Baffinland Iron Mines Corporation

DRAFT SURFACE WATER AND AQUATIC ECOSYSTEMS MANAGEMENT PLAN

Phase 2 Proposal Revisions – FOR REVIEW PURPOSES ONLY

This Document provides Revisions to:
Document #BAF-PH1-830-P16-0026
Rev 5
March 31, 2019

Baffinland Iron Mines Corporation

Surface Water and Aquatic Ecosystem Management Plan

BAF-PH1-830-P16-0026

Rev 5

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DOCUMENT REVISION RECORD*

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
3/31/2013	0	RK	JM	In support of the 2013 Work Plan
8/29/2013	1	SP	JM	In support of the Type 'A' Water Licence
3/26/2014	2	LW	JM	In support of the 2014 Work Plan
3/17/2015	3	LW	JM	In support of the 2015 Work Plan
3/17/2016	4	AV	JM	In support of the 2016 Work Plan
3/31/2019	5	AV	CM	Document issued for use.

*For revisions prior to Rev. 0, refer to previous revisions of the Plan.

Item No.	Description of Change	Relevant Section
1	Reorganization of document structure, format and content to provide additional clarity regarding the management and monitoring surface water and aquatic ecosystems at the Project.	Entire document.

TABLE OF CONTENTS

LIST OF TABLES

LISTS OF APPENDICES

1 INTRODUCTION

As required by Baffinland Iron Mines Corporation's (Baffinland) Type A Water Licence No. 2AM-MRY1325 – Amendment No. 1 (Type A Water Licence), issued by the Nunavut Water Board (NWB), the Surface Water and Aquatic Ecosystem Management Plan (SWAEMP) has been updated to reflect current operations at the Mary River Project (the Project). This Plan is a living document and will be revised, as required, based on future work scope modifications and associated approvals and in accordance with Baffinland's Type A Water Licence, Commercial Lease – Q13C301 (Commercial Lease) between Baffinland and the QIA, the Project Certificate No. 005 (Project Certificate) issued by the Nunavut Impact Review Board (NIRB) and any subsequent requirements which may be issued for the Project.

1.1 PURPOSE

The purpose of this Plan is to outline how potential Project impacts on the quality and quantity of surrounding waters will be managed throughout the lifecycle of the Project. Management processes and procedures include practices implemented at the Project to limit the potential for adverse impacts to receiving waters, aquatic ecosystems, fish and fish habitat. This document details the systems in place to mitigate and manage drainage and runoff at Project facilities, address point and non-point discharges to surface waters, and assess those discharges in terms of water quality and quantity relative to their receiving water systems.

This document identifies the roles and responsibilities, surface water monitoring programs and mitigation and management actions for erosion and sedimentation controls.

1.2 REGULATORY FRAMEWORK

This Plan outlines the Project's policies and procedures to ensure compliance with the relevant terms, conditions and regulations outlined in the following regulatory instruments:

- Project Certificate No. 005;
- Type A Water Licence;
- Type B Water Licence (2BE-MRY1421);
- Commercial Lease; and
- Milne Inlet Tote Road (Tote Road) Fisheries Authorization No. NU-06-0084 (DFO, 2007), and subsequent amendments for Project fish bearing water crossings.~~, and;~~

Additionally, Baffinland will seek a Fisheries Authorization for interactions of the North Railway and access roads associated with the Phase 2 Proposal. An update to this plan will be necessary to incorporate any additional mitigation or monitoring requirements specified in the Authorization.

Project activities are monitored for compliance with the regulatory instruments listed above. Where it is determined that Project activities fail to comply with the regulatory requirements, further assessment

shall be completed to modify activities such that compliance is achieved or mitigation methods shall be implemented.

1.3 Relationship to Other Management Plans

Project activities have the potential to affect site water quality, fish habitat, vegetation and other environmental components. Therefore, this Plan must be viewed in consideration with the following Environmental Management and Monitoring Plans for the Project.

- Environmental Protection Plan (BAF-PH1-830-P16-0008);
- Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010);
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039);
- Roads Management Plan (BAF-PH1-830-P16-0023); and,
- Snow Management Plan (BAF-PH1-830-P16-0023).

2 BAFFINLAND'S POLICIES

2.1 HEALTH, SAFETY AND ENVIRONMENT POLICY

This Baffinland Iron Mines Corporation Policy on Health, Safety and Environment is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goals.

We implement this Policy through the following commitments:

- Continual improvement of safety, occupational health and environmental performance
- Meeting or exceeding the requirements of regulations and company policies
- Integrating sustainable development principles into our decision-making processes
- Maintaining an effective Health, Safety and Environmental Management System
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- Reclamation of lands to a condition acceptable to stakeholders.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- As evidenced by our motto "Safety First, Always" and our actions Health and Safety of personnel and protection of the environment are values not priorities.
- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution through courageous leadership is essential for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake. The health and safety of all people working at our operation and responsible management of the environment are core values to Baffinland. In ensuring our overall profitability and business success every Baffinland and business partner employee working at our work sites is required to adhere to this Policy.

Brian Penney

Chief Executive Officer
April 2018

2.2 BAFFINLAND SUSTAINABLE DEVELOPMENT POLICY

At Baffinland Iron Mines Corporation (Baffinland), we are committed to conducting all aspects of our business in accordance with the principles of sustainable development & corporate responsibility and always with the needs of future generations in mind. Baffinland conducts its business in accordance with the Universal Declaration of Human Rights and ArcelorMittal's Human Rights Policy which applies to all employees and affiliates globally.

Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and with utmost respect for the cultural values and legal rights of Inuit. We expect each and every employee, contractor, and visitor to demonstrate courageous leadership in personally committing to this policy through their actions. The Sustainable Development and Human Rights Policy is communicated to the public, all employees and contractors and it will be reviewed and revised as necessary on a regular basis. These four pillars form the foundation of our corporate responsibility strategy:

1. Health and Safety
2. Environment
3. Upholding Human Rights of Stakeholders
4. Transparent Governance

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness, where everyone goes home safe everyday of their working life. Why? Because our people are our greatest asset. Nothing is as important as their health and safety. Our motto is "Safety First, Always".
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour, awareness and promoting active courageous leadership. We allow our employees and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- Baffinland employs a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- Baffinland applies the principles of pollution prevention, waste reduction and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop more sustainable practices.
- Baffinland ensures that an effective closure strategy is in place at all stages of project development to ensure reclamation objectives are met.

3.0 UPHOLDING HUMAN RIGHTS OF STAKEHOLDERS

- We respect human rights, the dignity of others and the diversity in our workforce. Baffinland honours and respects the unique cultural values and traditions of Inuit.

- Baffinland does not tolerate discrimination against individuals on the basis of race, colour, gender, religion, political opinion, nationality or social origin, or harassment of individuals freely employed.
- Baffinland contributes to the social, cultural and economic development of sustainable communities in the North Baffin Region.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.
- We expect our employees and contractors, as well as community members, to bring human rights concerns to our attention through our external grievance mechanism and internal human resources channels. Baffinland is committed to engaging with our communities of interest on our human rights impacts and to reporting on our performance.

4.0 TRANSPARENT GOVERNANCE

- Baffinland will take steps to understand, evaluate and manage risks on a continuing basis, including those that may impact the environment, employees, contractors, local communities, customers and shareholders.
- Baffinland endeavours to ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our safety, health, environmental, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

4.1 FURTHER INFORMATION

Please refer to the following policies and documents for more information on Baffinland's commitment to operating in an environmentally and socially responsible manner:

Health, Safety and Environment Policy
Workplace Conduct Policy
Inuktitut in the Workplace Policy
Site Access Policy
Hunting and Fishing (Harvesting) Policy
Annual Report to Nunavut Impact Review Board

If you have questions about Baffinland's commitment to upholding human rights, please direct them to contact@baffinland.com.

Brian Penney
Chief Executive Officer
March 2016

3 REGIONAL LANDSCAPE, CLIMATE AND HYDROLOGY

The Qikiqtani Region of Baffin Island is characterized by long cold winters and short cool summers, with continuous daylight from approximately May to August, and continuous darkness from November through February. The ground is snow-covered from September to June and ice persists in the marine offshore throughout most of the year.

3.1 REGIONAL LANDSCAPE

Surface landforms and glacial deposits are associated with a recent, widespread glaciation on Baffin Island. Surface geology is comprised of locally abundant Holocene Glaciolacustrine sediments, fluvial sediments (alluvial deposits), Marine and Glacio-marine Deltaic sediments, and end moraine till, with occasional outcrops of pre-Quaternary bedrock. The North Baffin region and Mary River area lies within the Committee Belt, a granite-greenstone terrain with intermixed rift basin sediments and volcanic rocks, and bounded by Precambrian mountains to the east and Palaeozoic lowland plateaus to the west. The Project lies within the zone of continuous permafrost, with an active layer thickness of up to two metres and a permafrost depth that may be as much as 700 m deep, based on extrapolation from temperature gradients measured in a 400 m-deep thermistor-instrumented drill hole located on site. The active layer throughout the Project area ranges from approximately 1 to 2 m thickness, but may be greater in areas where there is loose, sandy soil at the edges of lakes or ponds or at bedrock topographic highs.

The presence of permafrost greatly increases ground stability at depth but at surface it can affect the rates of soil erosion through the formation of ice wedges and patterned ground, pingos and palsas, massive ground ice, thermokarst, and mass wasting (i.e., solifluction).

3.2 CLIMATE

Baffin Island is one of the northernmost and coldest parts of Canada and the Mary River Project is situated towards the northern end of the Island. Regional data near the Project indicate a mean annual temperature of approximately -15°^{c}. Mean daily temperatures are below -20°^{c} from November through April, and are only above freezing (0°^{c}) during June through August, with July mean daily maximum temperatures reaching only 6 - 10°^{c}. The long length of the sub-zero degree temperatures in this region results in a very short runoff period that typically occurs from June through September, but may extend to late October in systems where large lakes are present. The frigid temperatures also result in very low precipitation values for northern Baffin Island due to the combined effect of the low moisture carrying capacity of cold air and the scarcity of liquid water throughout much of the year. According to Natural Resources Canada, the mean annual total precipitation ranges from 200 to 400 mm in the Project area, classifying it as semi-arid. Mean annual precipitation at the closest regional climate station (Pond Inlet) is closer to the 200 mm end of this range. Pond Inlet experiences 24-hour darkness (with less than 2 hours of twilight) from November 12 to January 29, and continuous daylight from May 5 to August 7.

3.3 REGIONAL HYDROLOGY

The extreme temperatures of the region, combined with permafrost ground conditions, result in a short period of runoff that typically occurs from June to September, extending into October in watersheds with significant lake surface areas. All rivers and creeks, with perhaps the exception of the very largest systems are frozen solid to the bottom during the winter months. For example, the Sylvia Grinnell River near Iqaluit (watershed area of ~4,000 km^2), which has been monitored by Water Survey of Canada (WSC) since 1971, freezes solid by April every year. Streams and river systems typically begin to flow in late May with the onset of snow and ice melt. Peak flows occur in June or July with rising temperatures and rapid corresponding snowmelt, before dropping steadily through to September or October when flows essentially cease. The peak runoff period is quite short and the volume of the annual hydrograph is low, relative to the rest of Canada, due to the region's very low average annual precipitation of approximately 200 mm. However, the proportion of annual precipitation that is realized as runoff is very high, due to low temperatures (low evaporation) and the permafrost ground conditions (low infiltration) and minimal vegetative cover (low evapotranspiration). Correspondingly, surface water is abundant, and the region is dotted with thousands of small lakes and streams. Groundwater infiltration and storage in the region is limited due to the permafrost. The groundwater flow is restricted to the upper one to two metres within the summer active layer.

Initial hydrology estimates for the Project areas, based on data collected between 2006 and 2011, are presented in a hydrology baseline report presented as Appendix 7A of the FEIS (Knight Piésold, 2012). The Knight Piésold report was based on data collected for baseline field studies between 2006 and 2011.

Peak instantaneous flows are significant due to frozen ground conditions and the lack of tall vegetation to provide subsurface root systems. This in turn produces very rapid basin runoff response. In larger watersheds, peak instantaneous flows are typically produced by snowmelt during the freshet, but in smaller watersheds (less than a few hundred square kilometres) rainfall, or rain on snow may produce the largest events and may occur at any time during the non-freeze period. Flood water levels in the smaller watersheds typically rise and fall very quickly with run-off response. Peak flow estimates were updated in 2016 incorporating subsequent stream flow data up to and including 2016 (Knight Piésold, 2016). The civil design criteria used to size water management structures such as watercourse crossings, stormwater ponds and ditching, is based on the updated peak flow estimates (Hatch Ltd. 2018). Baffinland continues to conduct hydrology monitoring at the Project, as required by the Project Certificate (conditions regarding Aquatic Effects Monitoring Plan) and Type A Water Licence. Details on the ongoing hydrology monitoring conducted at the Project is provided in Section 10 of this Plan.

4 TARGETED VALUED ECOSYSTEM COMPONENTS

Baffinland has identified the following targeted valued ecosystem components (VECs) to serve as indicators subject to this Plan:

- Water quantity;
- Surface water quality;
- Aquatic ecosystems;
- Fish; and
- Fish habitat.

Water is considered a VEC and the protection of regional water quality and quantity is critical to the residents of Baffin Island. Long-term downstream users (i.e., local residents) have not been identified; however, there is potential for incidental water-use by hunters and visitors on adjacent lands. Potential effects to fish and fish habitat from either water withdrawal exceedances or compromised water quality and/or quantity have been identified.

5 POTENTIAL IMPACTS

Project activities will influence surface water and aquatic ecosystems through the following pathways:

- Water intakes required for potable water in camps, dust suppression and construction;
- Water crossings (i.e. culverts, bridges, etc.) installation and maintenance, having a potential impact to fish and fish habitat;
- Erosion and sedimentation from land disturbances, such as quarrying, earthworks and soil spoils disposal associated with railway and road construction; and
- Potential surface water runoff generated from developed Project areas, including erosion and sedimentation, dust deposition and dust suppressants.

Mitigation measures focused on the above Project activities are described in Section 6. Site water management issues and mitigation measures specific to each Project site are described in Section 7, and water management related to mining of Deposit No. 1 is described in Section 8. A complete matrix of Project interaction with identified VECs is provided in the Project's Final Environmental Impact Statement (FEIS; Baffinland, 2012), and subsequent addendums (Baffinland, 2013; Knight Piésold Ltd., 2018).

~~5~~6 ~~GENERAL~~ MITIGATION MEASURES

~~5.1~~6.1 GENERAL

Ongoing construction and operations at the Project have the potential for soil disturbance and water diversions requiring sediment and erosion control planning to manage the discharge of site contact water. Best management practices, including preventative measures, shall be implemented throughout the lifecycle of the Project. The following section outlines the general measures used to mitigate potential environmental impacts arising from the storage and discharge of site contact water.

Monitoring of Project stream and river crossings, lakes and ponds adjacent to construction and operational areas will be completed during the life of the Project as outlined in Section 10 of this Plan. Subject to site-specific conditions, a variety of civil design structures or additional controls may be required to prevent localized erosion.

The deposition of debris or sediment into or onto any water body during the construction of access roads, site laydown pads and areas of other earthworks is prohibited. To prevent sedimentation into adjacent water bodies, stockpiling of debris must take place at a distance greater than 31 m from the ordinary high-water mark of nearby water bodies. In addition, removal of material below the ordinary high-water mark of any water body is prohibited, unless otherwise approved by the NWB.

A greater level of understanding of the unique site conditions that influence the selection of appropriate sediment and erosion control measures has been achieved through the ongoing construction and operation of the Project. Influences from climate, topography, and limited vegetation combine to produce short-term, high intensity discharges throughout May, June and July. Due to the impeded vegetation growth rate, sediment and erosion control techniques that involve vegetative covers (i.e., hydro seeding and the use of erosion control blankets) have been dismissed as potential mitigation options. Furthermore, straw bales are not permitted in the Arctic due to the possibility of introducing foreign species.

All Project infrastructure and activities that have the potential to influence any watercourse (i.e., culvert modifications, diversion of watercourses, modifications to the Milne Inlet Tote Road, and other areas of the Project site), will be designed and constructed in a manner that is consistent with the approach presented in the FEIS and the conditions of existing permits and authorizations. Construction and operational activities are prohibited from preventing and/or restricting the movement of water in identified fish bearing streams and rivers. Work in watercourses will be conducted in isolation of surface waters, if flow is present.

Prior to the development of new water related infrastructure and/or facilities, Baffinland will conduct an assessment to ensure sensitive landforms are not negatively impacted (i.e., ice-rich soils or easily erodible

soil). Where it is determined that the infrastructure and/or facility developments will not negatively impact sensitive landforms, Baffinland will continue to ensure that all regulatory requirements are met.

~~5.2~~6.2 WATER INTAKES

~~5.2.1~~6.2.1 ENGINEERING INTAKE STRUCTURES

Engineered intake structures are designed to minimize erosion, avoid sediment issues, and provide protection from ice and peak water flows. Care is taken to ensure that disturbance to aquatic environments is minimized during installation and maintenance of infrastructure. Riprap used in construction is clean, free of fine sediment, non-acid leaching, and non-metal generating.

~~5.2.2~~6.2.2 SCREENS ON INTAKE PIPES

Intakes are screened in accordance with the Fisheries and Oceans Canada (DFO) Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO Guideline, 1995) to ensure no entrainment or impingement of fish. It also requires a water withdrawal rate such that fish do not become impinged on the screen.

~~5.2.3~~6.2.3 SELECTION OF SHORT-TERM WATER TAKE LOCATIONS~~WATER TRUCK WATER WITHDRAWALS~~

~~Water trucks withdraw water from Phillips Creek and KM 32 Lake to supply Milne Port with its domestic and industrial water needs. A number of water sources are relied upon for use in dust control, a portion of which are approved under Amendment No. 1 of the Type A Water Licence, and others which are proposed for the Phase 2 Proposal for which approval is pending. Intakes on the extraction hoses are screened in accordance with DFO's (1995) guideline. Water withdrawals are~~ Short-term ~~(approximately 20 minutes to fill a water truck) and the approved and proposed water withdrawals are based on criteria established by Knight Piésold (2014). Additional detail on the water withdrawals is provided in the Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010).~~ water intake will be required at many locations for a variety of needs including ~~concrete manufacture,~~ drilling, and dust suppression, etc. A screening process will be used to confirm whether water sources are considered adequate as water take locations. Source selection begins by looking for the largest possible water body that is feasible for use. Lakes are considered first, followed by ponds and then large rivers. Streams and creeks will not be used for short-term water withdrawal without prior approval of the Water Licence Inspector. The DFO guideline used for water taken from water bodies is to restrict removal of water to a maximum of 5% of the total volume.

6.2.4 WATER TRUCK WATER WITHDRAWALS ~~WINTER WATER WITHDRAWAL FROM LAKES~~

Water trucks withdraw water from KM 32 lake to supply Milne Port, and from Camp Lake to supply the Mine Site ~~Lake to supply Milne Port~~ with its domestic and industrial water needs. A number of water sources are relied upon for use in dust control, a portion of which are approved under Amendment No. 1 of the Type A Water Licence, and others which are proposed for the Phase 2 Proposal for which approval is pending. Intakes on the extraction hoses are screened in accordance with DFO's (1995) guideline. Water withdrawals are short-term (approximately 20 minutes to fill a water truck) and the approved and

proposed water withdrawals are based on guidance established by Knight Piésold (2014). Additional detail on the water withdrawals is provided in the Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010). ~~Winter water withdrawals are made from KM 32 Lake to supply Milne Port, and from Camp Lake to supply the Mine Site.~~ During winter under ice conditions, water must be drawn from below two metres (2 m) of non-frozen water (as the top two metres (2 m) of water provides higher oxygenation for resident fish). Water withdrawals from these lakes have been assessed in the FEIS (Baffinland, 2012) and in TSD 13 of the FEIS Addendum for the Phase 2 Proposal Knight Piésold (2018). Additional detail on the water withdrawals is provided in the Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010). ~~During the open water season, the water taking guideline states that no significant drawdown shall be caused. There must be no impact to fish or fish habitat.~~

~~5.2.4~~6.2.5 Water Metering and Water Conservation Measures

Water meters are installed at strategic locations to monitor water consumption and enable the development of management strategies to reduce water usage/consumption. These strategies include the installation of low flow water taps, water use for drilling operation, etc.

Water withdrawn from approved water intake locations within the Project are to be recorded and reported to the site environment team. All personnel involved with water use activities are to follow the Type A Water Licence (2AM-MRY1325 – Amendment No. 1) to insure that daily withdrawal limits are not exceeded. Controls that may be implemented to ensure daily limits are not exceeded include water meters, source location and limit signage, ongoing training of involved personnel in water taking, detailed water truck logs and effective communication between day shift and night shift operators.

6.3 Water Crossings

The following subsections discuss the mitigation measures implemented at the Project in order to control sedimentation and erosion at Project water crossings~~, which is. These measures are required to protect fish and fish habitat.~~

6.3.1 Erosion and Sediment Control Measures at Water Crossings

Table 6-1 outlines the mitigation measures implemented at the Project to control sedimentation and erosion at Project water crossings.

Table 6-1~~: - ~~Control Measures at Water Crossings

Pumping	
Description	Pumps are used to transfer water from one side of the road/structure to ~~an~~the other.

Installation Locations	At crossings where culverts are not installed, incorrectly installed, blocked, or not allowing sufficient flow. Pumping is required prior to culvert installation for dewatering. Pumps may also be used as a temporary solution during freshet or prior to culvert installation. In addition, siphons can be used as an alternative, but require a pump to prime the system and sufficient slope between upstream and downstream locations.
Performance Issues/Limitations	Ineffective during high flows. Erosion control measures are required at pump discharge points. The associated risk of fuel spills requires secondary containment. Temporary solution requiring additional resources. Additional considerations and mitigation measures (e.g. fish intake screens) are required in conjunction with pumping for fish bearing watercourses.
Benefits	Effective temporary solution to lower water levels in places where water levels are high or prior to culvert installation. Also, useful at low flow locations where culverts have not been installed.
Culvert	
Description	Pipes installed through embankments to allow the passage of water while maintaining access over the site. The size and/or number of culverts required for installation is determined by a hydraulic design study, conducted to assess suitable hydraulic design criteria to avoid flooding or washouts. Culvert flow capacities are assigned using hydraulic analysis methods assuming an appropriate return period with allowance for ice accumulation. Permitting process may be required for watercourses where authorizations are required depending upon watercourse classifications.
Installation Locations	At points where roads intersect streams, rivers or seasonal drainages (freshet) or at locations where there is potential for water to flow over roads.
Performance Issues/Limitations	Potential for siltation during installation. Requires labour, equipment and materials (compacted backfill) for proper installation. Concentration of flows cause potential for erosion at downstream discharge points. Clearing of snow and/or ice prior to spring freshet is required to minimize the potential for blockages.
Benefits	High flow capacities can be achieved depending on culvert selection. Culverts also permit fish passage under roads where crossings have been identified as fish habitat.
French Drain	

Description	A ditch or channel filled with rock to provide a flow path for water. The clean rock material can be covered with a non-woven geotextile to prevent the ingress of finer material which could reduce the permeability of the drain.
Installation Locations	At points where roads intersect streams/drainages and where fish passage is not a consideration. May be used as an alternative for a culvert if culverts are not available.
Performance Issues/Limitations	Ice blockage potential in French drains has not been adequately assessed. Long-term performance has not been assessed.
Benefits	Constructed of natural local and/or local materials.
Bridge	
Description and Installation Locations	Bridges are required for the crossing of larger streams or rivers. The installation of bridges requires hydraulic design studies undertaken to evaluate suitable hydraulic design criteria to avoid flooding or any unexpected damage to the adjacent ground. Bridge locations are assessed using a river hydraulics analysis assuming an appropriate return period with an allowance for ice accumulation. The identification of appropriate engineering designs for each river crossing is determined using a systematic decision-making process which incorporates engineering and environmental factors at each crossing location. Screening and detailed evaluations are performed to assist in determining the most suitable site-specific crossing at each location (i.e., culvert or bridge). Criteria used to assist in the in the decision-making process included: potential impacts to freshwater aquatics, hydraulic conditions and ease of construction and cost. Permitting process may be required for watercourses where authorizations are required depending upon watercourse classifications.
Arch Culvert	
Description	A culvert consisting of an arch with an open bottom such that native streambed is exposed. Arch culverts typically rest on foundations constructed on either side of the watercourse.
Installation Locations	Typically installed at locations where hydraulic efficiency, fish habitat, and/or fish passage are considered important.
Performance Issues/Limitations	Reduced potential for siltation during installation as water diversion structures are typically not needed. Requires labour, equipment and materials (compacted backfill) for proper installation. Clearing of snow and/or ice prior to spring freshet is required to minimize the potential for blockages.
Benefits	Maintains the original stream width and streambed materials and has increased hydraulic efficiency.

Culverts that are installed along water crossings shall meet the following criteria:

- Install culverts at the same slope as the existing stream, where feasible;
- Minimize culvert lengths;
- Culverts with lengths that exceed 50 m may be considered barriers to fish passage due to darkness. Examine and consider methods to provide light inside culverts, where applicable;
- Compare culvert velocities to the velocity in the existing watercourse to determine fish passage potential. This information can be used to reassess design velocities under proposed conditions with the culvert installed; and
- With the channelization of flows and conveyance in culverts, the velocity of the flows may increase. This may be mitigated by placing rocks and boulders inside the culverts (stream replication) to provide greater friction, thereby reducing velocities and increasing the flow depth and to provide resting locations for fish. Boulders may be bolted into place.

~~5.2.5~~6.3.2 FRESHET MITIGATION

Extreme flows occurring during freshet can result in significant erosion and damage to water crossing structures. Operational protocols and plans, including the Snow Management Plan (BAF-PH1-830-P16-0023), ~~and the Sedimentation Mitigation Action Plan (Golder, 2016),~~and the Tote Road Monitoring Plan (Section 10.2.2.3) ~~have been~~were developed to manage freshet's high flows and mitigate freshet's potential negative impacts on surface water quality and associated infrastructure. Project protocols and plans include the following measures:

- Physically marking fish-bearing water crossings so that they can be easily identified in the spring, prior to snow/ice melt;
- Clearing snow from roads adjacent to water crossings and stockpiling snow in approved locations as outlined in the Snow Management Plan (BAF-PH1-830-P16-0023);
- ~~Completing downstream and upstream excavations at water crossings prior to the onset of freshet;~~
- Perform culvert steaming and monitoring program for clearance of snow and ice prior to freshet;
- Re-establishing flows by removing snow and ice blockages where it is safe to do so; and
- Implementing the appropriate erosion and sedimentation mitigation measures, as outlined in Section 6.3 and 6.4 of this Plan.

6.3.3 FISH PROTECTION

Fish and fish habitat are present throughout streams and water bodies near Project infrastructure and have been identified as an important VEC for the Project. As such, several operational protocols and plans were developed to prevent and mitigate negative impacts on fish and fish habitat at the Project. Project protocols and plans include the following measures:

- Construction of rocky ramps at locations where scour and erosion at culvert outlets are problematic;
- Monitoring Project water crossings and completing the appropriate repairs/modifications to improve fish passage;
- Adhering to the Fisheries and Oceans Canada (DFO) guidance "Guidelines for Use of Explosives In or Near Canadian Fisheries Waters, 1998" for work in or near fish bearing water, where feasible; [1]
- Using ~~the~~ silt curtains to prevent the dispersion of sediments during work activities in/near marine waters (dredging, piling, backfilling) and/or freshwater lakes;
- Ensuring compliance for Project activities with the No-Net-Loss principle (DFO, 2001) to prevent or mitigate direct or indirect fish and fish habitat losses;
- Implementing the appropriate erosion and sedimentation mitigation measures, as outlined in Section 6.3 and 6.4 of this Plan;
- Efforts will be made to not perform ~~In~~-stream work during the restricted activity window, September 1 through June 30 where there is water flowing and spawning habitat is present or at sites where fall spawning movements are occurring such as at the bridge crossing sites CV-15-5, CV-70-3, and CV-85-3~~)~~ to avoid effects on Arctic Char spawning and egg incubation. The DFO will be consulted if instream work is required for applicable in-water work guidelines;~~.~~
- If dewatering is required, salvage fish prior to dewatering and release to adjacent surface waters; if water is pumped from within a cofferdam prior to fish salvage, screens meeting criteria set out by DFO will be used;~~.~~
- Design mitigation for potential effects of increased flows on fish habitat include channel widening, regrading, construction of habitat features (in fish bearing streams),~~;~~ and channel stabilization; and
- All water intake hoses shall be equipped with a screen of an appropriate mesh size (as approved by the DFO) to ensure that fish are not entrained. Additionally, operators will ensure the water intake hoses withdraw water at such a rate that fish do not become impinged on the screen. Additional guidance regarding fish screens on water intakes is provided below.

6.3.4 Operating Equipment In and Near Water

Surface water runoff from areas of intense vehicular activity is susceptible to contamination from minor spills and/or leakage of machinery and equipment. Additionally, machinery and equipment can cause

~~[1] At locations where compliance with the DFO guidelines cannot be achieved, consultation with DFO will take place prior to blasting. Consultations with DFO and the QIA may be required to identify Project specific thresholds for blasting that would exceed the requirements of DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters.~~

inadvertent sedimentation and/or erosion following water body crossings. As such, the following mitigation measures will be followed to minimize potential impacts:

- 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~~will occur at least ~~50~~31 m from the high-water mark;~~.~~
- Machinery will arrive at site in a clean condition and be maintained free of fluid leaks, invasive species and noxious weeds; and~~.~~
- Limit fording of the watercourses by machinery 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.

~~5.3~~6.4 EROSION AND SEDIMENTATION FROM LAND DISTURBANCES

The removal of surface material in Arctic regions can cause the underlying permafrost to melt and result in the pooling of water, destabilization of landforms and sedimentation and erosion issues. To mitigate possible permafrost degradation from surface material removal, the following measures will be implemented throughout the Project.

- Removal of surface material should be avoided where possible to reduce permafrost degradation and will occur only at approved locations;
- Areas will be graded by filling in low areas rather than cutting into high areas, where feasible;
- Erosion control will be evaluated for areas where removal of surface material is required; and,
- Use of insulating material or erosion control material, such as concrete fabric or riprap, will be utilized to reduce erosion and potential permafrost degradation, as required.
- Fill material placed below 31m of the high-water level mark, where specifically authorized, will be either erosion resistant or protected from erosion and only clean fill will be used.
- No waste material resulting from work activities will be left in a manner such that it can enter the water (e.g., by being left on the ice).

Additional guidance for managing surface material and mitigating permafrost degradation during construction and operations at the Project are provided in Baffinland's Environmental Protection Plan (EPP) and Borrow Pit and Quarry Management Plan (BAF-PH1-830-P16-0004).

6.4.1 PREVENTATIVE MEASURES

The design and implementation of Project components are required to follow appropriate best practices procedures, including the following preventative measures:

- Preserve low vegetative cover within 100 metres (m) of the crossing unless constructing as designed or effective erosion and sediment control are in place to protect water quality;~~.~~

- Implement measures as soon as possible to stabilize banks disturbed by construction to avoid erosion or sediment releases to the water;~~.~~
- Implement measures for managing water flowing onto the site, as well as water being pumped/diverted from the site, such that sediment is filtered out prior to the water entering the waterbody (e.g., by discharging water to a vegetated area);~~.~~
- Deposit all dredged material in a manner to prevent its re-entry into the watercourse; and~~.~~
- Stabilize slopes with rocks, geotextiles, and/or other suitable engineered or natural materials.

~~5.3.1~~6.4.2 Implementing Erosion and Sediment Control Measures in the Arctic

A greater level of understanding of the unique site conditions that influence the selection of appropriate sediment and erosion control measures has been achieved through the ongoing construction and operation of the Project. Influences from climate, topography, and limited vegetation combine to produce short-term, high intensity discharges throughout May, June and July. Due to the impeded vegetation growth rate, sediment and erosion control techniques that involve vegetative covers (i.e., hydro seeding and the use of erosion control blankets) have been dismissed as potential mitigation options. Furthermore, straw bales are not permitted in the Arctic due to the possibility of introducing foreign species.

6.4.3 Generic Erosion and Sediment Control Measures

Table 6-2 outlines the general sedimentation and erosion controls used at the Project. ~~Where required,~~ These controls may be used alone or in combination to achieve a more effective control.

Table 6-2 – Sediment and Erosion Controls

Armouring	
Description	Used as a barrier between water flow and materials that are susceptible to erosion. Clean quarry rock and/or clean naturally occurring granular borrow material are used to protect underlying fine-grained material from scour and erosion.
Installation Locations	In areas of cuts and/or excavations and for installation of culverts, typically on exposed erodible slopes.
Substitute	Water diversion, berms, sumps and/or silt fencing may be used where armouring is not practical or where there is low risk of impacts to downstream receptors.
Benefits	Effective long-term solution for preventing erosion and re-suspension of susceptible fine grained materials.
Riprap	
Description	A rock lining that can be installed along a ground surface or structure to prevent erosion of the underlying material and/or sediments.

Installation Locations	Along road and/or stream embankments and along the upstream and downstream ends of culverts. May also be installed at locations where existing flows may cause erosion of the present surface materials specifically where flows may become concentrated.
Performance Issues/Limitations	Potential limited material ~~supply~~ available.
Benefits	Materials are local and are effective at protecting embankments from erosion. They may also be installed over non-woven geotextile (see below) to provide additional protection.
Concrete Fabric	
Description	Flexible concrete impregnated fabric installed along a ground surface or structure to prevent erosion of the underlying material and/or sediments. Rolled out at desired location and sprayed with water to set impregnated concrete.
Installation Locations	Installed in swales, ditches and areas with concentrated flows as well as along embankments and slopes.
Substitute	Riprap coupled with geotextile
Performance Issues/Limitations	Expensive. Large installations require heavy equipment for installation.
Benefits	Permanent solution to control erosion and sedimentation. Quick installation with concrete achieving 80% strength within 24 hours. No mixing plant or equipment required.
Geotextile – Woven and Non-Woven	
Description	Low erodible lining material installed for temporary erosion control.
Installation Locations	Along stream embankments, water channels and/or ditches.
Performance Issues/Limitations	Required to be securely anchored in order to be effective. Installed material is difficult to remove when it is no longer required.
Benefits	Easy to install and an effective erosion barrier that can be installed along a variety of embankments.
Polyacrylamides/Flocculants	
Description	Sediment and Turbidity Control ~~Applicator Logs are solid form f~~Flocculants that are placed directly in the impacted watercourse to efficiently bind to particulate matter causing it to settle out providing clarification. Flocculants can also be used as an additive to settling ponds or sumps (temporary or permanent).
Installation Locations	Along stream embankments or directly in impacted channels and/or ditches. Product can also be used to settle out suspended sediment in dedicated/temporary settling ponds/sumps as required.
Performance Issues	None.
Benefits	Cost effective.
Silt Fence	

Description	Geotextile or fabric barrier that impedes the flow of surface water which potentially may cause suspended solids to be deposited upstream of installation. Typically supported using wooden stakes (attached to the fabric by the manufacturer) and may be placed using methods such as digging a trench and backfilling material to ensure stability. Attempts are made to install silt fence in lines of equal elevation (along contour lines) to prevent channelling or focusing of the runoff. Standards for installation including trench excavation, insertion of fabric, and backfilling and compacting. Found on the Ontario Provincial Standard Drawing (OPSD) 219.110 Light Duty Silt Fence Barrier and 219.130 - Heavy Duty Silt Fence Barrier.
Installation Locations	Used in areas where surface water could potentially come into contact with disturbed sites causing elevated suspended solids. Typical installation locations are: • Downstream of drilling activities • Along roads where surface runoff is expected • Surrounding stockpiles of material or drill cuttings
Performance Issues	Not permeable enough to be placed in streams with greater than low flow. Very difficult to anchor the base against flow. Difficult to install due to frozen ground conditions, weight and susceptibility to wind.
Benefits	Effective in shoreline construction work where they are used to surround the installation of culvert crossings installed during open-water conditions.
Diversion/Collection Channel or Berm	
Description	Diversion/collection channels or berms are used to locally direct surface water runoff. Constructed using suitable materials to divert the surface water without causing erosion or suspension of additional sediment. Additionally, collection channels or berms may be constructed to collect runoff emerging from an area of soil disturbance. Also, used to ensure runoff is directed to a constructed mitigation measure such as an in-ground sump.
Installation Locations	Used in locations where diversion and/or collection of surface water is required. Diversion structures are installed to prevent runoff from entering a site where the surface soil has been disturbed and would cause suspension of sediment. May be constructed to collect runoff emerging from an area of soil disturbance.
Substitute	Silt fences can be used as an alternative to constructing a channel or berm.
Benefits	Effective method to direct runoff to a constructed mitigation measure such as an in-ground sump.
Containment Berm	

Description	Constructed to establish a sump, basin or pond to contain or collect water. The sump could be used to contain discharge water to allow settling of sediment before discharge or to temporarily contain the water for re-circulation (i.e., drilling activities). Constructed using native soils or acceptable man-made products which are nominally compacted to provide strength for the structure. Berm heights are minimized (typically <1 m).
Installation Locations	Across small valleys or around natural depressions to augment the capacity of the berms.
Performance Issues	Care must be taken when constructing berms to ensure the base is on a solid foundation.
Substitutes	In-ground sumps or portable containment sumps or tanks can be used in place of a containment berm.
Benefits	Effective structure in forming sumps, basins or ponds to contain water and settle out suspended solids prior to discharge or reuse.
In-Ground Sump	
Description	Constructed to establish a sump, basin or pond to contain or collect water, similar to the containment berm. Constructed by excavating a depression into soil to provide water containment.
Installation Locations	Used in areas where excavation of soil is possible and other control measures are impractical or ineffective.
Substitutes	Containment berms, or portable containment sumps or tanks can be used in place of an in-ground sump.
Benefits	Excavated material from the sump can be used to construct a containment berm surrounding the sump to augment the capacity of the sump.
Portable Containment Sump	
Description	Used to establish a sump to contain water from a source such as a drill rig. Where required, can be connected together in a series to provide additional containment or settling capacity if required. Collected sediment or drill cuttings from the portable containment sumps are removed from the sumps as necessary and disposed of in pit locations approved by Baffinland management and located at distances of at least 31 m from water bodies.
Installation Locations	Used in areas where containment berms or in-ground sumps are impractical such as steep topography or in areas where overburden is not readily available.
Substitutes	Containment berms or in-ground sumps are used in place of a portable containment sump.
Benefits	Requires minimal excavation or construction to provide a level base for the sump.
Geotubes	

Description	A woven tube of geosynthetic fabric into which water is pumped to filter out and remove suspended solids in impacted water. Water pumped into the tube diffuses through the geosynthetic fabric across the length of the tube. Popular water treatment option for dewatering projects.
Installation Locations	Installed downstream of a pump on ground that is not erosion prone to prevent erosion and the suspension of sediments downstream of geotube.
Performance issues/Limitations	Non-passive water treatment method. Requires active pumping. Effectiveness limited by a maximum influx/pumping rate.
Substitutes	Containment berms, portable containment sumps or tanks and/or chemical treatment can be used in place of a geotube to settle out suspended solids.
Benefits	Easy to deploy, inexpensive compared to chemical treatment or water filtering options. Can also be used as a containment berm to augment the capacity of a sump or temporary settling pond.
Spring Berms	
Description	Made up of a loose spring/coil covered with a geosynthetic fabric for filtering turbid water and removing suspended sediments.
Installation Locations	Across small channels and/or shallow outlets of in-ground sumps or ponds.
Substitutes	Silt fences or containment berms can be used in place of a spring berm.
Benefits	Easy to deploy, low cost and effective when combined with other mitigation measures.
Floating Silt Curtains	
Description	Floating panels/sections made of geosynthetic fabric used to contain and limit the spread of turbid water in low flow environments (i.e. lakes, marine environment). Suspended vertically in the water column using floats and weights on the top of bottom of each section, respectively. Additional anchors used to fix silt curtains in place.
Installation Locations	Installed in low flow environments such as stream/lake outfalls or in open water for large construction projects.
Performance issues/Limitations	Limited to low flow environments. Cannot be used to treat suspended solids in high flow environments (i.e. rivers, large streams). Effective deployment of multiple sections for large construction projects requires a significant level of knowledge, expertise, equipment and manpower.
Substitutes	None.
Benefits	Effective at containing turbid water/suspended solids in low flow/ open water settings. Able to connect multiple panels together for large scale construction projects (i.e. marine docks) or use single

	sections for small scale sedimentation control at stream/lake outfalls.
Molecords	
Description	Strips of fabric made of chenille fibers engineered to ensure rapid adhesion to particulates and suspended solids in turbid water. Turbid water streams are directed through draped sections of partially submerged molecords to remove suspended solids and particulates in impacted water.
Installation Locations	Used in multiple applications. Typical setups involve pumping turbid water through a series of molecords draped over a holding tank to remove particulates in turbid water.
Performance issues/Limitations	Limited effective lifespan. Must be replaced regularly based on particulate levels in impacted water streams requiring treatment.
Substitutes	Chemical treatment (i.e. flocculants)
Benefits	Effective alternative to chemical treatment. Effective at removing particulates without changing water chemistry. Easy to deploy.

~~6~~7 SITE~~URFACE~~ WATER MANAGEMENT

The following subsections describe how surface water runoff is managed at Milne Port, along the Tote Road and the Mine Site, with the exception of mining operations. Surface water management associated with mining operations is discussed in Section 8 of this Plan.

Water balance and general site drainage/monitoring figures for Milne Port and the Mine Site, have been developed and are presented in Appendices A and B, respectively.

~~6.1~~7.1 MILNE PORT

Throughout the year, key activities at Milne Port focus around the management of ore transported to the Port from the Mine Site and materials and equipment received annually by conventional sealifts. During the open-water season (July – October), stockpiled ore is loaded onto ore carrier vessels for shipment to international markets while materials and equipment received by sealift vessels are unloaded using barges. Equipment and materials received from sealift vessels are placed in designated laydowns at Milne Port or transported overland by trucks to the Mine Site via the Tote Road.

Surface water runoff from areas of intense vehicular activity is susceptible to contamination from minor spills and/or leakage of machinery and equipment. Mitigation measures identified in Section 6 of this Plan will be implemented at these sites to divert non-contaminated surface runoff away from these areas and minimize the potential for contamination. Surface water suspected to be impacted by hydrocarbons will be addressed using spill response absorbents and/or transported to containment areas at Milne Port, such as the Milne Port Landfarm Facility.

To minimize impacts on surface drainage and water quality, the Project footprint (i.e. laydowns, roads, quarries) is required to be constructed at least 31 m from the ordinary high-water mark of any water body unless otherwise approved by the NWB.

Storage of hazardous materials (i.e. fuel and other hazardous materials) are contained within approved impermeable containment areas (lined with geomembranes). As required by the Type A Water Licence, water within containment areas (i.e. hazardous materials containment, surface water management ponds, etc.) will be sampled and demonstrated to be in compliance with the relevant water quality discharge criteria prior to being discharged to the receiving environment.

7.1.1 Construction Activities

Milne Port will be an active area during construction of the Phase 2 Proposal, from normal operation of the Early Revenue Phase. Activities are summarized as follows:

- Key staging area for sealift delivery of equipment and supplies for construction;
- Modifications to the port area to accommodate rail unloading and maintenance facilities;
- Expanded ore stockpiles; and
- Construction of a second ore dock.

Construction of the rail and stockpile facilities will generate approximately 120,000 m^3 of excavated soil that is not suitable for reuse as fill and will require disposal. Two soil spoils disposal areas have been identified (Appendix B). Guidance on the disposal of soil spoils is provided in Section 7.3, as most of the soil spoils requiring disposal during construction of the Phase 2 Proposal will occur along the North Railway.

~~6.1.1 Milne Port Landfarm Facility~~

~~The Milne Port Landfarm Facility (Landfarm Facility) consists of two geomembrane lined containment cells. The larger west cell is used as a landfarm for the biotreatment of soils contaminated by hydrocarbons from spills. The smaller east cell is used to contain hydrocarbon contaminated snow generated during winter operations. The east cell is also used as a repository for other sources of oily water at Milne Port and provides a practical location where oily water can be effectively treated at Milne Port using the Project's mobile Oily Water Treatment System (OWTS). As required by the Type A Water Licence, hydrocarbon contaminated water contained with the Landfarm Facility is treated, sampled and demonstrated to be in compliance with relevant water quality discharge criteria prior to discharge. To prevent erosion and associated sedimentation concerns from such discharges, the appropriate erosion and sedimentation controls are installed (i.e. energy dissipaters, silt fences) at and downstream of the discharge outfall.~~

~~6.1.2 Milne Port Ore Stockpile Facility~~

~~The Milne Port Ore Stockpile Facility (Ore Stockpile Facility) is equipped with surface water management ponds to manage and monitor runoff retained within its footprint. Surface water runoff is directed to the surface water management ponds by a network of ditches that run along Ore Stockpile Facility's perimeter. The surface water management ponds have been designed to temporarily retain the Ore Stockpile Facility's surface water runoff and allow for the settling of the runoff's sediment load prior to being discharged to the receiving environment (Milne Inlet). As required by the Type A Water Licence, runoff retained in the surface water management ponds is sampled and demonstrated to be in compliance with relevant water quality discharge criteria prior to discharge.~~

~~6.1.3~~7.1.2 Surface Water Direction and Quantity

~~The general drainage/monitoring figure for Milne Port, provided in Appendix B, shows the local drainage routes and their flow direction. Estimated surface water runoff quantities for Milne Port catchment areas were outlined in a Knight Piésold report provided in the FEIS, Volume 7 – *Freshwater Aquatic Environment*.~~

A detailed drainage/monitoring plan was developed for Milne Port for the Phase 2 Proposal, which shows the local drainage routes and their flow direction~~. Estimated surface water runoff quantities for Milne Port catchment areas are included in~~ (Appendix B). Detailed water management plans have also been developed by Hatch (2019a).

~~6.1.4~~7.1.3 General Mitigation Measures

Mitigation measures at Milne Port will include periodic site inspections, as outlined in Baffinland's Environmental Protection Plan (BAF-PH1-830-P16-0008) to ensure existing drainage routes are maintained and surface water infrastructure is operating as designed. Erosion and sedimentation controls as outlined in Section 6.~~4~~4.2 of this Plan will be utilized as required to address erosion and sedimentation from construction and ongoing operations at Milne Port.

As shown in Appendix B, drainage structures have been installed to divert surface water runoff to specific points of discharge to facilitate monitoring of site contact water as required by the Type A Water Licence.

~~6.2~~7.2 Tote Road

The Tote Road is the primary transportation route between Milne Port and the Mine Site and is used daily to transport ore, equipment, material, fuel, and supplies between the Project sites.

The requirement and selection of effective sedimentation and erosion controls to be employed at areas along the Tote Road will be subject to Project authorizations and applicable DFO guidance, and informed by in field monitoring and site experience. Water crossings have been designed and constructed to minimize the potential loss of fish habitat. Erosion and sedimentation controls for water crossings as

outlined in Section 6.3 of this Plan will be utilized as required to address erosion and sedimentation from construction and ongoing operations of the Tote Road. Scheduled monitoring for fish, fish habitat and water quality at water crossings along the Tote Road is outlined Section 10 of this Plan.

Construction areas established along the Tote Road will be designed and prepared such that surface water runoff is effectively channelled/diverted to allow for water quality monitoring to ensure compliance with Part D, Item 15 of the Type A Water Licence.

To minimize impacts on surface drainage and water quality, the Project footprint (i.e. laydowns, roads, quarries) is required to be constructed at least 31 m from the ordinary high-water mark of any water body unless otherwise approved by the NWB.

~~6.2.1~~7.2.1 Mitigation Measures

Erosion and sedimentation controls as outlined in Sections 6.3 and 6.4 of this Plan will be utilized as required to address erosion and sedimentation concerns along the Tote Road.

The Road Management Plan describes mitigation for managing dust along the Tote Road, including the application of water as well as calcium chloride and water. Calcium chloride will be applied in accordance with applicable guidelines to minimize runoff into local watercourses.

In 2017, the Tote Road Earthworks Execution Plan (TREEP; Golder, 2017) was developed to address sedimentation concerns observed along the Tote Road by improving the road's surface water drainage infrastructure. Improvements outlined in the Tote Road Earthworks Execution Plan (TREEP) include culvert extensions, lining drainage ditches with riprap, improving road bed material and stabilizing road embankments. Improvements outlined in the TREEP along with the Issued-For-Construction drawings developed by Hatch for the Early Revenue Phase of the Project will continue to be implemented along the Tote Road as required by Project operations. Scheduled monitoring of water quality, water quantity and fish passage at water crossings along the Tote Road, as detailed in Section 10 of this Plan, will be used to inform and prioritize Tote Road maintenance activities and surface water drainage improvements.

7.3 North Railway

The North Railway will become the means of transporting ore between the Mine Site and Milne Port, once the Phase 2 Proposal has been constructed. The railway will be 110 km in length and will be constructed adjacent the Tote Road for most of its length.

The requirement and selection of effective sedimentation and erosion controls to be employed at areas along the North Railway will be subject to Project authorizations and applicable DFO guidance and informed by in field monitoring and site experience. Water crossings have been designed and constructed to minimize the potential loss of fish habitat.

Construction areas established along the North Railway will be designed and prepared such that surface water runoff is effectively channelled/diverted to allow for water quality monitoring to ensure compliance with Part D, Item 15 of the Type A Water Licence.

Interactions of the North Railway with surface water will include:

- Earthworks during construction of the railway embankment
- Installation of crossings, mainly corrugated steel pipe (CSP) culverts but also arch culverts and bridges
- Temporary access roads
- Laydown areas
- Mobile camps
- Quarries (addressed in the Borrow Pit and Quarry Management Plan)
- Blasting activities along the North Railway route during construction

7.3.1 Mitigation Measures

Key mitigation measures identified for the North Railway to protect surface water and aquatic ecosystems includes:

- Watercourse crossings are designed to the 1 in 200-year storm event, with an additional sizing allowance for ice accumulation
- The embankment is entirely constructed from aggregates, rather than borrow materials
- North Railway crossings will be constructed with armouring techniques to protect the underlying fine-grained material from erosion and sedimentation
- If cut and filling is required, standard procedures to be followed are outlined in the Environmental Protection Plan

Fish passage through culverts was identified as a potential concern in the environmental review (North/South Consultants Inc., 2018), based on flow velocities through culverts estimated by hydrological modelling that were compared to published fish passage thresholds (Knight Piesold, 2017b). Revised modelling is currently underway (in April 2019) for an updated railway alignment. Fish-bearing culverts that have been identified as potential fish passage barriers will be assessed on a case-by-case basis during the final detailed engineering design phase of the Project to include appropriate fish passing promoting measures. There are a number of ways that streamflow velocities can be reduced:

- Install culverts at the same slope as the existing stream, where feasible
- Install additional culverts, if the channel width allows for this
- Insert boulders, baffles, baffle inserts, or weirs to increase friction in the culvert and mimic stream bed conditions.

It is expected that with additional engineering design, flow velocities that currently exceed fish passage thresholds will be able to be reduced below the thresholds. Monitoring of fish passage through fish-bearing culverts along the North Railway is proposed to validate modelling and the effectiveness of mitigation measures to facilitate fish passage (Section 10.2.3).

Construction of the North Railway will involve the removal and disposal of a significant quantity of soil spoils. A portion of these soils will be fine-grained and ice-rich and will be prone to slumping and sedimentation. As such, disposal locations will be required that are areas of low relief of existing depressions (ex. exhausted quarry) to avoid slumping and sedimentation issues.

The railway will be constructed using a combination of cut and fill, with material gained from cuts filling the lower lying areas along the alignment. The majority of cuts will be into rock, to minimize cuts in soils, particularly ice-rich soils, to avoid inducing thermal changes and causing geotechnical instability issues. An estimated 1,500,000 m^3 of soil spoils will be generated during construction of the North Railway. Approximately half of the material will be unfrozen and excavated, while the other half will be frozen material that will require drilling and blasting before excavation.

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

- Soil spoils will be placed in exhausted quarries and borrow pits along the Tote Road as a preferred option. Quarries and borrow areas represent an existing disturbed footprint with limited future use, and therefore make ideal disposal sites, provided they are not planned for use as explosive storage areas during construction.
- Other disposal sites will be identified near to the construction activity. Local depressions or low-relief areas will be selected as opposed to slopes where material can run-off.
- In all instances, as a standard condition of land-use approvals, disposed overburden materials will be placed >31 m from a surface water body.
- Disposal locations will be approved by the appropriate construction personnel (i.e., engineer, construction superintendent or foreman) who have been given such authority, to avoid unauthorized and indiscriminate disposal.
- Disposal locations will be well removed from the railway embankment.
- The stockpile will be designed with a minimal slope that is physically stable.
- Overburden spoils in construction will not be re-used without prior approval by the supervising engineer.

- Overburden soils will be transported directly to the disposal site, without short-term storage and re-handling.

Sediment and erosion control measures will be implemented as identified in Section 6.4 to prevent runoff of sediment and to possibly divert runoff away from the disposed material.

Table 7-1 presents a reconciliation of the quantity of soil spoils with available capacity at existing borrow pits along the Tote Road and proposed quarries along the North Railway by 10 km segment of railway. There is sufficient capacity within these areas such that the expected additional footprint for dedicated soil spoils disposal sites may be minimal.

Table 7-1 Comparison of Soil Spoils Volumes with Available Capacities at Borrow Pits and Quarries

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

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

Excavation that will occur along the North Railway during construction will involve blasting of rock and frozen overburden. Pre-packaged explosives will be used. Prior to blasting near waterbodies, Baffinland will submit to the Board for review at least 30 days prior to implementation a separate Blasting Management Plan for blasting near water, in accordance with Part D, Item 24 of the Licence.

~~6.3~~7.4 MINE SITE

The Mine Site is located approximately 100 km inland from Milne Port. Main activities at the Mine Site include the management of the Project aerodrome and the mining, crushing and hauling of ore from the Nuluujaak Pit at Deposit No. 1. This section describes general surface water management for infrastructure not directly associated with the mining operations such as access roads, waste management facilities, laydowns and accommodation complexes. Refer to Section 8 of this Plan for information on the surface water management strategies associated with Deposit No. 1 mining operations.

Surface water runoff from areas of intense vehicular activity is susceptible to contamination from minor spills and/or leakage of machinery and equipment. Mitigation measures identified in Section 6 of this Plan will be implemented at these sites to divert non-contaminated surface runoff away from these areas and minimize the potential for contamination. Surface water suspected to be impacted by hydrocarbons will be addressed using spill response absorbents and/or by transporting impacted surface water to the Mine Site Hazardous Materials Containment Area 7 (MS-HWB-7) for temporary storage and subsequent treatment and discharge using the Project's mobile OWTS.

To minimize impacts on surface drainage and water quality, the Project footprint (i.e. laydowns, roads, quarries) is required to be constructed at least 31 m from the ordinary high-water mark of any water body unless otherwise approved by the NWB.

Storage of hazardous materials (i.e. fuel and other hazardous materials) are contained within approved impermeable containment areas (lined with geomembranes). As required by the Type A Water Licence, water within containment areas (i.e. hazardous materials containment, surface water management

ponds, etc.) will be sampled and demonstrated to be in compliance with the relevant water quality discharge criteria prior to being discharged to the receiving environment.

~~6.3.1~~7.4.1 Surface Water Direction and Quantity

A detailed drainage/monitoring plan was developed for the Mine Site for the Phase 2 Proposal, which shows the local drainage routes and their flow direction (Appendix B). Detailed water management plans have also been developed by Hatch (2019b).

~~The general drainage/monitoring figure for the Mine Site, provided in Appendix B, shows the local drainage routes and their flow direction. Estimated surface water runoff quantities for Mine Site catchment areas were outlined in a Knight Piésold report provided in the FEIS, Volume 7 – *Freshwater Aquatic Environment*.~~

~~6.3.2~~7.4.2 Mitigation Measures

Mitigation measures at the Mine Site will include periodic site inspections to ensure existing drainage routes are maintained and surface water infrastructure is operating as designed. Erosion and sedimentation controls as outlined in Section 6.4 of this Plan will be utilized as required to address erosion and sedimentation from construction and ongoing operations at the Mine Site.

As shown in Appendix B, drainage structures have been installed to divert surface water runoff to specific points of discharge to facilitate monitoring of site contact water as required by the Type A Water Licence.

~~7~~8 SURFACE WATER MANAGEMENT – MINING OPERATIONS

Surface water management infrastructure required for mining operations continue to be developed to ensure compliance with applicable regulations. Where required, these structures will be maintained throughout the lifecycle of the Project. Open pit mine and waste rock stockpile management activities and accountabilities will progress over time to accommodate future development and changes, management reviews, incident investigations, regulatory changes or other Project related modifications.

~~7.1~~8.1 Mitigation Measures

Sediment and erosion control measures shall be installed as required as per Section 6 of this Plan. Berms and other drainage control measures shall be established as required to limit erosion, maintain positive drainage, divert water away from Project areas or to the appropriate water management structure, and minimize water ponding. Contouring, berming and installation of silt fences will be conducted as required for sediment and erosion control. Routine monitoring shall be completed to ensure compliance with applicable regulations and prescribed threshold values.

~~7.2~~8.2 Deposit No. 1 Mining Facilities

The following facilities have been designed and have or will be constructed at the Mine Site to facilitate Deposit No. 1 mining operations at the Project:

- Mine Haul Road;
- Run-of-Mine (ROM) Ore Stockpile Facility;
- Crusher Facility; and,
- Waste Rock Facility.

A detailed drainage/monitoring plan was developed for the Mine Site for the Phase 2 Proposal, which shows the local drainage routes and their flow direction (Appendix B). Detailed water management plans have also been developed by Hatch (2019b).

~~The general drainage/monitoring figure for the Mine Site, provided in Appendix B, shows the local drainage routes and their flow direction. Estimated surface water runoff quantities for Mine Site catchment areas were outlined in a Knight Piésold report provided in the FEIS, Volume 7 – *Freshwater Aquatic Environment*.~~

~~7.2.1~~8.2.1 Open Pit

The open pit will be excavated using a conventional bench configuration with access via ramps. Movement of vehicles within the pit will be monitored by a central dispatching system in order to ensure worker health and safety and operational efficiency.

Predicted dimensions of the final open pit, determined by the preliminary design presented in the FEIS are:

- Maximum length: 2.0 km;
- Maximum width: 1.2 km; and
- Maximum depth: 465 m (northern side) to 195 m (southern side).

It is anticipated that groundwater inflows will be minimal below the active zone at the open pit. An assessment was completed to compare operations at three (3) mine sites at northern latitudes, including the Polaris, Ekati, and Diavik mines. From this assessment, it was determined that the Ekati mine is most similar to the Project's Mine Site. The Ekati pits were developed in competent granite that was cut by moderate faults. The base of permafrost at the Ekati mine was encountered at approximately 350 to 400 m. With the exception of the near surface layer, groundwater was not encountered in the pits until mining reached limits below permafrost. From the assessment, it was determined that the Project's Deposit No. 1 pit will receive negligible groundwater inflow below the active layer because mining activities will take place in competent bedrock characterized by colder mean temperatures, topographically higher elevations, minimal faulting, and a deeper permafrost zone.

Geotechnical investigations at the Mine Site have included the drilling of a 400 m deep borehole instrumented with thermistors along its depth. The thermistors report ground temperatures at various depths within the hole. Extrapolation of temperature gradients with depth suggests that permafrost conditions (i.e., below 0°C for two consecutive years) extend to approximately 700 m, well below planned mine depths. It is anticipated that water inflows into the pit will be minor, consisting of shallow seasonal groundwater flows and direct contribution from precipitation events. Drifting snow is not expected to significantly contribute to in-pit water volumes.

Mining commenced on a hill crest outcrop, and will progress for several more years ~~until Year 10 to 12 of operation at full production volume (based on a nominal 21.5 Mtpa)~~ before an Open Pit is formed. Open Pit surface water will be directed to a surface water management pond and monitored prior to discharge to the receiving environment.

~~7.2.2~~8.2.2 Run-of-Mine Ore Stockpile Facility

Run-of-mine ore from the Deposit No. 1 is stockpiled prior to crushing activities at the Run-of-Mine (ROM) Ore Stockpile Facility located on the Mine Haul Road.

The surface water runoff from the ROM Facility's pad and ore stockpiles is directed to the ROM Facility's surface water management pond (ROM Facility Pond) using ditches that run along the Facility's perimeter. Runoff retained in the ROM Facility Pond will be monitored and treated if required to ensure effluent discharged from the ROM Facility meets the applicable water quality discharge criteria outlined in Baffinland's Type A Water Licence and Metal & Diamond Mining Effluent Regulations (MDMER).

Mitigation measures will include routine inspections of the ROM Facility to ensure surface water infrastructure, such as culverts, ditches and the ROM Facility Pond, are operating as designed and the use of a water treatment plant at the ROM Facility Pond, if required, to ensure effluent water quality compliance under the MDMER and Type A Water Licence during controlled effluent discharges from the ROM Facility. Refer to the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010) for additional information on the water treatment processes approved for Project effluents.

~~7.2.3~~8.2.3 Mine Site Crusher Facility

Run-of-mine ore from the Deposit No. 1 is processed by crushing ore into lump and fines at Mine Site Crusher Facility. The surface water runoff from the Crusher Facility's pad and ore stockpiles is directed to the Crusher Facility's surface water management pond (Crusher Facility Pond) using ditches that run along the Facility's perimeter. Runoff retained in the Crusher Facility Pond will be monitored and treated if required to ensure effluent discharged from the Crusher Facility meets the applicable water quality discharge criteria outlined in Baffinland's Type A Water Licence and Metal & Diamond Mining Effluent Regulations (MDMER).

The Phase 2 Proposal will involve construction of a new crusher facility and stormwater pond at the rail load-out area, and subsequent decommissioning of the current crusher facility. Runoff from the new facility will be collected, monitored, treated (if required), and discharged as described above.

Mitigation measures will include routine inspections of the Crusher Facility to ensure surface water infrastructure, such as culverts, ditches and the Crusher Facility Pond, are operating as designed and the use of a water treatment plant at the Crusher Facility Pond, if required, to ensure effluent water quality compliance under the MDMER and Type A Water Licence during controlled effluent discharges from Crusher Facility. Refer to the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010) for additional information on the water treatment processes approved for Project effluents.

~~7.2.4~~8.2.4 Waste Rock Facility

Waste rock generated from mining operations on Deposit 1 will be directed to the Waste Rock Facility (WRF) located northeast of Deposit No. 1. Waste rock generated by Deposit No. 1 mining operations will be managed in accordance with Project's most current Interim Waste Rock Management Plan and Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031). As additional geological, geotechnical and geochemical data is collected, Baffinland will continue update the Project's Interim Waste Rock Management Plan and Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) to optimize the Project's waste rock management practices and strategies.

Surface water runoff from waste rock deposited at the Waste Rock Facility is directed to a surface water management pond (WRF Pond) using ditches and swales that run along the WRF's perimeter. Runoff retained in the WRF Pond will be monitored and treated if required to ensure effluent discharged from the Facility meets the applicable water quality discharge criteria outlined in Baffinland's Type A Water Licence and Metal & Diamond Mining Effluent Regulations (MDMER).

Mitigation measures will include routine inspections of the Waste Rock Facility to ensure surface water infrastructure, such as culverts, ditches and the WRF Pond, are operating as designed and the use of a water treatment plant at the WRF Pond to ensure effluent water quality compliance under the MDMER and Type A Water Licence during controlled effluent discharges from WRF. Refer to the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010) for additional information on the water treatment processes approved for Project effluents.

~~8~~9 ROLES AND RESPONSIBILITIES

Responsibilities for the management and monitoring of the surface water flows and effluents at the Project are as follows.

~~8.1~~9.1 Chief Operations Officer (COO) / General Manager

- Reports to the Chief Executive Officer
- Responsible for providing oversight for all Project operations and allocating the necessary resources for the operation, maintenance and management of Project infrastructure.

~~8.2~~9.2 Mine Operations Manager / Superintendent

- Reports to the COO / General Manager
- Provides oversight for all Deposit No. 1 mining operations, including the operation, construction and maintenance of surface water management infrastructure at Deposit No. 1 mining areas, Waste Rock Facility and along the Mine Haul Road, including culverts, ditches, surface water management ponds and associated water treatment systems.

~~8.3~~9.3 Crushing Manager / Superintendent

- Reports to the COO / General Manager
- Provides oversight for all ore crushing operations, including the operation, construction and maintenance of surface water management infrastructure at Mine Site Crusher Facility, including culverts, ditches, surface water management ponds and any associated water treatment systems.

~~8.4~~9.4 Site Services Manager / Superintendent

- Reports to the COO / General Manager
- Provides oversight for all Site Services operations, including the operation, construction and maintenance of surface water management infrastructure associated with Project service roads at the Mine Site and Milne Port.
- Responsible for managing water retained in containment areas associated with Project bulk fuel facilities and hazardous materials/waste storage areas, including landfarm facilities.

~~8.5~~9.5 Road Maintenance Manager / Superintendent

- Reports to the COO / General Manager
- Provides oversight for all Road Maintenance operations, including the operation, construction and maintenance of surface water management infrastructure for the Tote Road that runs between Milne Port and the Mine Site, including culverts, bridges, ditches and swales.

~~8.6~~9.6 Environment (Sustainable Development) Department

- Support the management of the Project surface water management infrastructure by advising operational departments and obtaining the appropriate regulatory approvals for necessary changes and modifications.

- Advise operational departments on the implementation of the appropriate controls to manage surface water flows and effluents at the Project, including the implementation of sedimentation and erosion controls outlined in Section 64 of this Plan.
- The on-site Environment Department will have the lead role in conducting and managing all on-site aquatic effects monitoring programs at the Project, discussed in Section 109 of this Plan.
- Report incidents to senior management and the appropriate regulatory agencies and stakeholders.
- Conduct inspections and monitoring to ensure compliance with applicable regulations and commitments.
- Provide training sessions to operational departments on the appropriate mitigation measures and strategies for managing surface water flows and effluents at the Project.

~~8.7~~9.7 ALL DEPARTMENTAL SUPERVISORS

- Reports to the Departmental Manager / Superintendent
- Responsible for reading and understanding applicable sections of this Plan and directing departmental personnel on the appropriate mitigation measures and strategies for managing surface water flows and effluents in their Project area.

~~8.8~~9.8 ALL PROJECT PERSONNEL

All personnel Project personnel will be responsible to comply with the requirements of this Plan in the management of surface water flows and effluents at the Project.

~~9~~10 MONITORING

~~9.1~~10.1 ROUTINE INSPECTIONS

In addition to the specific monitoring and reporting requirements subject to applicable regulatory approvals, routine inspections of Project areas will be conducted. Routine surface water management inspections shall be conducted at drill sites, Project camp sites and infrastructure, roadways, the railway and other areas associated with Project development. Where required, inspection locations will be modified to reflect current Project infrastructure and activities.

Table 10-1 outlines the basic components of typical routine inspections conducted at the Project. For the current compliance inspection forms used at the Project, refer to the Project's Environmental Protection Plan (BAF-PH1-830-P16-0008).

Table 10-1 Routine Inspections and Monitoring Requirements

Site / Area	Routine Inspections		
Milne Port **Mine Site** **North Railway (construction phase only)**	- Water management systems and infrastructure - Sediment and erosion control structures - Fuel storage and transfer operations - Drip pans and equipment condition (i.e. leaks, hydrocarbon staining) - Use of secondary containment (i.e. lined containment areas, spill trays, etc.) - Water intakes - Flow meter readings - Land disturbance (i.e. vehicle rutting) - Spill kits		
Tote Road **North Railway**	- Water management systems and infrastructure - Sediment and erosion control structures		
Borrow Sites **Quarries**	- Drip pans and equipment condition (i.e. leaks, hydrocarbon staining) - Full-time supervision of fuel transfer operations - Sediment and erosion control structures - Spill kits		
Drill Sites	*Pre-Drilling*	*Drilling Period*	*Post-Drilling*
	- Drill hole coordinates - Water source coordinates - Site photo - Water source photo - Distance to nearest water source - Archaeological approval	- Fuel leaks - Sediment and erosion control structures - Drip pans - Equipment condition - Rutting by vehicles - Water intake - Water management	- Fuel leaks - Sediment and erosion control structures - Drip pans - Equipment condition - Rutting by vehicles - Water intake - Water management

Site / Area	Routine Inspections
	- Wildlife survey - Flow meter reading - Flow meter reading
Waste Rock Facility	- Water management systems and infrastructure - Sediment and erosion control structures - Drip pans and equipment condition (i.e. leaks, hydrocarbon staining) - Evidence of ARD/ML
Bulk Fuel Storage Areas	- Primary containment structure - Evidence of hydrocarbon staining or leaks from containment devices - Equipment condition - Spill kits
Explosives Storage Areas	- Primary containment structure - Access and security - Equipment condition
Laydown and Storage Areas	- Sediment and erosion control structures - Evidence of hydrocarbon staining or leaks from containment devices - Fuel leaks - Drip pans - Equipment condition

~~9.2~~10.2 AREA-SPECIFIC SURFACE WATER AND AQUATIC ECOSYSTEM MONITORING

Baffinland has developed and/or implemented several monitoring programs at the Project to fulfill surface water and aquatic effects monitoring requirements outlined in the Project's Type A Water Licence, Project Certificate and other applicable regulations (i.e. MDMER, etc.). The following subsections describe the area-specific freshwater monitoring requirements and monitoring programs conducted at Project.

~~9.2.1~~10.2.1 MILNE PORT

Surface water and aquatic ecosystem monitoring programs implemented at Milne Port focus on meeting the monitoring requirements outlined in Schedule I of the Project's Type A Water Licence.

~~9.2.1.1~~10.2.1.1 TYPE A WATER LICENCE

Type A Water Licence water quality and quantity monitoring requirements for surface water at Milne Port include:

- The monitoring of volumes and water quality of surface water runoff and stormwater retained by Project infrastructure (e.g. surface water management ponds, containment areas) and discharged to the receiving environment;
- The monitoring of volumes and water quality of specific surface water drainage systems downstream of Project areas;
- The monitoring of water quality of surface water drainage downstream of active quarries and borrows sources; and,

- The monitoring of water volumes withdrawn from approved Milne Port water sources.

Volumes of effluent discharged from the Project infrastructure are monitored using inline flow meters and/or flow rate extrapolation. Weir boxes, water level data loggers and instream flow measurements are used to monitor flow volumes at monitored surface water drainages downstream of Project areas. Volumes of water withdrawn from approved water sources at Milne Port are monitored using inline flow meters. Water withdrawal limits for approved water sources at the Milne Port are outlined in Table 3 of the Type A Water Licence and discussed further in the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010).

Sampling frequency, monitored parameters and water quality discharge criteria for Milne Port monitoring stations are outlined in Part F and Schedule I of the Type A Water Licence.

Table 10-2 provides the select stormwater and surface water monitoring stations outlined in Schedule I of the Type A Water Licence for Milne Port, including each monitoring station's current status. The location of current and proposed SNP stations at Milne Port are shown on a Milne Port site plan in Appendix B. Monitoring requirements for developed quarries and borrow sources near Milne Port (i.e. Q1), as stipulated by the Type A Water Licence, are discussed in Section 10.6 of this Plan. Additional SNP stations are proposed at the Milne Port Ore Stockpile Pond No. 3, Pond No. 4 and Pond 5, as well as the Lump Ore Stockpile Perimeter Ditching East and West, and the Milne Port Rail Maintenance Shop Oily water/WWTF (Table 10-2).

Table 10-2 Milne Port – Water Licence Monitoring Stations[2]

Monitoring Station	Description	UTM Coordinates (NAD83)		Status
		Easting (m)	Northing (m)	
MP-03	Milne Port Bulk Fuel Storage Facility - Stormwater	503638	7976272	Active
MP-04	Milne Port Landfarm Facility - Stormwater (Contaminated Snow/Water Containment)	503710	7975574	Active
MP-05	Milne Port Ore Stockpile Facility – East Pond	503469	7976383	Active
MP-06	Milne Port Ore Stockpile Facility – West Pond	503125	7976364	Active
MP-07 (new)	Milne Port Ore Stockpile Stormwater Pond No. 3	TBC	TBC	New

[2] Refer to Schedule I of the Type A Water Licence for a complete list of all water licence monitoring stations at Milne Port.

Monitoring Station	Description	UTM Coordinates (NAD83)		Status
		Easting (m)	Northing (m)	
MP-08 (new)	Milne Port Ore Stockpile Stormwater Pond No.4	TBC	TBC	New
MP-09 (new)	Milne Port Ore Stockpile Stormwater Pond No.5	TBC	TBC	New
MP-10a (new)	Lump Ore Stockpile Perimeter Ditching East	TBC	TBC	New
MP-10b (new)	Lump ore stockpile perimeter ditching West	TBC	TBC	New
MP-11 (new)	Milne Port Rail Maintenance Shop Oily water/WWTF	TBC	TBC	New
MP-MRY-12	2008 Bulk Sample Program – Ore Stockpile Area Seepage	503357	7976453	Inactive
MP-C-A	Surface water drainage downstream of construction and operation areas at Milne Port.	503214	7976483	Inactive
MP-C-B		503191	7975396	Active
MP-C-C		503436	7975427	Inactive
MP-C-D		503651	7976363	Inactive
MP-C-E		503736	7976346	Active
MP-C-F		503922	7976304	Active
MP-C-G		502939	7976238	Inactive
MP-C-H		504113	7976509	Active

~~9.2.2~~10.2.2 TOTE ROAD

Surface water and aquatic ecosystem monitoring programs specific to the Tote Road focus on meeting the monitoring requirements stipulated by Baffinland's Type A Water Licence and DFO authorizations for water crossings as well as fulfilling commitments made to stakeholders and regulators.

~~9.2.2.1~~10.2.2.1 TYPE A WATER LICENCE

Type A Water Licence monitoring requirements for surface water along the Tote Road focus on:

- The monitoring of water volumes withdrawn from approved water sources along the Tote Road, outlined in Tables 2 and 3 of the Type A Water Licence; and,
- The monitoring of water quality of surface water drainage downstream of active quarries and borrows sources.

Volumes of water withdrawn from approved water sources along the Tote Road are monitored using inline flow meters and/or flow rate extrapolation. Water withdrawal limits for approved water sources along the Tote Road are outlined in Tables 2-3 and 3 of the Type A Water Licence and discussed further in the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010).

Monitoring requirements for developed quarries and borrow sources stipulated by the Type A Water Licence are discussed in Section 10.6 of this Plan.

~~9.2.2.2~~10.2.2.2 ANNUAL ASSESSMENT OF TOTE ROAD FISHERIES CROSSINGS

In accordance with Baffinland's DFO authorizations, Letters of Advice and other related amendments, Baffinland continues to conduct an annual assessment each year of identified fisheries water crossings along the Tote Road (HADD and compensation crossings). Annual assessments are conducted by a Professional Fisheries Biologist to confirm compliance with Baffinland's Fish Habitat No-Net-Loss and Monitoring Plan (Knight Piésold, 2007) by assessing the presence of fish, changes in quality of fish habitat and condition of fish passage at each identified fisheries crossing. Concerns identified during the annual assessment are promptly addressed by the Project's Road Maintenance Department. It should be noted that two (2) fisheries crossings at the Mine Site (CV-187, CV-186) are included in this annual assessment.

~~9.2.2.3~~10.2.2.3 TOTE ROAD MONITORING PROGRAM (TRMP)

The Tote Road Monitoring Program (TRMP) was developed by Baffinland to monitor the water quality of surface water flows at select water crossing (culverts, bridges) along the Tote Road, with a primary focus on monitoring total suspended solids (TSS) concentrations upstream and downstream of Tote Road water crossings. Monitoring data collected under the TRMP is used by the Project to:

- Inform Project operations of potential water quality impacts from Project activities at water crossings along the Tote Road;
- Guide and prioritize Tote Road maintenance work, corrective actions and improvements projects for surface water management infrastructure;
- Adjust mitigation measures and management strategies for Project activities along the Tote Road; and,
- Expand the Project's understanding of natural water quality conditions along the Tote Road (upstream) and the natural factors that contribute to changes in surface water quality.

Water crossings monitored under the TRMP have been selected to give a geographically representative sample set of water crossings for each given watershed intersected by the Tote Road (Phillips Creek, Ravn River, Mary River). In selecting the Tote Road water crossings within each watershed, the following factors were considered:

- Key depositional habitats downstream of the Tote Road (e.g. fish habitat);

- Areas historically prone to sedimentation events;
- Historical borrow source locations; and,
- Existing monitoring locations and programs.

In addition to TSS, the TRMP monitors for additional parameters, including metals, nutrients, oil & grease, and routine chemistry, such as dissolved anions (e.g. chloride), turbidity and total dissolved solids (TDS).

For additional details on the TRMP's sampling frequency, monitored parameters and response action frameworks and action levels refer to the Project's Roads Management Plan (RMP; BAF-PH1-830-P16-0023). The Project's RMP also details the water quality monitoring that will be completed for construction activities at Project water crossings to mitigate potential sediment and erosion impacts to aquatic ecosystems.

10.2.3 North Railway

Surface water and aquatic ecosystem monitoring programs specific to the North Railway focus on meeting the monitoring requirements stipulated by Baffinland's Type A Water Licence and DFO authorizations for water crossings as well as fulfilling commitments made to stakeholders and regulators.

10.2.3.1 Construction Monitoring

Monitoring will occur at active work areas along the North Railway during construction, as prescribed in a future Fisheries Authorization for crossings. This is expected to include turbidity monitoring downstream of active work areas, including crossing locations as well as downstream of quarries and soil spoils disposal areas (mainly former borrow pits and quarries). Fish-bearing streams will be monitored for fish passage in accordance with the future Fisheries Authorization.

A survey of the water withdrawal site BG32 is recommended in the first year following Project approval in late summer/fall when water withdrawals occur and during a low flow event to ensure there is no stranding of Arctic Char. In the event that stranding is observed, a fish salvage would be undertaken to relocate stranded fish to a local waterbody.

10.2.3.2 Post-Construction Monitoring

Construction monitoring will occur as described above until such time as turbidity and fish passage concerns have been resolved. Additionally, it will be necessary during construction to divert the upstream portion of several streams into adjacent streams. Hydrological modelling supporting the FEIS Addendum for the Phase 2 Proposal identified 27 such locations. Twenty-three of these locations were deemed low risk, and these will be monitored for a short period of time post-construction (i.e., 1 to 2 years) to verify that the diversions are not having any unexpected effects (Knight Piésold, 2018).

Four of the diversions are considered medium or high risk, and one of the streams (CV59-4) is probably fish habitat. Site specific assessments will be undertaken at these diversions during detailed engineering

design of the railway. The assessments will consider fish use and length of impacted channel. one of which may result in meaningful changes in flow in the receiving stream that may affect stream morphology downstream. Adaptive management can be used to address any unexpected effects. Where diversions are considered high or moderate risk of causing measurable change to channel morphology and sediment transport, design mitigation measures can be used to address the identified risks. Options for mitigation may include:

- Channel widening
- Regrading
- Construction of habitat features (in fish bearing streams)
- Channel stabilization

Monitoring and adaptive management will also be conducted, if deemed necessary. It should be noted that changes in the design of the North Railway since publication of the FEIS Addendum for the Phase 2 Proposal has resulted in a raise of the embankment and elimination of most of the previously identified rock cuts. Most of the previously identified diversions have been eliminated. Revised hydrological modelling is currently underway to re-assess this issue.

~~9.2.3~~10.2.4 MINE SITE

Surface water and aquatic ecosystem monitoring programs specific to the Mine Site focus on fulfilling the monitoring requirements outlined in the Project's Type A Water Licence, Project Certificate, and other applicable regulations, including MDMER.

~~9.2.3.1~~10.2.4.1 TYPE A WATER LICENCE

Type A Water Licence water quality and quantity monitoring requirements for surface water at the Mine Site include:

- The monitoring of volumes and water quality of surface water runoff and stormwater retained by Project infrastructure (e.g. surface water management ponds, containment areas) and discharged to the receiving environment;
- The monitoring of volumes and water quality of specific surface water drainage systems downstream of Project areas;
- The monitoring of water quality of surface water drainage downstream of active quarries and borrows sources; and,
- The monitoring of water volumes withdrawn from approved Mine Site water sources.

Volumes of effluent discharged from the Project infrastructure are monitored using inline flow meters and/or flow rate extrapolation. Weir boxes, water level data loggers and instream flow measurements are used to monitor flow volumes at monitored surface water drainages downstream of Project areas.

Volumes of water withdrawn from approved water sources at the Mine Site are monitored using inline flow meters and/or flow rate extrapolation. Water withdrawal limits for approved water sources at the Mine Site are outlined in Table 3 of the Type A Water Licence and discussed further in the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010).

Sampling frequency, monitored parameters and water quality discharge criteria for the Mine Site monitoring stations are outlined in Part F and Schedule I of the Type A Water Licence.

Table 10-3 provides the select stormwater and surface water monitoring stations outlined in Schedule I of the Type A Water Licence for the Mine Site, including each monitoring station's current status. An additional SNP Station (MSS-06B) will be required at the additional stormwater pond associated with the North Railway loadout area.

Table 10-3 Mine Site – Water Licence Monitoring Stations[3]

Monitoring Station	Description	UTM Coordinates (NAD83)		Status
		Easting (m)	Northing (m)	
MS-MRY-6	Exploration Phase Bulk Fuel Storage Facility (Bladder Farm) - Stormwater (Contaminated Snow/Water Containment)	558341	7914508	Active
MS-06	Mine Site Crusher Facility - Pond	561475	7913000	Active
MS-06B	Stormwater Pond No. 2 at North Rail Loadout Facility	TBC	TBC	Active
MS-07	Run-of-Mine Stockpile Facility – Pond	564198	7913346	Active[4]
MS-08	Mine Site Waste Rock Facility - Pond	563492	7916273	Active
MS-MRY-9	2008 Bulk Sample Program - Open Pit – Downstream Surface Water Drainage	563246	7914632	Inactive
MS-MRY-10	2008 Bulk Sample Program – Ore Stockpile Area – Downstream Surface Water Drainage	563488	7915197	Inactive

[3] Refer to Schedule I of the Type A Water Licence for a complete list of all water licence monitoring stations at the Mine Site.
[4] The Run-of-Mine Stockpile Facility is planned to be constructed and become active under the Type A Water Licence and the MDMER in 2019.

Monitoring Station	Description	UTM Coordinates (NAD83)		Status
		Easting (m)	Northing (m)	
MS-MRY-11	2008 Bulk Sample Program – Ore Processing Area - Downstream Surface Water Drainage	560690	7913350	Inactive
MS-MRY-13A **MS-MRY-13B**	Mine Site Non-Hazardous Waste Landfill Facility - Downstream Surface Water Drainage	560754 560642	7912484 7912527	Active
MS-C-A	Surface water drainage downstream of construction and operation areas at the Mine Site.	561263	7913571	Active
MS-C-B		561454	7913537	Active
MS-C-C		561110	7913199	Active
MS-C-D		561008	7913280	Active
MS-C-E		560980	7913388	Active
MS-C-F		561797	7913278	Active
MS-C-G		561813	7911830	Active
MS-C-H		561162	7912067	Active

Monitoring requirements for developed quarries and borrow sources near the Mine Site (i.e. QMR2), as stipulated by the Type A Water Licence, are discussed in Section 10.6 of this Plan.

~~9.2.3.2~~10.2.4.2 METAL & DIAMOND MINING EFFLUENT REGULATIONS

The MDMER were developed primarily under subsection 36(5) of the *Fisheries Act* and are designed to protect fish, fish habitat and fish use from effects in receiving waters from the release of effluents from metals and diamond producing mines. At the Mine Site, runoff and effluent managed at the Crusher Facility, Run-of-Mine Facility and Waste Rock Facility are regulated under the MDMER and are identified as monitoring locations MS-06, MS-07 and MS-08 under the Type A Water Licence, respectively. Additionally, effluent from the new crusher pad is regulated and identified as monitoring location MS-06B.

Sampling frequency, monitored water quality parameters and discharge criteria for effluent discharges from facilities regulated under the MDMER at the Mine Site are fully discussed in the Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010). For details on the Project's Environmental Effects Monitoring (EEM) Program required for receiving water bodies of regulated effluents under MDMER, refer to Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-

PH1-830-P16-0010) and the Project's Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039), discussed in Section 10.2.4.3 ~~below~~.

~~9.2.3.3~~10.2.4.3 AQUATIC EFFECTS MONITORING PLAN (AEMP)

The Aquatic Effects Monitoring Plan (AEMP) describes how monitoring of the aquatic environment will be undertaken at the Project. The AEMP was identified as a follow-up monitoring program in Baffinland`s Final Environmental Impact Statement (FEIS; Baffinland, 2012) and is prescribed by the Type A Water Licence. The AEMP, specifically, is a monitoring program designed to:

- Detect the short-term and long-term effects of the Project's activities on the surrounding aquatic environment;
- Evaluate the accuracy of impact predictions;
- Assess the effectiveness of planned mitigation measures; and
- Identify additional mitigation measures to avert or reduce unforeseen environmental effects.

The AEMP focuses on the key potential impacts to freshwater environment valued ecosystems components (VECs), as identified in the Final Environmental Impact Statement and Addendum for the Early Revenue Phase (ERP). The freshwater VECs include water quantity, sediment quality, and freshwater biota and fish habitat. The AEMP has been structured to serve as an overarching 'umbrella' that conceptually provides an opportunity to integrate results of individually monitored but related aquatic monitoring programs.

The following are the component studies that comprise the Project's AEMP.

- Core Receiving Environment Monitoring Program (CREMP), provides a basis for the evaluation of any mine-related influences on water quality, sediment quality and/or biota (including phytoplankton, benthic invertebrates and/or fish) within aquatic environments located near the Mine Site.
- Lake Sedimentation Monitoring Program evaluates baseline and Project-influenced lake sedimentation rates at Sheardown Lake NW.
- Hydrometric Monitoring Program assesses flow in several streams and rivers near Project sites and supports the AEMP.
- Dustfall Monitoring Program evaluates dustfall rates in proximity to the Tote Road, Milne Port and Mine Site and informs aquatic effects monitoring programs on the potential effects of dust generated by the Project on surrounding aquatic ecosystems and water bodies.
- Stream Diversion Barrier Study was an initial study evaluating the potential for fish barriers under natural conditions and due to Project-related stream diversions. This study has been deferred due to the low impact anticipated by the reduced footprint of the Waste Rock Facility during the Early Revenue Phase of the Project.

- Environmental Effects Monitoring (EEM) Program, as required under the MDMER, includes both water quality, benthic and fish monitoring studies in the receiving water bodies of effluent discharges at the Mine Site.

For additional details on the AEMP and its component studies, refer to Baffinland's Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039).

10.2.4.4 Short-term Fish Passage Monitoring

Following the first year of Phase 2 Project approval, it was recommended that a survey of the outflow of Camp Lake occur during late summer/fall. The timing shall be dependent on the timing when the water withdrawals occur and during a low flow event, to ensure that there is no stranding of Arctic Char. In the event that stranding is observed, a fish salvage would be undertaken to relocate the stranded fish to a local waterbody.

~~9.2.4~~10.2.5 Steensby Port

The construction of Steensby Port and associated railway has not commenced to date. As a result, water quality or quantity monitoring programs have not been initiated at the Steensby Port location. This plan will updated prior to the commencement of construction of Steensby Port and the associated railway to reflect planned surface water management and monitoring.

~~9.3~~10.3 Groundwater Monitoring

Condition 23 of the Project Certificate requires groundwater monitoring to be conducted at the Project. Initiated in 2017, Baffinland continues to conduct a preliminary groundwater monitoring program at the Project's Mine Site Landfill Facility to assess the feasibility and utility of monitoring groundwater quality near Project infrastructure using drive-point piezometers. The current monitoring program involves establishing shallow groundwater wells up-gradient and down-gradient of the Landfill Facility using drive-point piezometers and collecting water samples near the depth of the active layer during September of year; the time of year where the active layer should be at its maximum depth. As more data is collected and monitoring methodologies are further assessed, Baffinland will provide recommendations and plans to NWB and other agencies regarding the Project's groundwater monitoring program.

~~9.4~~10.4 Type B Water Licence Monitoring

Surface water monitoring requirements stipulated under the Type B Water Licence are related to exploration and geotechnical drilling programs and the establishment of satellite camps required to support these programs. Due to temporary and transitory nature of drilling programs, water quality monitoring programs will be established for drilling programs on as needed basis and in accordance with the monitoring requirements outlined in the Type B Water Licence. Proposed water quality monitoring

programs will be included in Baffinland's notification(s) to regulators and stakeholders for planned drilling programs and satellite camps.

~~9.5~~10.5 Water Crossing Construction Monitoring

In order safely and effectively transport ore from the Mine Site to Milne Port, the Project roads network, including the Tote Road, continues to be upgraded to address concerns regarding surface water drainage, sedimentation and erosion, operations and safety.

Monitoring associated with construction activities at Project water crossings is detailed in the Project Roads Management Plan (BAF-PH1-830-P16-0023), including sampling frequency, monitored parameters, response action frameworks and action levels.

To limit the potential water quality impacts of maintenance and construction activities at Project water crossings during periods of flow, in water work will be avoided whenever feasible, with the majority of water crossing maintenance and construction occurring before the onset of freshet (mid-May) and following freeze up (September/October).

~~9.6~~10.6 Monitoring at Project Quarries and Borrow Sources

In accordance with Part I, Items 24 of the Type A Water Licence, during periods of flow and following major precipitation events, Baffinland conducts monthly water quality monitoring of surface water flows downstream of active quarries and borrows sources. In accordance with Part I, Item 23 of the Type A Water Licence, monitored water quality parameters include:

- Total suspended solids (TSS);
- Oil and grease;
- Ammonia;
- Nitrate (total NO_3-N);
- pH;
- Conductivity; and
- Acute toxicity.

In accordance with Part D, Item 15 of the Type A Water Licence, weekly water quality sampling is also completed where it is determined that surface water runoff from active quarries flows directly or indirectly into a water body, to ensure that water quality of flows are in compliance with the water quality criteria outlined in Part D, Item 15.

Monitoring locations for developed quarries and borrows sources are documented in the site-specific Quarry and Borrow Source Management Plans.

As required, Baffinland will incorporate best management practices including sediment and erosion control measures installed as per Section 64 of this Plan. Berms and other drainage control measures shall be established where necessary to minimize or prevent surface runoff from nearby water bodies entering active quarries and borrow sources.

In developing Project quarries, efforts are made to ensure that a minimum 100 m naturally-vegetated buffer between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching is maintained.

~~9.7~~10.7 CHANGES TO MONITORING PROGRAMS

Conditional to the Project's construction and/or operations activities, it may be determined that additional monitoring stations may need to be established to effectively assess, and adequately monitor site-specific surface runoff and effluents. In these cases, Baffinland will provide notification to the NWB and other relevant agencies, and update this Plan accordingly.

~~10~~11 DATA MANAGEMENT AND REPORTING

~~10.1~~11.1 DATA MANAGEMENT

The on-site Environmental Superintendent in concert with the corporate Sustainable Development team is responsible for data management and reporting related to surface water management and monitoring. The data management system includes conducting routine inspections and monitoring, and forwarding results to appropriate parties as prescribed by Baffinland's applicable approvals, permits and authorizations.

~~10.2~~11.2 REPORTING

Table 11-1 summarizes the data reporting associated with the monitoring programs outlined Section 10 of this Plan.

Table 11-1 Reporting Summary for Monitoring Programs

Monitoring Program	Applicable Regulatory Instrument	Reporting
Type A Water Licence (Schedule I; Part I)	Type A Water Licence	Monthly Monitoring Reports Annual QIA & NWB Report for Operations
Fisheries Crossings Assessment	Applicable DFO Authorizations and Letters of Advice	Annual DFO Tote Road Monitoring Report Annual QIA & NWB Report for Operations - Appendices
Tote Road Monitoring Program	-	Annual QIA & NWB Report for Operations - Appendices
MDMER (Effluent and Receiving Environment Water Quality Monitoring)	MDMER	Quarterly ECCC MDMER Reports Annual ECCC MDMER Report
MDMER (Biological EEM)	MDMER	Annual QIA & NWB Report for Operations – Appendices (for applicable years)
AEMP (excluding Dustfall Program)	Type A Water Licence, Project Certificate	Annual QIA & NWB Report for Operations – Appendices
Groundwater Monitoring	Project Certificate	Annual QIA & NWB Report for Operations – Appendices
Type B Water Licence (Part B, Item 6)	Type B Water Licence	Annual QIA & NWB Report for Exploration and Geotechnical Activities
Dustfall Program	Type A Water Licence Project Certificate	Annual Terrestrial Environment Monitoring Report (Baffinland Document Portal)

12 REFERENCES

Baffinland Iron Mines Corporation (Baffinland), 2012. *Mary River Project - Final Environmental Impact Statement*. February.

Baffinland Iron Mines Corporation (Baffinland), 2013. *Mary River Project - Early Revenue Phase - Addendum to the Final Environmental Impact Statement*. June.

Fisheries and Oceans Canada, 2001. *Policy for the Management of Fish Habitat*. Cat. No. Fs 23-98/1986E ISBN 0-662-15033-3. January 9.

Golder Associates Ltd. (Golder), 2016a. *Mary River Project - Dust Mitigation Action Plan*. September 29. Rev. 1. Project Number: 1661774 (5000).

Golder Associates Ltd. (Golder), 2016b. *Mary River Project - Sedimentation Mitigation Action Plan*. September 29. Rev. 1. Project Number: 1661774 (5000).

Golder Associates Ltd. (Golder), 2017. *Mary River Project - Tote Road Earthworks Execution Plan*. April. Rev. 0. Report Number: 1667708.

Hatch Ltd. 2018. *Baffinland Iron Mines Corporation - Mary River Expansion Project, Civil Design Philosophy*. Ref. No. H353004-00000-200-210-0001, Rev. 2, March 12, 2018.

Hatch Ltd., 2019a. *Baffinland Iron Mines Corporation: Mary River Expansion Project – Port Surface Water Management Plan*. H353004- 40000-200-066-0001, Rev. 1, April 12.

Hatch Ltd., 2019b. *Baffinland Iron Mines Corporation: Mary River Expansion Project – Mine Surface Water Management Plan*. H353004- 10000-200-210-0001, Rev. 1, April 12.

Knight Piésold 2007. *Baffinland Iron Mines Corporation - Mary River Project - Bulk Sampling Program - Fish Habitat No Net Loss and Monitoring Plan*. Ref. No. NB102-00181/10-4, Rev. 0, August 30.

Knight Piésold Ltd. (KP), 2012. *Baffinland Iron Mines Corporation - Mary River Project - Baseline Hydrology Report*. January 4. Vancouver, British Columbia. Ref. No. NB102-181/30-7, Rev. 1.

Knight Piésold Ltd. (KP), 2014. Letter to Oliver Curran, Baffinland Iron Mines Corporation. Re: *Hydrology Assessment of Water Sources for Dust Suppression along the Tote Road Mary River Project - Early Revenue Phase*. July 14. North Bay, Ontario. Ref. No. NB14-00376 (NB102-181/35).

Knight Piésold Ltd. (KP), 2016. Letter to: Matt Weaver, Baffinland Iron Mines Corporation. Re: *Updated Design Peak Flow Assessment*. December 16. Ref. No. VA16-01950 (NB102-181/39).

Knight Piésold Ltd. (KP), 2017a. Letter to: Megan Lord-Hoyle, Baffinland Iron Mines Corporation. Re: *Hydrology Assessment of Water Sources for Dust Suppression along the Tote Road and North Rail - Mary River Project - Phase 2 Proposal*. November 16. North Bay, Ontario. Ref. No. NB17-00728 (NB102-181/39).

Knight Piésold Ltd. (KP), 2017b. Letter to: Adam Grzegorczyk, Baffinland Iron Mines Corporation. Re: *Hydrologic Assessment for Water Crossings - Proposed North Rail - Phase 2 Proposal - Mary River Project*. September 1. North Bay, Ontario. Ref. No. VA17-01009 (NB102-181/39).

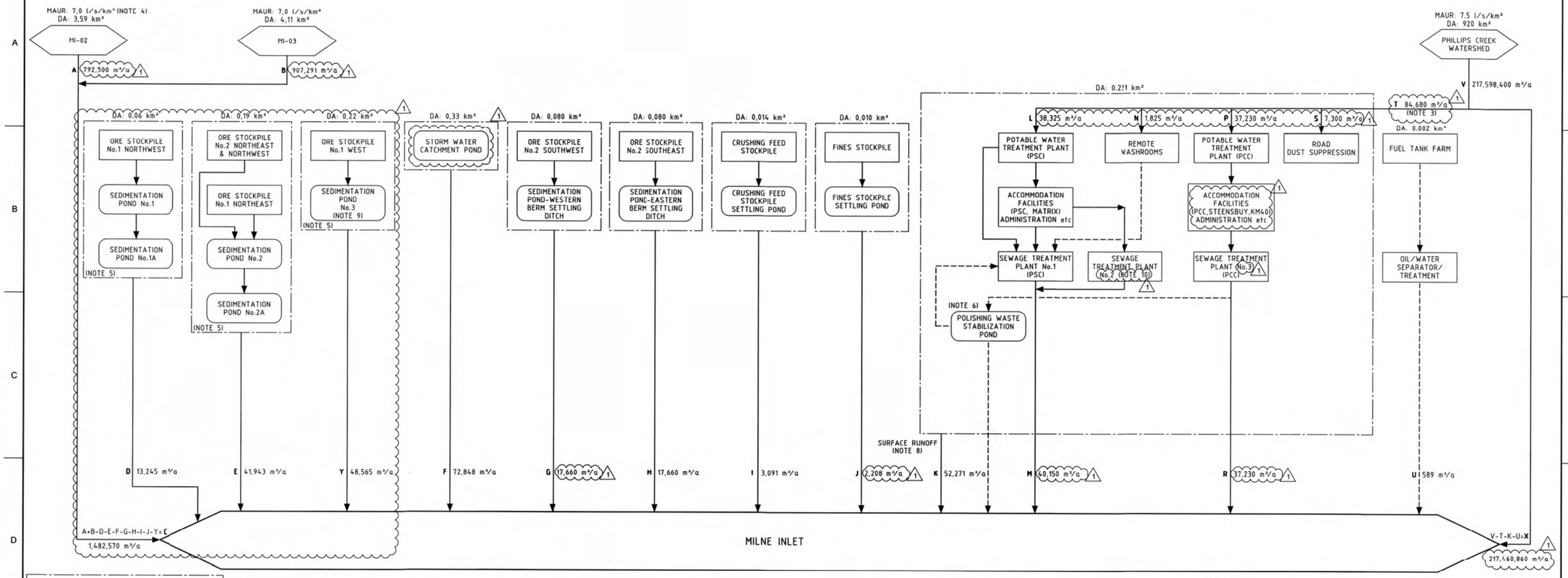
Knight Piésold Ltd., 2018. *Baffinland Iron Mines Corporation - Mary River Project – Phase 2 Proposal – Technical Supporting Document No. 13 – Surface Water Assessment*. October 3. Ref. No. NB102-181/39-8, Rev. 4.

North/South Consultants Inc., 2018. Baffinland Iron Mines Corporation – Mary River Project – Phase 2 Proposal – Technical Supporting Document No. 14 – Freshwater Biota and Habitat Assessment. June.

APPENDIX A

SITE WATER BALANCE – FIGURES

DWG No. H353004-40000-270-252-0002-0001



LEGEND

- IMPACTED WATERSHED
- DEVELOPMENT AREAS
- DEVELOPMENT AREAS SUBJECT TO APPROVAL
- STORMWATER PONDS
- CONTINUOUS OR WATERSHED FLOW
- INTERMITTENT FLOW
- A/AA 100,000 — ANNUAL VOLUME (m³/a)
- MAUR — MEAN ANNUAL UNIT RUNOFF (l/s/km²)
- PSC — PORT SITE COMPLEX
- PCC — PORT CONSTRUCTION CAMP
- MSC — MINE SITE COMPLEX
- DA — DRAINAGE AREA (km²) 1

NOTES:

1. SITE LAYOUT PER DRAWING H353004-00000-220-272-0001-0001, REV 3.
2. REFER TO PROCESS FLOW DIAGRAM H353004-40000-270-282-0001-0001, FOR MORE DETAILED WATER SUPPLY AND WASTE WATER TREATMENT.
3. RAW WATER SUPPLY FLOW RATE FROM PHILIPS CREEK (SUMMER) & KM32 LAKE (WINTER/SUMMER) ARE CURRENTLY EQUAL TO OR LESS THAN TYPE A WATER LICENCE 2AM-MRY1325 FLOW RATE LIMIT OF 68.5m³/day (25,000m³/year) PLUS TYPE B WATER LICENCE 8BC-MRY-1416 FLOW RATE LIMIT OF 299m³/day (109,135m³/year) TOTAL.
4. MAUR IN WATERSHEDS MI-02 AND MI-03 LIKELY RANGE BETWEEN 5 AND 7.5 l/s/km². PART OF THE MI-03 NATURAL CATCHMENT WILL BE USED FOR PROPOSED INFRASTRUCTURE CONSTRUCTION.
5. ORE STOCKPILE AND SEDIMENTATION POND CONSTRUCTION SUBJECT TO APPROVAL. ORE STOCKPILES RECEIVE ONLY PRECIPITATION AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
6. USE OF POLISHING WASTE STABILIZATION POND WILL OCCUR ON A CONTINGENCY BASIS ONLY, SHOULD OFF-SPEC TREATED SEWAGE EFFLUENT BE PRODUCED AND CANNOT BE RECYCLED. 1
7. PLANT SITE RECEIVES ONLY PRECIPITATION-RUNOFF AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
8. REFER ERP SURFACE WATER AND AQUATIC ECOSYSTEM MANAGEMENT FROM H349000-1000-07-126-0005, REV 1 FOR CATCHMENT AREA INFORMATION.
9. STOCKPILE No.1 DEVELOPMENT - POND 3 NORTH AND SOUTH
10. STP MOVED FROM MSC. 1

PERMIT TO PRACTICE
HATCH LTD.
Signature. James Wikston 2019.04.17 12:19:10 -04'00'
Date
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER J.M. WIKSTON LICENSE 249-04-4 NT/NU

FOR USE

No.	DESCRIPTION	BY	CHK'D	DATE
1	STOCKYARD 1 AND PSC UPGRADE	LS	PC	10-04-2019
0	APPROVED FOR USE	HV	PC	12-09-2018

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	H VINCENT		24-08-2018
DESIGNER			
CHECKER	P CHERRY		2019-04-16
DESIGN COORD.	R GOOSEN		2019-04-16
RESP. ENG.	J WIKSTON		2019.04.17 12:18:54 -04'00'
LEAD DISC. ENG.	P CHERRY		2019-04-16
AREA LEAD	V LAVRIC		2019-04-17
ENG. MANAGER	R GOOSEN		2019-04-16
AREA MANAGER	T ATIBA		19-04-17

DRAWING APPROVAL STATUS: Approved for Use

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Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

PORT SITE
AREA WATER BALANCE
BLOCK FLOW DIAGRAM

DRAWING No.	DRAWING TITLE
H349000-2000-10-002-0002	PORT SITE - WATER BALANCE - BLOCK FLOW DIAGRAM

REFERENCE DRAWINGS

REG. PROFESSIONAL

SCALE NTS OR AS NOTED

DWG. No. H353004-40000-270-252-0002-0001

REV 1

SHEET SIZE: D

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DWG. No. H353004-30000-270-252-0001-0001

MAUR: 7.5 l/s/km² (NOTE 4)
DA: 875 km²

MR-01

A 206,955,000 m³/a

C 1,022 m³/a

DA: 0.03 km²

STOCKPILE No.1

STOCKPILE No.2

STOCKPILE No.3

SETTLING POND

B 7,096 m³/a

ROAD DUST SUPPRESSION

DA: 0.001 km²

RAW WATER

OFFICE FACILITIES WASHROOM

F 236 m³/a

DA: 0.0004 km²

FUEL STORAGE & REFUELING

SEWAGE TREATMENT AT MINE

OIL/WATER SEPARATOR/ TREATMENT

E 1,022 m³/a

D 95 m³/a

D+E=G 1,117 m³/a

A-C-F-B=H
206,946,646 m³/a

DISCHARGE POINT - PHILLIPS CREEK

MARY RIVER
LICENSED DISCHARGE

LEGEND

- IMPACTED WATERSHED
- DEVELOPMENT AREAS
- DEVELOPMENT AREAS SUBJECT TO APPROVAL
- STORMWATER PONDS
- CONTINUOUS OR WATERSHED FLOW
- INTERMITTENT FLOW
- A/AA 100.000 — ANNUAL VOLUME (m³/a)
- MAUR — MEAN ANNUAL UNIT RUNOFF (l/s/km²)

PERMIT TO PRACTICE
HATCH LTD.
Signature RJ.
Date 2018-09-14
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

NOTES:

1. SITE LAYOUT PER DRAWING H353004-30000-224-271-0029-0001, REV 0.
2. FLOW 'C' IS BASED ON 6 PERSONS/DAY AT THE OFFICE FACILITIES USING 50 l/day AND 250 trucks/day OF ORE USING 10 l PER TRUCK LOAD PER DAY.
3. MAUR IN WATERSHED MR-01 IS LIKELY IN THE RANGE BETWEEN 5 AND 7.5 l/s/km².
4. ORE STOCKPILE AND SETTLING POND CONSTRUCTION SUBJECT TO APPROVAL. ORE STOCKPILES RECEIVE ONLY PRECIPITATION AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
5. PLANT SITE RECEIVES ONLY PRECIPITATION-RUNOFF AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
6. REFER ERP SURFACE WATER AND AQUATIC ECOSYSTEM MANAGEMENT FROM H349000-1000-07-126-0005, REV 1 FOR CATCHMENT AREA INFORMATION.

FOR USE

REGISTERED PROFESSIONAL ENGINEER — P.R. JIM — LICENSEE — 2018-09-14 — NT/NU

No.	DESCRIPTION	BY	CHK'D	DATE
0	APPROVED FOR USE	HV	PC	12-09-2018

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	H VINCENT	NR	24-08-2018
DESIGNER		NR	
CHECKER	P CHERRY		2018-09-13
DESIGN COORD.	R GOOSEN		2018-09-14
RESP. ENG.	P JIM	RJ.	2018-09-14
LEAD DISC. ENG.	P CHERRY		2018-09-13
AREA LEAD	F v BILJON		
ENG. MANAGER	D STANGER		2018-9-14
AREA MANAGER	F PITTMAN		2018-09-17

DRAWING APPROVAL STATUS: Approved for Use

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

ORE STAGING RAIL SITE
AREA WATER BALANCE
BLOCK FLOW DIAGRAM

SCALE NTS OR AS NOTED

DWG. No. H353004-30000-270-252-0001-0001

REV 0

SHEET SIZE: D

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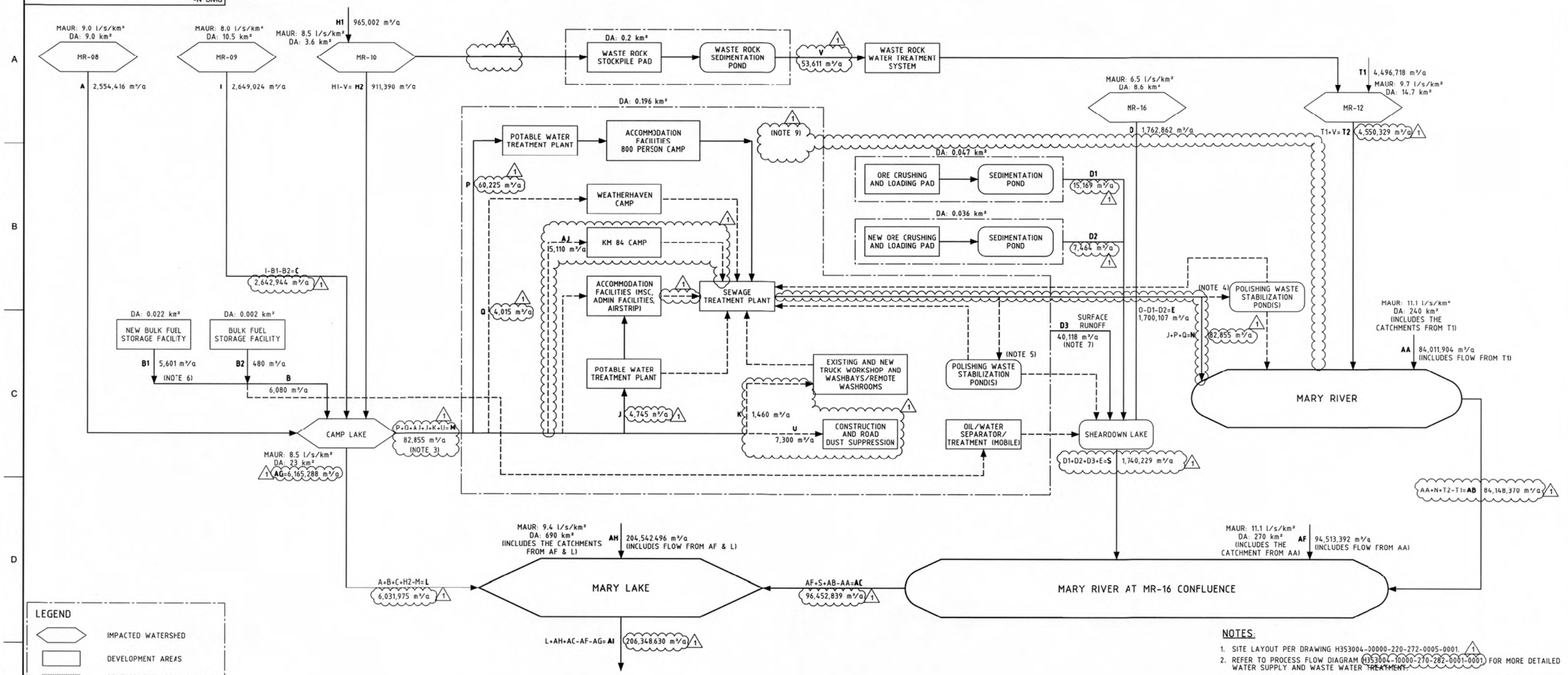
DRAWING No. | DRAWING TITLE
REFERENCE DRAWINGS
REG. PROFESSIONAL
REVISIONS

DWG. No. H353004-10000-270-252-0002-0001



LEGEND

- IMPACTED WATERSHED
- DEVELOPMENT AREAS
- DEVELOPMENT AREAS SUBJECT TO APPROVAL
- STORMWATER PONDS
- CONTINUOUS OR WATERSHED FLOW
- INTERMITTENT FLOW
- A/AA 100,000 — ANNUAL VOLUME (m³/a)
- MAUR — MEAN ANNUAL UNIT RUNOFF (l/s/km²)
- MSC — MINE SITE COMPLEX
- DA — DRAINAGE AREA (km²)

NOTES:

1. SITE LAYOUT PER DRAWING H353004-10000-220-272-0005-0001.
2. REFER TO PROCESS FLOW DIAGRAM H353004-10000-270-282-0001-0001 FOR MORE DETAILED WATER SUPPLY AND WASTE WATER TREATMENT.
3. RAW WATER SUPPLY FLOW RATE CAMP LAKE IS EQUAL TO OR LESS THAN TYPE A WATER LICENCE 2AM-MRY1325 FLOW RATE LIMIT OF 657.5m³/day (240,000m³/year) TOTAL.
4. USE OF POLISHING WASTE STABILIZATION POND PRIOR TO MARY RIVER DISCHARGE WILL OCCUR ON A CONTINGENCY BASIS ONLY, IN THE EVENT OF OFF-SPEC TREATED SEWAGE EFFLUENT.
5. USE OF POLISHING WASTE STABILIZATION POND AND SHEARDOWN LAKE DISCHARGE WILL OCCUR ON A CONTINGENCY BASIS ONLY, SHOULD CAPACITY BE EXCEEDED THROUGH THE SEWAGE TREATMENT SYSTEM DISCHARGING TO MARY RIVER.
6. BULK FUEL STORAGE AREA RUNOFF DRAINED TO ENVIRONMENT IF QUALITY SATISFIES DISCHARGE REQUIREMENTS; OTHERWISE IS CONVEYED TO MOBILE OIL/WATER SEPARATOR FOR TREATMENT PRIOR TO DISCHARGE.
7. PLANT SITE RECEIVES ONLY PRECIPITATION-RUNOFF AND NO SURFACE WATER RUNOFF FROM SURROUNDING AREAS.
8. REFER ERP SURFACE WATER AND AQUATIC ECOSYSTEM MANAGEMENT FROM H349000-1000-07-126-0005, REV 1.
9. MSC STP MOVED TO PORT.

PERMIT TO PRACTICE
HATCH LTD.
Signature _____ 2019.04.17 12:22:11 -04'00'
Date _____
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

FOR USE

REGISTERED PROFESSIONAL ENGINEER — J.M. WIKSTON — LICENSEE — 2019-04-17 — NT/NU

No.	DESCRIPTION	BY	CHK'D	DATE
1	MSC DORMITORIES AND STP MOVED TO PORT	LS	PC	10-04-2019
0	APPROVED FOR USE	HV	PC	12-09-2018

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	H VINCENT	NR	24-08-2018
DESIGNER		NR	
CHECKER	P CHERRY		2019-04-16
DESIGN COORD.	R GOOSEN		2019-04-16
RESP. ENG.	J WIKSTON		2019.04.17 12:21:46 -04'00'
LEAD DISC. ENG.	P CHERRY		2019-04-16
AREA LEAD	M HAAKSMA		2019-04-16
ENG. MANAGER	R GOOSEN		2019-04-16
AREA MANAGER	T ATIBA		19-04-17

DRAWING APPROVAL STATUS: Approved for Use

HATCH

Baffinland

BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

MINE SITE
AREA WATER BALANCE
BLOCK FLOW DIAGRAM

DRAWING No.	DRAWING TITLE
H349000-4000-10-002-0002	MINE SITE - WATER BALANCE - BLOCK FLOW DIAGRAM

REFERENCE DRAWINGS

REG. PROFESSIONAL

SCALE NTS OR AS NOTED

DWG. No. H353004-10000-270-252-0002-0001

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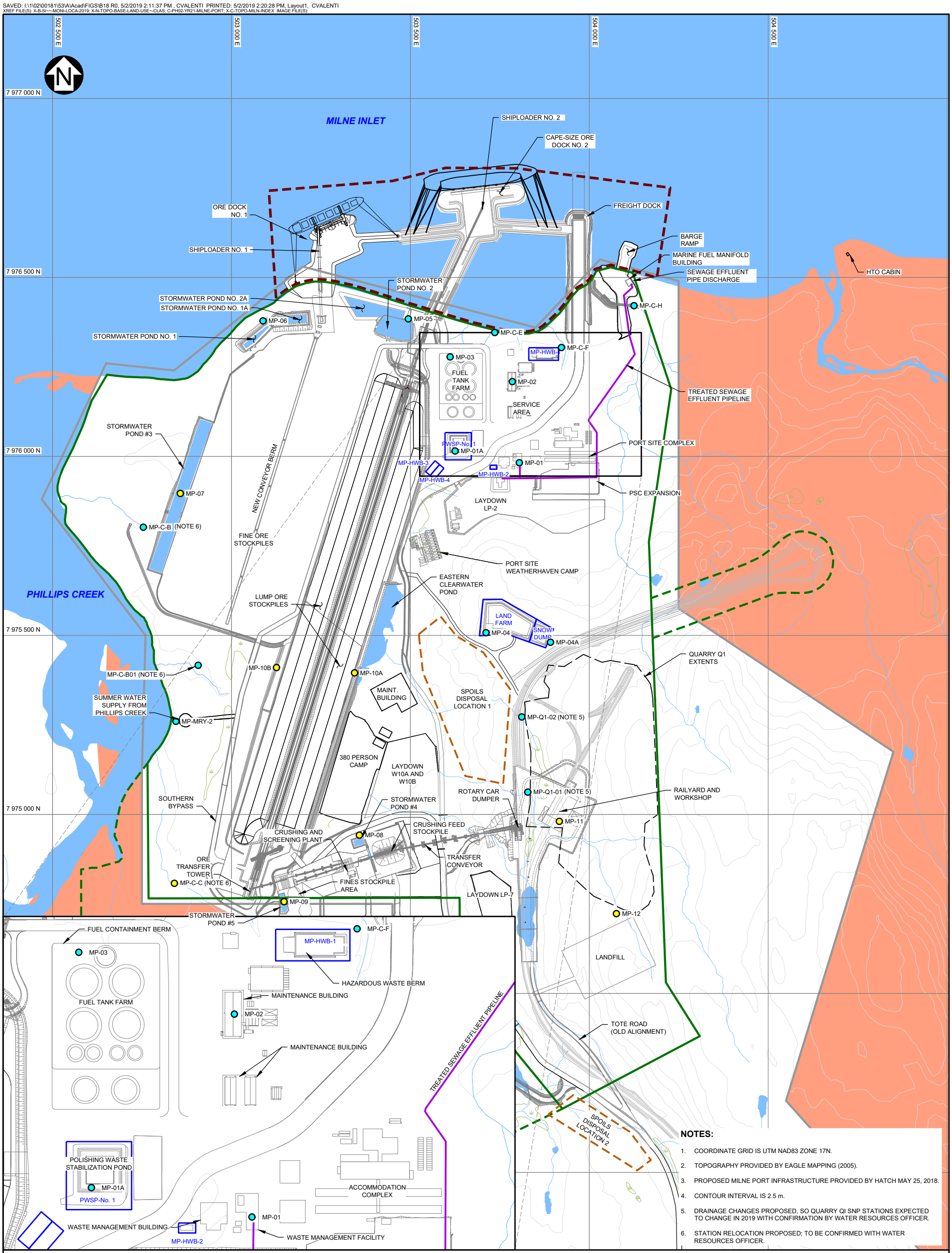
APPENDIX B

SITE DRAINAGE AND MONITORING FIGURES

SAVED: I:\1\02\00181\53\A\Acad\FIGS\B18 R0, 5/2/2019 2:11:37 PM , CVALENTI PRINTED: 5/2/2019 2:20:28 PM, Layout1, CVALENTI
XREF FILE(S): X-B-SI~~-MONI-LOCA-2019; X-N-TOPO-BASE-LAND-USE~~CLAS; C-PH02-YR21-MILNE-PORT; X-C-TOPO-MILN-INDEX IMAGE FILE(S):



NOTES:

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

LEGEND:

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

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

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

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

PHASE 2 PROPOSAL MILNE PORT LAYOUT SHOWING WATER LICENCE MONITORING STATIONS

Knight Piésold CONSULTING

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

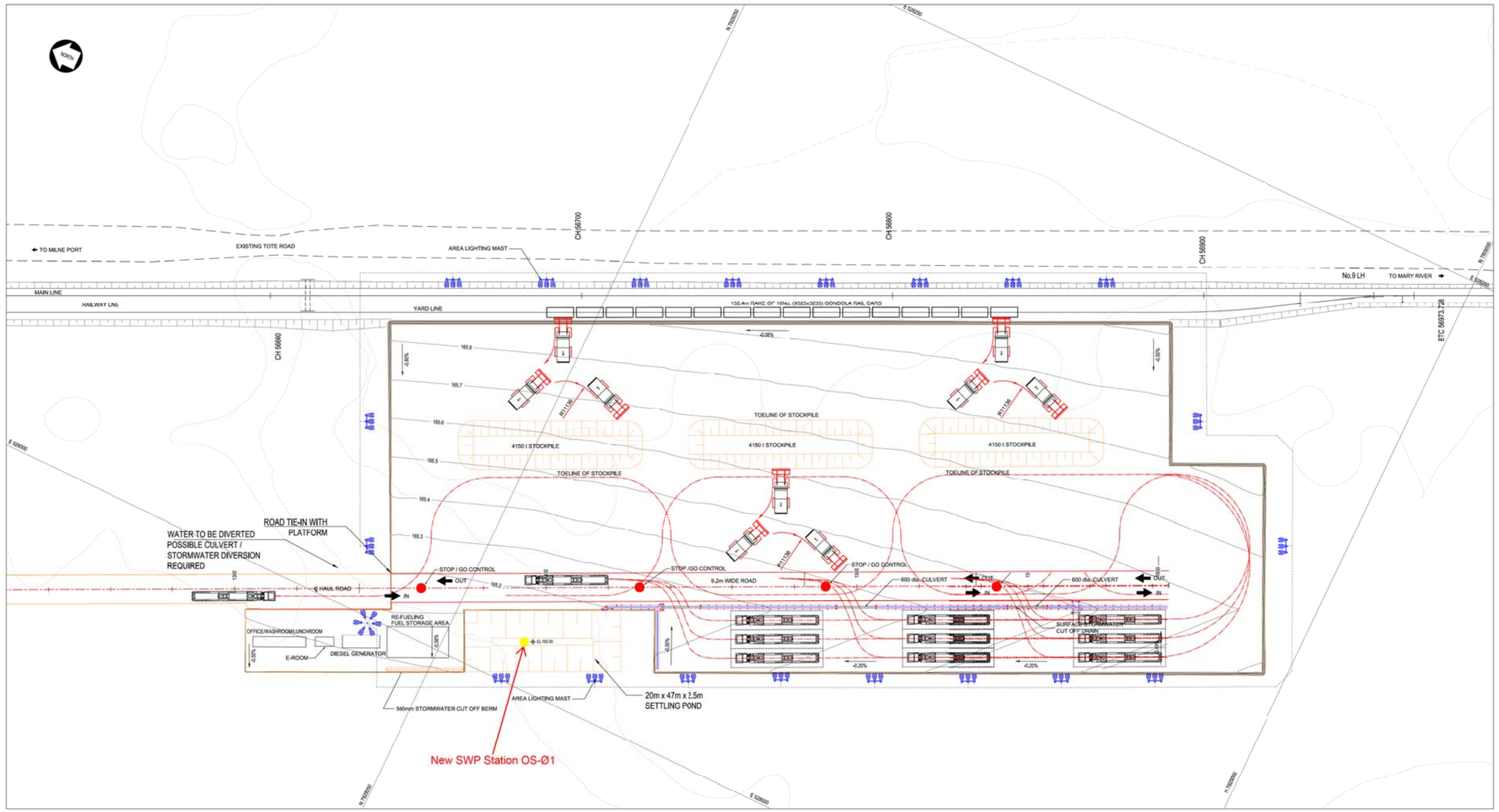
FIGURE 6.1 | REV 0

DWG. No. H353004-30000-224-271-0029-0001

KEY PLAN
N.T.S.

NOTES:
1. LIDAR SURVEY PROVIDED BY PHOTSAT (2016)
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
3. CONTOURS ARE IN METERS. CONTOUR INTERVAL IS 0.5m.
4. ALL DIMENSIONS SHOWN ARE IN METERS, UNLESS OTHERWISE SPECIFIED.

LEGEND:
198 CONTOUR
NEW TREATED EFFLUENT



LOADING PLATFORM LAYOUT
SCALE 1:500

DRAWING No.	DRAWING TITLE
H353004-30000-224-273-0032-0001	TEMPORARY LOADOUT CROSS SECTION
H353004-30000-224-271-0029-0003	HAUL ROAD LAYOUT AND PROFILE 800m to 1600m
H353004-30000-224-271-0029-0002	HAUL ROAD LAYOUT AND PROFILE 0.0m to 800m

REFERENCE DRAWINGS

NAME
SIGNATURE
ENG REG NUMBER
REVISION DATE
ORIGINAL DATE
REG. PROFESSIONAL

INTERNAL/CLIENT REVIEW

No.	DESCRIPTION	BY	CHK'D	DATE
A	INTERNAL / CLIENT REVIEW	WT	PVB	2017/02/03

REVISIONS

HATCH

DRAFTSPERSON	S VAN DER WALT	NR	2018/03/21
DESIGNER	S VAN DER WALT	NR	2018/03/21
CHECKER	A AQUIL		-
DESIGN COORD.	A AQUIL		-
RESP. ENG.	F VAN BILJON		-
LEAD DISC. ENG.	F VAN BILJON		-
AREA LEAD	F VAN BILJON		-
ENG. MANAGER			-
AREA MANAGER			-

ROLE	NAME	SIGNATURE	DATE

DRAWING APPROVAL STATUS: INTERNAL / CLIENT REVIEW

Baffinland

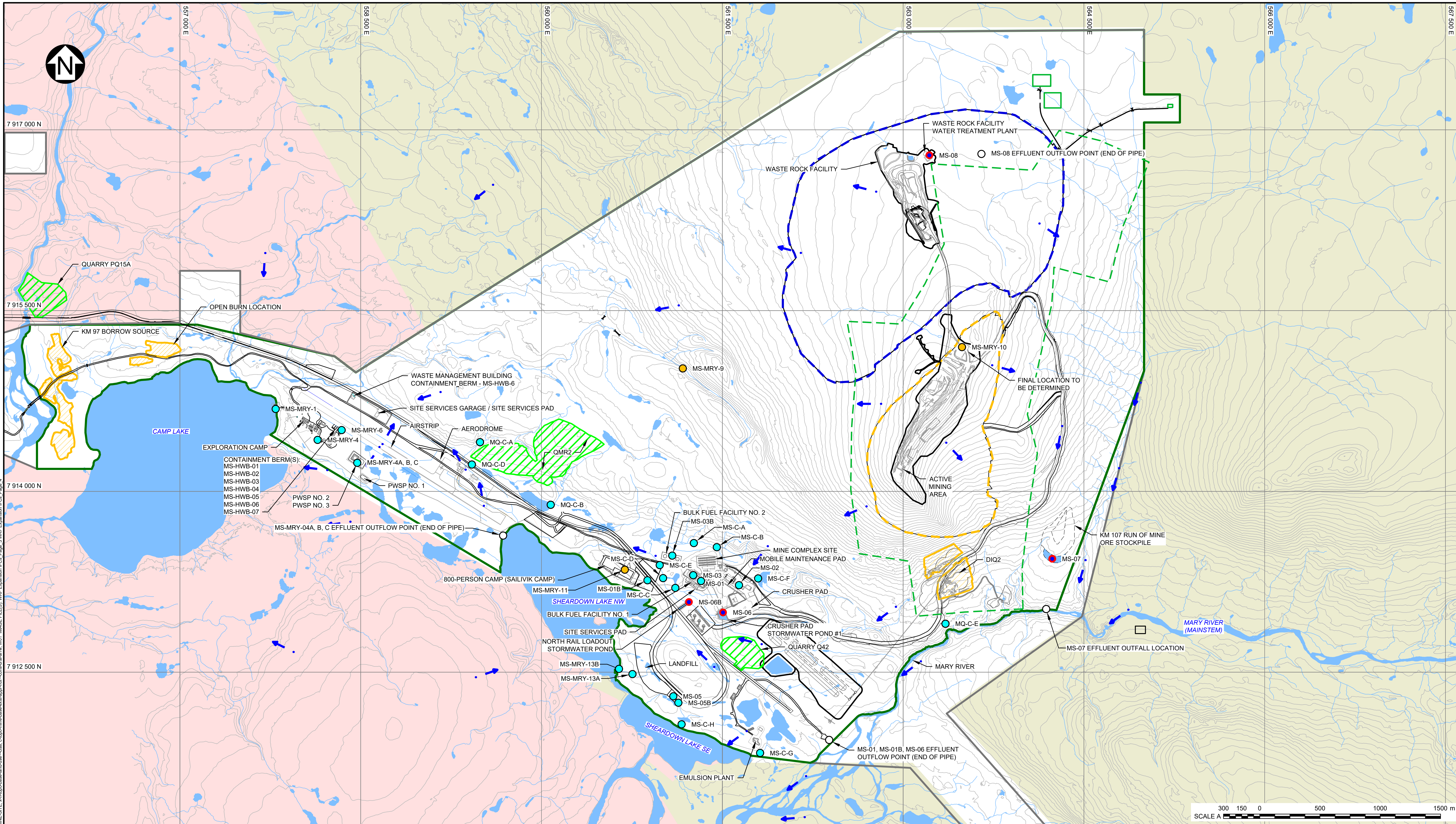
BAFFINLAND IRON MINES LP
MARY RIVER EXPANSION PROJECT

RAIL SITE (56km)
RAIL TEMPORARY LOADING FACILITY

SCALE	DWG. No.	REV
1:2000 OR AS NOTED	H353004-30000-224-271-0029-0001	A

SHEET SIZE: A0

BUSINESS UNITS / DISCIPLINES / STAGES



LEGEND:

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

NOTES:

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

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

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

PHASE 2 PROPOSAL
MINE SITE LAYOUT SHOWING
WATER LICENCE MONITORING STATIONS

Knight Piésold CONSULTING

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

FIGURE 6.2 REV 0