ATTACHMENT 29

Environmental Protection Plan

(140 Pages)

Baffinland Iron Mines Corporation

ENVIRONMENTAL PROTECTION PLAN

BAF-PH1-830-P16-0008

< PHASE 2 PROPOSAL REVISIONS - FOR REVIEW PURPOSES ONLY >

REV B

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DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
07/15/14	0	AV	JM	Issued for Use
30/16	1	LW	JM	Issued for Use
10/23/19	2			Under Review

All staff members are responsible to ensure the latest version is used; these are available at: http://www.baffinland.com/document-portal-new/?cat=9&archive=1.

CONCORDANCE TO PREVIOUS DRAFT PLAN

Previous Section		Updated Section		Comments
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1.2	Organization of the Environmental Protection Plan	1.2	Document Organization	
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		1.4	Relationship to Other Management Plans	New section
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1.4	Environment Approvals	1.6	Environmental Approvals	
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2.18	Tote Road Watercourse Crossings Installation	4.7	Watercourse Crossings Installation	Added rail watercourse crossings
2.19	Road Traffic Management	2.4	Road and Rail Traffic Management	Added rail traffic management
2.20	Drilling, Blasting and Crushing	4.6	Drilling, Blasting and Crushing	
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3.11	Active Migratory Bird Nest Search Form		Appendix B7	
3.12	Off-Site Waste Disposal Log		Appendix B12	Replaced by Bill of Lading Marine Transport
3.13	Wastewater Log			Deleted
3.14	Watercourse Crossing Data Monitoring Form			Deleted
3.15	Turbidity Monitoring Data Form			Deleted
3.16	Environmental Inspection Forms			Deleted
4.0	Request For Revision To An Operational Environment Standard	9.0	Request for Revision to an Operational Environment Standard Appendix C	
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1.0 INTRODUCTION

The Environmental Protection Plan (EPP) concisely describes the procedures and control actions to be implemented by Project Personnel in the field to protect the environment throughout the lifecycle of Baffinland Iron Mines Corporation's (Baffinland's) Mary River Project (Project).

1.1 PURPOSE AND SCOPE

The EPP provides Operational Environmental Standards (OESs) to identify and address Project environmental issues and concerns and to provide guidance and control measures (which may be field fitted as required), to avoid potential negative impacts to the environment and/or minimize or mitigate these impacts to the greatest extent practicable. The OESs and are intended to be used in conjunction with relevant documents such as Environmental Management Plans (EMPs), Standard Operating Procedures, Environmental Permits, Licences, Regulation, etc.

The EPP will be updated as required to reflect current management reviews, incident investigations, regulatory changes, or other Project-related process modifications. The EPP is an integral part of the Project's Environmental Management System to allow for the integration of environmental issues, the terms and conditions of Project authorizations and regulations into the construction and operation of the Project through the implementation and evolution of the OESs presented in this document.

The EPP provides a practical way to facilitate field implementation of environmental regulations, practices, and measures required to eliminate or reduce potential adverse environmental effects. It is a working document for use by Project Personnel, as well as at the Baffinland corporate level for ensuring commitments made in policy statements are implemented and monitored. The EPP provides a quick reference for Project Personnel to monitor for compliance and to make suggestions for improvements. This EPP provides the general protection measures for routine and unplanned activities associated with the Project. The EPP is developed in recognition of applicable permits, authorizations, approvals and Inuit Knowledge. As well, the plan provides operational measures that comply with aforementioned permits, approvals, etc., and provides reference to other associated and relevant documents such as Environmental Management Plans and Standard Operating Procedures.

The specific purposes of the EPP are as follows:

- Provide a reference document to ensure that commitments to minimize adverse environmental effects will be met.
- Document and identify environmental concerns and ensure appropriate protection measures are implemented.
- Provide concise guidance to Project Personnel regarding the implementation of appropriate standards for protecting the environment and minimizing adverse environmental effects.
- Provide a reference and training document for Project Personnel when planning and/or conducting specific activities and working in specific areas.
- Communicate changes in the program through the revision process.
- Provide a reference to related applicable documents such as legislative requirements, guidelines, permits, Environmental Management Plans, Standard Operating Procedures, etc.

Project Personnel are expected to understand and implement the environmental protection measures provided within the EPP. If Project Personnel do not understand or are unclear regarding how or when to implement an environmental protection measure the Environment Department must be contacted to obtain clarification.

1.2 DOCUMENT ORGANIZATION

The OESs are grouped as follows:

- Section 2 - Land and resource use
- Section 3 - Wildlife
- Section 4 - Construction activities
- Section 5 - Water management
- Section 6 - Waste management
- Section 7 - Drilling

The remaining sections provide supporting details as follows:

- Section 8 - Compliance inspections
- Section 9 - Request for revision to an OES
- Section 10 - Review of Plan effectiveness
- Section 11 - References

1.3 ADAPTIVE MANAGEMENT

Adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes (Canadian Environmental Assessment Agency, 2016). Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project.

Baffinland has developed an Adaptive Management Plan (AMP) that provides the framework by which adaptive management is to be incorporated into Project operations (Baffinland, 2019). The adaptive management process is iterative and starts with a planning phase; followed by implementation of monitoring; ongoing evaluation of the effectiveness of the plans based on monitoring results; and adjustment of the management strategies and responses as needed. This process is illustrated on Figure 1.1.

FIGURE 1.1 BAFFINLAND'S ADAPTIVE MANAGEMENT PROCESS

Baffinland has incorporated adaptive management into its environmental management system including most environmental management plans. Given the EPP is intended to provide a wide range of Project personnel with concise descriptions of environmental protection measures that can be implemented in the field, descriptions of adaptive management measures are beyond the scope of this EPP and are reserved for the discipline-specific management plans. Relationship to Other Management Plans

The EPP describes the environmental protection measures described in a wide range of management plans. Relevant management plans are identified in each OES/Section.

1.4 CORPORATE POLICIES

Baffinland has two corporate policies that apply to environmental management:

- **Sustainable Development (SD) Policy -** identifies Baffinland's commitment internally and to the public to operate in a manner that is environmentally responsible, safe, fiscally responsible and respectful of the cultural values and legal rights of Inuit.
- **Health, Safety and Environment (HSE) Policy -** describes the company's commitment to achieve a safe, healthy and environmentally responsible workplace.

All employees and contractors must comply with the contents of these policies, which are included in Appendix A.

1.5 ENVIRONMENTAL APPROVALS

Table 1.1 provides a list of Baffinland's issued Environmental Approvals.

TABLE 1.1 ENVIRONMENTAL APPROVALS ISSUED TO BAFFINLAND

Permit ID	Licence Name	Status	Expiry
Nunavut Impact Review Board			
No. 005 (Amendment No. 1)	Amended Project Certificate	All works and activities proposed have been screened by the Nunavut Impact Review Board (NIRB) and have been considered in the amended Project Certificate issued by the NIRB in May 2014. A NIRB Annual Report is submitted by March 31 of each year summarizes the status of the Project relative to the conditions outlined in the Project Certificate.	N/A
No. 005 (Amendment No. 2)	Amended Project Certificate	Amendment No. 2 was issued October 30, 2018 to reflect modifications to the Project associated with the Production Increase Proposal.	December 31, 2019
Nunavut Water Board (NWB) Licences			
2AM-MRY1325 Amendment No. 1	Type A Water Licence	Current	June 30, 2025
2BE-MRY1421	Type B Water Licence	In good standing; no amendments from previous year.	April 16, 2021
8BC-MRY1416	Type B Water Licence	The activities therein are now covered by the amended Type A. As such, the licence was cancelled by the NWB on February 25, 2016.	Cancelled
Crown Land Use Permits and Quarry Permits			
47H/16-1-2	Foreshore Area for Milne Port Ore Dock Lease	In good standing; no changes from previous year. Will be renewed.	June 30, 2035
N2014Q0016	Tote Road and Borrow Area Land Use Permit	In good standing; no changes from previous year. Will be renewed.	June 30, 2019
N2014C0013	Steensby Camp Land Use Permit	In good standing, no changes from previous year. Will be renewed.	June 30, 2019
N2014J0011	Bruce Head Land Use Permit	In good standing, no changes from previous year. Will be renewed.	June 30, 2019
N2014X0012	Milne Foreshore Land Use Permit	In good standing, no changes from previous year.	June 30 2019
#2483, #2484, #2485	Mineral Leases	In good standing. Lease #2484 covers Deposit No. 1.	August 27, 2034

Permit ID	Licence Name	Status	Expiry
Authorizations under the Fisheries Act			
06-HCAA-CA7-0084	Crossings along the Milne Inlet Tote Road Authorization	The authorization remains valid and has been amended over the years. Monitoring and reporting to Department of Fisheries and Oceans (DFO) occurs annually.	N/A
NU-07-0050	Upgrades to Tote Road Crossings Letter of Advice	The construction summary report was provided in the 2014 Annual Report to NIRB.	N/A
14-HCAA-00525	Authorization - Milne Ore Dock	A monitoring report for the construction of the ore dock was submitted to DFO on January 4, 2016.	December 31, 2020
NU‑06‑0084	Fisheries Authorization - Tote Road		N/A
18-HCAA-00160	Fisheries Authorization Freight Dock	Issued March 21, 2019 to allow for construction of the freight dock at Milne Port.	June 1, 2020
Approvals under the Navigable Waters Protection Act			
8200-07-10273, 8200-07-10267, 8200-07-10269, 8200-07-10268, 8200-07-10274, 8200-07-10272, 8200-07-10266, 8200-07-10271	Construction of Watercourse Crossings (Bridges and Culverts)	In good standing, no changes from previous year. Apply to crossings CV040, BG50, CV128, CV223, CV072, BG17, CV217, and CV099.	Until complete
001743	Statement of Compliance of a Marine Facility	Approval for the Milne Inlet Marine Facility to conduct ore operations. In good standing.	June 24, 2020
Approvals under Nunavut Mine Health and Safety Act			
-	-	In good standing, no changes from previous year.	-
Licence under the Explosives Act			
F1-076068/E	Division 1 Factory Licence	Held by explosives contractor for the Project.	May 31, 2019
Leases under the Nunavut Land Claims Agreement			
Q13C301	Inuit Owned Land Commercial Lease	Compliance with the lease is outlined in the 2015 Annual Report to QIA and NWB.	December 31, 2043

NOTE:

1. The *Navigable Waters Protection Act* was replaced by the *Canadian Navigable Waters Act* in 2019.

The terms and conditions of these approvals have been incorporated into the OESs provided in this document. Project Personnel are directed to the applicable approvals. Should discrepancies exist between the OES and approvals provided in Table 1.2, the approvals govern. Official copies of the approvals are maintained on site by the Baffinland Document Controller.

1.6 RESPONSIBILITIES

The personnel responsible for implementing this plan and their respective roles are described in Table 1.2.

TABLE 1.2 ROLES AND RESPONSIBILITIES FOR IMPLEMENTATION OF THE EPP

Position	Responsibilities
Vice-President, Corporate Sustainability	Provide corporate resources and overall direction to the implementation of the EPP.
Health, Safety, Environment and Security Director	Provide corporate resources and overall direction to the implementation of the EPP. Provide review and approval of revised versions of EPP.
Health, Safety, Environment and Security Manager	Provide technical guidance and final review and approval of revised versions of EPP Ensure EPP is properly communicated to departmental Site Managers and ensure adequate training is in place for all site Supervisors.
Environmental Superintendents and Coordinators	Conduct a review and revision of the EPP on an as needed basis to determine if updates are required, or at the request of the Environmental Manager. Review revisions to the EPP. Ensure revisions are distributed to managers and supervisors. Perform document controls. Ensure that managers, supervisors and their staff are familiar with the EPP and its protection measures. Obtain approvals from management.
Site Managers (including Contractors)	Implement the EPP in daily operations. Maintain a current copy of each relevant OES and the Contents and Revision Control List (Section 0). Provide training and support to ensure successful implementation of the EPP. Initiate changes to improve and update the plan as needed.
Site Personnel	Familiarization with the relevant sections of the EPP. Have knowledge of reporting procedures.
Environmental Consultants	Provide technical support to EPP development and ongoing revisions. Provide audits of EPP implementation, as requested by the VP Sustainable Development.

2.0 LAND AND RESOURCE USE

2.1 CULTURAL HERITAGE AND ARCHAEOLOGICAL RESOURCES

2.1.1 ENVIRONMENTAL CONCERN

The Mary River Project area has been occupied by humans for over 4,000 years. Archaeological sites are very common throughout the region, mostly consisting of stone structures that usually represent tent rings and shelters, caches, traps, hunting blinds, cairns and *inukshuks*. Stone tool making sites are also present. These types of archaeological sites and features are often difficult to recognize. All archaeological sites are valuable, non-renewable sources of information about local people's history and provide crucial data for scientists studying Northern ways of life throughout the past. It is against territorial law to disturb known or suspected archaeological sites, punishable by fine or imprisonment. Many areas of the Project have not been surveyed by a qualified archaeologist; therefore, Project Personnel must obtain approval from the Environment Department before traveling off existing roads or disturbing ground surfaces.

Milne Port, the Tote Road, and Mary River sites have been identified as having high overall archaeological potential. While surveys have been completed throughout Project areas, they are ongoing. The locations of identified archaeological finds have been provided to Baffinland.

2.1.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 2.1.

TABLE 2.1 CULTURAL HERITAGE AND ARCHAEOLOGICAL RESOURCES RELATED DOCUMENTS

Document No.	Title
This EPP	Appendix B1 Cultural Heritage Chance Find Discovery Report
BAF-PH1-830-P16-0006	Cultural Heritage Resource Protection Plan

2.1.3 ENVIRONMENTAL PROTECTION MEASURES

The following procedures will be implemented to minimize the potential to impact an archaeological site:

- Project Personnel shall not deviate from already disturbed areas or established routes (existing roads and camp areas).
- Cultural resources discovered during Project activities (Chance Finds) shall be reported to the Environment Department, who will develop a course of action in consultation with the Project Archaeologist.
- Upon a discovery, a Cultural Heritage Chance Find Discovery Report must be completed and submitted to the Environment Department.
- Human remains and funerary objects shall be treated with dignity and respect at all times, regardless of ethnic origins, cultural backgrounds or religious affiliations.
- Artifacts shall be left where they are found. If artifacts are disturbed or removed, their location shall be reported to the Environment Department.
- Archaeological site locations shall be kept confidential to prevent unauthorized collection or disturbance of artifacts.

- Known sites near Project activities will be marked by stakes, flagging and/or yellow rope at approximately 30 m away from each site.
- Project Personnel shall avoid and remain more than 30 m away from all known or suspected archaeological sites, staying well away from any temporary protection measures such as flagging, stakes and/or yellow rope fencing.
- Existing inukshuks shall not be modified or disturbed. New inukshuks or rock piles shall not be constructed since building new rock piles may clutter the archaeological record and/or result in unknowingly using rocks from existing archaeological sites.
- Known archaeological sites shall be avoided by re-routing roads and establishing borrow excavations at locations approved for use by the Project Archaeologist. Sites that cannot be avoided will be mitigated by the archaeology team prior to construction activities.
- If suspected archaeological or human remains (structures, artifacts or bones) are unearthed during work operations, stop work immediately and notify the Environment Department. The Environment Department will in turn contact the Project Archaeologist and the appropriate lands inspector and the Government of Nunavut, as required by law. The Project Archaeologist shall complete an archaeological review of all proposed Project Areas as they are finalized to identify areas with possible conflicts and areas where Project activities may proceed.

2.2 AVOIDING DISTURBANCE TO LOCAL LAND USERS

2.2.1 ENVIRONMENTAL CONCERN

Land and resource use in the Project Area includes hunting, fishing, trapping and tourism. Potential impacts to existing land use will include the interruption of camping, hunting, tourism and marine activities in and around Milne Port, the Tote Road, the North Railway, and Mary River. During open water, it is common for Pond Inlet residents to travel by boat to Milne Port. During fall, winter and spring, hunters travel to Project Areas to hunt seals on the sea ice and caribou inland. Baffinland is committed to minimizing disturbance to land users to the extent possible.

2.2.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 2.2.

TABLE 2.2 AVOIDING DISTURBANCE TO LOCAL LAND USERS RELATED DOCUMENTS

Document No.	Title
This EPP	Section 2.3 Aircraft Flights
	Section 2.4 Road and Rail Traffic Management
	Appendix B2 Hunter and Visitor Access Log
	Appendix B3 Visitor Access Routes - Mary River and Milne Port
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan
BAF-PH1-830-P16-0023	Roads Management Plan
BAF-PH1-320-PRO-0050	Site Snow Management Procedure
BAF-PH1-830-PRO-0002	Hunter and Visitor Site Access Procedure

2.2.3 ENVIRONMENTAL PROTECTION MEASURES

Measures will be implemented to minimize disturbance to existing land use patterns for the duration of the Project. These measures include:

- Advanced notification of shipping schedules to the community of Pond Inlet and to Nunavut Tourism. This will allow other land users (e.g., hunters, tourist operators) to re-schedule or modify travel plans, if preferred.
- Limit activities at Milne Port to the western portion of the beach near camp and do not operate equipment along the eastern half of the beach or off existing roads.
- Aircraft will fly in accordance with guidelines outlined in the Aircraft Flights OES (Section 2.3).
- Road traffic will operate in accordance with guidelines outlined in the Road and Rail Traffic Management OES (Section 2.4).
- Railway construction will be carried out in accordance with the guidelines outlined in the Railway Operation and Maintenance Plan, in accordance with the Hunter and Visitor Site Access Procedure.
- Railway traffic will operate in accordance with guidelines outlined in the Road and Rail Traffic Management OES, the Railway Operation and Maintenance Plan, and the Hunter and Visitor Site Access Procedure.
- Pilots and others will record the presence of other land users in the Hunter and Visitor Access Log posted at each site and will notify the Environment Department of any sightings.
- Land users are encouraged to record their presence using the Hunter and Visitor Access Log posted at each Project Site.
- Early warning signs will warn road users of an approaching railway crossing and stop sign ahead.
- A combined stop and railway crossing sign will be located on either side of the crossings.
- Designated railway crossings will be marked and graded to a slope of 1:5 to enable road users to cross the railway safely without damage to personal property.
- Crossing timbers will ease vehicle, ATV, and snowmobile crossing at assigned crossing locations.
- Instructional bulletins regarding the rail crossings will be posted in English and Inuktitut at Project facilities.
- Any disruptions to land use will be documented so that this information can be considered in subsequent phases of project development.
- Baffinland has developed a Hunter and Visitor Site Access Procedure which provides safe access routes to and instructions upon arrival for Hunters and Visitors visiting Project Sites.

As discussions with local communities advance regarding the Phase 2 Proposal, additional mitigation measures may be identified that require incorporation into this OES.

2.3 AIRCRAFT FLIGHTS

2.3.1 ENVIRONMENTAL CONCERN

The construction and operation phases of the Project involves air traffic consisting of flights by helicopters, smaller twin-engine fixed wing aircraft, and chartered commercial jets. The high level of aircraft use requires pilots, and Project Personnel directing pilots, to be aware of the potential disturbances to wildlife and the requirements of the various permits and licences issued to Baffinland. Additionally, Inuit hunters may be moving through the Project Area at any time of the year, and Baffinland has committed to minimizing disturbance of local users to the extent possible. All Project Personnel are responsible for operating in accordance with the legal requirements and commitments outlined in this OES. However, safety is the most critical aspect of aircraft operations and safety considerations supersede other concerns.

2.3.1.1 CONCERNS REGARDING WILDLIFE

Aircraft can cause disturbance to wildlife by interrupting their activities (i.e., feeding, calving, migration, etc.) and possibly causing the animals to leave an area and important habitats. Caribou, important to Inuit culture and diet, can be sensitive to aircraft noise. Disturbance of caribou has the greatest effect prior to, during, and following calving (approximately mid-May to mid-July). Migratory birds are also disturbed by low-level overflights.

2.3.1.2 CONCERNS REGARDING INUIT LAND USE

Aircraft can disturb hunters or other land users (i.e., tourists) during low level flights that disturb the people and/or the wildlife they may be pursuing. Land users travel over land and ice from roughly November through late June/early July. August is particularly important for boats due to the short duration of open water. Land users may travel by boat and camp in Milne Inlet, and may travel inland hunting caribou by walking or using all-terrain vehicles. Remember that local land users were here first.

2.3.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 2.3.

TABLE 2.3 AIRCRAFT FLIGHTS RELATED DOCUMENTS

Document No.	Title
This EPP	Section 3.1 Polar Bear Encounters
	Section3.2 Fox and Wolf Encounters
	Section 3.3 Caribou Protection Measures
	Section 3.4 Bird Protection Measures
	Appendix B4 Wildlife Log and Instructions
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan

2.3.3 ENVIRONMENTAL PROTECTION MEASURES

The following environmental protection measures will be implemented to minimize the disturbance caused by aircraft:

- Minimize the number of flights to the extent possible.
- Subject to safety requirements, aircraft will maintain a cruising altitude of at least:
  - 650 m above ground level minimum.
  - 1,100 m vertical and 1,500 m horizontal from observed concentrations of migratory birds. If altitude is not possible, maintain a lateral distance of at least 1,500 m.
  - In July and August, either avoid travelling over, or use a minimum of 1,100 m vertical distance, when travelling over the Snow Goose Area shown on Figure 2.1.
- Low-level flights are required during slinging operations in the vicinity of the Mine Site and Steensby Camp, Milne Port and on occasion at other locations, or where short distances are involved.
- Low-level flights are permitted during wildlife surveys, as directed by the Project biologists in accordance with wildlife research permits.

- Ensure that certification of noise compliance is current, where compliance is applicable.
- Employees are responsible for reporting to the appropriate supervisor any improper flight practices.
- Avoid caribou calving sites, as identified by Project biologists or observed by aircraft pilots, between May 15 and July 15.
- Pilots shall report to the Environment Department caribou movements and locations during calving and post-calving periods, so that these areas can be avoided.
- Avoid large concentrations of wildlife and take alternate routes.
- Plan routes that are likely to have the least occurrences of wildlife.
- Hovering or circling may greatly increase disturbances and must be avoided when practical.
- Flights between Pond Inlet and Mary River will be routed to minimize interruption with community activities within the fiords between the site and the community.
- The Environment Department will inform pilots of wildlife sensitive areas.
- For details on reporting wildlife sightings, refer to the Wildlife Log Instructions.

2.4 ROAD AND RAIL TRAFFIC MANAGEMENT

2.4.1 ENVIRONMENTAL CONCERN

Project-related road and rail traffic will be managed to:

- Ensure smooth flow of road traffic during the Project's construction and operation.
- Ensure efficient and orderly movement of rail traffic throughout Project operations.
- Ensure that adequate information is given to drivers, other road users and pedestrians (on Mine Site and Milne Port site roads) in a timely manner to avoid accidents and holdups.
- Ensure necessary information is provided to land/road users and others whose activities may occur in vicinity of the railway to ensure safety.
- Ensure safety of land users along the North Railway and the Tote Road area are able to safely use the land through the provision of cabins, snowmobile trails and designated snowmobile crossings. Additionally, dedicated pick-ups and trailers will be provided to move people and snowmobiles between the port and mine.
- Ensure assessment, monitoring, and improvement of the existing road traffic site plans.

Over the life of the Project, there will be different levels of traffic flow. The peak flow periods of vehicles and equipment and construction workers are expected to occur during the day. Low flow periods will be during the night. However, traffic flow will highly depend on operational planning or restrictions.

The main environmental concerns related to traffic management are:

- Traffic during construction and operations, if not properly managed, may cause disruption, accidents, and interference in local community lifestyle.
- Railway crossings for wildlife and other land users.
- Project traffic has the potential to affect traditional land-based activities (i.e., hunting).
- Improper traffic management may cause increased dust levels and higher environmental risks pertaining to hydrocarbon releases.

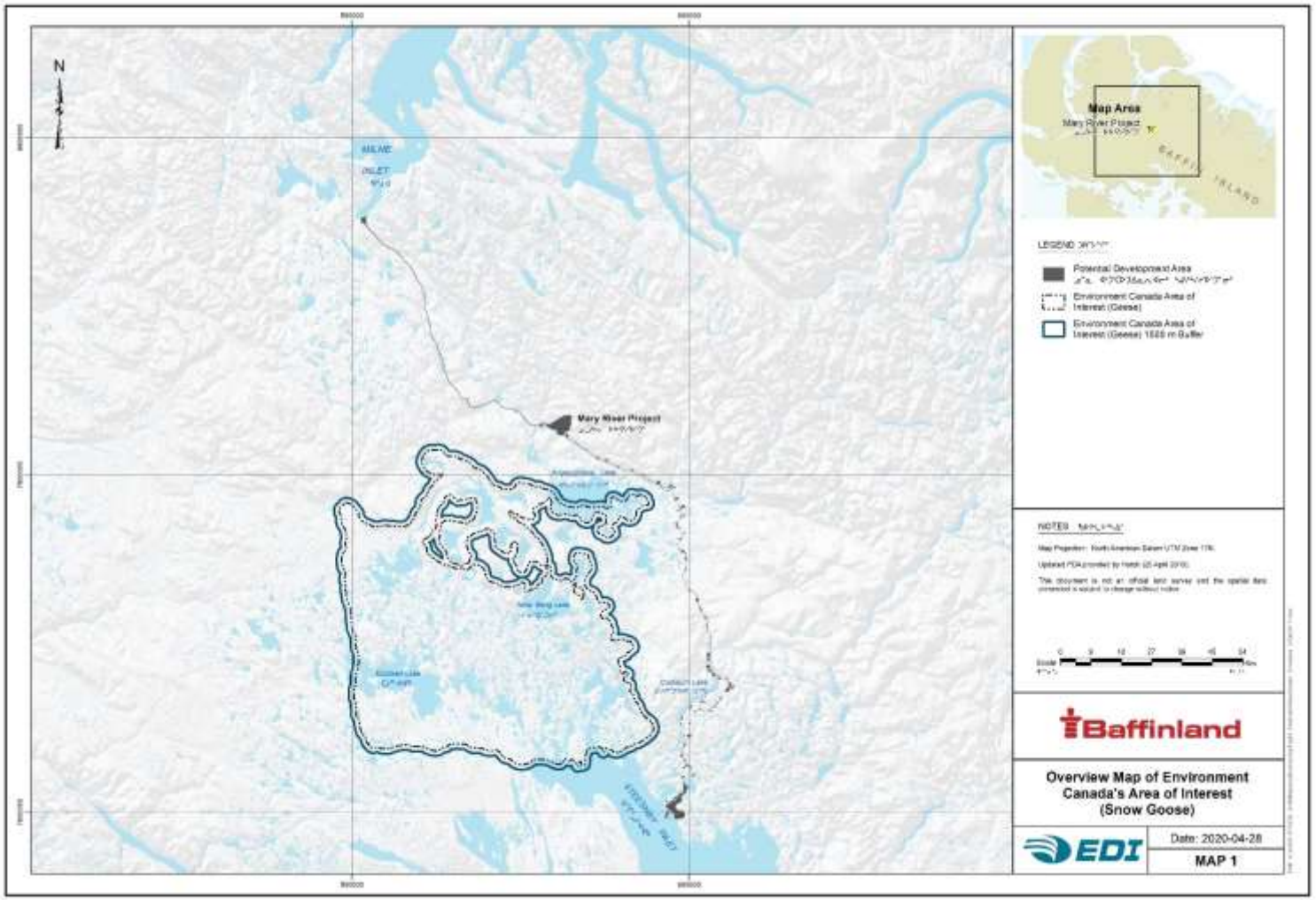

FIGURE 2.1 THE MARY RIVER PROJECT AND THE SNOW GOOSE AREA

Once the North Railway is operational, Inuit land users will be able to use the Milne Inlet Tote Road under the terms of a Controlled Access Policy to be developed in consultation with the communities. Additional measures may be identified in this future policy that warrant incorporation into this OES. Related Documents

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 2.4.

TABLE 2.4 ROAD AND RAIL TRAFFIC MANAGEMENT RELATED DOCUMENTS

Document No.	Title
This EPP	Appendix B4 Wildlife Log Instructions and Wildlife Log Form
BAF-PH1-830-P16-0023	Roads Management Plan
TBD	Railway Operation and Maintenance Plan
BAF-PH1-830-P16-0027	Terrestrial Environment Mitigation and Monitoring Plan
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan
BAF-PH1-320-PRO-0050	Site Snow Management Procedure
TBD	Tote Road Controlled Access Policy (to be developed)
TBD	Culture, Resources and Land Use (CRLU) Monitoring Program (to be developed)
Q13C301	QIA Commercial Lease (Inuit Owned Land Commercial Lease)
N2014Q0016	CIRNAC Quarry and Land Use Permits (Tote Road and Borrow Area Land Use Permit)

Railway traffic management will be addressed within a Railway Operation and Maintenance Plan being prepared for the North Railway. This section of the EPP will be updated based on the content of the Railway Operation and Maintenance Plan, once available. Baffinland will also be developing a Culture, Resources and Land Use (CRLU) monitoring program in consultation with the QIA and the communities.

2.4.2 ENVIRONMENTAL PROTECTION MEASURES

Work will be conducted in accordance with the Environmental Protection Measures listed in the documents in the table above.

3.0 WILDLIFE

3.1 POLAR BEAR ENCOUNTERS

3.1.1 ENVIRONMENTAL CONCERN

Polar bear encounters at the Mary River Project pose an immediate threat to life, health, safety, environment, and property. Polar bears are protected in Canada where they are legally hunted. Seasons, protected categories, and quotas apply. The purpose of the Wildlife Act (statute of Nunavut) is to establish a comprehensive regime for the management of wildlife and habitat. The legislation provides that it is legal for anyone to attempt to deter, and if necessary, destroy, a bear in defense of life or property. Any bear killed must be reported to the nearest conservation officer. It is an offense to allow the hide of a polar bear to spoil.

3.1.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 3.1.

TABLE 3.1 POLAR BEAR ENCOUNTERS RELATED DOCUMENTS

Document No.	Title
This EPP	Appendix B5 Polar Bear Readiness Procedure and Audit
BAF-PH1-830-P16-0041	Polar Bear Safety Plan
BAF-PH1-830-P16-0007	Emergency Response Plan
	Inuit Impact Benefit Agreement
	QIA Directive 2013-1-17-2

3.1.3 ENVIRONMENTAL PROTECTION MEASURES

The Polar Bear Safety Plan is to be used in conjunction with Baffinland's Emergency Response Plan, which provides the following guidance:

- Ensure the safety and well-being of personnel, the environment, and property.
- Identify the types of emergencies that may occur and the procedures to respond, intervene, stop, or limit the emergency situation.
- Ensure effective communication between personnel and the mine rescue team.
- Ensure that personnel responding to emergencies are trained and have appropriate resources for the response.

In addition to the measures outlined in the Emergency Response Plan, the following measures must also be implemented to minimize the potential for bear-human encounters:

- Site and working areas will be kept clean of food scraps and garbage at all times. Effective waste management is paramount to reducing the likelihood of encounters.
- Do not attempt to chase, catch, or follow polar bears under any circumstance.
- Polar bears that attempt to approach work sites or personnel must be actively deterred by shouting or the use of noise makers such as bear bangers whenever possible.

- All polar bear sightings must be reported immediately to the Environmental Superintendent or his designate, regardless of the time of day.
- Bear monitors will be posted at coastal locations and will accompany remote field crews that do not have full-time air support.
- The Environmental Superintendent or his designate will authorize and coordinate the use of deterrent measures. A defence kill is to be used as an absolute last resort only when there is an imminent risk to human safety.
- Helicopters may be used to haze/deter polar bears away from camps only under the authorization and direction of the Environmental Superintendent or his designate.
- Any defensive kills must be reported immediately to the Environmental Superintendent or his designate, who will notify the Qikiqtani Inuit Association (QIA), Hunters and Trappers Organization (HTO), wildlife officer, and other stakeholders as required. The Inuit Impact Benefit Agreement (IIBA) outlines the protocol to be followed in the event of a defensive kill. The meat must not be allowed to spoil and the animal will need to be dressed immediately and the meat and pelt appropriately stored until transportation is available to the designated affected community, in accordance with the IIBA.
- Polar bear safety is a part of the Site Orientation Program.
- Please refer to the Polar Bear Safety Plan that has been developed for more information on mitigation measures and safety measures pertaining to polar bear encounters.
- Routine completion of a Polar Bear Readiness Audit to ensure that all Polar Bear incidents are documented and promptly reported to regulators and that all preparation and requirements regarding Polar Bear mortalities are in place.

3.2 FOX AND WOLF ENCOUNTERS

3.2.1 ENVIRONMENTAL CONCERN

Foxes and wolves can become habituated to sites where they can access food and food waste. This situation can arise from intentional feeding by Project Personnel or improper waste management practices. Once such food conditioning has occurred, these animals lose their fear of humans and may approach Project Personnel in an aggressive fashion. Rabies is usually endemic in fox populations. Habituated foxes that act aggressively need to be dealt with immediately.

3.2.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 3.2.

TABLE 3.2 FOX AND WOLF ENCOUNTERS RELATED DOCUMENTS

Document No.	Title
This EPP	Appendix B4 Wildlife Log Instructions and Wildlife Log Form
BAF-PH1-830-P16-0027	Terrestrial Environment Mitigation and Monitoring
BAF-PH1-830-P16-0028	Waste Management Plan

3.2.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures will be implemented to minimize potential impacts to foxes and wolves and the associated risk to the health and safety of Project Personnel:

- Site and working areas will be kept clean of food scraps and garbage. All waste will be disposed of in accordance with the Waste Management Plan.
- Wildlife will not be intentionally fed under any circumstances. The consequences of such actions will lead to major disciplinary action.
- Solid carnivore proof skirting shall be installed on all kitchen and accommodation buildings to prevent foxes from venturing under buildings.
- Fox and wolf sightings should be recorded in the Wildlife Log at camp. Wolf sightings should be reported to the Environment Department immediately.
- Wildlife attempting to approach personnel will be deterred by shouting, chasing and using noise makers, such as bear bangers. Should those deterrents not work, the site Environmental and Health and Safety Supervisors will be notified immediately for their assessment. Typically, wolves can be readily deterred by the above methods. Based on site experience, foxes are less responsive to deterrence. Due to the high incidence of rabies in foxes on Baffin Island, foxes that exhibit aggressive behaviour to humans, regardless of deterrence measures, are presumed to be rabid. The Environmental and Health and Safety Supervisors will assess the situation and make the recommendation for or against dispatching a likely rabid fox by lethal shot.
- In the rare situation where a lethal shot is necessary, approval to proceed will be provided by the Environment Supervisor for the location. Only personnel authorized and trained in the use of firearms will be used. This task will be executed so that Project Personnel, equipment, and infrastructure are not endangered. If rabies is suspected, a body shot will be taken, and the carcass will be handled to avoid direct physical contact. The carcass will be incinerated immediately, and the Conservation Officer in Pond Inlet will be notified.
- Fox and wolf interactions with Project activities will be documented and included in the Wildlife Logs and annual reports.
- No drilling activity should take place within 2 km of an active wolf den between mid-May and mid-August if direct line of sight and disturbance is noted. Contact on-site Environment staff to determine if a den is in the vicinity of operations.
- Qualified biologists will survey for carnivore (wolf and fox) dens, and an avoidance zone will be identified in consultation with the Project biologist. Den locations will be identified and Project Personnel advised accordingly. All Project personnel will adhere to wildlife and den avoidance guidelines during the denning season.

3.3 CARIBOU PROTECTION MEASURES

3.3.1 ENVIRONMENTAL CONCERN

Caribou are currently present in relatively low numbers in the Project Area, but their numbers and encounter rates are expected to increase through the life of the Project. Caribou harvesting is important to local communities, so there is added importance to ensuring that the Project operates with minimal potential effects on caribou. The potential effects on caribou are changes in behaviour caused by disturbance such as noise and other sensory disturbances from project activities. The primary mitigation for caribou is avoidance followed by monitoring.

A Zone of Influence (ZOI) of 3 km from project activities has been defined for stationary activities such as camps, mining and drilling during the pre- to post-calving time period of May 15 to July 15. At other times of the year the caribou are less sensitive and a ZOI of less than 3 km is likely.

3.3.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 3.3.

TABLE 3.3 CARIBOU PROTECTION RELATED DOCUMENTS

Document No.	Title
This EPP	Appendix B4 Wildlife Log Instructions and Wildlife Log
	Appendix B6 Caribou Encounter Decision Tree
BAF-PH1-830-P16-0027	Terrestrial Environment Mitigation and Monitoring Plan
BAF-PH1-820-POL-0001	Hunting and Fishing (Harvesting) Policy - On or Near Baffinland Leased Lands

3.3.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures will be implemented to minimize disturbance to caribou:

- Employees that are not Nunavut Agreement beneficiaries will not be permitted to hunt or fish on any land accessed from the Project. All personnel shall return home between shift rotations and shall not be permitted to stay in the area to hunt or fish as part of their shift rotations.
- Mobile equipment and vehicles shall yield the right-of-way to wildlife.
- Traffic is to slow down and keep distance from the animals as much as possible. If necessary, traffic (including trains) will stop to enable crossings of groups or to allow groups of caribou paralleling the road to move into adjacent habitat. Specific guidance is provided in the Caribou Encounter Decision Trees for the Tote Road (Figure 3.1) and North Railway (Figure 3.2).
- All caribou sightings will be reported to the Environment Department, who will keep geo-referenced records of caribou sightings. This will enable Project biologists to monitor caribou activity in relation to the Project.
- Active caribou calving sites (as identified by Project biologists or observed by aircraft pilots) will be avoided between May 15 and July 15, and where possible, there will be no increase in mine construction or operational activity within 3 km of the calving sites during this time period.
- If females (one or more) are observed within 3 km of a planned project activity such as drilling or road and railway construction from May 15 through to July 15, then the activity location will either be moved or the activity deferred as appropriate, and if possible, until a later date when caribou are not present.
- Should a female caribou or a female with calves approach within 3 km of project activities between May 15 and July 15, the animals will be observed on the ground. If it is obvious, they are being disturbed, the activity will cease until they have moved at least 3 km away.
- If caribou approach a project activity site before work commences, the Environment Department shall be notified immediately and will determine the necessary measures that need to be taken to protect caribou activity.
- If caribou approach a Project Site while work is in progress, caribou will be observed for signs of disturbance.
- If the caribou are disturbed, the activity will be modified or cease until the caribou have moved away or they are guided away from the worksite.

- If caribou are observed within 3 km of a proposed new drill site and disturbance is noted, yet to be deployed drills should be sent to an alternative location and activity at the site deferred until after the caribou leave the area. If the drill is already in place and operating, and caribou move into the area, the animals should be monitored by the Project biologist or on-site Environmental personnel. If the caribou show no obvious signs of disturbance, drilling activities can continue. If the animals appear agitated, then activities must cease until the caribou leave.
- A wildlife monitor will be periodically present on site during the calving season to detect calving activities near the Northern Transportation Corridor, monitor cow/calf behaviour in relation to traffic, designate a temporary no-stopping zone, and document measures taken to reduce sensory disturbance to calving caribou.
- All wildlife mortalities are incidents that will be documented, investigated to determine route cause, and corrective actions will be implemented.

3.4 BIRD PROTECTION MEASURES

3.4.1 ENVIRONMENTAL CONCERN

Birds are generally widespread and often encountered in the Baffin region. Virtually all of these birds are migratory. The main concern with birds is that the potential exists that some aspects of the Project may disrupt nesting and migratory patterns. Birds are an important part of the food chain in the Arctic ecosystem, and changes in their numbers and distribution will directly affect predators like raptors and foxes that rely on them as a readily available source of food. It is against the law to disturb or destroy an active migratory bird's nest (Migratory Birds Convention Act and regulations).

3.4.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 3.4.

TABLE 3.4 BIRD PROTECTION RELATED DOCUMENTS

Document No.	Title
This EPP	Appendix B7 Active Migratory Bird Nest Survey Protocol and Field Sheet
BAF-PH1-830-P16-0027	Terrestrial Environment Mitigation and Monitoring Plan

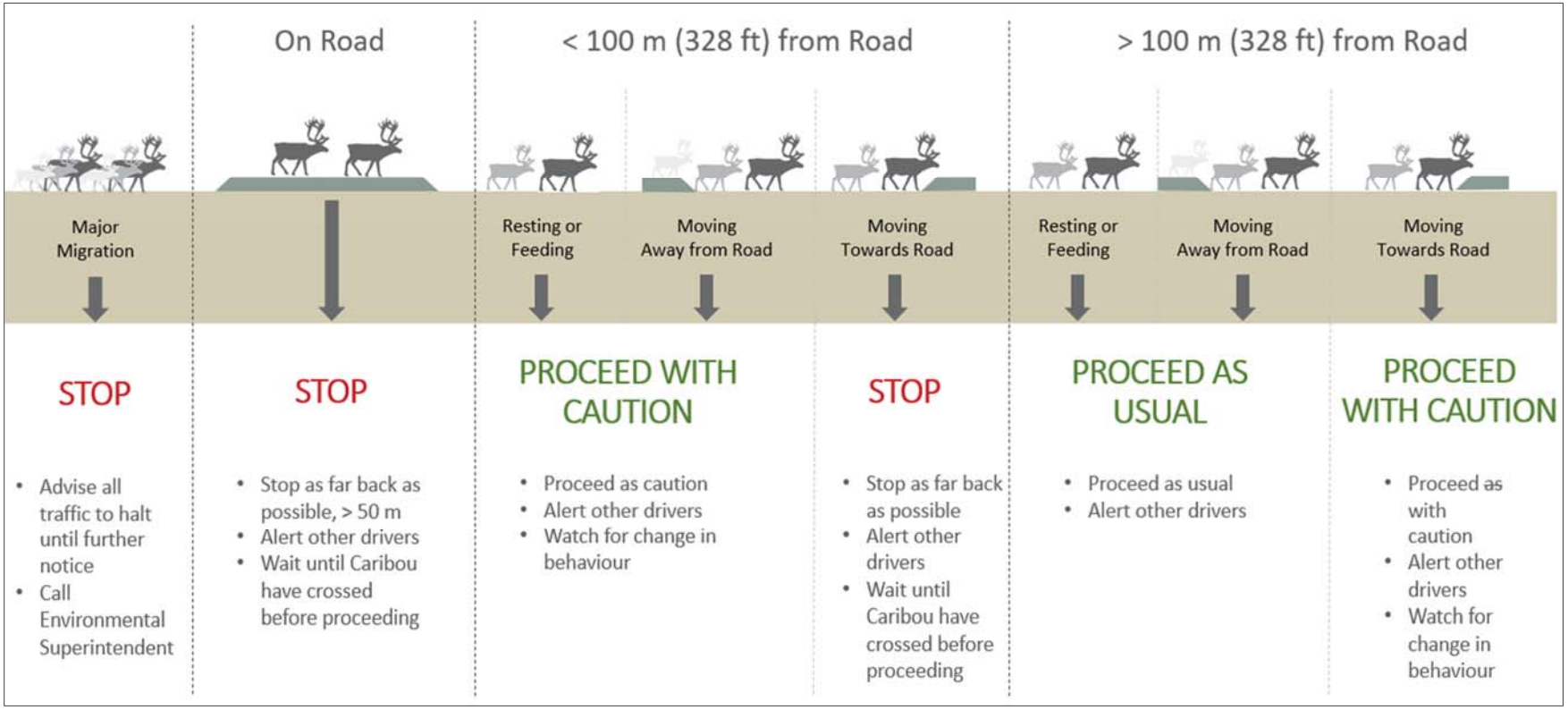

FIGURE 3.1 CARIBOU DECISION FRAMEWORK - ROAD

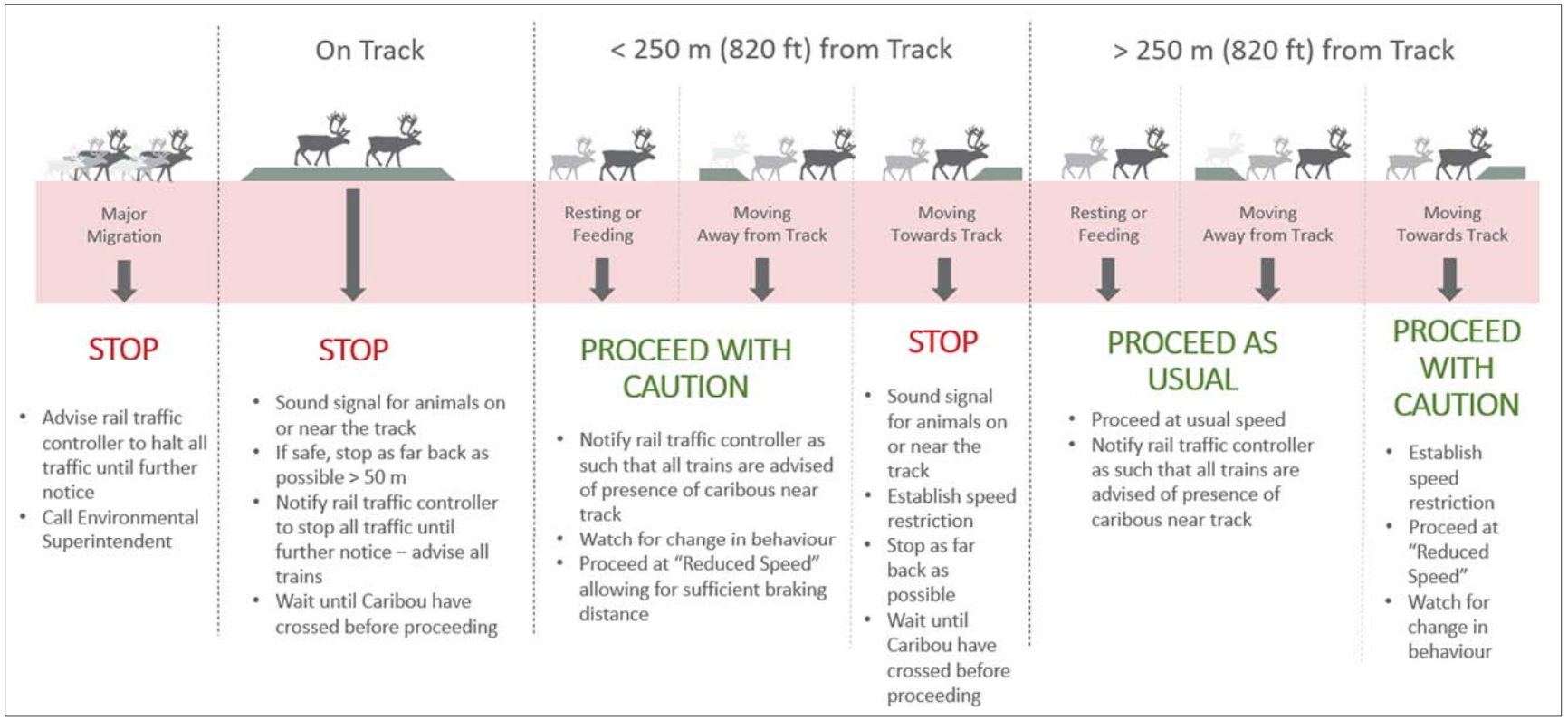

FIGURE 3.2 CARIBOU DECISION FRAMEWORK - RAIL

3.4.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures will be implemented to minimize disturbance to birds and bird nests:

- Project Personnel are not permitted to hunt birds.
- Inspections of each work area for nests will be conducted prior to commencement of project activity.
- On-ground inspections will be conducted for bird nest and eggs of each area prior to equipment placement or project activity. Active nest sites will be identified through observation of high densities of birds, nests, or birds exhibiting territorial behaviour indicating a nearby nest. Active nests must not be destroyed or disturbed.
- The inspections will be conducted based on method described in the Active Migratory Bird Surveys Protocol.
- Select new equipment placement location, at least 500 m from identified active nest sites, or as otherwise identified in the Mary River Terrestrial Environment Mitigation and Monitoring Plan.
- Precaution will be taken to avoid disrupting nest sites, if these are discovered.
- Songbirds, shorebirds, loons and waterfowl - If nests of these birds are found, then drills, pumps and waterlines should be placed at least 500 m from these nest sites and precaution should be taken to avoid disrupting them.
- Shoreline and waterline routes will be inspected for breeding birds, nests, and post-hatch young before waterlines for drills are placed.
- Active raptor (falcons, hawks and owls) nests will be avoided by relocation of project activities, if possible. An individual nest protection plan will be produced by an avian biologist to direct activities within 500 m, or other appropriate distance, of the nest if it is not possible to relocate or delay the Project activities.
- Bird sightings, particularly raptors or large concentrations of birds, should be recorded in the Wildlife Log at camp and reported to Project biologists.
- If Species at Risk or their nests and eggs are encountered during Project activities, the primary mitigation will be avoidance. Project personnel shall establish clear zones of avoidance on the basis of the species-specific nest setback distances outlined in the Terrestrial Environment Mitigation and Monitoring Plan.
- Guy-wire deterrents will be used on communication towers established for the Project. Consideration will be given to reducing lighting when possible in areas where it may serve as an attractant to birds or other wildlife.
- Inspections of each work area for nests will be conducted prior to commencement of any Project activity during the nesting season. Any nests found (or indicated nests) will be protected with a buffer zone determined by the setback distances outlined in the Terrestrial Environment Mitigation and Monitoring Plan until the young have fledged. If it is determined that observance of these setbacks is not feasible, nest-specific guidelines and procedures shall be developed to ensure the nests and their young are protected.
- Drills, pumps and waterlines should be placed at least 500 m from active bird nests and every precaution should be taken to avoid disrupting the nests. All Project Personnel must avoid active nest sites. Time spent on the hose alignment should be minimized to reduce disturbances in areas between the water source and Project activities. Active nests must not be destroyed.
- No drilling activity should take place within 500 m of an active raptor nest site during the breeding season (approximately mid-May to August) unless an individual nest protection plan has been prepared by an avian biologist in conjunction with the Baffinland Environment Department. Report all active nest sites to the Environment Department.
- Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered (at risk of immediate injury or death) by work being conducted.

3.5 PROTECTION OF THE MARINE ENVIRONMENT AND WILDLIFE

3.5.1 ENVIRONMENTAL CONCERN

Potential environmental impacts associated with Project construction and operation have been identified, such as underwater and airborne noise, release of sediment into the water, and accidental introduction of hydrocarbons or other deleterious substances/materials into the marine environment. To prevent these impacts on marine habitat and wildlife, the appropriate protection and mitigation measures need to be implemented.

3.5.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 3.5.

TABLE 3.5 MARINE ENVIRONMENT AND WILDLIFE RELATED DOCUMENTS

Document No.	Title
BAF-PH1-830-P16-0024	Shipping and Marine Wildlife Management Plan

In 2015, Baffinland developed the Marine Environmental Effects Monitoring Plan (MEEMP), which is Appendix H of the Shipping and Marine Wildlife Management Plan. This plan is reviewed by the Marine Environment Working Group and submitted annually to the Nunavut Impact Review Board.

The objectives of the MEEMP are to:

- Address regulatory requirements, especially those listed in the amended NIRB Project Certificate No. 005.
- Develop a comprehensive and integrated environmental monitoring program that includes follow-up as required.
- Incorporate an ecosystem-based approach for monitoring and management of Project-related environmental effects.
- Coordinate all aspects of project-related marine environment effects monitoring.

3.5.3 ENVIRONMENTAL PROTECTION MEASURES

Environmental Protection Measures as required will be outlined in the Shipping and Marine Wildlife Management Plan.

4.0 CONSTRUCTION ACTIVITIES

4.1 LAND DISTURBANCE

4.1.1 ENVIRONMENTAL CONCERN

Ground disturbances will occur due to construction activities and an expansion of the mining footprint over the life of the Project.

The Arctic is a fragile environment where the recovery of vegetation within the region is slow. Ground disturbance shall be minimized to protect archaeological resources, wildlife habitats, sensitive landforms, such as ice-rich permafrost features, and prevent erosion and the movement of sediment into watercourses and water bodies. Conditions provided in Baffinland's permits, licences and authorizations address ground disturbances and outline the necessary protection measures that are required to minimize impacts to the environment.

Thaw settlements and surface sloughing of cut slopes may occur in Project Areas, particularly during the thaw seasons immediately following construction. The behaviour of both cut slopes and embankment fills will be monitored throughout these thaw seasons and remedial measures will be implemented, as necessary. For example, it is expected that many of the cut slopes will need to be monitored as thaw settlements occur. Silt fences and other erosion protection measures as described below will be installed as necessary to prevent siltation of adjacent drainage courses and water bodies.

4.1.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.1.

TABLE 4.1 LAND DISTURBANCE RELATED DOCUMENTS

Document No.	Title
This EPP	Section 2.1 Cultural Heritage and Archaeological Resource
	Section 4.4 Sediment and Erosion Control
	Section 4.5 Road Construction and Borrow Development
	Section 4.8 Quarry and Borrow Pit Management
	Section 4.10 Excavations and Foundations
BAF-PH1-810-FOR-0005	Incident Investigation Form
BAF-PH1-830-P16-0023	Roads Management Plan
TBD	Railway Operation and Maintenance Plan
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan

4.1.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures will be implemented to minimize potential ground disturbances:

- Project Personnel and equipment will remain on only existing roads and trails.
- Modifications to design/engineering drawings must be approved by the Environment Department before Work on the modification may be started.
- Rutting (furrow creation) will be minimized on ground surfaces when possible.
- Camps and equipment storage areas will be located on gravel, sand and/or other durable land.
- No materials will be stored on the surface ice of streams.
- No material shall be removed from below the ordinary High Water Mark of any stream or water body.
- Greywater sumps must be located at distance of at least 31 metres above the ordinary High Water Mark of any water body.
- Equipment and supplies brought to Project sites shall be clean and free of soils that could contain plant seeds not naturally occurring in the area. Vehicle tires and treads must be inspected prior to initial use in Project Areas.
- Prior to construction activities, a site drainage drawing must be submitted to the Environment Department for approval.
- The limits for clearing, grubbing and topsoil overburden removal shall be identified on the "Issued for Construction" drawings and staked in the field prior to the commencement of any Work.
- Areas to be cleared shall have sediment and erosion control measures implemented prior to the initiation of clearing activities. The sediment and erosion control measures shall be adapted to suit the field conditions associated with the specific construction activities as construction proceeds.
- No debris or other construction material shall be allowed to enter any water body.
- New equipment entering the site will be examined for invasive species.
- A Baffinland Incident Investigation Form (BAF-PH1-810-FOR-0005) will be completed for all non-approved land disturbances.

4.2 EQUIPMENT MOBILIZATION AND OPERATION

4.2.1 ENVIRONMENTAL CONCERN

Mobile equipment emits noise and air emissions; can be potential sources of leaks and spills; can cause rutting and land disturbances; and can cause disturbance of archaeological sites if clearances have not been obtained.

Noise associated with equipment use and mobilization may negatively affect other land users. Air emissions may have air quality implications. Accidental leaks or spills of fuel or other hazardous materials may affect soils, water quality, fish and fish habitat, and wildlife.

4.2.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.2.

TABLE 4.2 EQUIPMENT OPERATION AND MOBILIZATION RELATED DOCUMENTS

Document No.	Title
This EPP	Section 2.1 Cultural Heritage and Archaeological Resources
	Section 4.1 Land Disturbance
	Section 6.4 Spill Control Measures and Reporting
	Appendix B8 NT-NU Spill Report Form
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan
BAF-PH1-810-FOR-0005	Baffinland Incident Investigation Form

4.2.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures will be implemented to minimize risks associated with equipment operation and mobilization:

- Damage to archaeology sites will be avoided by following the protection measures outlined in the Cultural Heritage and Archaeology Resources OES.
- Rutting and land disturbance will be minimized by following the protection measures outlined in the Land Disturbance OES.
- Equipment will be equipped with properly functioning mufflers.
- Spills involving equipment will be reported to the Environment Department immediately and documented by submitting the necessary documentation within 12 hours of the spill using the Baffinland Incident Investigation Form and NT-NU Spill Report Form. See Spill Control Measures and Reporting OES for more details on spill reporting.
- Daily pre-operation inspections will be made on all equipment using the Pre-Op Inspection Form. Pre-Op Inspection Forms should be given to the Maintenance Department at the end of day. If problems are identified, the Maintenance Department should be notified and the equipment will be taken out of service and repaired.
- Equipment operators will be trained and licenced to operate their particular equipment; training will be provided for operators before operating any new equipment.
- Equipment and vehicles that will remain parked for extended periods of time or that are prone to leaks will have spill trays placed underneath them to contain any fluid leaks.

4.3 FUEL STORAGE AND HANDLING

4.3.1 ENVIRONMENTAL CONCERN

At Milne Port and the Mary River Mine Site, fuel is stored in bulk storage facilities consisting of steel fuel tanks and bladders located within lined containment berms. Small quantities of fuel are stored in barrels and double walled ISO tanks within constructed containment berms at the Steensby and Mid-Rail Exploration Camps.

Accidental and uncontrolled leaks, releases and spills of fuel may occur due to improper storage, poor handling procedures or equipment malfunction. Fuel releases to the environment have the potential to negatively affect worker health and safety as well as soil quality, water quality, aquatic life, air quality and wildlife.

4.3.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.3.

TABLE 4.3 FUEL STORAGE AND HANDLING RELATED DOCUMENTS

Document No.	Title
This EPP	Section 6.2 Hazardous Material and Hazardous Waste Management
	Section 6.4 Spill Control Measures and Reporting
	Section 8.0 Compliance Inspections
	Appendix B8 NT-NU Spill Report Form
	Appendix B9 Daily Fuel Tank Farm Inspection Checklist
	Appendix B10 Fuel Tank Dipping Form
BAF-PH1-810-FOR-0005	Baffinland Incident Investigation Form
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0007	Emergency Response Plan
BAF-PH1-830-P16-0036	Spill Contingency Plan
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan
BAF-PH1-830-P16-0013	Milne Port Oil Pollution Emergency Plan
BAF-PH1-350-PRO-0010	Bulk and Equipment Re-Fueling Procedure
2AM-MRY1325 Amendment No. 1	Type A Water Licence
Canadian Council of Ministers of the Environment	Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products

The potential for fuel spills is addressed through the Company's Emergency Response and Spill Contingency Management Plans

4.3.3 ENVIRONMENTAL PROTECTION MEASURES

The following environmental protection measures will be used for all storage and handling of fuels at the Project:

- Project personnel refuelling equipment or vehicles will supervise re-fuelling at all times and will not leave fuel transfer operations unattended.
- Avoiding ship-to-shore transfer of fuel during freeze-up or break-up periods.
- Undertake fuel transfer from vessels to shore under good weather conditions.
- Transfer of fuel to storage tanks or to vehicles shall be conducted by a fully-trained and qualified person.
- Exposed pipelines shall be protected from damage by vehicular collision through the installation of guard rails or barriers.
- Hoses and pipes used for fuel transfer shall be equipped with properly functioning and approved check valves that are spaced to prevent backflow of fuel in the case of failures.

- All spills shall be reported to the Environment Department immediately and documented by submitting the necessary documentation within 12 hours of the spill to using the Baffinland Incident Investigation Form and NT-NU Spill Report Form. See the Spill Control Measures and Reporting OES for more details on spill reporting.
- All fuel storage tanks will be inspected on a regular basis and will be in accordance with the requirements outlined in the Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products, issued by the Canadian Council of Ministers of the Environment.
- Daily inspections of the permanent fuel storage and dispensing facilities, located at Milne Port and the Mary River Mine Site, will be conducted by the Site Services Department using the Daily Tank Farm Inspection Checklist.
- Fuel tanks at the permanent fuel storage and dispensing facilities, located at Milne Port and the Mary River Mine Site, will be dipped every 3 days by the Port and Logistics Department to confirm fuel levels and total fuel inventory using the Fuel Tank Dipping Form.
- Fuel storage containers will be stored in secondary containment and shall not be placed within 31 m of ordinary High Water Mark of any water body.
- All mobile equipment will be serviced and fuelled on land at least 31 m away from the ordinary High Water Mark of any water body. No petroleum or chemical product will be allowed to spread to surrounding lands or into water bodies.
- All fuel containers shall be sealed and labelled with the name Baffinland Iron Mines Corporation.
- Waste oils, lubricants, and other used oil shall be placed in drums, labelled as waste materials, and stored in a contained area until removed from site for disposal at an approved, licenced waste management facility (see Hazardous Material & Hazardous Waste Management OES).
- All fuel storage areas shall be inspected on a regular basis.
- Examine all fuel storage containers in your work area for leaks at least once per day.
- Repair all leaks immediately.

4.4 SEDIMENT AND EROSION CONTROL

4.4.1 ENVIRONMENTAL CONCERN

Land disturbances during road construction and operation, culvert installation, and excavation of borrow locations and quarries have the potential to cause erosion and release sediment-laden runoff into nearby watercourses.

The potential exists for the movement of soil (wind erosion), the unplanned release of sediment to watercourses/waterbodies and the slumping or change in landscape form associated with changes in the permafrost profile. Stormwater, which may include any surface runoff and flows resulting from precipitation, drainage or other sources, may contain suspended sediments, metals, petroleum hydrocarbons, and other substances. These materials may affect water clarity and, subsequently, aquatic life by reducing feeding success, fish egg and larval survival, and fish habitat. Rapid runoff can degrade the quality of the receiving water by eroding stream beds and banks. Wind erosion is a key issue for the Project. The arid climate allows the wind to transport unprotected/disturbed soils from current locations. Improved road surfaces will increase potential runoff in downstream areas throughout the Project Area.

4.4.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.4.

TABLE 4.4 SEDIMENT AND EROSION CONTROL RELATED DOCUMENTS

Document No.	Title
This EPP	Section 4.5 Road Construction and Borrow Development
	Section 4.7 Watercourse Crossing Installations
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan Appendix E Tote Road Monitoring Program

4.4.3 ENVIRONMENTAL PROTECTION MEASURES

Sediment and erosion control measures may include, but are not limited to, silt fencing, erosion control mats (fascines), sedimentation ponds, erosion blankets/geotextile lining, sandbags, terraces, benching, use of flocculants and riprap structures. Project Personnel are responsible for the implementation of erosion and sedimentation control measures prior to the initiation of construction activities and during ongoing mining Operations (i.e., clearing, grubbing, development of facilities, etc.) in each specific work area.

As required, Project Personnel may be instructed to implement additional sediment and erosion control measures by the Project's Environment Department to ensure protection of the environment.

The following environmental protection procedures/measures will be taken to prevent or mitigate erosion and sediment-laden runoff impacts:

- The Surface Water and Aquatic Ecosystem Management Plan will be adopted to prevent and/or mitigate sediment loading into surface water within the Project Area.
- The size of the disturbed area and duration of soil exposure shall be limited as specified in the construction schedule and "Issued for Construction" drawings.
- Road embankments, watercourse crossing installations and borrow areas shall be constructed in accordance with approved plans and procedures.
- Temporary and permanent drainage installations shall be designed, constructed, and maintained to an appropriate standard, while maintaining hydrologic drainage patterns to the extent possible.
- The topsoil/overburden stockpiles shall be contoured, where possible, with established drainage routes around the stockpiles, as specified by the Environment Department.
- Stream bank sections and slopes that contain loose or erodible materials shall be stabilized through the application of filter fabrics or geotextile in conjunction with riprap. Sediment control measures will be installed prior to watercourse crossing installations (see Tote Road Watercourse Crossing Installation OES).
- Appropriate sediment and erosion control measures will include a combination of silt fences, silt (turbidity) curtains, sediment traps, settling ponds and gravel berms.
- Access and haul roads shall be constructed with gradients or surface treatment and drainage systems to limit the potential for run-off and erosion (see Road Construction and Borrow Development OES).
- Borrow activities will be concentrated to the maximum extent possible to limit the area of disturbance.
- At borrow areas, drainage patterns will be re-established to near natural conditions.
- Turbidity monitoring will be conducted at watercourses by Environmental Monitors during and after construction activities when necessary.
- Project Personnel shall maintain, as required, all sediment and erosion control measures following rain or storm events to minimize further environmental damage. All repairs shall be undertaken under the direction and to the satisfaction of the Environment Department.

4.5 ROAD CONSTRUCTION AND BORROW DEVELOPMENT

4.5.1 ENVIRONMENTAL CONCERN

Excavations disturb the ground surface and vegetative cover that stabilizes the ground and reduces the potential for erosion. The excavation of sand and gravel from borrow areas, as well as the cut and fill technique that will occur during road construction throughout the lifecycle of the Project exposes soil, making it vulnerable to erosion and permafrost degradation.

These activities result in changes to the thermal regime of the ground (active layer and permafrost), as a new active layer is created. Modification to the thermal regime may induce melting of any ground ice present, resulting in thaw settlement and depressions caused by these settlements. This may lead to erosion and possibly ponding of water. These activities may also change the hydrologic drainage patterns in the area as a result of water ponding.

4.5.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.5.

TABLE 4.5 ROAD CONSTRUCTION AND BORROW DEVELOPMENT RELATED DOCUMENTS

Document No.	Title
This EPP	Section 4.4 Sediment and Erosion Control
	Section 4.8 Quarry and Borrow Pit Management
	Section 4.10 Excavations and Foundations
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0023	Roads Management Plan
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan

4.5.3 ENVIRONMENTAL PROTECTION MEASURES

The ground surface will re-establish thermal equilibrium and will be suitable for re-colonization by natural vegetation over time, albeit slowly. The following measures will be implemented to enhance this re-establishment of thermal equilibrium and minimize the effects of erosion, sedimentation, and water ponding:

- Cut and fill areas will be stabilized by constructing gentle slopes less prone to erosion.
- Cut and fill areas are expected to be relatively small in horizontal and vertical extent. The side slopes of the borrow pits will be between 1H: 1V to 2H: 1V, slightly gentler than the slopes in the natural condition to reduce erosion.
- In low lying areas where roadbed fill is on the order of 1 m and the permafrost can be expected to rise to a meaningful degree, swales or culverts will be installed as part of road maintenance to prevent the ponding of water.
- At closure, swales will be left in place, or alternatively, the roadbed will be breached to allow drainage.
- Borrow activities will occur only at approved locations and will be concentrated to limit the area of disturbance. Borrow pits will be located a minimum of 31 m away from the High Water Mark of the nearest water body or stream.

- Thawed layer removal will be done sequentially.
- Areas of unexpected settlement will be filled to re-establish the natural contours and eliminate ponding of water.
- Regular inspection of borrow locations will be completed and unstable slopes re-graded to eliminate depressions and re-establish natural drainage patterns.

4.6 DRILLING, BLASTING AND CRUSHING

4.6.1 ENVIRONMENTAL CONCERN

Drilling and blasting will be conducted at all stages of the Project's lifecycle. Drilling and blasting activities will occur primarily at Deposit 1 at the Mary River Mine Site and rock quarries located throughout the Project Area, including along the North Railway. Throughout that life of the Project various blasting methods will be utilized. This will include the use of high explosives, pre-packaged emulsions, ammonium nitrate fuel oil, and emulsion produced on site. Although these explosives contain ammonium nitrate; the chance of ammonium nitrate escaping and contaminating the surrounding area is extremely low when using emulsions or high explosives. Ammonia is toxic to aquatic life at certain concentrations; therefore, the proper handling of explosives during blasting operations is crucial in preventing spills from having an impact on nearby watercourses.

Crushing will occur at Milne Port and will generate air and noise emissions. Air quality and noise levels will be monitored by the Environment and Health and Safety Departments.

4.6.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.6.

TABLE 4.6 DRILLING, BLASTING AND CRUSHING RELATED DOCUMENTS

Document No.	Title
This EPP	Appendix B8 NT-NU Spill Report Form
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan
Various	Site Specific Quarry Management Plans
BAF-PH1-830-P16-0023	Roads Management Plan
E337697-PM407-50-126-0001	Explosives Management Plan
BAF-PH1-810-FOR-0005	Baffinland Incident Investigation Form
Q13C301	QIA Commercial Lease (Inuit Owned Land Commercial Lease)
Various	CIRNAC Quarry and Land Use Permits
2AM-MRY1325 Amendment No. 1	NWB Type A Water Licence

4.6.3 ENVIRONMENTAL PROTECTION MEASURES

The following protection measures shall be implemented:

- Explosives use at the site, and worker safety around mining and crushing activities, is governed by Natural Resources Canada, and is detailed in the Explosives Management Plan. Project Personnel using explosives shall have all required certifications, including a blasters' certificates.
- All necessary precautions shall be taken to safely handle the explosives and to minimize spillage during blasting operations.
- All spills shall be reported to the Environment Department immediately and documented by submitting a report within 12 hours of the spill to the Environment Department using the Baffinland Incident Investigation Form and NT-NU Spill Report Form.
- All drilling and blasting activities at quarries will be in accordance with the site-specific Quarry Management Plans and the Explosives Management Plan.
- Environmental personnel will monitor water bodies and watercourses adjacent to blasting activities to ensure operational activities are not causing deleterious effects on aquatic resources, as stipulated in Baffinland's Type A Water Licence.

4.7 WATERCOURSE CROSSINGS INSTALLATION

4.7.1 ENVIRONMENTAL CONCERN

Both the Tote Road and North Railway are equipped with a significant number of watercourse crossings. Three major crossing types have been historically developed on the Tote Road:

- Conventional single or multiple culverts crossings designed to pass select design flows
- Culvert crossings (single or multiple) with an additional swale to accommodate increased flows during flood conditions
- Steel frame bridges (which may include culverts and/or swales)

The North Railway is equipped with the following types of crossings:

- Conventional single or multiple culverts crossings designed to pass select design flows
- Open bottom arch culverts
- Bridges equipped with in-water steel piers

Watercourse crossing installation has the potential to impact fisheries resources through the:

- Alteration of fish habitat or blockage of fish passage
- Accidental releases of deleterious substances (i.e., fuel spills, sediment)

Watercourse crossings have the potential to negatively affect fish and fish habitat, either as a result of construction activities or through changes in fish habitat resulting from the structure in the watercourse. Elevated levels of suspended sediment are the primary change in water quality that could result from work on or around water. Construction activities typically result in short-term effects, while long-term effects can arise through erosion of ditches and slopes if not mitigated. Sediment sources related to construction activities include equipment crossings, excavation, blasting, and installation of bank protection measures (riprap), erosion from ditches and steep slopes, erosion from exposed areas on the right-of-way, and increased bed scour or bank erosion due to changes in downstream flow patterns.

There are four main groups of crossings with respect to fish habitat and the environmental protection measures required:

- Crossings with no fish habitat
- Crossings in fish habitat, subject to an authorization under the Fisheries Act, listed in Table 4.7 (Tote Road authorization) and Table 4.9 (North Railway authorization)
- Small crossings with fish habitat, subject to the conditions of a DFO Letter of Advice (listed in Table 4.8)
- Fish habitat compensation sites - crossings where remedial work was or must be carried out to improve conditions for fish and expand potential fish habitat, as agreed upon as a condition of one of the fisheries authorizations

Basic environmental protection measures apply to all groups of crossings, and additional measures that apply to the crossings that are subject to a *Fisheries Act* authorization.

4.7.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.6.

TABLE 4.7 WATERCOURSE CROSSING RELATED DOCUMENTS

Document No.	Title
This EPP	Section 4.4 Sediment and Erosions Control
	Section 4.8 Excavations and Foundations
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan Appendix D Environmental Guidelines for Project Water Crossing Repairs and/or Installations Appendix E Tote Road Monitoring Program
BAF-PH1-830-P16-0023	Roads Management Plan
06-HCAA-CA7-0084	Crossings along the Milne Inlet Tote Road Authorization
NU - 06 - 0084	Fisheries Authorization - Tote Road
Various	Construction of Watercourse Crossings (Bridges and Culverts)

4.7.3 ENVIRONMENTAL PROTECTION MEASURES

4.7.3.1 GENERAL

The following measures will be implemented to minimize the potential impacts of stream crossing and installations:

- Culverts will be installed in accordance with approved plans.
- Work should be conducted during low flow conditions – avoid conducting work during large precipitation/runoff events.
- Culverts will be installed at the same slope as the existing stream, where feasible.
- In culverts on steep slopes, high velocities may result in the movements of rocks inside the culvert. At these locations, baffles, baffle inserts, or weirs may be installed to assist in keeping rocks inside the culvert, maintain and increase roughness in order to reduce velocities, and provide additional resting locations for fish as they move through the culvert.

- Culvert lengths will be minimized.
- If a culvert is to exceed 50 m in length, methods to provide light inside the culvert will be examined and considered to prevent it being a barrier to fish passage due to darkness.
- Fish passage potential in culverts will be determined in consideration of culvert velocity compared to the existing watercourse, and this information will be used to reassess design velocities under the proposed conditions within the culvert.
- Rocks and boulders may be placed inside culverts to reduce velocities, increase flow depth, and provide resting locations for fish. Boulders may be bolted into place where necessary.
- Sediment and erosion control measures shall be implemented prior to work and shall be left in place and maintained until all disturbed areas have been stabilized. For more information on sediment and erosion control measures see the Sediment and Erosion Control OES.
- Any stockpiled materials shall be stored and stabilized 31 m away from the High Water Mark of any water body, unless for immediate use.
- All materials and equipment shall be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, debris, etc.) from entering the water. This includes checking that equipment is free of fluid leaks, and that grease and other debris is wiped or washed clean from the equipment, before entering the water.
- Re-fuelling and equipment maintenance is to be conducted 31 m away from the High Water Mark of any water body.
- Install crossings at right angles to the watercourse so that the original direction of stream flow is not significantly altered.
- Minimize in-water work (get-in and get-out quickly).
- Water crossings will be backfilled with substrate (fill) material that is clean, competent, and consistent with the existing substrate size and texture found within the watercourse and will remain in/under the crossing.

4.7.3.2 ADDITIONAL ENVIRONMENTAL PROTECTION MEASURES - CROSSINGS SUBJECT TO *FISHERIES ACT* "LETTER OF ADVICE"

For crossings subject to a *Fisheries Act* Letter of Advice (Table 4.8), the following additional measures will apply:

- Water depth within the water crossing should be not be less than 20 cm or the same depth as the natural channel, especially during low flows.
- All disturbed areas shall be stabilized immediately upon completion of work and restored to a pre-disturbed state or better.

4.7.3.3 ADDITIONAL ENVIRONMENTAL PROTECTION MEASURES - CROSSINGS SUBJECT TO *FISHERIES ACT* AUTHORIZATIONS AND FISH HABITAT COMPENSATION SITES

For crossings subject to a *Fisheries Act* Authorization, the following additional measures will apply:

- An environmental inspector shall be on on-site to assess the crossings prior to the onset of construction to confirm the absence or presence of spawning sites at least 20 m upstream or downstream of the crossing location, and whether spawning Arctic char are present in the vicinity (only applies to road crossings listed in Table 4.7; Table 4.9 will list the locations for the future *Fisheries Act* authorizations for the rail crossings).

- For all crossings where fish may be present (Table 4.7, 4.8, and 4.9, and compensation sites), an environmental inspector shall be present to monitor construction activities and document turbidity levels upstream and downstream of the crossing under construction as outlined in the Surface Water and Aquatic Ecosystem Management Plan. A qualified biologist or environmental inspector shall be on-site during all in-water construction, compensation, and restoration works to ensure implementation of the designs, as intended in the Plan, and conditions of the fisheries authorization are being met.
- Construct new crossings at the existing crossing sites whenever practicable.
- If machinery is required to bring material or equipment to the opposite side of the watercourse, then it shall be restricted to a one-time event (over and back) and only if no other existing crossing can be used. If the stream bed and banks are highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment crossing, then a temporary crossing structure or other practices shall be used to protect these areas.
- Machinery fording shall occur at least 20 m upstream or downstream of location where fish and/or spawning sites are noted.

TABLE 4.8 TOTE ROAD CROSSINGS SUBJECT TO DFO *FISHERIES ACT* AUTHORIZATION 06-HCAA-CA7-0084

Location Code	Road Location (km)	Easting (NAD 83)	Northing (NAD 83)
BG50	62.836	529,334	7,926,846
CV128	17.683	513,545	7,965,895
CV217	79.824	542,219	7,922,158
CV223	97.230	555,818	7,914,691
BG17	90.168	550,703	7,917,643
BG32	78.163	540,706	7,921,622
CV040	72.263	535,175	7,920,305
CV048	64.312	530,415	7,925,875
CV049	63.303	529,677	7,926,542
CV072	53.878	526,897	7,934,576
CV078	51.172	525,852	7,936,787
CV079	50.599	525,562	7,937,276
CV094	41.613	522,805	7,945,397
CV099	37.840	521,811	7,948,820
CV129	15.651	512,381	7,966,783
CV216	80.647	542,774	7,921,700
CV225	99.033	557,407	7,915,138
BG01	99.676	557,991	7,914,919
BG04	94.148	553,250	7,915,113
BG24	87.710	548,766	7,918,878
CV060	58.853	527,622	7,930,342

Location Code	Road Location (km)	Easting (NAD 83)	Northing (NAD 83)
CV104	33.794	521,732	7,952,788
CV111	31.991	521,355	7,954,524
CV114	29.648	520,278	7,956,528
CV224	97.758	556,238	7,915,044

TABLE 4.9 CROSSING AT CURRENT OPERATIONS SUBJECT TO DFO LETTER OF ADVICE NU-07-0050

Location Code	Road Location (km)	Easting (NAD 83)	Northing (NAD 83)	Catchment Area Size
BG27	86.606	547,876	7,919,342	Small
BG29	84.805	546,229	7,919,877	Small
CV001	94.728	553,782	7,914,922	Small
CV030	77.503	540,123	7,921,310	Small
CV046	66.489	531,686	7,924,265	Small
CV057	60.714	528,379	7,928,657	Small
CV058	60.523	528,322	7,928,839	Small
CV059	59.960	528,102	7,929,356	Small
CV076	53.028	526,617	7,935,335	Small
CV082	49.656	525,254	7,938,131	Small
CV086	46.300	523,746	7,940,983	Small
CV102	36.029	521,934	7,950,591	Small
CV106	33.170	521,663	7,953,392	Small
CV112	31.446	521,033	7,954,935	Small
CV113	30.656	520,747	7,955,659	Small
CV115	27.686	519,222	7,958,135	Small
CV119	24.264	517,762	7,961,153	Small
CV120	23.510	517,294	7,961,707	Small
CV125	20.448	515,296	7,963,841	Small
CV151	10.460	508,341	7,969,584	Small
CV152	10.282	508,201	7,969,684	Small
CV153	10.219	508,152	7,969,718	Small
CV154	9.570	507,620	7,970,076	Small
CV157	8.960	507,374	7,970,538	Small
CV166	6.055	505,538	7,972,370	Small
CV170	5.268	505,015	7,972,923	Small
CV176	2.637	503,834	7,975,057	Small

Location Code	Road Location (km)	Easting (NAD 83)	Northing (NAD 83)	Catchment Area Size
CV186	102.812	560,705	7,913,498	Small
CV187	103.078	560,957	7,913,414	Small
CV202	32.825	521,603	7,953,731	Small
CV203	34.150	521,782	7,952,435	Small
CV159	8.407	506,909	7,970,830	Extra Small
CV167	5.960	505,519	7,972,462	Extra Small
CV173	4.425	504,465	7,973,535	Extra Small

TABLE 4.10 NORTH RAIL CROSSINGS SUBJECT TO DFO *FISHERIES ACT* AUTHORIZATION XXXXX

Location Code	Railway Chainage	Easting (NAD 83)	Northing (NAD 83)	Catchment Area Size

4.8 QUARRY AND BORROW PIT MANAGEMENT

4.8.1 ENVIRONMENTAL CONCERN

A number of rock quarries and borrow pits will be required throughout the Project's lifecycle. The excavated aggregate and rock from borrow pits and quarries will be stockpiled until required for further processing or construction activities. During quarry development, overburden and soil will be removed and stockpiled to expose the bedrock.

Quarrying and borrow pit operation may be responsible for a number of environmental impacts throughout the life of the Project. Potential impacts include: soil erosion, habitat loss, dust generation, permafrost degradation, and changes to hydrologic drainage patterns (i.e., water ponding). The water quality of waterbodies adjacent to these activities may also be impacted by means of sedimentation, fuel contamination, and ammonia contamination from explosives residue.

4.8.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.10.

TABLE 4.11 QUARRY AND BORROW PIT MANAGEMENT RELATED DOCUMENTS

Document No.	Title
This EPP	Section 4.1 Land Disturbance
	Section 4.4 Sediment and Erosion Control
	Section 4.5 Road Construction and Borrow Development
	Section 7.0 Drilling
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan
Various	Site Specific Quarry Management Plans
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan Appendix D Environmental Guidelines for Project Water Crossing Repairs and/or Installations Appendix E Tote Road Monitoring Program
BAF-PH1-830-P16-0029	Life of Mine Waste Rock Management Plan
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan
Q13C301	QIA Commercial Lease (Inuit Owned Land Commercial Lease)
Various	CIRNAC Quarry and Land Use Permits

4.8.3 ENVIRONMENTAL PROTECTION MEASURES

The following environmental protections measures for rock and aggregate excavation and management shall be implemented when developing all borrow pits and quarries:

- A site-specific Quarry Management Plan shall be developed for each of the Project's quarries, based on guidance provided in the Borrow Pit and Quarry Management Plan.
- All quarry materials used shall be non-acid generating and non-metal leaching in chemical characteristics. The quarry-specific management plan shall specify the results of acid rock drainage (ARD) and metal leaching (ML) testing, and if any specific measures need to be carried out in consideration of identified ARD/ML potential.
- All Project Personnel involved in quarry and/or borrow pit development will be familiar with the conditions and environmental protection measures outlined in the Borrow Pit and Quarry Management Plan as well as site specific Quarry Management Plans.
- The limits of the area to be excavated and the aggregate stockpile areas shall be clearly flagged/staked in the field prior to conducting any construction activities in the field, consistent with the quarry-specific management plan which identifies nearby environmental sensitivities (i.e., archaeological sites, watercourses, bird nests).
- The borrow pits shall be designed to prevent water from ponding.
- When explosives are utilized, Environmental personnel shall monitor the effects of explosives residue and related by-products from project-related blasting activities. In the event water licence criteria or other criteria established in the quarry or waste rock management plans are exceeded or close to being exceeded, Mine Operations personnel will work with Environment to develop and implement effective preventative and/or mitigation measures, including treatment, if necessary, to ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the Project and surrounding areas.

- Retain as much vegetation as practicable to the maintain slope stability, particularly within buffer zones protecting water bodies.
- The side slopes of the borrow pits will be 1H:1V to 2H:1V, slightly gentler than natural slopes to reduce erosion.
- Maintain natural drainage patterns to the extent practicable.
- Sources of in-pit water will be diverted away from the development area by constructing ditches and berms using rip-rap, geotextile and other sedimentation control measures. Ditching will be minimized to reduce land disturbance and will be approved by the Environment Department prior to construction.
- Organics and topsoil will be salvaged and stored for use in reclamation. Overburden material may be stored for reclamation, or, if the material is of acceptable quality, be used for construction.
- All material stockpiles, including aggregate, rock, waste rock and overburden, will be located at least 31 m away from the ordinary High Water Mark of any water body, unless for immediate use.
- Use rip-rap to reinforce drainage channel corners and water discharge points.
- Promote natural revegetation where required to stabilize slopes.
- Adequate sediment and erosion control measures, including silt fences, turbidity curtains, settling ponds and gravel berms, will be installed around the development area to protect adjacent watercourses and waterbodies from adverse impacts such as sedimentation and elevated turbidity levels (Sediment and Erosion Control OES).
- Use proper fuel containment and handling techniques and have spill kits accessible (Fuel Storage and Handling OES).
- Use proper explosives handling techniques to minimize waste.
- Ice-rich material will be stockpiled 31 m away from the ordinary High Water Mark of any water body and in a location where melt water will not re-enter the pit or have adverse impacts on adjacent aquatic resources.
- Dust shall be controlled as per the Air Quality and Noise Abatement Management Plan.

4.9 CONCRETE PRODUCTION

4.9.1 ENVIRONMENTAL CONCERN

During construction concrete will be mixed at batching plants located at the construction laydown areas. Cement will be shipped via sealift and mixed with water and aggregate to make the concrete. Waste concrete will arise from off-spec mixes, residual concrete at the end of pours, and from wash down of the equipment. It is important to ensure that there are no spills of waste cement or cement wash water runoff on site, as concrete is corrosive and waste runoff can impact the surrounding environment.

Another major concern is dust formation from the production of concrete. Dust will have a significant impact on the air quality on site so it is important that all precautionary measures, as outlined in the Air Quality and Noise Abatement Management Plan, are taken to contain and reduce the potential impact of dust generation.

4.9.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.11.

TABLE 4.12 CONCRETE PRODUCTION RELATED DOCUMENTS

Document No.	Title
BAF-PH1-830-P16-0002	Air Quality and Noise Abatement Management Plan
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0010	Fresh Water Supply, Sewage and Wastewater Management Plan

4.9.3 ENVIRONMENTAL PROTECTION MEASURES

The following environmental protections measures shall be implemented:

- To the greatest extent practicable, concrete production shall occur within the batch plant in order to ensure the dust is contained, and Best Management Practices will be implemented to minimize the production and effects of dust on site.
- Shipping of cement to site will be done using tote bags stored in sealed sea can containers. This will reduce the likelihood of any spills occurring on site.
- A purpose-built concrete wash water pond shall be used to receive all wash water from concrete related activities in order to allow for the settling of solids, decant analysis, and pH adjustment as required. Wash water will be recycled back into concrete production to the fullest extent possible in order to reduce water use and the quantity of wastewater generated by concrete production. All concrete product waste shall be disposed of in the concrete wash pond or at other agreed to appropriate locations that pose no risk to the receiving environment.
- Lined containment areas will be used to wash concrete delivery trucks' drums and chutes on site to minimize runoff of waste wash water.
- Waste hardened concrete will be used as fill or disposed of in one of the landfills.

4.10 EXCAVATIONS AND FOUNDATIONS

4.10.1 ENVIRONMENTAL CONCERN

Various activities requiring excavations and foundations will be undertaken throughout the life of the Project. Such activities include: driving pile foundations for buildings; excavating foundations for buildings; and excavating abutments for bridges.

Excavations and foundations on site may have several environmental impacts that could potentially occur throughout the life of the Project. Possible environmental impacts that may occur include: loss of vegetation and wildlife habitat; effects on the stability and profile of permafrost; and erosion, sedimentation, and changes to hydrologic drainage patterns (i.e., water ponding).

4.10.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.13.

TABLE 4.13 EXCAVATIONS AND FOUNDATIONS RELATED DOCUMENTS

Document No.	Title
BAF-PH1-830-P16-0008	Section 4.1 Land Disturbance
	Section 4.4 Sediment and Erosion Control
	Section 4.7 Watercourse Crossings Installation
BAF-PH1-830-P16-0004	Borrow Pit and Quarry Management Plan
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan Appendix D Environmental Guidelines for Project Water Crossing Repairs and/or Installations Appendix E Tote Road Monitoring Program

4.10.3 ENVIRONMENTAL PROTECTION MEASURES

Measures that will be implemented to minimize the environmental impact of excavations and foundations throughout the Project include:

- Minimize vegetation disturbance as much as possible to enhance soil stability (Land Disturbance OES).
- Ensure adequate drainage and maintain natural drainage patterns.
- Locate the development in a well-drained area whenever feasible.
- Ensure excavations are properly drained and that surface water drainage is diverted away from development areas whenever feasible.
- Adequate sediment and erosion control measures, including silt fences, turbidity curtains, settling ponds and gravel berms will be installed around the development area to protect adjacent watercourses and waterbodies from adverse impacts such as sedimentation and elevated turbidity levels (Sediment and Erosion Control OES).
- For more details on work activities related to water crossings (culverts, bridges), see the Rail and Tote Road Watercourse Crossings Installation OES.

4.11 ORE DOCK CONSTRUCTION

4.11.1 ENVIRONMENTAL CONCERN

Construction of the second ore dock may result in potential environmental impacts such as:

- Underwater and airborne noise
- Release of sediment into the water
- Disturbance to marine wildlife, and
- Accidental introduction of hydrocarbons or other deleterious substances/materials into the marine environment

To prevent these impacts, the appropriate protection and mitigation measures need to be implemented. In 2015, Baffinland developed the MEEMP (Appendix H of the Shipping and Marine Wildlife Management Plan). This plan is reviewed by the Marine Environment Working Group and submitted annually to the NIRB.

Construction activities will be managed through development of an Ore Dock Construction Environmental Management Plan, outlining specific procedures to avoid or reduce effects on the marine environment. Proposed mitigation measures during construction will include:

- Installation of silt curtains around in-water works to minimize disturbance to the surrounding marine environment
- Turbidity monitoring
- Underwater noise monitoring during pile installation and dredging
- Environmental monitoring with regular inspection audits to verify effectiveness of mitigation measures and compliance of Project activities with existing permits and authorizations

4.11.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.13.

TABLE 4.14 ORE DOCK CONSTRUCTION RELATED DOCUMENTS

Document No.	Title
This EPP	Section 4.5 Road Construction and Borrow Development
BAF-PH1-830-P16-0024	Shipping and Marine Wildlife Management Plan, including the MEEMP
TBD	Ore Dock Construction Environmental Plan - Phase 2 Proposal

4.11.3 ENVIRONMENTAL PROTECTION MEASURES

An Ore Dock Construction Environmental Plan will be prepared to meet *Fisheries Act* Authorization requirements and will be implemented during construction of marine facilities in Milne Inlet. The environmental protection measures listed below will be updated based on the content of the Ore Dock Construction Environmental Management Plan, once available.

Silt curtains:

- Silt curtains will be installed prior to any in-water work in order to encapsulate the entire construction footprint and to reduce disturbance to the marine environment in the surrounding area. The curtain will be designed and procured in sections which relate to the water depth in order to remain buoyant and extend to the ocean floor with sufficient slack.
- Prior to construction work within the silt curtain area, efforts will be made to salvage fish and release them alive outside of the work area. The silt curtain will also serve as a deterrent to fish re-entering the isolated work area.
- Silt curtains will be installed around localized construction areas during the ice break-up period and around the full perimeter of construction, including removed sediment disposal area during the open-water season.
- Construction of concrete components of the dock will consist of installation of prefabricated concrete elements whenever possible. If in-situ concrete production is required, works will be conducted in a way to avoid contact of cement and uncured concrete with surrounding water.
- The proposed ore dock will be constructed during the ice-covered season, when ringed seal would be the only marine mammal species present in southern Milne Inlet.
- The majority of construction work, particularly in shallow water (e.g., access causeway), will take place in winter as land-fast ice is formed. It is expected that, as construction gradually moves offshore, ice will thicken and

become grounded. Therefore, ice surrounding construction areas will act as a barrier limiting particulate deposition and spills in surrounding water.

- To reduce disturbance to the marine environment, the ore dock components will be constructed sequentially, moving from onshore to offshore; the causeway will be constructed in small sections, placing protective layers and armouring immediately after core material is placed to minimize erosion.
- The proposed ore dock will be constructed in succession to limit disturbance to the natural marine environment, with a focus on in-water activities and producing an effective structure for long term, low maintenance operation.
- Backfilling of the berth will only occur after a sufficient length of quay is installed so the fill remains within the structure footprint and no material is dispersed.
- Machine operation in water will be reduced, e.g., piling and filling equipment will operate on the constructed sections of the ore dock and will not enter the water.
- Disposal of removed sediment will be conducted to minimize effects on water and sediment quality. The material will be removed using a suction pump, which will reduce dispersal of re-suspended sediment in water.

Pile Driving:

- Vibratory pile driving methods will be preferred over impact pile driving.
- Impact pile driving will be scheduled when practical to avoid sensitive fish periods such as fish spawning and migratory periods.
- Implementation of a Marine Mammal Exclusion Zone - defined as the zone within which MM may be potentially exposed to sound levels above the injury threshold criteria, which are:
  - 180 dB re 1 µPa SPLrms for cetaceans, and
  - 190 dB re 1 µPa SPLrms for pinnipeds)
- The occurrence of a marine mammal within the exclusion zone will trigger specific mitigation actions (e.g., shut-downs) so as to avoid the potential for physical injury to animals from pile driving noise.
- During all pile driving activities, marine mammal monitoring will be undertaken by a qualified and experienced Marine Mammal Observer (MMO), with all sightings communicated to the piling contractor.
- Implementation of a 30-minute pre-operational search for marine mammals prior to start-up of pile driving. This would consist of a visual scan of the water by the MMO to determine that no marine mammals are present within the exclusion zone.
- A ramp-up procedure consisting of initial activation of the equipment using the lowest energy source / pulse and gradually increasing the intensity of the sound until it reaches the required intensity, thus allowing time and incentive for marine mammals to leave the immediate zone of potential injury before the pile driver is operating at full power.
- Shut-down procedures –pile driving will be temporarily suspended when a marine mammal enters the exclusion zone and until it moves outside the safety zone.
- Installation of a bubble curtain around the wetted pile to dampen sound transmission through water during active pile driving.
- The MMO will periodically verify underwater sound levels in the field using a hydrophone and a real-time sound monitor to confirm that sound levels at the modelled exclusion zone radius are below the established injury thresholds for marine mammals. If sound levels are shown to exceed the injury thresholds at the exclusion zone radius, the exclusion zone boundary will be adjusted accordingly.
- Concurrent pile driving activities will be minimized when practicable (e.g., avoiding multiple pile driving activities at the same time).

- The dock face will be oriented parallel to the existing seabed contours to minimize dredging activities.
- The release of deleterious substances in the marine environment can adversely affect marine mammals and fish found in the Project area. A water quality monitoring plan will be developed as a condition of a future Authorization under the Fisheries Act for the second ore dock. Water quality monitoring needs will be set out in the Ore Dock Construction Environmental Plan and will include:
  - In situ monitoring of turbidity during in-water and nearshore works, and specifically during pile driving and dredging operations (as needed)
  - In situ monitoring of pH levels during concrete pouring (as needed)
  - Daily in situ monitoring turbidity monitoring, including background turbidity measurements
  - Daily visual inspection of the works areas and surrounding water for visual turbidity events

4.12 BLASTING IN OR NEAR WATER

4.12.1 ENVIRONMENTAL CONCERN

Various blasting methods will be utilized throughout the lifecycle of the Project, including the use of high explosives and pre-packaged emulsions. Although these explosives contain ammonium nitrate, the chance of ammonium nitrate contaminating the water is low. Ammonia is toxic to aquatic life at certain concentrations; therefore, the proper handling and use of explosives during blasting operations is important to minimize potential impacts on the environment.

Blasting in or near water produces shock waves and vibrations that may have a potential impact on fish and marine mammals. Because of this, it is important that the appropriate and safe vibration limits are implemented to minimize the impact to the surrounding environment.

Potential silt and sediment production resulting from blasting activities may also have negative effects on fish and fish habitat. Silt and sediment can be transported in the water, which may cause turbidity and a variety of other harmful effects on fish. Some of these negative effects include:

- Clogging and abrasion of the gills of fish and other aquatic organisms
- Behavioural changes such as movement and migration
- Decreased resistance to disease
- Impairment of feeding (turbidity interferes with feeding for visual feeders and poor egg and fry development)

These are just a few of the potential harmful effects that silt, sediment, and turbidity can have on the surrounding marine and freshwater environment, so ensuring that the appropriate precautions are put in place when blasting is essential.

4.12.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 7.4.

TABLE 4.15 BLASTING IN WATER RELATED DOCUMENTS

Document No.	Title
BAF-PH1-830-P16-0003	Blasting Operations Management Plan
Canadian Technical Report of Fisheries and Aquatic Sciences 2107	Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (DFO, 1998)
Various	DFO Fisheries Authorizations

4.12.3 ENVIRONMENTAL PROTECTION MEASURES

The following protection measures shall be implemented:

- Explosives use at the site and worker safety is governed by the *NWT/Nunavut Occupational Health and Safety Act* and Regulations.
- Project Personnel using explosives shall have all the required certifications, including blasters' certificates.
- Modern explosive materials (i.e., emulsions) and blasting methods will reduce the risk of ammonia contaminating the water.
- The production of silt in the water from the use of explosives will be minimized by applying the mitigation measures identified in the Blasting Operations Management Plan, including the installation of silt fences and turbidity curtains.
- Precautions shall be taken to safely handle the explosives and to minimize spillage during blasting operations.
- Adaptive Management will be implemented in all phases of the Project to ensure that the precautionary measures are in place to reduce the environmental impact of the associated activities.
- DFO has produced the "*Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters*" (DFO, 1998) to protect marine wildlife, including fish and marine mammals, from underwater vibrations. Highlights of the guideline include the following:
  - No explosive is to be knowingly detonated within 500 m of any marine mammal (or no visual contact from an observer using 7 x 35 power binocular).
  - No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e. overpressure) greater than 50 kPa in the swim bladder of a fish. Note that the DFO guideline states an overpressure threshold of 100 kPa, but during the Phase 2 Proposal review Baffinland agreed to a request from DFO to apply a lower threshold of 50 kPa.
  - No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm/s in a spawning bed during the period of egg incubation.
  - The guideline also presents tables of weight of explosive charge versus distance and other estimation methods to determine the potential impacts.
  - This guideline is relevant mostly for the Construction Phase of the Project with regards to port and river crossing construction.

4.13 POST-CONSTRUCTION ACTIVITIES

4.13.1 ENVIRONMENTAL CONCERN

Post-construction activities may include the re-contouring of stockpiled soil and overburden, natural re-vegetation, restoring natural drainage patterns, equipment and waste removal etc., as required within the Project to prepare for the Reclamation Phase of the Project and minimize environmental impacts.

The loss of terrestrial and aquatic habitat, erosion and slope failure, and the disturbance and/or destruction of historic resources are environmental concerns associated with the potential activities related to construction. With the proper post-construction activities in place, the physical environment shall be more readily restored and remediated to mitigate the potential impacts listed above.

4.13.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 4.14.

TABLE 4.16 POST-CONSTRUCTION RELATED DOCUMENTS

Document No.	Title
BAF-PH1-830-P16-0012	Interim Closure and Reclamation Plan

4.13.3 ENVIRONMENTAL PROTECTION MEASURES

Refer to the Interim Closure and Reclamation Plan for more information on Post-Construction Activities and progressive reclamation.

5.0 WATER MANAGEMENT

5.1 WATER USE

5.1.1 ENVIRONMENTAL CONCERN

Water is an important resource that must be protected. The use of water by Baffinland for the Project is currently governed by the Type A Water Licence (2AM-MRY1325, Amendment No. 1) and Type B Water Licence (2BE-MRY1421) issued to the Company by the NWB. In addition to regulating water usage, Baffinland's water licences regulate many aspects of the Company's waste management practices, construction and operation activities, aquatic effects monitoring, emergency response planning, and the abandonment, reclamation and closure of the Project.

This OES highlights the key terms and conditions of Baffinland's water licences and other approvals governing water use.

5.1.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 5.1.

TABLE 5.1 RELATED DOCUMENTS

Document No.	Title
This EPP	Section 4.4 Sediment and Erosion Control
	Section 7.1 Geotechnical Drilling Operations
	Section 7.2 Exploration Drilling Operations
	Appendix B11 Water Collection Logs
BAF-PH1-830-P16-0010	Freshwater Supply, Sewage and Wastewater Management Plan
BAF-PH1-830-P16-0036	Spill Contingency Plan
2AM-MRY1325, Amendment No. 1	NWB - Type A Water Licence
2BE-MRY1421	NWB - Type B Water Licence
ISBN 0-662-23168-6	Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO, 1995)

5.1.3 ENVIRONMENTAL PROTECTION MEASURES

5.1.3.1 CAMP WATER SUPPLY

The following Environmental Protection Measures apply to the Camp Water Supply:

- Only approved water sources shall be used for Project activities.
- The Mary River Mine Site will obtain water from Camp Lake.
- The Milne Port Camp is approved to obtain water from Phillips Creek during the summer (open water) and km 32 lake or another approved source during the winter.

- Water supply facilities are to be maintained to the satisfaction of the Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Inspector.
- Total volumes of water withdrawn from any water body by Baffinland will be recorded and provided to the Environment Department upon request using the Water Collection Log.
- Daily water usages volumes for Project Sites shall not exceed volumes outlined in Baffinland's Type A Water Licence), as shown in Table 5.2.
- If water is required from a source that may be drawn down (small lake or stream), Baffinland shall submit a request for approval to the NWB 15 days prior to withdrawing the water.
- Work shall be performed in such a way as to ensure that materials such as sediment, fuel, or any other hazardous material does not enter watercourses and waterbodies, through the implementation of sediment control measures and proper hazardous materials management practices. In the event of a release to the environment, the Spill Contingency Plan shall be implemented.
- The Licensee may recycle water and use reclaimed water from the various Treatment Facilities, surface water management ponds and embankment dams and approved discharge locations under the licence if such waters meet appropriate discharge criteria for those facilities.
- All water intake hoses shall be equipped with a screen of an appropriate mesh size (as approved by 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.
- Measures shall be provided to prevent and control erosion on banks of any body of water.
- Equipment shall not be washed in any watercourse or water body.
- No fuelling and/or servicing of equipment shall occur within 31 m of any water body.

For water use associated with drilling programs, see the OES for Geotechnical and Exploration Drilling Operations (Sections 7.1 and 7.2).

5.1.3.2 DUST SUPPRESSION ALONG TOTE ROAD AND NORTH RAILWAY

Suitable water sources for dust suppression along the Milne Inlet Tote Road and along the adjacent North Railway (to be constructed) were reviewed. The Fresh Water Supply, Sewage and Wastewater Management Plan lists approved water sources under the Type A Water Licence. Water can be extracted from these small stream sources during June and July in any year, but in drier years water withdrawals are prohibited during August and September. Consult the Environmental Coordinator or Superintendent before withdrawing waters from the streams to verify if it is a wet or dry year and if water withdrawals are authorized. Section 3.1 of the Fresh Water Supply, Sewage and Wastewater Management Plan also lists the maximum water take allowed at each location.

5.1.3.3 SCREENS ON WATER TRUCK INTAKE HOSES

A fish screen is required under Section 20 of the Fisheries Act on any water intake, ditch, channel, or canal to prevent harm to fish. The fish screen is used to cover the water intake structure in order to prevent the passage or impingement of fish. DFO provides a guideline titled "*Freshwater Intake End-of-pipe Fish Screen Guideline*" (DFO, 1995) to assist in the design and installation of fish screens. The measures presented below are adapted from the DFO guideline for implementing fish screens where fresh water is extracted from fish bearing waters at the Mary River Project.

TABLE 5.2 WATER USE FOR DOMESTIC AND INDUSTRIAL PURPOSES

Site	Source	Authorized Water Use Volume (m^3/day)	
		Construction Phase	Operation Phase
Milne Port (Milne Inlet)	Phillips Creek (summer)	367.5	367.5
	km 32 Lake (winter)		
Mine Site (Mary River)	Camp Lake	657.5	355.4
Steensby Port (Steensby Inlet)	ST 347 km Lake	435.8	243.6
	3 km Lake		
Ravn River	Camp Lake	145.2	
Mid-Rail	Nivek Lake (summer)	79.5	
	Ravn Camp Lake (winter)		
Cockburn North (Tunnels Camp)	Cockburn Lake	101.4	
Cockburn South Camp	Cockburn Lake	111.1	

Freshwater will be extracted from fish bearing water for use in dust suppression around the Project Site, largely focusing on the Milne Inlet Tote Road (Tote Road) and the railway construction right-of-way (ROW). Dust suppression is completed using water trucks with a capacity of 8,000 US gallons, equivalent to 30,000 L. The water trucks are equipped with onboard water pumps (Bowie 3300 pumps) powered by the trucks' engines.

Fish species present in freshwaters at the Baffinland Project include Arctic char and ninespine stickleback. Fish screens are designed to protect fish with a minimum fork length of 25 mm and a maximum endurance time of 10 minutes, by limiting approach velocities to approximately 0.11 m/s.

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.

The following fish screen designs meet the above DFO criteria for water take during dust suppression activities:

- Cylindrical Screen: 0.10 m diameter and 0.85 m length
- Box Screen: 0.10 m x 0.10 m width and 0.68 m length
- Circular Screen: 0.59 m diameter
- Square Screen: 0.52 m width x 0.52 m length

Typical end of pipe installation guidelines (DFO, 1995):

- Screens should be in areas and depths of water with low concentrations of fish throughout the year.
- Screens should be located away from natural or man-made structures that may attract fish that are migrating, spawning, or in rearing habitat.
- The screen face should be oriented in the same direction as the flow.
- Ensure openings in the guides and seals are less than the opening criteria to make "fish tight".
- Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.

- Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.
- Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made from solid materials and the end of the manifold capped.
- Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.

Typical cleaning and maintenance procedures (DFO, 1995):

- Provision should be made for the removal, inspection, and cleaning of screens.
- Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
- Pumps should be shut down when fish screens are removed for inspection and cleaning.
- Screens may be cleaned by methods such as air or water, backwashing, removal and pressure washing or scrubbing.
- Under certain site-specific winter conditions, it may be appropriate to remove screens to prevent screen damage.
- Flexible suction pipe may be used instead of solid, fixed piping for ease of screen removal and cleaning.
- Pump suction pressure can be measured to assess the need for screen cleaning.

If another type of mesh or screen design is used, the guidelines for designing these fish screens are provided in the DFO (1995) guideline. DFO (1995) includes examples of common screen shapes and typical installations of end of pipe installations.

5.2 FRESHET MANAGEMENT

5.2.1 ENVIRONMENTAL CONCERN

The effective management of freshet is imperative to maintaining the usability of the Tote Road and Rail, as wells as stability of the camp pad and associated infrastructure. Improper or mismanaged preparation activities can result in significant washouts of the Tote Road or Rail, which could result in major damage and loss of material.

The failure to properly prepare for and manage freshet along the Tote Road and Rail is a major risk to the Company, as road washouts could potentially affect personnel movement between Project Sites, and result in significant production losses, schedule delays, and loss of reputation/regulatory enforcement.

5.2.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 5.3.

TABLE 5.3 FRESHET MANAGEMENT RELATED DOCUMENTS

Document No.	Title
This EPP	Section 4.4 Sediment and Erosion Control
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0023	Roads Management Plan

5.2.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures must be implemented by Site Personnel trained in completing culvert excavation and steaming activities to minimize the potential risks associated with freshet:

- Culvert ends must be dug out using an excavator prior to the commencement of the melt to allow access to the ends. When digging out the culverts using the excavator, it is very important not to damage the culvert ends. The culvert ends should have rebar markers; however, this activity should be undertaken with the use of a spotter. Also, if the rebar is no longer in place on one end, a metal detector should be used by the spotter to locate the culvert end.
- Culverts found to be substantially or completely blocked will need to be opened using a portable steam generator or steaming truck in order to allow for the passage of the initial melt water. It is important to monitor initial days of runoff as, if the weather gets cold once melt begins, there will be the possibility of refreezing of the culverts.
- Once the flows begin, a dedicated monitor is required to watch for potential problem areas, including upstream build-up of water, high flows, and upstream and downstream erosion and sedimentation. Should any of the above conditions be observed, various measures can be adopted including the use of pumps, berms, the installation of additional overflow culverts, and the installation of riprap or geotextile. Under certain circumstances, a controlled breach of the road may also be necessary to allow upstream flows to subside and to minimize the overall damage to the road.
- Should a washout or erosion occur, all reasonable efforts need to be made to prevent the siltation of downstream water bodies. Methods of controlling the migration of deleterious materials include silt fences, silt curtains, sumps and check dams, settling ponds, riprap and armouring, as well as the use of flocculants.
- Preparation and management activities should follow the Tote Road Freshet Management Procedure; however, in the event of significant erosion or siltation, please refer to the Surface Water and Aquatic Ecosystem Management Plan and the Roads Management Plan.

6.0 WASTE MANAGEMENT

6.1 SOLID WASTE MANAGEMENT

6.1.1 ENVIRONMENTAL CONCERN

Solid wastes are non-liquid, non-soluble materials including domestic garbage, food wastes, construction debris, commercial refuse, non-combustible and non-hazardous materials. Solid waste materials at site will be re-used and recycled wherever possible and feasible. Where it is not possible or feasible, the two main methods of solid waste treatment and/or disposal for the Project lifecycle will be incineration and landfilling. Solid waste, if not properly disposed of, may cause health and safety concerns to Project Personnel, attract wildlife, and could impair the aesthetics of the Project Areas. If unapproved wastes (i.e., hazardous or organic wastes) are placed in the landfill, poor quality landfill leachate may be generated and potentially affect nearby watercourses. This could also lead to attracting wildlife and increase wildlife interactions.

The management of solid wastes is discussed below.

6.1.1.1 INCINERATION

Domestic wastes, including those that cannot feasibly be re-used or recycled, are incinerated at Project Sites. Combustible non-hazardous waste (i.e., food scraps, oily rags, paper, and small plastics, etc.) generated at Project Sites is incinerated to minimize the negative impacts of attraction vectors to wildlife. Incinerator ash generated is analyzed and placed in the Mine Site Landfill after ensuring the ash meets regulatory requirements, as outlined in the *Environmental Guidelines for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities* provided by the Department of Environment of the Government of Nunavut. Waste oil and waste fuel may be burned when possible in the incinerator as a secondary source of fuel.

6.1.1.2 OPEN BURNING

Untreated, clean wood waste products including lumber, timber, and pallets, as well as paper and cardboard packaging that cannot feasibly be re-used or recycled, will be burned on site at approved open-burn locations at Milne Port and Mary River. Any treated and/or painted waste wood products, including plywood or particle board, is not permitted for opening burning. Open burning shall strictly be operated in an open top sea container at an approved open-burning location as per the requirements provided in the *Open Burning of Untreated Wood, Cardboard and Paper Products Procedure*. Ash generated from open burning will be analyzed and placed in the Mine Site Landfill after ensuring the ash meets regulatory requirements.

6.1.1.3 INERT WASTE LANDFILL

Inert waste generated by Project activities will be disposed of as per the requirements provided in the *Landfill Maintenance and Operation Manual*. The Mary River Landfill Facility is used for disposal of inert, non-hazardous, bulky waste with little to no salvage value. This includes scrap metal, ash, rubber, concrete, plastics, and treated wood (including manufactured wood such as particle board and plywood). Landfill disposal of organic and hazardous wastes is prohibited. A future landfill at Milne Port will be operated in a similar manner.

6.1.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 6.1.

TABLE 6.1 SOLID WASTE MANAGEMENT RELATED DOCUMENTS

Document No.	Title
This EPP	Section 6.2 Hazardous Material and Hazardous Waste Management
	Appendix 12 Bill of Lading Marine Transport Log
BAF-PH1-300-PRO-0001	Open Burning of Untreated Wood, Cardboard and Paper Products Procedure
BAF-PH1-830-P16-0028	Waste Management Plan
BAF-PH1-320-0004	Landfill Maintenance and Operation Manual
BAF-PH1-830-P25-0001	Environmental Standard - Waste Sorting Guidelines
Government of Nunavut (2011)	Environmental Guideline for Industrial Waste Discharges into Municipal Solid Waste and Sewage Treatment Facilities

6.1.3 ENVIRONMENTAL PROTECTION MEASURES

The following environmental protections measures shall be implemented:

- Solid waste generated on site will be segregated following Baffinland's Waste Management Plan. Waste streams generated at Project Sites are brought for incineration, disposed of one of the landfill facilities, approved open-burn locations, or backhauled offsite for proper disposal at a licenced waste facility (Hazardous Material and Hazardous Waste Management OES). Inert wastes, such as scrap metal, discarded machinery parts, kegs, concrete, building materials, wood, rubber, and bulky plastics, will be landfilled.
- Food wastes, packaging and paper will be incinerated on site. Kitchen grease will be incinerated or shipped south for disposal.
- Untreated, clean wood waste products, including lumber, timber, and pallets, as well as paper and cardboard packaging that cannot feasibly be re-used or recycled, will be burned on site at an approved open-burn location at either Milne Port or the Mary River Mine Site.
- All wildlife attracting waste (i.e., food scraps, human waste) will be stored in sealed animal proof containers and incinerated as soon as practicable.
- All waste backhauled offsite will be manifested and logged for tracking purposes (Hazardous Material and Hazardous Waste Management OES).
- Sewage sludge generated at the sewage treatment plants will be dewatered and incinerated on site.
- Waste accumulated on site prior to disposal will be confined so that it does not pose health or environmental hazards.
- Time lapse between collection and disposal shall be minimized to the extent practical.
- All combustible waste and debris will be stored and covered until disposal.
- Additional training will be provided to the kitchen and accommodations staff on sorting camp domestic wastes.
- All Project Personnel are responsible for daily clean-up of the area in which their work activities are being conducted.

6.2 HAZARDOUS MATERIAL AND HAZARDOUS WASTE MANAGEMENT

6.2.1 ENVIRONMENTAL CONCERN

Hazardous materials (other than fuels) used throughout the lifecycle of the Project include:

- Oils and greases
- Antifreeze
- Calcium chloride salt
- Ammonium nitrate
- Lead acid batteries
- Cleaners and other chemicals

Where the generation of the hazardous waste cannot be prevented, its management aims to prevent potential negative effects to the health and safety of Project Personnel and the environment.

Exposure to hazardous materials resulting from spills, leaks, or releases can create potential human safety and health concerns. For more information refer to Baffinland's Hazardous Materials and Hazardous Waste Management Plan.

6.2.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 6.2.

TABLE 6.2 HAZARDOUS MATERIAL AND HAZARDOUS WASTE MANAGEMENT RELATED DOCUMENTS

Document No.	Title
This EPP	Section 6.4 Spill Control Measures and Reporting
	Appendix B8 NT-NU Spill Report Form
BAF-PH1-810-FOR-0005	Baffinland Incident Investigation Form
BAF-PH1-830-P16-0011	Hazardous Materials and Hazardous Waste Management Plan
BAF-PH1-830-P16-0028	Waste Management Plan
BAF-PH1-830-P25-0001	Waste Sorting Guidelines
BAF-PH1-830-P16-0036	Spill Contingency Plan
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan
BAF-PH1-830-P16-0007	Emergency Response Plan

6.2.3 ENVIRONMENTAL PROTECTION MEASURES

Effective implementation of the following controls is required to ensure that hazardous materials and hazardous wastes are properly managed in order to minimize the potential for accidental releases to the environment:

- Hazardous materials and hazardous waste will be handled in accordance with Baffinland's Hazardous Materials and Hazardous Waste Management Plan and will be stored within designated lined and contained areas or within shipping containers at the laydown area.
- Storage containers will be leak-proof and have content names and labels clearly visible.
- All drums shall be marked with the name Baffinland Iron Mines Corporation.

- Hazardous materials arriving by sealift will be temporarily stored in their original sea containers at laydown locations at Milne Port until transported to their final destination.
- Lubricating oils and antifreeze will be dispensed from drums or cubes using either fitted taps or pumps and will employ drip trays.
- Regular visual inspection for leaks, drips or indications of loss will be conducted at all storage areas for evidence of accidental releases and verification that wastes are properly labelled and stored.
- Waste storage sites will be monitored and sampled in accordance with Baffinland's Water Licences.
- All chemical spills must reported immediately to the Environment Department. The Emergency Response Plan and Spill Contingency Plan may be implemented, depending on the nature of the spill.
- Cleaning materials (i.e., rags, gloves, etc.) will be properly wrapped in sealed plastic bags and will be directed to disposal by incineration.
- All hazardous waste shall be clearly labelled and will not be combined with other solid non-hazardous waste.
- Smoking within 10 m of any hazardous waste storage location is prohibited.
- Baffinland shall itemize and maintain a tracking manifest for all hazardous materials to be used on-site. Environmental personnel shall conduct periodic inspections and audits to confirm the tracking manifest is up to date and accurate. Baffinland Departments and Contractors are responsible for maintaining the current Safety Data Sheets on-site for all hazardous materials pertaining to their activities.
- All hazardous material spills shall be reported to the Environment Department immediately and documented by submitting the necessary documentation within 12 hours of the spill using the Baffinland Incident Investigation Form and the NT-NU Spill Report Form.
- All biological hazardous wastes generated at the medical clinic and first aid stations will be packaged, labelled, and transported offsite for disposal at an appropriate licenced facility.
- Transportation and packaging of hazardous waste offsite shall be coordinated and supervised by fully-trained and qualified Project personnel or an appropriately licenced Contractor.

6.3 WASTEWATER TREATMENT

6.3.1 ENVIRONMENTAL CONCERN

Wastewater, such as sewage, grey water, and oily (contaminated) water will be generated throughout the lifecycle of the Project.

The quantity of treated effluent discharged from the Project Wastewater Treatment Plants (WWTP) and Oily Water Treatments Systems (OWTS) will be monitored and recorded using inline flow monitors. To fulfill the requirements of Baffinland's Type A Water Licence (as amended), routine analysis of treated effluent is completed at Project WWTPs by an accredited laboratory to confirm that effluent quality meets applicable discharge criteria and is acceptable for release into the receiving environment. Similarly, treated effluent from the Project's OWTS is adequately monitored when in operation using an accredited laboratory and by Baffinland's internal environment laboratory.

Uncontrolled or untreated releases of wastewater to the environment may impact drinking water, aquatic resources, wildlife, and human health and should be reported immediately to the Environment Department (Spill Control Measures and Reporting OES).

6.3.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 6.3.

TABLE 6.3 WASTEWATER TREATMENT RELATED DOCUMENTS

Document No.	Title
This EPP	Section 6.4 Spill Control Measures and Reporting
BAF-PH1-830-P16-0010	Fresh Water Supply, Sewage and Wastewater Management Plan
BAF-PH1-840-P16-0002	Emergency Response Plan
BAF-PH1-830-P16-0036	Spill Contingency Plan
2AM-MRY1325 Amendment No. 1	NWB – Type A Water Licence

6.3.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures will be implemented to minimize the potential for accidental releases of wastewater on site:

- Operation of Project WWTPs and OWTSs is conducted in accordance with the Type A Licence, in conjunction with the Freshwater Supply, Sewage and Wastewater Management Plan.
- Raw wastewater and final effluent quality will be sampled and tested according to the requirements of the Type A Water Licence.
- All issues and/or concerns with Project WWTPs or OWTSs (i.e., improper operation, pipeline rupture, system breakdown, etc.), must be reported immediately to the Site Services and Environment Department.
- In the event of an accidental release of wastewater into the environment (i.e., pipeline rupture, etc.), immediate action is required to ensure that the release is contained and prevented from reaching any water body. Refer to the Emergency Response Plan and Spill Contingency Plan for additional guidance. All sewage spills must be reported immediately to the Environment Department. For more information on spill reporting, see Spill Control Measures and Reporting OES.
- Quantity of sewage treated will be documented continuously using in-line flow or vacuum truck counts. Vacuum truck counts will be tracked.
- Quantity of sludge generated by the Projects WWTPs will be recorded daily by the WWTP operators.
- Data will be reported as required by the Water Type A Licence and other relevant approvals.
- The sludge generated by the Project WWTPs is dewatered using a filter press and incinerated on site. Sludge will be stored in an animal proof secure area until picked up for disposal.
- Conserve water use to reduce the amount of wastewater generated.
- Treated wastewater will only be released into the receiving environment at approved locations at both the Milne Port and the Mary River Mine Site. All wastewater discharges are monitored to ensure all discharged effluent meets the regulatory requirements outlined in the Type A Water Licence.

6.4 SPILL CONTROL MEASURES AND REPORTING

6.4.1 ENVIRONMENTAL CONCERN

A wide range of hazardous materials will be used during the life of the Project, including Jet-A, diesel, oils, greases, antifreeze, calcium chloride, ammonium nitrate, lead acid batteries, cleaners, and a variety of other materials. The management of hazardous materials on site will focus on preventing the materials from causing harm to the health and safety of Project Personnel and the surrounding environment. All spills, leaks and releases of hazardous materials will be reported to the Environment Department immediately and documented by submitting the necessary documentation within 12 hours of the spill using the Incident Investigation Form and NT-NU Spill Report Form.

6.4.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 6.4.

TABLE 6.4 SPILL CONTROL RELATED DOCUMENTS

Document No.	Title
This EPP	Section 6.2 Hazardous Material and Hazardous Waste Management
	Appendix B8 NT-NU Spill Report Form
BAF-PH1-830-P16-0036	Spill Contingency Plan
BAF-PH1-830-P16-0007	Emergency Response Plan
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan
BAF-PH1-830-P16-0013	Milne Port Oil Pollution Emergency Plan
BAF-PH1-810-FOR-0005	Incident Investigation Form

6.4.3 ENVIRONMENTAL PROTECTION MEASURES

Refer to the Spill Contingency Plans and Emergency Response Plans for various response action levels based on type of hazardous product spilled, volume spilled, and type of receiving environment. A brief summary of the various spill response action levels is provided below.

Emergency response action levels and response procedures for environmental (spill) emergencies are provided in the Emergency Response Plan and Spill Contingency Plan.

Baffinland has adopted a classification system that includes three levels of emergency response. Each level of emergency, based on the significance of the event, requires varying degrees of response, effort and support. With emphasis on spills and releases the three response levels are as follows:

- Level 1 (Low) - Minor accidental release of a deleterious substance with:
  - No threat to public safety; and/or
  - Negligible environmental impact to receiving environment

- Level 2 (Medium) - Major accidental release of a deleterious substance with:
  - Some threat to public safety; and/or
  - Moderate environmental impact to receiving environment
- Level 3 (High) - Uncontrolled hazard which:
  - Jeopardizes project personnel safety: and/or
  - Significant environmental impacts to receiving environment

For spills, the level of emergency response to a spill incident is based on the substance released, quantity spilled, the receiving environment that is potentially impacted, and the human health risk. The level of response is also based on whether the location of the spill release is within engineered containment. Figure 5.1 provides a working guideline for project personnel.

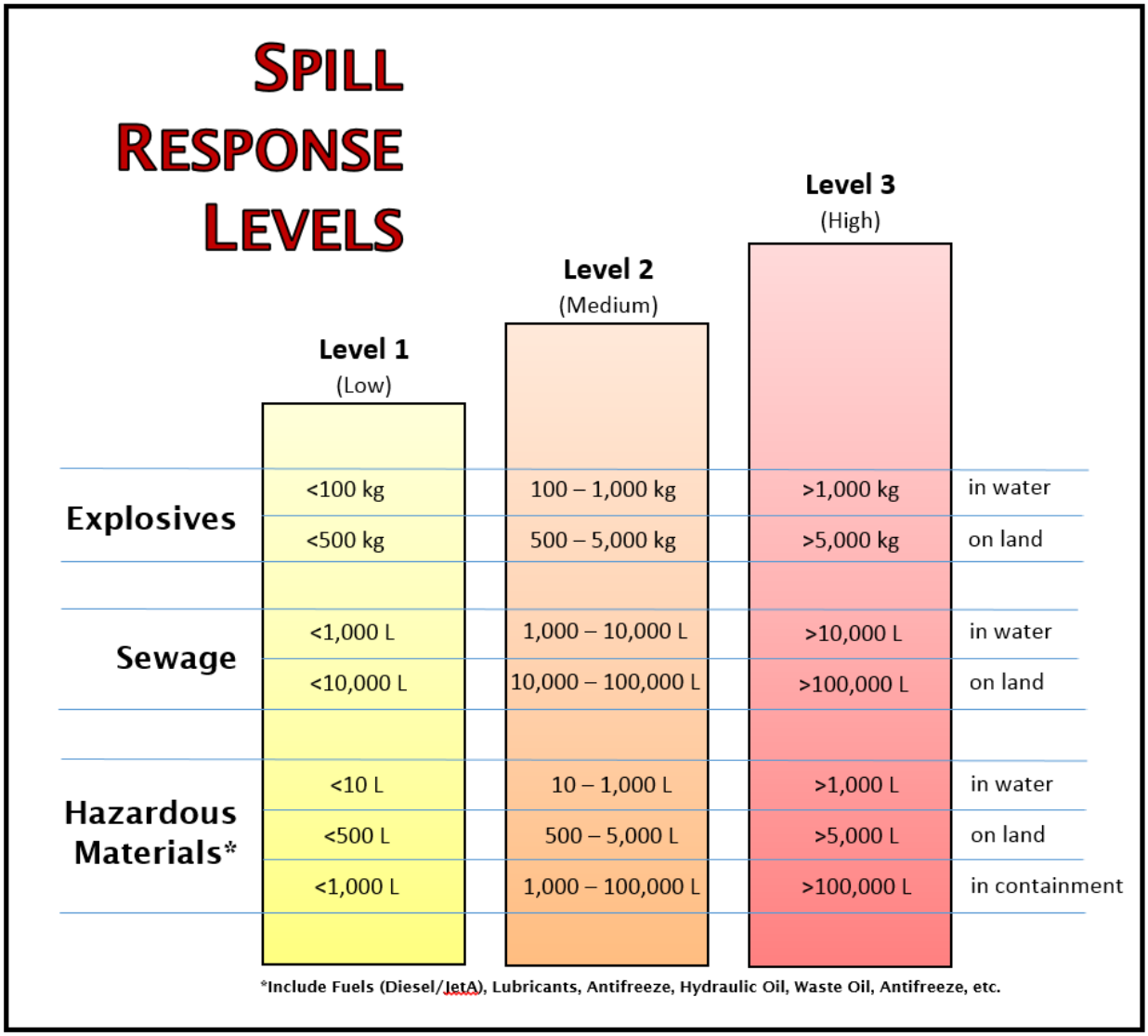

FIGURE 6.1 SPILL RESPONSE LEVELS

Emergency spill response training shall be completed in conjunction with the Emergency Response Plan. Baffinland's Emergency Response lead, with support from the Environmental Manager/Superintendents, will identify Project training needs and the resources required to provide the necessary skills to personnel tasked with duties in emergency and spill response. Circumstantially, emergency spill responses often occur in parallel with emergency responses (i.e., an overturned fuel tanker accident along the Tote Road not only causes imminent hazards to site personnel, but also to the surrounding environment). To facilitate efficient emergency response to all different types of emergency scenarios, project personnel on the Mine Rescue Team are trained to respond to Health and Safety emergencies and shall also receive sufficient training to effectively respond to accidental releases of hazardous materials.

Internal Baffinland reports are to be provided by the responsible department to the Environment Department via the Incident Reporting System. All external reporting to outside agencies is to be provided by the Environment Department.

General spill reporting and cleanup standards are summarized in Table 6.5.

TABLE 6.5 GENERAL SPILL REPORTING AND CLEAN UP STANDARDS

Spill on Land		
Volume	**Required Documentation**	**Spill Clean up**
< 1 litre	• Verbal or email report	Environment Department will advise if needed.
>1 litre and < 100 litres	• Photos of Spill and Clean-up • Incident Investigation Report • NT-NU Spill Report	Spills >30 litres will have an Environmental Monitor present to advise clean-up efforts.
> 100 litres	• Photos of Spill and Clean-up • Incident Investigation Report • NT-NU Spill Report • Notification to regulators and the Spill Line	Environmental Superintendent or designate will lead and advise clean-up efforts.
Spill on Water Body or Watercourse		
Volume	**Required Documentation**	**Spill Clean up**
Any volume	• Photos of Spill and Clean-up • Incident Investigation Report • NT-NU Spill Report • Notification to regulators and the Spill Line	Environmental Superintendent or designate will lead and advise clean-up efforts.

7.0 DRILLING AND BLASTING

7.1 GEOTECHNICAL DRILLING OPERATIONS

7.1.1 ENVIRONMENTAL CONCERN

Geotechnical drilling may be required to obtain soil and rock samples necessary for engineering and designing the Project facilities and infrastructure. Environmental concerns associated with drilling include: surface disturbances, drilling fluid and cutting disposal, impacts on dust, noise, water quality, and habitat encroachment. The use of water for drilling purposes is subject to the conditions outlined in Baffinland's Type B Water Licence 2BE-MRY1421 (NWB, 2014).

7.1.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 7.1.

TABLE 7.1 GEOTECHNICAL DRILLING RELATED DOCUMENTS

Document No.	Title
This EPP	Section 5.1 Water Use
	Section 3.1 Polar Bear Encounters
	Section 3.2 Fox and Wolf Encounters
	Section 3.3 Caribou Protection Measures
	Section 3.4 Bird Protection Measures
	Section 4.4 Sediment and Erosion Control
	Section7.2 Exploration Drilling Operations
	Section 7.3 Water Sampling for On-Ice Drilling
	Appendix B13 Drill Inspection Forms: Pre-Drilling, Daily, and Post Drilling
BAF-PH1-830-P16-0010	Freshwater Supply, Sewage and Wastewater Management Plan
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan
BAF-PH1-830-P16-0007	Emergency Response Plan
2BE-MRY1421	NWB Type B Water Licence

7.1.3 ENVIRONMENTAL PROTECTION MEASURES

The following protection measures for geotechnical drilling management shall be implemented:

Pre-Drilling Preparation and Acceptable Drill Locations:

- A Pre-Drilling Inspection Report shall be completed by the acting supervisor before drilling activities commence.
- Additional geotechnical investigations shall be undertaken to identify sensitive landforms, modify engineering design for Project infrastructure, develop and implement preventative and/or mitigation and monitoring measures to minimize the impacts of the Project's activities and infrastructure on sensitive landforms.
- Geotechnical drilling activities may be carried out within 31 m of the ordinary High Water Mark of waterbodies as long as the drilling location has been approved by the NWB. Please confirm all geotechnical drill locations with the Environment Department before drill mobilization.
- Archaeology clearance shall be obtained from the Environment Department for all geotechnical drill locations.
- Conduct a wildlife inspection immediately prior to movement of the drill, involving aerial and ground surveys of the new site. For details on drilling restrictions associated with wildlife interactions, see Polar Bear Encounters OES, Fox and Wolf Encounters OES, Caribou Protection Measures OES and Bird Protection Measures OES.
- Implement sediment and erosion control measures prior to drilling operations and maintain these during the operation to minimize transport of sediment into adjacent water bodies. Prior to the commencement of drilling for each hole, establish a dedicated sump location where collected "dirty" drill water and cuttings are to be disposed. The location shall be a minimum of 31 m from surface water bodies and located such that any flow toward a surface water body is minimized (sump shall be in a bowl, depression or be on a flat surface).

Drill Operation and Movements:

- Material shall not be stored on the surface of frozen streams or lakes, including immediate banks, except materials that are for immediate use.
- All drill waste, including water, chips, muds and salts ($CaCl_2$) from land based drilling shall be disposed of in a properly constructed sump or natural depression located at least 31 m away from the High Water Mark of any water body.
- All activities, including the overland transport of workers, shall be conducted in such a way to minimize ground disturbance.
- All waste, such as food and packaging, shall be collected for disposal at the camp.
- Feeding of all wildlife is prohibited.
- Equipment or vehicles shall not be moved unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging.
- Daily inspections for fuel/hydraulic leaks, equipment condition, sediment and erosion control, and water intakes shall be conducted prior to commencing Work activities at the start and end of each work shift/day. All leaks shall be immediately repaired.
- All drill rigs shall be equipped with spill kits in the event of leaks and spills. All operators should be trained in spill response and be familiar the use of spill kits.
- In case the bottom of the permafrost is broken through by the drill, the depth of the bottom and location shall be reported immediately to the Environment Department, who shall in turn report to the NWB.
- Equipment shall not obstruct any stream.
- Equipment storage holding areas will be located on gravel, sand or other durable land 31 m away from the ordinary High Water Mark of any water body in order to minimize impacts on surface drainage and water quality.

- Establish water quality conditions prior to and upon completion of any on-ice drilling program See Water Sampling for On-Ice Drilling OES for more details.
- All water intake hoses shall be equipped with a screen of an appropriate mesh size 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.
- Contain and re-circulate drill water to the fullest extent possible in order to reduce water usage. Utilize silt fences and natural depressions to prevent water from running into nearby watercourses and water bodies.
- Separate clean water from “dirty” water streams whenever possible (by means of hose extensions and snow berms or other means that direct and keep discharge away from the immediate area of the drill hole) to prevent migration and expansion of a “dirty” water plume.
- Work shall be performed in such a way as to ensure that materials such as sediment, fuel, and/or any other hazardous material does not enter watercourses and waterbodies through the implementation of sediment control measures and proper hazardous materials management practices. In the event of a release to the environment, the approved Spill Contingency Plan shall be implemented.
- To maximize drill return water recirculation, casing is to be frozen into the ground to a depth of 3 to 6 m below grade. The specific depth of casing to be frozen into each hole and length of time to allow for freezing will be specified by the acting Supervisor.
- The drill water and cuttings spillage footprint shall be minimized using berms, silt fences and/or other means of containment.
- Dispose of drill water into a properly constructed sump, or a naturally occurring contained depression. Drill water shall not be released directly to a nearby water course or to the ground.
- Use portable containment sumps (bins), for drill water and cuttings where containment in the ground is impractical. The bins shall not overflow and shall be dumped by means of helicopter or pump to the location identified for disposal of dirty drill water and cuttings.
- Drilling waste must not be allowed to spread to the surrounding land or water bodies; the footprint of any spillage must be minimized to the greatest degree practicable.
- In case of an artesian flow occurrence, drill holes shall be immediately plugged and permanently sealed to prevent induced contamination of groundwater or salinization of surface waters. Report the artesian flow occurrence as soon as possible to the Environment Department who in turn will report the occurrence to the NWB.
- For on-ice drilling, returned water released must be non-toxic, and not result in an increase in Total Suspended Solids (TSS) in the immediate receiving water above the Canadian Council of Ministers of Environment (CCME) guidelines for the protection of Freshwater Aquatic Life (i.e., 10 mg/L for lakes with background levels under 100 mg/L or 10% for those above 100 mg/L).

Drill Hole Abandonment:

- Materials such as debris and/or drill cuttings shall not be left on the ice when there is potential for that material to enter a water body.
- Restore, contour and stabilize constructed drill sumps, and other disturbed areas, to the pre-disturbed state immediately upon completion of drilling.
- Return all combustible waste and petroleum products to camp for proper management and disposal.
- Plug all drill holes upon completion, and where possible return drills cuttings at the surface to the drill hole at all land-based drilling locations.

- Contour and stabilize all other disturbed areas upon completion of work and restore these areas to a pre-disturbed state.
- Upon completion of a hole in rock, the casing will be removed. If the casing cannot be removed it will be cut off to be flush with surface and backfilled.
- Remove all non-combustible garbage and debris from the land use area to an approved disposal site.
- A Post-Drilling Inspection Report comprised of Drill Inspection Forms (Pre-Drilling, Daily and Post Drilling) will be filled out at the completion of each drill hole.
- Ensure a copy of all Pre-Drilling, Post-Drilling and Daily Drill Inspection Reports for all drill holes are submitted to the Environment Department at the completion of each drilling program.

7.2 EXPLORATION DRILLING OPERATIONS

7.2.1 ENVIRONMENTAL CONCERN

Exploration drilling will be required to confirm, characterize, and quantify new and already known deposits during the life of the Project. Environmental concerns with drilling include surface disturbances, drilling fluid and cutting disposal, impacts from dust, impact from noise and impacts on water quality, and habitat encroachment.

All drilling muds and other additives must be approved by the Environment Department prior to being transported and used on site for any exploration drilling program. Data on drilling muds and other additives must be included as part of the Emergency Response and Spill Contingency Management Plans. Use of water for drilling for the Project is subject to the conditions outlined in Type B Water Licence 2BE-MRY1421 (NWB, 2014).

7.2.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 7.2.

TABLE 7.2 EXPLORATION DRILLING RELATED DOCUMENTS

Document No.	Title
This EPP	Section 2.1 Cultural Heritage and Archaeological Resources
	Section 5.1 Water Use
	Section 3.1 Polar Bear Encounters
	Section 3.2 Fox and Wolf Encounters
	Section 3.3 Caribou Protection Measures
	Section 3.4 Bird Protection Measures
	Section 4.4 Sediment and Erosion Control
	Section 7.3 Water Sampling for On-Ice Drilling
	Appendix B13 Drill Inspection Forms: Pre-Drilling, Daily, and Post Drilling
BAF-PH1-830-P16-0010	Freshwater Supply, Sewage and Wastewater Management Plan
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0037	Exploration Spill Contingency Plan

Document No.	Title
BAF-PH1-830-P16-0007	Emergency Response Plan
2BE-MRY1421	NWB Type B Water Licence
TBD	Railway Operation and Maintenance Plan (under development)
BAF-PH1-830-P16-0027	Terrestrial Environment Mitigation and Monitoring Plan

7.2.3 ENVIRONMENTAL PROTECTION MEASURES

The following protection measures for exploration drilling management shall be implemented:

Pre-drilling Preparation and Acceptable Drill Locations:

- Prior to drill placement, investigate site drainage to determine the proper downstream placement of the collection/settling sump(s). Note that in most situations, sumps will be required; however, in some circumstances sumps may not be practical. In these cases, approval must be obtained from the Environment Department.
- At least 15 days notice must be provided to the NWB and an Inspector prior to the use of water from any sources not previously identified.
- 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 cannot be used as a water source unless authorized and approved by the NWB in writing.
- In cases where water withdrawals may drawdown the source waterbody, a request for approval must be submitted to the NWB at least 30 days prior to use of the water. The request must include the following information: volume required, hydrological overview of the waterbody, details of impacts, and proposed mitigation measures.
- Ensure sumps are of sufficient capacity based on a combination of proposed drill-hole length, water usage, and the potential residence time of the sumps.
- Do not construct drill sites or drill sumps within 31 m of the Normal High Water Mark of a water body unless specific approval is obtained by Baffinland from the NWB.
- Ensure that the Pre-drilling Inspection Report is completed prior to finalizing the drill site, sump locations, and silt fence locations.
- Silt fences shall be placed immediately down-gradient of drill set-ups/sumps and up-gradient of any water body or stream. The selection of silt fence locations will be based on minimizing the transport distance of drill cuttings/mud and placing silt fences in optimal locations that will be functionally effective.
- Archaeology clearance shall be obtained from the Environment Department for all exploration drill locations (Cultural Heritage and Archaeological Resources OES).
- Conduct a wildlife inspection immediately prior to movement of the drill, involving aerial and ground survey of the new drill site. For details on drilling restrictions associated with wildlife interactions, see Polar Bear Encounters OES, Fox and Wolf Encounters OES, Caribou Protection Measures OES and Bird Protection Measures OES.

Drill Operations and Movements:

- Material shall not be stored on the surface of frozen streams or lakes, including immediate banks, except materials that are for immediate use.
- Ensure that the drilling area is kept clean and tidy at all times. No littering is permitted - collect and package all waste for disposal at camp.
- Feeding of wildlife is prohibited.
- Activities shall be conducted to minimize surface disturbance.
- Minimize overland transportation for transport of workers off of approved roads and trails to reduce the potential for ground disturbance.
- Do not use surface vehicles to move drill rigs or other equipment without prior authorization by the Environment Department. The use of any vehicles off approved routes is prohibited.
- Do not move equipment or vehicles unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging.
- Daily checks of active sumps will be conducted to ensure that sump water spillover occurs in a controlled manner. Sumps are to be constructed so that there is an overflow notch cut into the sump embankment to allow the sump water to decant from the sump in a controlled fashion.
- Silt fences will be placed downstream of the sumps as described previously and will be checked daily.
- Daily inspections for fuel/hydraulic leaks, equipment condition, sediment and erosion control, and water intakes shall be conducted prior to commencing work activities at the start and end of each work shift/day. All leaks shall be immediately repaired.
- A Daily Drill Inspection Report will be filled out by the acting Supervisor for every day of drill operation.
- All drill rigs shall be equipped with spill kits in the event of leaks and spill. All operators should be trained in spill response and be familiar the use of spill kits.
- If the bottom of the permafrost is broken through by the drill, the depth of the bottom of the permafrost and location shall be reported immediately to the Environment Department, who in turn will provide immediate notification to the NWB.
- Equipment or material shall not obstruct any stream.
- Equipment storage holding areas will be located on gravel, sand or other durable land at least 31 m away from the ordinary High Water Mark of any water body in order to minimize impacts on surface drainage and water quality.

Water Use, Brine and Drill Water Runoff:

- Brine (calcium chloride salt mixed with water) used in exploration drilling is to be controlled to the maximum extent practicable. Drilling muds contained in drilling fluids must be settled out in sumps or by silt fences prior to entering any downstream water bodies or streams.
- Salt and water use for each drill is to be controlled by the use of brine mixing stations. The brine station operator will inspect his/her station daily and will be in continuous communication with each exploration drill. Brine conservation measures will be adopted which will include: shutting off the flow of brine to drills when brine is not required (i.e., when drills are temporarily shut down); eliminating spillage in the vicinity of the brine stations; and minimizing to the greatest extent practicable the brine's salt concentrations.
- 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.

- Measures shall be provided to prevent and control erosion on banks of any body of water. The measures shall be implemented prior to and maintain during the drilling to prevent entry of sediment into water.
- Streams cannot be used as a water source unless authorized and approved by the NWB.
- If water is required from a source that may be drawn down (small lake or stream), Baffinland shall submit a request for approval to the NWB at least 15 days prior to withdrawing the water.
- Drill water shall be obtained from water sources(s) proximal to the drilling targets and shall not exceed a total of 250 m^3 per day for all drilling activities on the Project.
- Water use will be tracked using inline water meter on intake lines and recorded on the Daily Drilling Inspection Reports.
- No material shall be removed from below the ordinary High Water Mark of any water body unless authorized by the NWB.
- Contain and re-circulate drill water to the fullest extent possible in order to reduce water usage. Utilize silt fences and natural depressions to divert water from running into nearby watercourses and water bodies.
- Separate clean water from “dirty” water streams whenever possible (by means of hose extensions and snow berms or other means that direct and keep discharge away from the immediate area of the drill hole) to prevent migration and expansion of a “dirty” water plume.
- Work shall be performed in such a way as to ensure that materials such as sediment, fuel and/or any other hazardous material do not enter watercourses and waterbodies, through the implementation of sediment control measures and proper hazardous materials management practices. In the event of a release to the environment, the Spill Contingency Plan shall be implemented.
- The drill water supply temperature should be monitored during drilling and kept to a temperature as low as possible (but not so low as to cause an imminent risk of frozen water lines).
- To maximize drill return water recirculation, casing is to be frozen into the ground to a depth of 3 to 6 m below grade. The specific depth of casing to be frozen into each hole and length of time to allow for freezing will be specified by the acting Supervisor.
- The drill water and cuttings spillage footprint shall be minimized through the use of berms, silt fences, and/or other means of containment.
- Dispose of drill water into a properly constructed sump, or a naturally occurring contained depression. Drill water shall not be released directly to a nearby water course or to the ground.
- Use portable containment sumps (bins), for drill water and cuttings where containment in the ground is impractical. The bins shall not overflow and shall be dumped by means of helicopter or pump to the location identified for disposal of dirty drill water and cuttings.
- Drilling waste must not be allowed to spread to the surrounding land or water bodies; the footprint of any spillage must be minimized to the greatest degree practicable.
- In case of an artesian flow occurrence, drill holes shall be immediately plugged and permanently sealed to prevent induced contamination of groundwater or salinization of surface waters. Report the artesian flow occurrence within 48 hrs to the Environment Department, who in turn will report the occurrence to the NWB.
- For on-ice drilling, returned water released must be non-toxic, and not result in an increase in TSS in the immediate receiving water above the CCME guidelines for the protection of Fresh Water Aquatic Life (i.e., 10 mg/L for lakes with background levels under 100 mg/L or 10% for those above 100 mg/L).

Drill Hole Abandonment:

- Materials such as debris and/or drill cuttings shall not be left on the ice when there is potential for that material to enter a water body.
- Restore, contour and stabilize constructed drill sumps, and other disturbed areas, to the pre-disturbed state immediately upon completion of drilling.
- Return all combustible waste and petroleum products to camp for proper management and disposal.
- Plug drill holes upon completion, and where possible return drill cuttings at surface to the drill hole at land-based drilling locations.
- Contour and stabilize other disturbed areas upon completion of work and restore these areas to a pre-disturbed state.
- Upon completion of a hole in rock, the casing will be removed. If the casing cannot be removed it will be cut off to be flush with surface and backfilled.
- Remove non-combustible garbage and debris from the land use area to an approved disposal site.
- Return combustible waste and petroleum products to camp for proper management.
- Ensure that a Post-Drilling Inspection Report, comprised of the drill inspection forms, is filled out at the completion of each drill hole.

Copies of Pre-Drilling, Post-Drilling and Daily Drill Inspection Reports for drill holes will be submitted to the Environment Department at the completion of each drilling program.

7.3 WATER SAMPLING FOR ON-ICE DRILLING

7.3.1 ENVIRONMENTAL CONCERN

On-ice drilling is critical for geotechnical investigations so that information for ports, bridges and other Project infrastructure may be collected for use in the infrastructure's design and engineering. Marine and lake environments are sensitive to disturbances such as on-ice drilling. As such, overall water quality, including occurrence and concentrations of suspended solids and trace metals, must be monitored and protected. Water samples should be taken prior to on-ice drilling and after on-ice drilling to determine if appropriate water quality standards have been maintained. Water sampling, for the purposes of water monitoring and detection of exceedances will ensure that additional measures are implemented to protect water quality during future on-ice drilling.

7.3.2 RELATED DOCUMENTS

This OES should be read and/or used in conjunction with the licences, management plans, monitoring plans, other sections of this EPP, and documentation forms listed in Table 7.3.

TABLE 7.3 WATER SAMPLING FOR ON-ICE DRILLING OES RELATED DOCUMENTS

Document No.	Title
This EPP	Section 7.1 Geotechnical Drilling Operations
BAF-PH1-830-P16-0026	Surface Water and Aquatic Ecosystem Management Plan
BAF-PH1-830-P16-0010	Fresh Water Supply, Sewage and Wastewater Management Plan
BAF-PH1-830-P16-0007	Emergency Response Plan
2BE-MRY1421	Type B Water Licence

7.3.3 ENVIRONMENTAL PROTECTION MEASURES

The following measures will be followed to monitor on-ice drilling (for both inland and marine environments):

- A location not more than 30 m downstream (if applicable) from the proposed drill hole location will be selected for pre-drilling and post-drilling water samples.
- The pre-drilling water sample will be taken no more than four hours prior to drilling commencing at that location.
- The post-drilling water sample will be taken within four hours of the rods and casing being removed from the hole and the drill being decommissioned.
- The following methodology will be used to collect the water samples:
  - A hole will be augured through the ice and ice cuttings will be cleared from the hole.
  - A bailer will be used to obtain a representative water sample from the water column below the bottom of the ice.
  - The water sample will be transferred to sample bottles.
  - The same hole will be used to collect the pre-drilling and post-drilling water samples.
- Water samples will be collected to monitor the TSS concentration: TSS should not increase by more than 10 mg/L for water bodies with background levels under 100 mg/L, or by more than 10% of the background level for water bodies with background levels above 100 mg/L.
- Before and after water samples will be tested in the field for TSS, pH, and electrical conductivity.
- Before and after water samples will be collected and submitted for laboratory testing to monitor total trace metals as determined by a standard ICP scan (to include at a minimum, the following elements: Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Hg, Mo, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn).
- Drill water and cuttings reporting to surface from on-ice drilling will be discharged into a portable containment sump and removed from the ice. Water and cuttings will be stored in a pit at least 31 m away from the High Water Mark of any water body, as specified by Baffinland.
- The measures included in the Geotechnical Drilling Operation OES will also be followed.

8.0 COMPLIANCE INSPECTIONS

8.1.1 RELATED DOCUMENTS

Individual departments are responsible for maintaining a clean, safe and environmentally acceptable work area. Departments are expected to conduct and document regular inspections of their work areas and facilities to ensure the Company's commitments and expectations regarding health, safety and environment are being met or exceeded. Inspection documentation shall be made available to Environmental personnel conducting periodic inspections or to external inspectors, regulators, and agencies conducting inspections under the terms and conditions of Baffinland's licences, permits, authorizations, and leases.

In addition to departmental inspections, Environmental personnel will conduct routine inspections throughout the Project Site to confirm department personnel are operating in accordance with the Company's Water Licences, permits and other regulatory requirements put in place by stakeholders, landowners, and government regulators. Project Personnel who are unsure about certain environmental impacts and/or necessary protection measures should consult the relevant sections of this EPP and other management plans listed in Table 8.1 first, followed by the Environment Department, before proceeding with the activity under question.

TABLE 8.1 COMPLIANCE INSPECTION RELATED DOCUMENTS

Document No.	Title
This EPP	Section 6.4 Spill Control Measures and Reporting
	Section 4.3 Fuel Storage and Handling
	Section 6.2 Hazardous Material and Hazardous Waste Management
	Appendix 14 Compliance Inspection Schedule 2019: Milne Port and Mine Site
BAF-PH1-830-P25-0001	Waste Sorting Guidelines
xxx	Use of Spill Trays at Site
BAF-PH1-830-P16-0028	Waste Management Plan

While conducting inspections, departments should pay close attention to the following:

- All hazardous materials and hazardous waste should be contained in a spill tray, a lined containment berm, or some other form of secondary containment.
- All waste should be segregated in accordance with the Waste Sorting Guidelines. Departments should ensure that disposal bins for each type of waste (hazardous, landfill, incinerator) are accessible and clearly labelled.
- All food waste and wildlife attractants will be disposed indoors to prevent the attraction and food conditioning of wildlife.
- All refuelling and equipment maintenance activities should employ the use of spill trays to prevent hazardous materials such as fuel, oils and greases from spilling onto the ground. See the Environmental Standard - Use of Spill Trays at Site for more details.
- All spills should be documented and reported to the Environment Department as soon as possible. Spills should be cleaned up as soon as possible after being reported, unless told otherwise by the Environment Department. For more details on spill reporting see the Spill Control Measures and Reporting OES.

8.1.2 SCHEDULE

The schedule for conducting environmental inspections will vary and will be established by the Environmental Superintendents and Coordinators and approved by the Environmental Manager. The schedule will be developed based on a Project activity risk-based approach: the inspection schedules for the mine site and Milne Port for 2019 are provided in Appendix B14.

9.0 REQUEST FOR REVISION TO AN OPERATIONAL ENVIRONMENTAL STANDARD

The EPP is a living document, and its users are encouraged to suggest changes to the content or wording of any OES to make the document more useful, appropriate to the work being conducted, and user-friendly.

Please submit a copy of the Request for Revision to an Operational Environmental Standard found in Appendix C to the Environmental Superintendent.

10.0 REVIEW OF PLAN EFFECTIVENESS

An important element of Baffinland's management system is reviewing the continued suitability, adequacy and effectiveness of each management plan. This will occur through an annual review process as well as scheduled updates.

10.1 ANNUAL REVIEW OF COMPLIANCE AND UNANTICIPATED EFFECTS

Throughout the year, immediate corrective actions are taken as appropriate to address instances of non-compliance, as well as unanticipated effects observed. Follow-up corrective actions may also be required. These immediate and follow-up corrective actions are documented in annual reports.

One follow-up corrective action may be to revise mitigation measures or monitoring programs described in the applicable management plans and to update OES. During the annual reporting cycle, Baffinland staff will review instances of non-compliance as well as unanticipated effects and determine if a review of plan effectiveness is appropriate. This process is articulated on Figure 6.1. The results of this annual review will be reported in the annual report. Management plan updates that result from this process will also be filed with the annual report.

10.2 SCHEDULED UPDATES

In addition to the annual review cycle described above, scheduled Plan reviews will occur according to the schedule presented in Table 10.1.

TABLE 10.1 PLAN REVIEW SCHEDULE

Review Event	Description
Post-construction	Mandatory management review
Every 3 years during operation	Mandatory management review

Plan updates will be recorded in the Document Revision Record located at the front of the Plan.

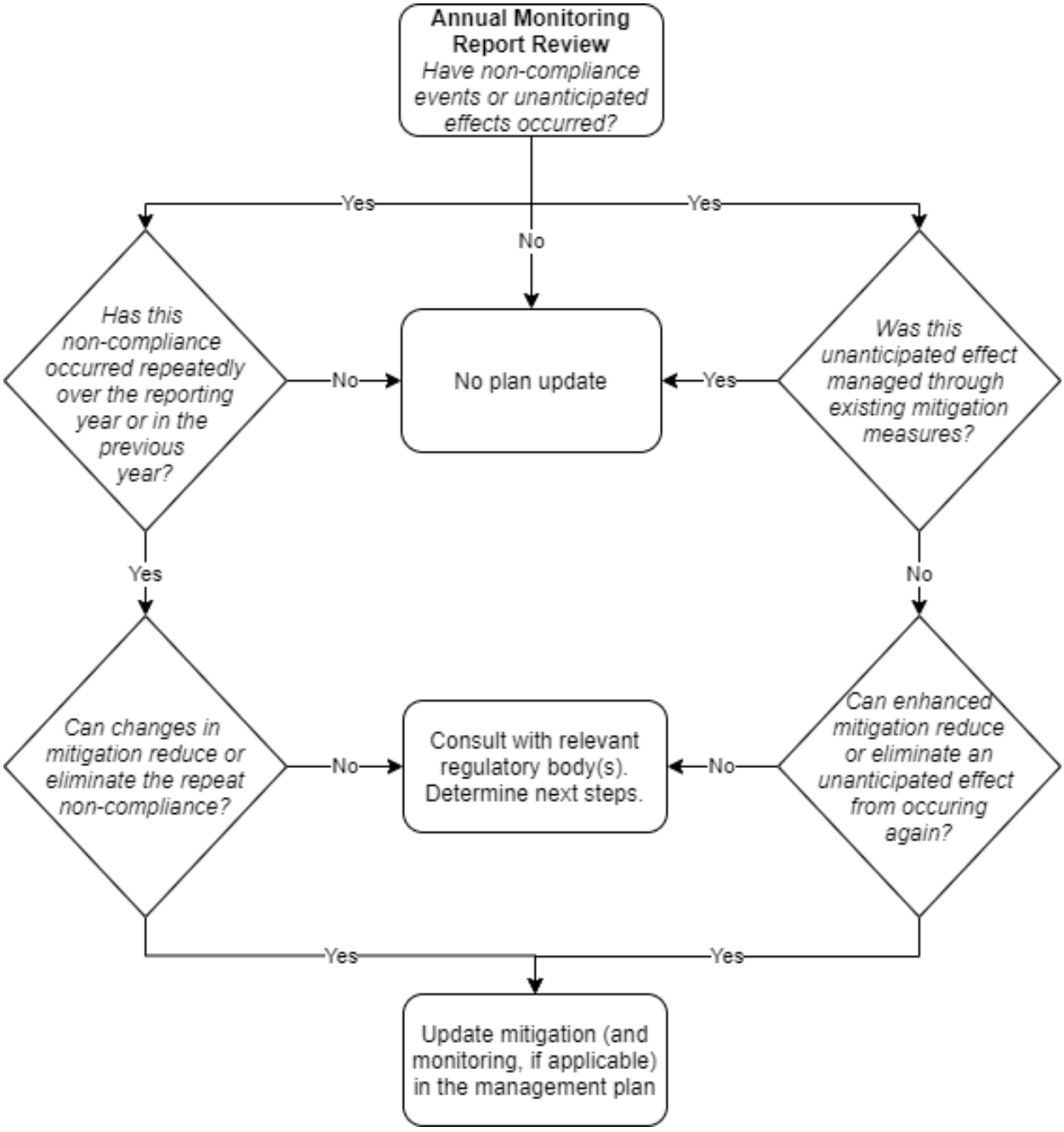

FIGURE 10.1 ANNUAL REVIEW OF PLAN EFFECTIVENESS

11.0 REFERENCES

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