November 7, 2017
Nunavut Impact Review Board
29 Mitik Street, PO Box 1360
Cambridge Bay, NU, X0B 0C0

Attention: Solomon Amuno
Technical Advisor II
Sent via email: info@nirb.ca

RE: Mary River Project - Tote Road, Camp and Fuel upgrade
Request for Project Certificate Review

Baffinland Iron Mines Corporation (Baffinland) is requesting that the Nunavut Impact Review Board (NIRB) provide a review of the proposed upgrades to the Tote Road and associated camp and fuel needs and indicate to Baffinland and the Nunavut Water Board (NWB) if the proposed upgrades are consistent with the NIRB Project Certificate No. 005, Amendment 1.

In accordance with Part G of Baffinland's Type "A" Water Licence 2AM-MRY1325 – Amend. 1 (Water Licence), Baffinland submitted a Modification Request for a planned modification at the Mary River Project's Milne Port location that involves modifications to the Mary River Project's (the Project) Tote Road, Milne Port Fuel Storage Facility, and Milne Port Accommodations Camp.

The modification request includes upgrades proposed to the existing Tote Road to address road safety and operational issues, an addition of a 15 ML diesel fuel tank to the existing Fuel Storage Facility at Milne Port and the installation of a new 280-person accommodations camp at Milne Port.

The Modification Request was submitted to the NWB on November 6, 2017. One of the requirements for carrying out a Modification under the Water Licence is that "Such Modifications are consistent with the NIRB Project Certificate".

There is no defined process under the Water Licence or NIRB's Amended Project Certificate No.005 for a determination of 'consistency', however, the NWB has indicated in an email to Baffinland on November 7, 2017, that before the NWB can commence processing the request, a determination by the NIRB regarding the consistency of the request will first be required.

We look forward to your review of the Modification Request. Please do not hesitate to contact the undersigned should you have any questions or comments.

Regards,

Megan Lord-Hoyle

Megan Lord-Hoyle,

Director, Sustainability (Acting), Baffinland Iron Mines

Cc: Stephen Williamson Bathory (Qikiqtani Inuit Association)
Solomon Amuno (NIRB)
Sean Joseph, David Hohnstein (NWB)
Sarah Forté, Karen Costello (INAC)
Todd Burlingame, Christopher Murray (Baffinland)

Attachments:
Attachment #1: Modification Request – Tote Road, Fuel and Camp (Parts 1-5)

November 6, 2017

Sean Joseph
Senior Technical Advisor
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

RE: Mary River Project – Tote Road Upgrades, Milne Port Increased Fuel Storage, and Milne Port Accommodations Camp
(Modification Request)
Water Licence 2AM-MRY1325 – Amend. No. 1

In accordance with Part G of Baffinland Iron Mines Corporation's (Baffinland) Type A Water Licence 2AM-MRY1325 – Amend. 1 (Type A Water Licence), the purpose of this letter is to request approval from the Nunavut Water Board (NWB) for planned modifications to the Mary River Project's (the Project) Tote Road, Milne Port Fuel Storage Facility, and Milne Port Accommodations Camp.

The organization of this letter is as follows:

- **Section 1 Tote Road Upgrades** – upgrades proposed to the existing Tote Road to address road safety and operational issues.
- **Section 2 Milne Port Fuel Storage Facility Capacity Increase** – addition of a 15 ML diesel fuel tank to the existing Fuel Storage Facility at Milne Port.
- **Section 3 Milne Port Accommodations Camp** – installation of a new 280-person accommodations camp at Milne Port.

The supporting information included in this letter for planned modifications is consistent with the requirements of Part G of the Type A Water Licence. Attachments 1 to 17 provide additional design details and rationale.

Financial Security for this modification request is being determined as part of the 2018/19 Annual Security Review (ASR) process and is described in Baffinland's 2018 Marginal Closure and Reclamation Financial Security Estimate report. Baffinland is committed to post the financial security determined by the NWB to be required for these activities prior to the activities occurring.

1 – TOTE ROAD UPGRADES

The Milne Inlet Tote Road (Figure 1) was originally constructed as a CAT train trail in the 1960s. In 2007, Baffinland upgraded the original road and installed new watercourse crossings in 2007 to support its bulk sample program. Modest improvements have continued to be made since then, but significant upgrades are required to meet productivity and safety objectives associated with the Project's activities.

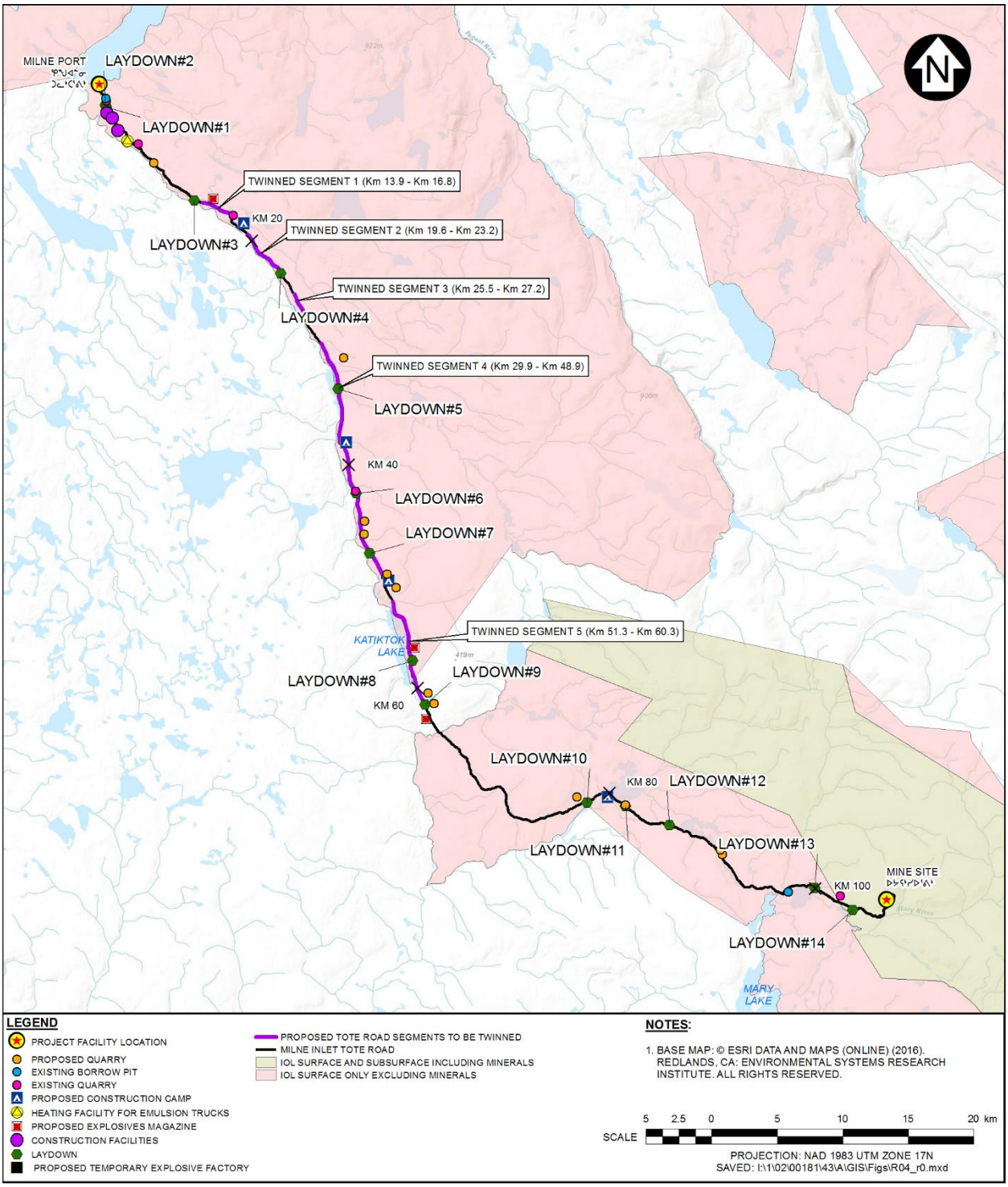

Figure 1 Tote Road Upgrades Overview Map

The Milne Inlet Tote Road was upgraded during the bulk sampling program in 2008 from a winter road to an all-season road adequate for transporting equipment and ore using 45-t trucks. The road was widened to between 8 m to 10 m to accommodate the truck traffic. Pullouts or passing areas were also constructed at intervals to allow traffic to pass. Further upgrades were completed for the Early Revenue Phase (ERP) to support the level of traffic proposed with year round ore haulage from the Mine Site to Milne Port using approximately 150-t trucks. The upgraded road follows the original alignment as constructed in the 1960s.

The road is a public right of way, which Baffinland maintains. Land users are permitted to use the road as prescribed in the Nunavut Agreement. Nonetheless, Project use of the road poses a public safety concern due to the interaction of mine trucks and land users. To mitigate these effects and ensure the safety of all users, Baffinland has implemented its Roads Management Plan (BAF-PH1-830-P16-0023), which includes a Hunter and Visitor Site Access Procedure (BAF-PH1-810-PRO-0002).

Baffinland has gained valuable operational experience over the past three years. A review of current operations has documented 56 safety incidents on the road over the past 1.5 years. This has included equipment coming into contact with other equipment or going off the road. Freshet normally results in a nearly complete halting of ore transport over the road, due to increased surface runoff and reduced stability of the road surface, shoulders, and stream crossings. This review has identified the need to invest in major improvements to the Tote Road to improve operational efficiency and address health and safety concerns.

Several issues are currently affecting safety and operational efficiency on the Tote Road:

- **Sections of road are too narrow** – The road is designed to be 10 m wide, but some areas are as narrow as 8 m, requiring trucks to slow down or stop while passing each other. Soft shoulders can pull vehicles off the road, and thus trucks tend to take the centre of the road.
- **Depth of sub-base** - The road is level with the original ground in many locations, and therefore the road surface does not shed water during freshet or rainfall events. Resulting ponded water induces permafrost degradation and the ground sinks, worsening the problem.
- **Gradient** – The gradient in some locations approaches 10%, compared to preferred maximum grades of 4 to 5%. Fully loaded ore haul trucks struggle, which causes mechanical failures. Occasionally, trucks have needed to be pushed up the hills with other heavy equipment, presenting a safety issue.
- **Sharp turns** – A number of sharp turns cause traffic slow downs, and the road wears significantly at these locations. The sharp turns also cause additional wear on trailer brakes and wheel studs. There are locations where sharp turns combine with steep gradients and these are the locations that trucks often require assistance because it is not safe to accelerate before the hill.
- **Topping availability** - Road crush is typically sourced from the Mine Site primary crushers and placed on the road surface, but loose placement and grading cause washboard effects. Crowning and compacting are required to prevent water from penetrating into the road. Dust along the road needs to be controlled with water and/or calcium chloride.

An area of concern for immediate road improvements is between km 20 and km 60, where the road can be improved greatly from a performance and safety perspective. This section of road closely follows Phillips Creek, and thus creating a twinned loaded route to the east of the existing location is desirable to pull the loaded vehicles away from a potential loss of control into the water. The incident summary also indicates that a significant number of the road widening issues are in this area.

The large hill located between the km 62 bridge and km 76 has been the area of largest performance concern along the road as the loaded uphill climb is hard on trucks and adds significantly to travel time.

The requested modification is described below and is consistent with the requirements of Part G of the Type A Water Licence.

1.1 Description of Facilities and/or Works to be Constructed

1.1.1 Watercourse Crossings

The proposed twinned segments of the Tote Road and watercourse crossing locations are shown on Figures A.2 to A.7 of Attachment 1. Five segments of the Tote Road totalling a cumulative distance of 37.2 km will be upgraded as indicated in Table 1. The new road segments will require the installation of 119 culverts and partial infills of the margins of 4 ponds below the high water mark. Three of the four affected ponds do not contain fish, and only minor habitat encroachment is expected on the fourth pond which is fish bearing. There are 18 confirmed fish crossings on the new twinned road segments, and 17 of these are associated with culvert installations (North/South Consultants Inc., 2017).

Table 1 Proposed Tote Road Segments Designated for Twinning

Twinned Segment No.	Adjacent Tote Road km	Twinned Segment Length (km)	Number of Culverts	Number of Partial Pond Infills	Total Number of Fish Crossings
1	13.9 to 16.8	3.1	13	0	2
2	19.6 to 23.2	3.8	8	1	0
3	25.5 to 27.2	1.9	6	1	0
4	29.9 to 48.9	19.2	65	1	7
5	51.3 to 60.3	9.2	27	1	9
Totals		**37.2**	**119**	**4**	**18**

Road upgrades will consist of constructing a parallel roadbed along these segments. The new roadbed will be constructed to meet the requirements for a surface haulage road specified in the Mine Health and Safety Regulations (Government of Nunavut, 2011). Once the second roadbed has been constructed and is operational, requisite upgrades to the existing roadbed such as grade improvements and realignments at sharp turns can be made. The minimum top width of new road segments will be 6.12 m, using the same design criteria as for the existing Tote Road, while the average subgrade width will average 10 m.

Construction of the twinned road segments will involve rock cuts that intersect three existing streams that will require the stream at the crossing locations to be permanently diverted to nearby streams,

resulting in increased flow in the downstream sections of the receiving watercourse and no flow in the downstream sections of the diverted watercourse. These stream sections are summarized in Table 2 (KP, 2017). The five associated streams do not contain fish (NSC, 2017).

Table 2 Tote Road Stream Diversions

Twinned Segment No.	Diversion from	Diversion To	Crossing Type	Waterbody Type	UTM Coordinates		Mean Annual Flow Range (litres/sec)
1	CV-12-4b	CV-13-1	Cut	LP	511455	7967168	3.4 – 5.1
1	CV-12-5	CV-13-1	Culvert	S	511552	7967152	0.4 – 0.6
5	CV-35-5	CV-35-4	Cut	LP	522298	7948170	20.1 – 30.3

NOTES:

1. WATERBODY TYPE – STREAM (S), LOW POINT (LP)
2. UTM COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.

Plan and section views of typical road profiles and culvert installations are provided as Attachment 2. The list of culverts is provided as Attachment 3.

1.1.2 Quarries and Rock Cuts

Rock quarries will be exploited to support road upgrades and the establishment of laydowns and other development areas. This includes seven existing and permitted rock quarries or borrow areas and 13 new rock quarries (see Attachment 4). The types of rock that will be quarried include granitic gneiss, limestone, and sandstone. Rock volumes from cuts from the road right of way have been included in Attachment 4.

Quarries (and rock cuts) will be developed in accordance with the Borrow Pits and Quarries Management Plan (BAF-PH1-830-P16-0004). This includes preparing quarry-specific management plans in accordance with the requirements of the Type A Water Licence and the Commercial Lease No. Q13C301 (Commercial Lease) agreed upon by the QIA and Baffinland.

A number of geochemical evaluations have been conducted to establish the metal leaching (ML) or acid rock drainage (ARD) potential of these materials (KP, 2007a,b; AMEC, 2010; Hatch, 2017a). The sedimentary rocks (limestone and sandstone) identified along the railway alignment are carbonate rich and pose no ML/ARD risk. While the granitic rocks (granite, gneiss, and schist) and the diabase contain low sulphide content, due to the relatively low neutralizing potential of these rocks, there is a low risk of ML/ARD (AMEC, 2010; Hatch, 2017a).

As a mitigation strategy, Baffinland's Borrow Pit and Quarry Management Plan (BAF-PH1-830-P16-0004) prescribes site-specific geochemical testing of rocks prior to quarrying. As a precautionary measure, quarries and rock cuts within granitic and diabase rock materials will be subject to geochemical testing to confirm that the material is geochemically suitable.

Several mitigation options are available if a potential rock cut area is found to be acid generating. The first option would be to avoid the area, and re-route the road if possible. If not possible, rock cuts may

be managed by placing non-acid generating materials (non-PAG) over the acid generating material, or placing limestone within the seepage path to increase pH and decrease metal loading of the runoff.

1.1.3 Laydown Areas

Development of 14 laydown areas will be established along the Tote Road alignment for crushed rock stockpiling and material storage, reducing Tote Road construction traffic. The laydowns will be constructed utilizing blasted rock with granular topping to a total minimum thickness of 1 m, free draining to appropriate ditches and watercourses. The approximate proposed locations of the laydown areas are shown on Figure 1 and Figures A.1 to A.7 of Attachment 1. The total area of the 14 laydowns is 250,000 m^2.

1.1.4 Explosives Storage Magazines

Explosives storage magazines will be established at three locations adjacent to the Tote Road upgrades (km 12.8, 48, and 59). A temporary heated garage for bulk emulsion truck parking will be established at about km 6.9 as well. Location details for the heated garage are provided in Attachment 5. The approximate proposed locations of the explosives storage magazines are shown on Figure 1 and Figures A.2 to A.7 of Attachment 1. These features will be temporary, but nonetheless, minor leveling and grading will be required before the magazines and heated garage can be established. Details associated with the proposed explosives magazines and heated garage are summarized in Table 3.

1.1.5 Portable Fuel Storage

Portable double-walled fuel storage tanks will be positioned at laydown areas to supply fuel to the mobile earthworks fleet executing the road upgrades. This is expected to consist of 14 tanks (6 - 50,000 L, 2 - 22,500 L and 6 - 10,000 L). Positioning the portable double walled fuel tanks will reduce fuel vehicle traffic and spill risk by minimizing fuel handling. Baffinland and its contractors will implement the same safe fuel transfer protocols as used elsewhere on the Project. Contractors will position spill response equipment and implement spill contingency measures. Baffinland will update its Spill Contingency Plan (BAF-PH1-830-P16-0036) to identify the additional fuel storage and spill response equipment, response training and responsibilities for implementing the additional spill response measures.

Table 3 Proposed Heated Garage and Explosives Storage Magazines

Location Along Tote Road	Footprint Area (m^2)	Details
Km 6.9	6,400	• Pad measuring 131 m x 49 m consisting of compacted gravel over existing ground • Access road 220 m long x 131 m wide • Temporary heated garage for bulk emulsion truck parking
km 12.8	12,500	• Pad measuring 205 m x 43 m consisting of compacted gravel over existing ground • Access road 352 m long x 6 m wide • Approximately four magazines • Temporary heated garage for explosives truck
Km 48	10,000	• Pad measuring 100 m x 100 m consisting of compacted gravel over existing ground • Access road 265 m long x 6 m wide • Approximately one magazine
km 59	19,658	• Pad measuring 135 m x 150 m consisting of compacted gravel over existing ground • Access road 425 m long x 6 m wide • Approximately two magazines

1.1.6 Mobile Construction Camps

Two 80-bed mobile temporary camps will be positioned along the Tote Road using four different locations (km 18, km 38, km 50, and km 80) near to road upgrade activities, as shown on Figure 1.

The temporary mobile camps will consist of a hardwall kitchen and wash cars and soft wall accommodations units, all constructed on wood block foundations. The camps will be installed on 75 m x 120 m pads, located approximately 500 m from the Tote Road and accessed by constructing 8 m wide access roads. The installation of mobile camps will increase productivity, reduce worker vehicle traffic on the Tote Road and improve working conditions.

Water from the mobile temporary camps will be delivered from either the Mine Site or Milne Port by truck. Total water use at both the Milne Port and Mine Site water sources will remain within the daily volumes approved under the Type A Water Licence. Sewage and waste will be trucked to the Mine Site for treatment in existing facilities.

1.2 Proposed Location of the Structure

An overview map of the Milne Inlet Tote Road is shown on Figure 1. The proposed twinned sections of the Tote Road and locations of watercourse crossings, quarries, laydown areas, temporary explosives magazines, and mobile construction camps are shown on Figures A.1 to A.7 of Attachment 1. The coordinates of all 123 watercourse crossing locations are included in Attachment 3.

1.3 Identification of any Potential Impacts to the Receiving Environment

Activities associated with the Tote Road Upgrades include:

- Construction of approximately 37.2 km of new road parallel to the existing Tote Road
- Installation of culverts at 119 watercourses and partial infills at 4 ponds
- Extraction of 1,746,000 m^3 of rock from seven existing permitted quarries and 13 new quarries along the Tote Road
- Extraction of 650,000 m^3 of rock and granular material from new road excavations
- Operation of two 80-bed mobile temporary construction camps, located on gravel pads at four locations along the Tote Road
- New explosives storage magazines at Tote Road km 12.8, 48, and 59
- Temporary heated parking garage for parking the bulk emulsion truck at Tote Road km 6.9
- Use of temporary fuel tanks at various locations (14 tanks, 10,000 L to 50,000 L)
- Establishment of 14 laydown pads with a combined surface area of 250,000 m^2.

The potential effects of these activities are similar to those previously assessed in the FEIS and FEIS Addendum (Baffinland 2012, 2013) and include:

- Atmospheric Environment: emission of criteria air contaminants and an increase in noise and vibration levels.
- Terrestrial Environment:
    - ML/ARD associated with quarry operations
    - Change in thermal regime of permafrost
    - Loss of vegetation, including culturally valued vegetation
    - Direct habitat loss within the project footprint
    - Indirect habitat loss as a result of noise (sensory disturbance)
    - Disruption of migration corridors for caribou
    - Indirect morality from contamination of the environment (air and water emissions)
    - Direct morality from increased access to the area for hunters and collisions with vehicles.
- Aquatic Environment:
    - Loss of habitat (direct habitat loss related to the project footprint, indirect habitat loss associated with changes in water quality and quantity and sediment quality)
    - Potential fish mortality and indirect effects on fish health.

The Tote Road Potential Development Area (PDA) presented in the FEIS is 865 ha (Baffinland, 2012). The proposed Tote Road upgrades will increase the Tote Road PDA by 188 ha to 1,053 ha, equivalent to a 22% increase. Tote Road upgrades are expected to have minor interactions with the atmospheric and

terrestrial environment, and increased interactions with the aquatic environment. Mitigation measures and monitoring previously developed for work in and around water are presented in the sections below.

1.4 Monitoring

Baffinland has developed and implemented comprehensive programs for the existing Tote Road in accordance with the following regulatory approvals:

- Type A Water Licence 2AM-MRY1325
- Fisheries Authorization NU-06-0084 (Tote Road watercourse crossings)
- Commercial Lease No. Q13C301 (activities on Inuit Owned Land)
- Class A Land Use Permit #N2014Q0016 (quarrying on the Tote Road).

The current monitoring programs are largely adequate to address the additional infrastructure and activities associated with the Tote Road upgrades. Biophysical environment components will require minor updates to the current monitoring programs such as additional monitoring parameters and/or modifications to the locations of monitoring stations to account for an expanded project footprint.

Environmental monitoring of construction activities will consist of water quality monitoring and periodic environmental inspections. Specific monitoring measures related to fish protection include:

- An environmental monitor will be on on-site to assess the crossings prior to the onset of construction to confirm the absence or presence of spawning sites at least 20 m upstream or downstream of the crossing location, and whether spawning Arctic char are present in the vicinity (only applies where fish may be present).
- For all crossings where fish may be present an environmental monitor will be present to monitor construction activities and document turbidity levels upstream and downstream of the crossing under construction.
- Environmental monitoring and data collection will be conducted by a qualified environmental professional who will be present during all in-water construction, compensation, and restoration works to ensure implementation of the designs as intended in the engineering plans and compliance with permit conditions.

1.5 Schedule for Construction

The construction of the proposed Tote Road upgrades is planned to start as soon as the Request for Modification approval has been received from the NWB with the intent of completing construction by September 2018 prior to the ground freezing.

1.6 Drawings of Engineered Structures

Plan and section views of typical road profiles and culvert installations are provided as Attachment 2.

1.7 Proposed Sediment and Erosion Control Measures

Baffinland will employ a combination of sediment and erosion control measures (check dams, rip-rap, silt fences, etc.), as outlined in Baffinland's Environmental Protection Plan (BAF-PH1-830-P16-0008) and Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026), to address and manage sedimentation concerns during construction. Further details concerning specific fish protection measures pare discussed below.

1.7.1 Timing Windows for In-Water Work

The Nunavut Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (DFO, 2013) outlines timing constraints to protect fish and fish habitat during instream construction projects. The Project area is within Nunavut Fish Timing Zone 1, and the general range of spawning times for Arctic char, the species of concern, is noted as Fall (DFO, 2013). The in-water work timing restrictions (i.e., when work should be avoided) for fall spawning species in Zone 1 is September 1 to June 30. None of the waterbodies within the new road alignments with the North Rail right of way support permanent populations of anadromous char, due to the lack of connectivity between Milne Inlet and all freshwater spawning habitat (i.e., lakes with sufficient depths) in the study area (NSC, 2017).

If instream work is scheduled to occur within the restricted timing window, applicable "measures to avoid causing harm to fish and fish habitat including aquatic species at risk" (DFO, 2016) will be implemented. The primary "measure to avoid causing harm" will be to conduct all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse (DFO, 2016). Temporary diversion channels may be required to isolate the work sites if the streams are flowing: the diversion channels will be designed by a professional engineer to accommodate peak flows.

A fish salvage program will be conducted prior to re-routing fish-bearing streams into the diversion channel. A fish collection permit will be obtained for salvage operations and the salvage will be completed by qualified professionals. Fish will be relocated in areas upstream or downstream of the work site in suitable habitat. If pumping is required in the isolated stream channel between the cofferdams prior to fish salvage, water intakes will be screened to prevent fish entrainment, and pumps and intake screens will be sized to prevent impingement of fish.

1.7.2 Contaminant and Spill Management

Adverse effects to Arctic char and other freshwater biota from deleterious substances will be prevented by applying the following mitigation measures:

- Emergency spill kits will be kept near any instream works
- No waste material resulting from work activities will be left within 30 m of the top of any bank without containment measures
- Machinery will be washed, refueled, and serviced, and fuel and other materials will be stored in such a way as to prevent any deleterious substances from entering the water; such activities typically occur at least 50 m away from the high water mark of a stream or lake

- Spill response plan measures will be implemented immediately in the event of a sediment release or spill of a deleterious substance
- Machinery will arrive at site in a clean condition and be maintained free of fluid leaks, invasive species, and noxious weeds
- Fording of the watercourse by machinery will be limited to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, a temporary crossing structure will be constructed.

1.7.3 Erosion and Sediment Control

Baffinland will employ a combination of sediment and erosion control measures (check dams, rip-rap, silt fences, etc.), as outlined in Baffinland's Environmental Protection Plan (BAF-PH1-840-P16-0002) and Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026), to address and manage sedimentation concerns during construction.

Erosion and sediment control measures will be implemented prior to the start of construction and maintained until all disturbed ground has been permanently stabilized. The following measures will be included in engineering and construction along fish-bearing watercourses to minimize and mitigate erosion and sedimentation issues:

- Culverts will be installed in accordance with approved environmental protection and management plans
- Sediment and erosion control measures will be implemented prior to work and left in place and maintained until all disturbed areas have been stabilized
- Measures for managing contact and non-contact water flowing onto the site such that sediment is filtered out prior to entering a waterbody. These could include pumping/diversion of water to a vegetated area, or construction of a settling basin or other filtration system.
- Slopes will be stabilized with rocks, geotextiles and/or hydraulic seed and mulch
- Any stockpiled materials shall be stored and stabilized 30 m away from the High-Water Mark of any water body, unless for immediate use
- Fill material placed below the high water mark within the floodplain will be either erosion resistant or protected from erosion and only clean fill will be used
- Whenever possible, machinery will be operated on land above the high water mark or on ice, in a manner that minimizes disturbance to the banks and bed of the waterbody.

1.7.4 Culvert Design and Installation

During the detailed design phase fish-bearing streams and lakes will be assessed to identify fish passage requirements (depth and velocity) and mitigation measures to ensure maintenance of access and reduction of fish mortality. These mitigation measures include:

- Installation culverts at the same slope as the existing stream, where feasible
- Minimizing culvert lengths: culverts with lengths that exceed 50 m may be considered barriers to fish passage
- Placement of rocks and boulders or baffles, baffle inserts, or weirs inside the culverts to provide greater friction and velocity refugia
- Diversion channels and cofferdams will be used in fish-bearing streams in the open-water season to isolate the watercourse from flow prior to construction, and a fish salvage will be conducted in the isolated section prior to dewatering
- For installation of culverts in lake infill sections silt booms or silt curtains will be installed to contain suspended sediment.

To the extent possible the natural channel width will be maintained within crossing structures.

1.7.5 Stream Diversion Design and Installation

Site specific assessments will be undertaken during the detailed design phase at watercourse crossings that will require diversions for construction of the new road segments. The assessments will consider fish use and length of impacted channel, and potential mitigation options can be identified and incorporated into the final design. Mitigation measures and design will depend on:

- Channel capacity: If flow increases are modest, flooding may be infrequent. Where flow increases are larger, the channel banks may be overtopped each year during freshet (nival runoff) or during rainfall driven runoff events. Given the lack of vegetation and shallow frozen soils, rainfall runoff is rapid, causing sudden pronounced and relatively large increases in flow. If the channel is within a well defined valley, the flooded extent may be modest, but in flat terrain flooding may be extensive or follow low terrain (e.g. ice wedges) into other drainages.
- Changes in permafrost and frozen soil. Flooding and higher water levels may affect permafrost and frozen soil conditions proximal to the channel, causing subsidence or slope instability
- Fluvial geomorphic change. Increased flows may cause channel bed scour or bank erosion. Additionally, overbank flows may erode surficial soils. These eroded materials would be deposited downstream where the watercourse meets the diverted channel, larger river or lake.

1.7.6 Blasting

Use of explosives in or near water produces shock waves and vibrations that can damage a fish swim bladder, rupture internal organs, or kill or damage fish eggs or larvae (DFO, 2016). DFO “Measures to avoid causing harm to fish and fish habitat” will be considered during planning for construction of the stream crossings.

2 – MILNE PORT FUEL STORAGE FACILITY

The Mary River Project uses two types of fuel:

1. Arctic diesel for mobile equipment, trucking, mining equipment, and power generation
2. Jet-A aviation fuel for helicopters and aircraft

Fuel is delivered to Milne Port by tanker each open water season, and is transferred to the main tank farm at Milne Port using the floating hose method that is used at nearly all Nunavut communities. The Milne Port tank farm needs to be sized to store more than one year of fuel.

In 2016, 31.5 ML of arctic diesel and 2.0 ML of Jet A aviation fuel was delivered to Milne Port. Arctic diesel stored at Milne Port is used to supply the power plant and other port users, as well as trucks operating over the Milne Inlet Tote Road. The main tank farm at Milne Port stores arctic diesel, with a current capacity of 46 ML (an available volume of 41.4 ML allowing for 10% thermal expansion). The current Jet A fuel storage capacity at Milne Port is 2.25 ML.

To meet the fuel demands associated with current operations, Baffinland included an additional 3 ML tank of arctic diesel and 0.75 ML of Jet-A aviation fuel in an amended (and approved) 2017 Work Plan. The 0.75 ML tank has been constructed and the 3 ML tank will be constructed in 2018.

To support the earthworks and other construction activities associated with the Tote Road upgrades and other capital improvements, an additional 15 ML of arctic diesel fuel is required. A 15 ML tank is proposed within the existing Fuel Storage Facility to address this need for additional diesel fuel (Figure 2.13). There is sufficient room in the existing lined containment facility to accommodate the 3 ML and 15 ML tanks.

The proposed modification to the Milne Inlet Fuel Storage Facility will occur within the Project's Development Area and is consistent with approved activities outlined in the Project Certificate (Project Certificate 005 – Amend. 1) issued for the Mary River Project by the Nunavut Impact Review Board (NIRB).

The requested modification is described below and is consistent with the requirements of Part G of the Type A Water Licence.

2.1 Description of Facilities and/or Works to be Constructed

The design and construction of the proposed additional fuel tank and associated piping will be similar to the Fuel Storage Facility's existing tanks and in accordance with the applicable guidelines and standards.

Attachments 7 and 8 show the process flow diagram and general layout for the Fuel Storage Facility, respectively, including the proposed additional fuel tanks and associated piping. Attachment 9 shows the earthworks setting out points for the additional fuel tank and the Facility's overall piping layout, respectively. A review of the Fuel Storage Facility's secondary containment, presented in Attachment 10, confirms that there is sufficient secondary containment to accommodate the proposed additional fuel tanks, as per Canadian Council of Ministers of the Environment (CCME) guidelines. Attachment 11 discusses the construction methodology for the proposed additional fuel tanks and associated piping.

Tank construction and leak testing will be undertaken using the construction methodology provided in Baffinland's previous application for tank farm upgrade submitted to the Nunavut Water Board (Hatch Ltd., 2017b).

Another required upgrade will be to install a fuel pipeline from the tank farm to a new fuel manifold that will be constructed at the shore next to the proposed freight dock. The freight dock is part of the Approved Project will be installed during the 2018 open water season at or immediately adjacent to the current barge landing. This will allow ship-to-shore fuel transfers to occur at the freight dock. The current fuel manifold used for floating hose fuel transfers from tankers will be decommissioned. This upgrade will improve the safety and efficiency of marine fuel delivery for the Project.

Baffinland's existing marine fuel transfer and fuel storage practices at Milne Port are covered by a Transport Canada approved Oil Pollution Emergency Plan (OPEP, BAF-PH1-830-P16-0013). The OPEP was updated in 2017 to account for the proposed additional tank farm capacity. Before the freight dock and new fuel manifold are used, Baffinland will obtain approval of a revised OPEP that addresses the relocation of the marine fuel manifold and ship-to-shore transfers occurring at the proposed freight dock.

2.2 Proposed Location of the Structure

The 15 ML fuel tanks will be installed in the Milne Inlet Fuel Storage Facility's existing secondary containment at Milne Port, adjacent to existing fuel tanks, as shown on Figure A.1 of Attachment 1. Associated piping, with the exception of the diesel piping system feeding the Milne Port generators, will be installed inside the Fuel Storage Facility's secondary containment to allow for fuel transfer with minimal additional piping and no additional dispensing modules.

2.3 Identification of any Potential Impacts to the Receiving Environment

Baffinland foresees minimal impacts to the receiving environment during the construction and installation of the 15 ML fuel tank and associated piping at the Milne Inlet Storage Facility. As discussed in Attachment 11, the majority of the work will occur within the existing secondary containment of the Fuel Storage Facility and therefore sediment releases to nearby water bodies from earthworks are not expected. The Fuel Storage Facility is not located near fish-bearing streams, but is located in proximity to Milne Inlet.

Appropriate crane pads and access ramps will be constructed at the Fuel Storage Facility to prevent mobile equipment from coming into contact and transferring hydrocarbon impacted soils outside the Facility's containment. In addition, construction activities at the Milne Inlet Fuel Storage Facility will be conducted in accordance with Baffinland's suite of environmental management plans including but not limited to:

- Waste Management Plan (BAF-PH1-830-P16-0028)
- Hazardous Materials and Waste Management Plan (BAF-PH1-830-P16-0011)
- Spill Contingency Plan (BAF-PH1-830-P16-0036)

- Environmental Protection Plan (BAF-PH1-830-P16-0008).

2.4 Monitoring

Environmental monitoring of construction activities will include periodic environmental inspections conducted by Baffinland's Environmental personnel in concert with the Contractor's Health, Safety and Environment Lead. Inspections will ensure Contractors are properly managing waste and hazardous materials and operating in accordance with Project's onsite procedures and management plans. Inspections will be documented by taking photos of any deficiencies and using Baffinland's existing environmental inspection forms. Deficiencies identified will be compiled and forwarded to the responsible Contractor to be corrected and addressed. In addition, before, during and after photographs of the tank construction and installation will be taken.

2.5 Schedule for Construction

Construction and installation of the 15 ML tank and associated piping at the Milne Fuel Storage Facility are planned to start as soon as approval has been received from NWB with the intent of completing construction prior to the arrival of the fuel sealift vessels in August 2017.

2.6 Drawings of Engineered Structures

Hatch were retained to develop the design and construction plan for the proposed fuel tanks and associated piping at the Milne Inlet Fuel Storage Facility. Construction drawings are provided in Attachments 7, 8, and 9 of this letter. Confirmation that the Fuel Storage Facility's secondary containment can accommodate the proposed additional fuel tanks is provided in Attachment 10.

2.7 Proposed Sediment and Erosion Control Measures

Baffinland does not foresee sedimentation and erosion as a likely environmental concerns during the construction and installation of the additional fuel tank and associated piping at the Milne Inlet Fuel Storage Facility. In the unlikely event that sedimentation and erosion become a concern during construction, Baffinland will employ a combination of sediment and erosion control measures (check dams, rip-rap, silt fences, etc.), as outlined in Baffinland's Environmental Protection Plan (BAF-PH1-830-P16-0008) and Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026), to address and manage sedimentation and erosion concerns.

3 – MILNE PORT ACCOMMODATIONS CAMP

In operating the Mary River Project since 2013, Baffinland has determined that more equipment is required to reach full production (4.2 Mt per annum). The additional equipment will require additional operators and in turn more maintenance and support personnel than originally expected during the previous approval process. Moreover, Baffinland has observed that the work at Milne Port, and therefore the required number of beds, is very seasonal, peaking during the spring and open water season (June to October). Key port activities during the spring and open water season include refurbishment and maintenance on the ship loader, loading of the ore carriers, off-loading of freight and fuel vessels and all of the associated work for port operations, facility operations and maintenance, procurement and warehousing, Health and Safety, and environmental monitoring.

In addition, Baffinland is experiencing high turnover rates with the site workforce. Several returning contractors are refusing to send their employees to site due to the current accommodations conditions. During 2016, approximately 50% of personnel who resigned cited poor accommodations as a primary reason for their resignation.

To address the accommodations issues described above, a new combination hardwall and softwall accommodations camp facility is proposed to upgrade the existing Milne Port Weatherhaven softwall camp (i.e., Matrix). The new camp location is shown on Figure A.1 of Attachment 1.

As outlined in Table 3 of the Water Licence, the domestic water use limit at Milne Port is 300 m^3/day. Baffinland anticipates that domestic water use at Milne Port will continue to remain significantly below the permitted 300 m^3/day limit following the construction and operation of the new camp and that no increase to the Water Licence Terms and Conditions is required.

During the last two years of operation, daily domestic water consumption at both Milne Port and the Mary River Mine Site have been on average 200 L per person per day. With an expected active bed capacity of 554 beds at peak summer capacity, the daily water use at Milne Port is expected to be 111 m^3/day which is well below the Water License permitted volume of 300 m^3/day for domestic use.

The requested modification will occur just outside the Milne Port PDA. The proposed accommodations camp is consistent with approved activities outlined in the Project Certificate (Project Certificate 005 – Amend. 1) issued for the Mary River Project by the Nunavut Impact Review Board (NIRB).

The requested modification is described below and is consistent with the requirements of Part G of the Type A Water Licence.

3.1 Description of Facilities and/or Works to be Constructed

The new camp features softwall single rooms connected to a hardwall core configuration consisting of the camp dining area, kitchen, and food preparation areas. The camp was purchased as a 380 room camp based on an evaluation of available of used camps on the open market that met the Project criteria however only 280 of the rooms are proposed to be installed and occupied in 2018.

The camp layout and associated facilities, including a dedicated potable water treatment plant and sewage treatment plant, are shown in Attachment 15. Upon completion of the new camp, the Matrix camp will be scheduled for decommissioning and reclamation. Attachment 16 shows the Milne Port

process flow diagram for camp water use, sewage treatment, and effluent discharge to Milne Inlet. The Waste Water Treatment Plant (WWTP) guarantee from the supplier is included as Attachment 17.

The sub-grade of the accommodations camp pad will be constructed using coarse material and capped with crushed granular surface material. The same capping material will be utilized as a final pavement for walkways and parking areas. The foundations will consist of wooden cribbing assembled on top of interlocking 6" thick wooden matting. Both the hard-wall common core structures as well as the soft-wall dormitories will be erected upon these wooden foundations. The foundations for the potable water treatment plant and the sewage treatment plant will incorporate a high-density expanded polystyrene insulating layer to offset any potential thermal migration into the underlying pad.

The new camp will need to be temporarily energized following the assembly of the camp and associated infrastructure using an electrical feed (3-5 kV cable) tied into Milne Port's existing power generators. A route for the utility berm extension has been determined and is aligned in a northeast direction from the new camp pad.

Construction of the new camp and associated infrastructure will commence on the north end of the new camp pad with the erection of a garage. The garage will be used by the Camp Installation Contractor as a warming shed and fabrication area during the assembly of the new camp and associated infrastructure (sewage treatment plant, potable water treatment plant, etc.). Following the construction of the new camp and associated infrastructure, the garage will continue to be used to support the operation of the new camp.

Following the construction of the garage, construction of the new camp will commence with placement of the hard-wall common core facilities on the wooden foundations. While these common core units of the new camp are being integrated and assembled, the installation of the potable water treatment plant, located adjacent to the garage, will begin. The installation of the transformer and dedicated e-house will also occur during this same period in the schedule.

In parallel to the installation of the potable water treatment plant, the installation of the sewage treatment plant will occur on the far southern portion of the new camp pad. This location has been selected to take advantage of the prevailing winds from the north. Commissioning of the sewage treatment plant and potable water treatment plant will include connecting the plants to the new camp using insulated HDPE piping.

The new camp, sewage treatment plant and potable water treatment plant include a fire suppression system (sprinkler system) that will be connected to the fire pumps and tanks by insulated HOPE piping. Assembly and commissioning of the fire suppression systems and associated pumps and tanks will occur during the construction of the new camp.

Following the assembly and integration of the hardwall common core units of the new camp, the Camp Installation Contractor will start the installation and integration of the soft walled accommodations modules, starting from the north and progressing to the south. During this time, and following the sewage treatment plant and potable water treatment plant becoming operational, Baffinland Operations will coordinate the opportunity to populate the beds as they become available.

3.2 Proposed Location of the Structure

The proposed location of the Milne Port camp is shown on Figure A.1 of Attachment 1.

3.3 Identification of any Potential Impacts to the Receiving Environment

The expected Milne Port camp occupancy was under-estimated in the FEIS Addendum (Baffinland, 2013), and additional camp space is required to support planned road upgrades. The proposed 280-person accommodations camp will involve marginal impacts as follows:

- The camp footprint is small (4.1 ha), which represents a modest (1.8%) increase to the current Milne Port PDA of 224 ha
- No drainage diversion system is required at the proposed location (unlike the previous modification request)
- The revised camp location avoids the water diversion issues of the previously proposed camp
- The proposed new accommodations camp is not located near fish-bearing streams
- The proposed camp location is not in an environmentally sensitive area or where there are sensitive landforms
- No increases in the water use approved under the Type A Water Licence will be required
- Additional sewage will be generated by a second WWTP. Final discharge will be the same as the final discharge location of the current Milne Port WWTP. The additional volume of treated sewage being discharged to Milne Inlet is minor in the context of Milne Inlet as the receiving environment.

The proposed WWTP is the same as the existing camp facility; mitigation measures and monitoring will be conducted in accordance with the Fresh Water Supply, Sewage, and Wastewater Management Plan (BAF-PH1-830-P16-0010), and the requirements of the Type A Water Licence. Sewage from the new camp will be piped to the new WWTP, and the treated effluent will be discharged by pipeline or truck to the existing final discharge location for the current WWTP. Sewage sludge will be incinerated.

The type of camp, approximate location, water supply locations/quantities, and sewage treatment facility technology/discharge location remains consistent with what was previously proposed in the FEIS Addendum. The increase in environmental impacts is likely not detectable.

To prevent the release of sediment into the receiving environment during construction, Baffinland will employ a combination of sediment and erosion control measures (check dams, rip-rap, silt fences, etc.) to address sedimentation concerns, as outlined in Baffinland's Environmental Protection Plan (BAF-PH1-830-P16-0008) and Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026).

The operation of the new camp will increase the number of people that can be housed at Milne Port and will increase the amount of associated wastewater and waste generation from operations. The volume of wastewater generated is less than the expected volume of water already approved under the current Water Licence and the vendor has provided a performance guarantee to ensure that the wastewater meets the discharge criteria specified in the Water Licence. Regular sampling of wastewater discharge

will continue as required under the Water Licence and other permits. Waste generated by the upgraded facility will be managed under the existing Waste Management Plan for the site and will use the existing waste management facilities including the waste management building at Milne Port and the landfill located at the Mary River Mine site.

3.4 Monitoring

The environmental management plans applicable to the proposed activities (road upgrades, camp and tank farm expansion) that require update include:

- Fresh Water Supply, Sewage and Wastewater Management Plan (BAF PH1 830 P16 0010) – the plan will be updated to include the additional camp and WWTP; no changes to the mitigation measures or monitoring requirements are needed.
- Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026) – The sediment and erosion control measures described in this plan will remain unchanged. Monitoring of effluent from the new WWTP will be added in accordance with anticipated addition of a monitoring station in the Type A Water Licence.

Environmental monitoring of construction activities will consist of water quality monitoring and periodic environmental inspections. Water quality monitoring will focus on runoff originating from the construction area and monitoring the potential impacts of the runoff on downstream water bodies. In the event that turbid runoff is observed originating from the construction area, sedimentation mitigation measures will be installed and water quality monitoring locations will be established downstream of construction activities to assess the potential impacts on nearby water bodies. Water quality at monitoring locations will be compared to the water quality discharge criteria established under Baffinland's Type A Water Licence.

In addition, periodic environmental inspections of the construction activities will be conducted by Baffinland's Environmental personnel in concert with the Contractor's Health, Safety and Environment Lead. Inspections will ensure Contractors are properly managing waste and hazardous materials and operating in accordance with Project's onsite procedures and management plans. Inspections will be documented by taking photos of any deficiencies and using Baffinland's existing environmental inspection forms. Deficiencies identified will be compiled and forwarded to the responsible Contractor to be corrected and addressed. Photos will also be taken to document the construction of the new camp and associated infrastructure.

3.5 Schedule for Construction

The construction of the proposed accommodations camp infrastructure and facilities is planned to start as soon as the Request for Modification approval has been received from the NWB with the intent of completing the camp construction as soon as possible.

3.6 Drawings of Engineered Structures

Horizon North Logistics (Horizon North) is the selected contractor for the construction and commissioning of the new camp and associated facilities. A site plan and vendor drawings for the new camp are provided by Horizon North in Attachment 15. Any additional Issued for construction (IFC) drawings required under Baffinland's Type A Water Licence will be provided to the NWB 90-days prior to construction.

3.7 Proposed Sediment and Erosion Control Measures

Baffinland will employ a combination of sediment and erosion control measures (check dams, rip-rap, silt fences, etc.), as outlined in Baffinland's Environmental Protection Plan (BAF-PH1-830-P16-0008)and Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026), to address and manage sedimentation concerns during construction.

4 – CLOSURE

We trust that this information meets the requirements under Part G under Baffinland's Type A Water Licence and look forward to the NWB's response. Please do not hesitate to contact the undersigned should you have any questions or comments.

Regards,

Christopher Murray,
Compliance Manager, Baffinland Iron Mines.

Cc:
David Hohnstein, (Nunavut Water Board)
Stephen Williamson Bathory (Qikiqtani Inuit Association)
Jonathan Mesher, Sarah Forté, Karen Costello (Indigenous and Northern Affairs Canada)
Solomon Amuno (Nunavut Impact Review Board)
Todd Burlingame, Megan-Lord Hoyle, Timothy Ray Sewell, Andrew Vermeer (Baffinland)

Attachments:

1. Figures A.1 to A.7 Detailed Site Layouts
2. Culvert Details
3. Watercourse Crossings
4. Quarry Details
5. Explosives Magazines and Truck Parking Details
6. Mobile Construction Camp Details
7. Port Site TM001 Fuel System Process Flow Diagram (H353004-48000-210-282-0001-0001, Rev. 1)
8. Port Site TM001 Fuel System Overall Layout (H353004-48400-240-272-0001, Rev. 2)
9. Milne Port Fuel Tanks 003, 010 & 011 Setting Out Earthworks (H353004-40000-220-260-0003-0001, Rev. 0)
10. Memo: Calculations of Tank Farm Containment Capacity (H353004-00000-240-202-0001, Rev. A)
11. Construction Methodology Milne Inlet Fuel Storage Facility System (H353004-40000-400-050-0002, Rev. 0)
12. Banner Environmental Engineering Consultants Ltd. – Baffin WWTP Review
13. Horizon North – FilterBoxx WWTP General Arrangement Drawings
14. FilterBoxx WWTP – Process Description (Section 3 of O&M Manual)
15. Milne Port Accommodations Camp Site Plan
16. Milne Port Water and Sewage Process Flow Diagram
17. Newterra Vendor Guarantee for Camp Water Treatment System (Potable)

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