fuel farm definition.

Tax Revenue	Government revenue due to taxation.
Temporary Closure	the planned shutdown of a mine site for a period of less than one year.
Temporary Infrastructure	Infrastructure constructed or positioned at Project sites needed only for the construction phase will be removed once construction is complete.
Thaw Sensitive Ground	They are typically "ice rich" or at least contain a small amount of ice. Depending on the grain size and subsequently the permeability of a soil, even soils that are just borderline ice rich can be thaw sensitive if they are fine grained in nature (i.e. have a low enough permeability).
Thermistors	Instruments to report ground temperatures at various depths within the hole.
Track Circuits	Safety systems to detect broken rails along the Railway.
Valued Ecosystem Component (VECs)	Environmental attributes or components perceived to be locally important based on local ecological, social, cultural, and/or economic reasons.
Valued Socio-Economic Components (VSECs)	Environmental attributes or components perceived to be locally important based on local social, cultural, and/or economic reasons.
Waste Heat Recovery System	System which circulates recovered waste heat from the generators to the accommodation/maintenance/administration complex and other buildings.
Waste Management Handling Facilities	A central depot where waste generated across the site will be managed, properly processed, packaged, labelled, inventoried, secured (e.g., on pallets) and stored for sealift or reuse on site.
Waste Oil Burners	Consumes waste oil in the maintenance shops.
Wayside Detectors	Safety systems to monitor passing trains for defects, such as hot bearings/wheels and dragging equipment along the Railway.
Wayside Power	Used for locomotives which cannot be stored indoors; the railways equivalent of plugging in a block heater.

Wheel Impact Detectors	Safety systems to identify defective wheels along the Railway.
Zone of Influence	Zone which encompasses lower level helicopter traffic between the camp and drilling sites, where achieving the minimum flight altitude is not possible, and also including the approach and take off of fixed-wing aircraft at the airstrip.

8.2 ABBREVIATIONS

ABA .... Acid-base Accounting
ADR .... Acid Rock Drainage
AEEM .... Aquatic Environmental Effects Monitoring
AIRSS .... Arctic Ice Regimes Shipping System
ANFO .... Ammonium Nitrate Fuel Oil
AREMA ...... American Railway Engineering and Maintenance-of-Way Association
ASPPR .... Arctic Shipping Pollution Prevention Regulation
Baffinland .... Baffinland Iron Mines Corporation
BIML .... Baffinland Iron Mines Ltd.
Brunex .... British Ungava Explorations Limited
CAMBS .... Computer Assisted Manual Block System
CCG .... Canadian Coast Guard
CHS .... Canadian Hydrographic Service
CLEY .... Department of Culture, Language, Elders and Youth
CSP .... Corrugated Steel Pipe
DWT .... Deadweight Tonnage
EBA .... EBA Engineering Consultants Ltd.
EPCM .... Engineering Procurement Construction Management
ha .... hectare
IACS .... International Association of Classification Societies
IIBA .... Inuit Impact and Benefits Agreement
INAC .... Indian and Northern Affairs Canada
IRSCS .... Ice Regime Shipping Control System
KP .... Kilometre Post
KPa .... Kilopascals
L .... Litres
LTL .... Less Than Load
m^3/day .... Cubic Meters per Day
ML .... Metal Leaching
ML .... Mega Litres
MMER .... Metal Mining Effluent Regulations
MOU .... Memorandum of Understanding
MoW .... Maintenance of Way
MRIKS .... Mary River Inuit knowledge Study
Mt .... Million Tonne
Mt/a .... Million Tonne-per-annum

MW ....Mega Watts
MWh ....Mega Watt Hours
NCSIS ....Nunavut Community Skills Inventory System
NLCA..........Nunavut Land Claims Agreement
NRCan.......... Natural Resources Canada
NSA ....Nunavut Settlement Area
NTI.......... Nunavut Tunngavik Incorporated
NWTWB .... Northwest Territories Water Board
OHF .... Oil Handling Facility
OPEP .... Oil Pollution Emergency Plan
PAG.......... Potentially Acid Generating
PWSP..........Polishing And Waste Stabilization Pond
QIA ....Qikiqtani Inuit Association
RBC.......... Rotating Biological Contactor
ROGESA..........ROGESA Roheisengesellschaft Saar mbH
ROM ....Run of Mine
ROW.......... Right-of-Way
satcom.......... Satellite Communications
SWM.......... Stormwater Management
SS..........Suspended Solids
TGD..........Technical Guidance Document
TSS ....Total Suspended Solids
the Company.......... Baffinland Iron Mines Corporation
the Project .... Mary River Project
WWTF .... Wastewater Treatment Facilities