Draft GUIDELINES

FOR THE PREPARATION OF AN

ENVIRONMENTAL IMPACT STATEMENT

For

BAFFINLAND IRON MINES CORPORATION'S

MARY RIVER PROJECT

(NIRB File No. 08MN053)

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GLOSSARY

This glossary is provided for the Proponent's greater certainty; the onus is on the Proponent to request clarification from the NIRB on any term it feels has not been made clear. Please note that, where possible, a reference has been provided for each of the terms below.

Archaeology	The scientific study of the material remains of the cultures of historical or prehistorical peoples.
Bioaccumulation	The process in which certain pollutants gather in living tissue (Theodore et. al 1997).
Biodiversity	The diversity of plant and animal life in a particular habitat or ecosystem.
Borrow pit	Excavated areas used to provide low quality fill for construction activities such as roadbed building and landscaping. Fill of this type is usually removed from a nearby borrow pit and then compacted on the site as a base for other construction (DIAND 1999).
Cumulative effects	The impact on the environment that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions (Tilleman 2005). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
Demography	The statistical study of populations, with particular reference to births, deaths, migratory movements, age and sex.
Ecosystem	A functional unit consisting of all living organisms (plants, animals and microbes) in a given area, and all the nonliving physical and chemical factors of their environment linked together through nutrient cycling and energy flow. An ecosystem can include humans and be of any size, but it always functions as an integrated unit. Ecosystems are commonly described according to the major type of vegetation, e.g. forest ecosystems or grassland ecosystems (Tilleman 2005).
Esker	A ridge of sand and gravel deposited by a receding glacier.
Faulting	Cracks or breaks within a body of rock, causing one part of the body of rock to slip or slide relative to the other.
Fines	The portion of a powder composed of particles [of rock, mineral or sediment] which are smaller than a specified size (Theodore *et. al* 1997).
General Circulation Model	A mathematical or statistical model describing atmospheric movements over the Earth. Among other things, such models

	are used to predict how the climate of the Earth may evolve over the years to come as a result of, for example, changes in atmospheric pollution.
Geochemistry	The study of the chemical composition of the earth and the physical and chemical processes responsible for it.
Geology	The study of Earth in terms of its development as a planet, commonly thought of as the study of rocks.
Geomorphology	The scientific discipline that studies the surface features of the Earth, including land forms.
Geotechnical	Relating to the application of engineering to geology.
Greenhouse Gases (GHGs)	Greenhouse gases (GHGs) are gases in the atmosphere that trap energy from the sun. Naturally occurring GHGs include water vapour, ozone, carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), By United Nations Framework Convention on Climate Change (UNFCCC), GHGs of interest may include: carbon dioxide (CO2) methane (CH4), nitrous oxide (N2O), sulphur hexafluoride (SF6), perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs) (EC 2008).
Harvest	The reduction of wildlife into possession, and includes hunting, trapping, fishing, as defined in the Fisheries Act, netting, egging, picking, collecting, gathering, spearing, killing, capturing or taking by any means (NLCA 1993).
Hydrocarbons	Any substance containing carbon and hydrogen in various combinations (e.g., gasoline and oil).
Hydrology	The science that deals with the occurrence, circulation, distribution, and properties of the waters of the Earth, including their reactions with the environment.
Inuit	Aboriginal peoples of northern Canada and Greenland. In the context of Nunavut, for the purpose of these Guidelines, meaning those people to whom NLCA Beneficiary status is ascribed.
Leaching	The process by which a liquid (e.g., water) passes through a substance, picking up some of the material and carrying it to other places. Leaching can occur underground in soil and rock, or above ground through piles of material.
Limnology	The study of life in lakes, ponds, and streams.
Lithology	The description of the physical characteristics of a rock, often based on its colour, structure, mineral components, and grain size.
Local Study Area	That area where there exists the reasonable potential for immediate impacts due to project activities, ongoing normal activities, or to possible abnormal operating conditions.
Mitigation	Actions taken for the purpose of reducing the negative impacts on the environment of a particular land use or activity (Tilleman

	2005). Actions may include considerations in design, construction, schedule, and restorative measures. Mitigation may also include restitution for any damage to the environment caused by a land use or activity through replacement, restoration, compensation, or any other means.
Nunavummiut	Residents of Nunavut.
Ore	A mineral or aggregate containing a precious or useful substance in a quantity and form that makes its extraction/mining profitable.
Overburden	Material that must be removed to allow access to an ore body, particularly in a surface mining operation.
Permafrost	A permanently frozen layer of soil or subsoil, or even bedrock
Palaeontology	The study of life in the past as recorded by fossil remains.
Periphyton	Very small plants that live attached to a surface in freshwater but do not move around.
Phenology	The study of periodic phenomena in plants, such as the time of flowering in relation to climate.
Phytoplankton	Very small plants that float or drift in lakes.
Plume	A visible or measurable discharge of a contaminant from a given point of origin. Plumes may occur in water or air.
Post-closure	The period of time following the shut-down of a mine or other facility, during which monitoring of its effects should be continued.
Post-project audit	An evaluation after a development of all of its environmental and social impacts and of the mitigation measures applied to it.
Potentially affected communities	A community or communities with the potential to be impacted, either positively or negatively, by a proposed project or development. Such communities may be defined physical entities or comprised of dispersed populations in the area of influence of a development or project.
Precautionary Principle	Where there are threats of serious or irreversible damage, lack of full scientific certainty must not be used as a reason for postponing cost-effective measures to prevent environmental degradation (United Nations 1972).
Proponent	The organization, company, or department planning to undertake a proposal (Tilleman 2005).
Quarries	Are any sites used for the extraction of building products or construction material from bedrock, such as limestone, shale, sandstone, or granite. Quarries may also be used as to manufacture crushed rock or other specific types of aggregate (DIAND 1999).
Raptor	A bird that hunts by snatching its prey.

Reasonably foreseeable future development	Projects or activities that are currently under regulatory review those or that will be submitted for regulatory review in the near future, as determined by the existence of a proposed project description, letter of intent, or any regulatory application filed with an authorizing agency (NIRB 2007).
Regional Study Area	The area within which there is the potential for indirect or cumulative biophysical and socio-economic effects.
Rock heave	The movement of rocks as a result of freezing and thawing.
Run of Mine Ore	the mined ore comes out of a mine before crushing or any other form of processing and treatment.
Sacred site	A place on the land created or used by Inuit spiritual leaders in the past for religious ceremonies, such as: a platform or formation leading to an "altar"; a hill, mountain, stone, boulder, river, lake, or Inukshuk designated as a sacred site; an offering place where people might plead for good fortune and well-being, often found along the coast, but also inland; a place where an unusual event might have happened, or an event that led to a death or a story of survival; a place known to Elders in legend where a significant story occurred (Ittarnisalirijiit Katimajiit 1996).
Scoping	A process that pinpoints significant issues requiring study and analysis. This process aims to identify those components of the biophysical and/or socio-economic environment that may be impacted by the project and for which there is public concern (NIRB 2008b).
Seismicity	The phenomenon of earth movements, in extreme cases in the form of earthquakes, and their geographic distribution.
Significant environmental effects	Either: (1) any irreversible damage to biological, commercial, or agricultural resources of importance to society, (2) any reversible damage to biological, commercial, or agricultural resources of importance to society if the damage persists beyond a single year, or (3) any known or reasonably anticipated loss of members of an endangered or threatened species. Endangered or threatened species are those species identified as such in accordance with the Endangered Species Act, as amended (Tilleman 2005).
Sustainable Development	Economic growth and activities that do not deplete or degrade the environmental resources on which present and future economic growth depend (Tilleman 2005).
Talik	Permanently unfrozen ground in regions of permafrost. Usually applies to a layer that lies above the permafrost but below the active layer.

Thermal stability	The degree to which something, such as permafrost, has the capacity to remain at the same temperature over time.
Toxin	A poisonous substance.
Thermal stability	The degree to which something, such as permafrost, has the capacity to remain at the same temperature over time.
Transboundary impacts	any impact, not exclusively of a global nature, within an area under the jurisdiction of a Party caused by a proposed activity the physical origin of which is situated wholly or in part within the area under the jurisdiction of another Party (United Nations, 1991).
Transportation corridor	The general routing for an area containing a road (winter or permanent), a pipeline, transmission line or any combination of the three, within Nunavut but outside community boundaries (NPC 2000). In the current context, routings or tracts utilized for regular marine shipping activities are also considered to be transportation corridors.
Valued Ecosystem components Components (VECs)	Those aspects of the environment considered to be of vital importance to a particular region or community, including: Resources that are either legally, politically, publically, or professionally recognized as important, such as parks, land selections, and historical sites; Resources that have ecological importance; and Resources that have social importance (NIRB 2007).
Valued Socio-Economic Components (VSECs)	Those aspects of the socio-economic environment considered to be of vital importance to a particular region or community, including components relating to the local economy, health, demographics, traditional way of life, cultural well-being, social life, archaeological resources, existing services and infrastructure, and community and local government organizations (NIRB 2007).
Waste rock	All rock materials, except ore and tailings that are produced as a result of mining operations.
Water crossing	An area used for the purpose of crossing a water body. Water crossings may consist of naturally occurring areas, or installed structures such as pipelines, bridges, culverts, or roads, etc.
Zooplankton	Very small animals that float or drift in lakes.

LIST OF ACRONYMS

ARD	- Acid Rock Drainage
CEA	- Cumulative Effects Assessment
DPA	- Development Partnership Agreement
DEIS	- Draft Environmental Impact Statement
EIS	- Environmental Impact Statement
EMP	- Environmental Management Plan
FEIS	- Final Environmental Impact Statement
GN	- Government of Nunavut
QIA	- Qikiqtani Inuit Association
INAC	- Indian and Northern Affairs Canada
IR	- Information Request
LSA	- Local Study Area
NBRLUP	- North Baffin Regional Land Use Plan
NIRB	- Nunavut Impact Review Board
NLCA	- Nunavut Land Claims Agreement
NPC	- Nunavut Planning Commission
NWB	- Nunavut Water Board
NSA	- Nunavut Settlement Area
RSA	- Regional Study Area
VEC	- Valued Ecosystem Component
VSEC	- Valued Socio-Economic Component

PART I – THE ASSESSMENT

1.0 INTRODUCTION

1.1 OBJECTIVE OF NIRB GUIDELINES

The present Guidelines are issued for the preparation of a draft Environmental Impact Statement (EIS) for the Mary River Project (the Project) by Baffinland Iron Mines Corporation (the Proponent). An EIS is a tool used by NIRB to evaluate the potential environmental and socioeconomic impacts of a project proposal and to ensure the integrated planning of development proposals (NIRB 2006). It includes the identification and development of mitigation measures, which are measures designed to control, reduce or eliminate potentially adverse impacts of an activity or project and enhance positive impacts. It also contains monitoring and reporting methods to verify the accuracy of impact predictions.

1.2 EIS GUIDELINE DEVELOPMENT

The Mary River Project is subject to the environmental review and related licensing and permitting processes established by the *Nunavut Land Claims Agreement* (NLCA) (GC and TFN 1993). In correspondence dated February 11, 2009, the Minister of Indian and Northern Affairs Canada (the Minister) referred the Project to the Nunavut Impact Review Board's (NIRB or Board) for a Review under Part 5 of Article 12 of the NLCA. The EIS developed in accordance with these Guidelines will serve as the basis for the Board review of the Project and will enable the Board and any interested parties to understand and assess the potential adverse and beneficial biophysical environmental and socio-economic effects associated with development of the Project.

The NIRB has developed these EIS Guidelines based on the information contained within the *Mary River Project Proposal* (Baffinland, 2008a) submitted by the Proponent and on the NIRB's Public Scoping process. During the scoping period, NIRB solicited and received oral and written comments from the Mary River project distribution list which included the Hunters' and Trappers' Organizations (HTO) and Hamlet offices of 11 communities in Nunavut, relevant Federal and Territorial Agencies, Inuit Organizations and interested parties regarding the issues to be included in the environmental review. Also, this distribution list included organizations in the Nunavik Region of Northern Quebec (Makivik Corporation, Kativik Environmental Quality Commission, etc.) and Labrador, in accordance with the Minister's direction to include groups in adjacent jurisdictions which might potentially be affected by the Proposal, as referenced below:

Pursuant to section 12.5.1 of the Agreement, I would like to identify a particular issue of concern for the Board to consider. Year-round shipping involving seasonal ice breaking at the rate proposed by the proponent is unprecedented in the North. As a result, I will be looking to the Board to carry out a very thorough assessment of the impacts related to this component of the Proposal, which as a starting point, will involve obtaining a clear description of the location of the shipping route for the project within the Nunavut Settlement Area. Since the parties in adjacent jurisdictions might potentially be affected by the Proposal, I request the Board to encourage the participation of these groups in the review.

NIRB staff have also conducted public scoping sessions in the following potentially-affected communities: Pond Inlet, Arctic Bay, Resolute, Grise Fiord, Igloolik, Hall Beach, Coral Harbour, Cape Dorset, Kimmirut, Clyde River and Iqaluit. The objective of these meetings was to allow NIRB staff to effectively engage the public and interested parties on the proposed scope of the

assessment, while soliciting their advice on Valued Ecosystem Components (VECs) and Valued Socio-Economic Components (VSECs) that should be addressed by the Proponent in its EIS. A *Public Scoping Meeting Summary Report* (NIRB, 2009) was developed following these community visits in the Nunavut Settlement Area, taking into account all comments received from community members. Additional community consultation by NIRB in Northern Quebec is planned to occur in 2009.

1.3 PREPARATION AND REVIEW OF THE EIS

Upon receipt of NIRB's EIS Guidelines, the Proponent is required to prepare and submit to NIRB a Draft EIS (EIS) that meets or exceeds the requirements specified herein. It is the sole responsibility of the Proponent to prepare a complete EIS that includes sufficient basic data and analysis for a complete assessment of the anticipated impacts of the Project. The EIS should be concise and should focus on the assessment of significant ecosystemic and socio-economic impacts. In particular, the Proponent cannot invoke omissions in these Guidelines to justify any inadequacies in its EIS. The EIS must be a stand-alone document that allows the reader to understand the Project and its likelihood to cause significant environmental effects.

The NIRB shall conduct an internal review of the material presented in the Proponent's submission of an EIS to determine whether the document conforms to these Guidelines (conformity review). The guideline conformity review is focused on identifying whether any information requested in the Guidelines or in the NIRB's Minimum EIS Requirements (Appendix A – to be included in the Final version of these Guidelines) has been omitted from the EIS. Guideline conformity review is a presence or absence analysis rather than an evaluation of the quality of the information presented, although the NIRB may point out significant deficiencies encountered. Should any omissions be identified, the Proponent is responsible for submitting supplementary information and may be required to revise and resubmit the DEIS.

Following a positive conformity determination by the NIRB and acceptance of the EIS submission, the NIRB will distribute the EIS to Inuit organizations, community stakeholders, Federal and Territorial regulatory agencies, technical advisors, and other interested parties for review. The technical review period involves a more detailed review of the EIS than the guideline conformity review, and is intended to analyze the quality of the information presented by the Proponent. A technical review of an EIS comprises the following:

- Determination of whether Parties agree/disagree with the conclusions in the EIS regarding the alternatives assessment, environmental impacts, proposed mitigation, significance of impacts, and monitoring measures – and reasons to support the determination;
- Determination of whether or not conclusions in the EIS are supported by the analysis – and reasons to support the determination;
- Determination of whether appropriate methodology was utilised in the EIS to develop conclusions – and reasons to support the determination, along with any proposed alternative methodologies which may be more appropriate (if applicable);
- Assessment of the quality and presentation of the information in the EIS; and
- Any comments regarding additional information which would be useful in assessing impacts – and reasons to support any comments made.

1.4 COOPERATION IN THE NIRB REVIEW OF THE MARY RIVER PROJECT

The NPC, NIRB and the NWB are Institutions of Public Government (IPGs), established under the NLCA with mandates for land use planning, impact assessment, and licensing and managing water use, respectively, in the Nunavut Settlement Area. Section 13.6.1 in the NLCA directs the IPGs to cooperate as follows:

The NPC, NIRB and the NWB shall co-operate and co-ordinate their efforts in the review, screening and processing of water applications to ensure they are dealt with in a timely fashion.

Given this direction from the NLCA, the nature of the project proposal, and a request from the Proponent (Baffinland 2008b), the NPC, NIRB and the NWB have made significant efforts to cooperate and coordinate their efforts in NIRB's Part 5 Review for the Mary River Project.

1.4.1 Joint Review of Transportation Corridor

Upon referral of the Project to NIRB for a Part 5 Review, the Minister recommended the following:

In order to limit the delays to the overall review of the Proposal, I would encourage the Board and the Commission to develop an arrangement that will satisfy the outstanding requirements of the land use planning process, while not unduly encumbering the Board's Part 5 review process. Once finalized, I would encourage the Commission and Board to communicate the agreed upon processes to all parties involved in the review.

Also, Appendix C of the NBRLUP states:

3.5.11:

All parties wishing to develop a transportation corridor and/or communication corridor shall submit to the NPC a detailed application for an amendment. This application must include an assessment of alternative routes, plus the cumulative effects of the preferred route. It shall provide reasonable options for other identifiable transportation and utility facilities.

3.5.12:

The NPC, and either NIRB or a panel acting under section 12.4.7 of the NLCA, shall publicly review the proposed corridor to determine whether the proposal adequately meets the guidelines set out in Appendices J and K. Once it is determined that a proposal does meet the guidelines, the NPC may request the ministers to amend the plan to include the new transportation corridor.

In keeping with the Minister's direction, and the provisions of the NBRLUP noted above, NIRB and the NPC have worked out an arrangement to jointly review the railway (transportation corridor) proposed by the Project. The Proponent is required to include the project-specific information stipulated in Appendices J and K of the NBRLUP <to be included in their entirety in the Final version of these Guidelines>, within a separate chapter of its EIS.

Based on the requirements stipulated in the NBRLUP, the Proponent has to submit to the NPC with application in accordance with Appendices K for an alternative route assessment. Given that Subsection 6.1 and 6.5.5 in these guidelines contain explicit information requirements for project alternative analysis for the railway, among other project components in the Project, therefore the Proponent can use cross reference in the application for NBRLUP amendment. Other information which is exclusive pursuant to NBRLUP amendment for a transportation/communication corridor must be address in an independent application document.

An overview of the NIRB-NPC joint review process is presented in Appendix B of these Guidelines <to be included in the Final version of these Guidelines>.

1.4.2 NIRB and NWB Coordination

Section 13.5.2 of the NLCA speaks to coordination between the NIRB and the NWB as follows:

Where the water application is referred for review under Article 12, the NWB and the review body shall coordinate their efforts to avoid unnecessary duplication in the review and processing of the application. Legislation may provide for joint hearings or authorize the NWB to forego public hearings on any water application where it has participated in a public review of the relevant water application pursuant to Article 12.

As per the current framework for NIRB/NWB coordination in the Part 5 Review process agreed between NIRB and the NWB, the Proponent is required to submit an EIS with an appendix containing the Proponent's *Draft* water licence application referenced to relevant components of the EIS, which are required by both NIRB's environmental impact assessment and the NWB's water licensing process (i.e. Abandonment and Reclamation Plan, Waste Management Plan, Spill Contingency Plan, etc.). After the Pre-Hearing Conference (PHC), when the Proponent submits a Final EIS (FEIS) to NIRB, it can include annexed water licence application(s), with appropriate cross referencing to eliminate duplication and for the ease of reviewing parties. However, the submission to the NWB must be a stand-alone water licence application(s). The Proponent shall ensure that all information contained in the water licence application(s) are identical to those annexed in the FEIS submitted to NIRB.

An overview of the NIRB-NWB coordination is presented in Appendix C of these Guidelines <to be included in the Final version>.

1.5 REASSESSMENT OF THE GUIDELINES

The NIRB reserves the right at any time, having given reasonable notice to the Proponent, to reassess these Guidelines and to update and amend them accordingly to allow for consideration to changes in the Project description, baseline information, relevant technological advances, or changes in the regulatory and/or regional environments.

2.0 GUIDING PRINCIPLES

The following general principles should guide the creation of the Proponent's EIS and NIRB's assessment of the Project's impacts.

2.1 NIRB IMPACT REVIEW PRINCIPLES

In accordance with NIRB's primary objectives found in NLCA Article 12.2.5, the following principles should be followed in the EIS review, and precautionary approaches should be adopted in the preparation of the DEIS:

- **An Ecosystem based approach must be adopted for the review** - In order to gain an adequate understanding of the effects of the Project, an ecosystem-based approach must be adopted to ensure that the review addresses both the direct impacts that the Project will have on the various ecosystem components, as well as the interactions that will occur between components.
- **Socio-economic issues, such as the Project's potential to affect economic development within the region, must be included in the review** - Members of the community constitute a critical part of the environment, and their concerns relating to the Project need to be to be assessed by the NIRB. As such, adverse and beneficial effects of the Project on members of the community with respect to health, recreation, and other

aspects of social well-being need to be addressed in the EIS, in order to ensure a culturally holistic understanding of the Project's effects.

- **An understanding of past and potential future environmental, economic, and social trends in the Baffin Region of Nunavut, and how the Project will influence these trends is required** - The inclusion of a time perspective, from the early planning of the Project through to its operation and possible closure over the next two decades (20 years), is important in order to provide the NIRB with a full understanding of the cumulative environmental effects of the Project in combination with other past, present and reasonably foreseeable projects.
- **The well-being of residents of Canada outside the Nunavut Settlement Area must be taken into account** – Significant transboundary bio-physical and socio-economic effects directly related to this Project must be included in the EIS in order to ensure the NIRB's assessment of the well-being of Canadians outside of the Nunavut Settlement Area.

2.2 PUBLIC PARTICIPATION AND ENGAGEMENT

Public participation is a central objective of the NIRB review process. Meaningful public participation requires the Review to address concerns of the general public regarding the anticipated or potential environmental effects of the project. In preparing its EIS, the Proponent is required to engage residents and organizations in all potentially-affected communities, including where relevant, adjacent jurisdictions outside of the Nunavut Settlement area.

Another objective of the NIRB review process is to involve potentially affected Nunavummiut to address concerns regarding any changes that the Project may cause in the environment and the resulting effects of any such changes on the traditional and current use of lands/ices and resources. The Proponent must ensure that Nunavummiut have the information that they require in respect of the Project and of how the Project may impact them.

Meaningful involvement in the environmental impact assessment process takes place when all parties involved have a clear understanding of the proposed project as early as possible. The NIRB Part 5 Review process requires the development of a public participation and awareness program to initiate engagement of the public during the initial stages of the review, to facilitate meaningful consultation with those communities potentially-affected by a proposed project. To this end, NIRB staff have conducted public scoping sessions in the following potentially-affected communities: Pond Inlet, Arctic Bay, Resolute, Grise Fiord, Igloolik, Hall Beach, Coral Harbour, Cape Dorset, Kimmirut, Clyde River and Iqaluit (NIRB, 2009). The objective of these meetings was to allow NIRB staff to effectively engage the public and interested parties on the proposed scope of the assessment, while soliciting their advice on Valued Ecosystem Components (VECs) and Valued Socio-Economic Components (VSECs) that should be addressed by the Proponent in its EIS. Throughout the community visits, concerns were voiced about the necessity for meaningful consultation about this proposed project. Therefore, the Proponent is required to:

- continue to provide up-to-date information describing the project to the public, particularly residents of communities likely to be most affected by the project;
- involve the public in determining how best to deliver that information, *i.e.* the types of information required, translation and interpreting needs, different formats, the possible need for community meetings; and
- explain the results of the EIS in a clear direct manner to make the issues comprehensible to as wide an audience as possible.

The Proponent must provide the highlights of this engagement within the EIS, including the methods used, the results, and the ways in which the Proponent intends to address the concerns identified.

2.3 PRECAUTIONARY PRINCIPLE

One of the purposes of environmental assessment is to ensure that projects are considered in a careful and precautionary manner before authorities take action in connection with them, in order to ensure that such projects do not cause significant adverse environmental effects. Principle 15 of the 1992 Rio Declaration on Environment and Development states that *"Where there are threats of serious or irreversible damage, lack of full scientific certainty must not be used as a reason for postponing cost-effective measures to prevent environmental degradation."* (United Nations, 1992). This precautionary principle has since been incorporated into several pieces of Canadian legislation, including the *Canada National Marine Areas Conservation Act* (2002), the *Oceans Act* (1999), and the *Canadian Environmental Protection Act* (1999). In applying a precautionary approach to its planned undertakings, the Proponent must:

- demonstrate that the proposed actions are examined in a careful and precautionary manner in order to ensure that they do not cause serious or irreversible damage to the environment;
- outline the assumptions made about the effects of the proposed actions and the approaches to minimize these effects;
- identify any follow-up and monitoring activities planned, particularly in areas where scientific uncertainty exists in the prediction of effects; and
- present public views on the acceptability of these effects.

2.4 SUSTAINABLE DEVELOPMENT

Sustainable development means "meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). The central task of environmental impact assessment is to contribute to sustainable development by safeguarding the sustainability of Valued Ecosystem Components (VECs) in the face of development that might compromise that sustainability (Duinker and Greig 2006). Promotion of the principle of sustainable development is fundamental to the NIRB's primary objectives laid out in Section 12.2.5 of the NLCA:

In carrying out its functions, the primary objectives of NIRB shall be at all times to protect and promote the existing and future well-being of the residents and communities of the Nunavut Settlement Area, and to protect the ecosystemic integrity of the Nunavut Settlement Area. NIRB shall take into account the well-being of residents of Canada outside the Nunavut Settlement Area.

These EIS Guidelines are based upon three factors that the NIRB considers directly associated with sustainable development. These factors are:

1) The extent to which biological diversity is affected by the Project;
2) The capacity of renewable and non-renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of future generations; and
3) The "precautionary principle", defined as follows: if there are threats of serious or irreversible damage, lack of full scientific certainty must not be used as a reason for postponing cost-effective measures to prevent environmental degradation (United Nations 1992).

The NIRB interprets progress towards sustainable development as meeting the following goals:

1) The preservation of ecosystem integrity, including the capability of natural systems (local and regional) to maintain their structure and functions and to support biological diversity;
2) Respect for intergenerational equity, i.e., the right of future generations to the sustainable use of renewable and non-renewable resources depends on our commitment to those resources today; and
3) The attainment of durable social and economic benefits, particularly in Nunavut.

The NIRB requires the Proponent to demonstrate how the Project meets these three goals as noted above.

2.5 TRADITIONAL KNOWLEDGE

Traditional Knowledge (used broadly in the current context, and meant to encompass local- and community-based knowledge, traditional ecological knowledge and Inuit Qaujimajatuqangit), which is rooted in the traditional life of Inuit and Aboriginal people, has an important contribution to make to an environmental assessment (Stevenson 1996). This knowledge represents experience acquired over thousands of years of direct human contact with the environment (Berkes 1993) and is rooted in personal observation, collective experience and oral transmission over many generations. Traditional Knowledge relating to factual information on such matters as ecosystem function, social and economic well-being, and explanations of these facts and casual relations among them, enhances the development of adequate baseline information, identification of key issues, prediction of the effects, and assessment of their significance, all of which are essential to the EIS and its review.

Traditional Knowledge can be obtained with the cooperation of other concerned parties. Peer-referenced, systematic identification of local Traditional Knowledge experts assures that those considered most knowledgeable within either the local community, social group, or livelihood fraternity will be revealed and potentially included in work dedicated to documenting the local ecological knowledge system (Davis and Wagner 2003). The Proponent must incorporate into the EIS the Traditional Knowledge to which it has access or that it may reasonably be expected to acquire through appropriate due diligence, in keeping with appropriate ethical standards and without breaching obligations of confidentiality.

2.6 STUDY STRATEGY AND METHODOLOGY

The Proponent is expected to observe the intent of these Guidelines and to identify all environmental effects that are likely to arise from the project (including situations not explicitly identified in these guidelines), the mitigation measures that would be applied, and the significance of any residual effects. It is possible that the EIS guidelines include matters that, in the judgement of the Proponent, are not relevant or significant to the project. If such matters are omitted from the EIS, they must be clearly indicated so that the public and other interested parties have an opportunity to comment on this judgement. Where the NIRB disagrees with the Proponent's decision, it may require the Proponent to provide additional information. The Proponent is advised to consult with the NIRB on any issues within these Guidelines on which it plans significant deviation.

The Proponent must explain and justify methods used to predict impacts of the project on each valued ecosystem component (VEC) and valued socio-economic component (VSEC), the interactions among these components and the relations of these components within the environment. The information presented must be substantiated. In particular, the Proponent must describe how the VECs were selected and what methods were used to predict and assess the adverse environmental effects of the project on these components. The value of a component not

only relates to its role in the ecosystem, but also to the value placed on it by humans. The culture and way of life of the people using, or with a cultural connection to, the area affected by the project may themselves be considered VSECs.

In describing methods, the Proponent must document how it used scientific, engineering, traditional and other knowledge to reach its conclusions. Assumptions must be clearly identified and justified. All data, models and studies must be documented such that the analyses are transparent and reproducible. All data collection methods must be specified. The uncertainty, reliability and sensitivity of models used to reach conclusions must be indicated.

The Proponent must identify all significant gaps of knowledge and understanding where they are relevant to key conclusions presented in the EIS. The steps to be taken by the Proponent to address these gaps must also be identified. Where the conclusions drawn from scientific and technical knowledge are inconsistent with the conclusions drawn from Traditional Knowledge, the EIS must contain a balanced presentation of the issues and a statement of the Proponent's conclusions.

2.7 USE OF EXISTING INFORMATION

In preparing the EIS, the NIRB expects the Proponent will rely heavily on the use of existing information and available results of scientific surveys and studies completed in the project regions by the government agencies, institutions and individual researchers, which are related to the project and the environment. When using existing information to meet the requirements of various sections of the EIS guidelines, the Proponent must either include the information directly in the EIS or clearly direct (*e.g.* through cross-referencing) the NIRB to where it may obtain the information in the EIS (including supporting documents of the EIS). The Proponent must also clarify how representative the data are, clearly separate factual lines of evidence from inference, and state any limitations on the inferences or conclusions that can be drawn from them.

The EIS must clearly document any information or knowledge gaps encountered in the existing literature or other information sources, and discuss how these gaps might affect the ability to draw conclusions and the reliability of those conclusions drawn in the assessment.

3.0 SCOPE OF THE NIRB ASSESSMENT

Based on the information contained within the Project Description and the NIRB's requirements for the Proponent's development of an Environmental Impact Statement, the following subsections comprise the focus and scope of the NIRB review. In preparing the DEIS, the Proponent must follow these guidelines closely, while paying specific attention to the requirements of the NLCA, the NIRB's Minimum EIS Requirements (Appendix A), and General EIS Principles as listed below. In addition, the Proponent should note that directions regarding EIS Format are a further submission requirement of the NIRB. A detailed discussion of EIS format requirements may be found in Subsection 4.4.

3.1 NLCA – SECTIONS 12.5.2 AND 12.5.5

Where appropriate, the EIS shall contain information with respect to the following:

1) Project description, including the purpose and need for the project;
2) Anticipated ecosystemic and socio-economic impacts of the project;
3) Anticipated effects of the environment on the project;
4) Steps which the Proponent proposes to take including any contingency plans, to avoid and mitigate adverse impacts;

5) Steps which the Proponent proposes to take to optimize benefits of the Project, with specific consideration being given to expressed community and regional preferences as to benefits;
6) Steps which the Proponent proposes to take to compensate interests adversely affected by the Project;
7) The monitoring program that the Proponent proposes to establish with respect to ecosystemic and socio-economic impacts;
8) The interests in land and waters which the Proponent has secured, or seeks to secure;
9) Options for implementing the proposal; and
10) Any other matters that NIRB considers relevant.

Furthermore, when reviewing any project proposal, the NLCA directs the NIRB to take into account all matters that are relevant to its mandate, including the following:

1) Whether the project would enhance and protect the existing and future well-being of the residents and communities of the Nunavut Settlement Area, taking into account the interests of other Canadians;
2) Whether the project would unduly prejudice the ecosystemic integrity of the Nunavut Settlement Area;
3) Whether the proposal reflects the priorities and values of the residents of the Nunavut Settlement Area;
4) Steps which the proponent proposes to take, or that should be taken, to compensate interests adversely affected by the project;
5) Posting of performance bonds;
6) The monitoring program that the proponent proposes to establish, or that should be established for ecosystemic and socio-economic impacts; and
7) Steps which the proponent proposes to take, or that should be taken, to restore ecosystemic integrity following project abandonment.

3.2 SCOPING LIST

The following is the scoping list of the Mary River Project subject to a review of ecosystemic and socio-economic impacts under Part 5, NLCA.

3.2.1 Mary River Project Components

The scope of the project includes all works or undertakings, required for the construction, operation, modification/maintenance, decommissioning, abandonment or other undertakings of the listed project components.

1) Milne Inlet and Tote Road
2) Mary River Mine Site
3) Railway
4) Steensby Inlet sea port
5) Marine Shipping
6) Air Traffic
7) Ongoing Geotechnical Exploration

3.2.2 Environmental Factors

The scope of the project includes following environment elements, associated baseline information, and related impacts assessment from construction, operation, modification, maintenance, decommissioning, abandonment or other undertakings of the listed project components above.

3.2.2.1 Biophysical Components

1) Meteorology and climate (including climate change)
2) Air quality
3) Noise/vibration
4) Hydrology and hydrogeology
5) Surface/Groundwater quality
6) Freshwater Biota (including fish as defined in the Fisheries Act) and habitat
7) Landforms, soil and Permafrost
8) Vegetation
9) Terrestrial wildlife and wildlife habitat
10) Marine environment, marine water and sediment quality
11) Marine wildlife and marine habitat
12) Birds
13) Human and ecological health

3.2.2.2 Socio-Economic Components

1) Population Demographics
2) Education and Training
3) Livelihood and Employment
4) Economic Development and Self-Reliance
5) Human Health and Well-being
6) Community Infrastructure and Public Services
7) Contracting and Business Opportunities
8) Cultural, Archaeology/Paleontology Resources
9) Benefits, Royalty and Taxation
10) Governance and Leadership

PART II – THE EIS

4.0 OUTLINE OF ENVIROMENT IMPACT STATEMENT

4.1 PRESENTATION

The Proponent shall provide an EIS that is complete, including scientific works, subject-specific studies and all other sources of information covering all of aspects of the Project in ecosystemic and socio-economic perspectives. For clarity and ease of reference, the EIS should be presented in the same order as the EIS guidelines. However, in certain sections of the EIS, the Proponent may decide that the information is better presented following a different sequence. The EIS must include a guide that cross-references the Guidelines with the EIS so that points raised in the EIS

guidelines are easily located in the EIS. In the interest of brevity, the EIS should make reference to, rather than repeat, information that has already been presented in other sections of the document. A key subject index would also be useful and should reference locations in the text by volume, section and sub-section.

The EIS shall be made available to NIRB electronically on searchable CD-ROM, and also in hard copy. The Proponent shall be responsible, where requested, for the delivery of the EIS to regulators and relevant authorities, in addition to those recipients listed **in Appendix D (**to be included in the Final version of these Guidelines).

4.2 CONFORMITY

The Proponent is expected to follow these Guidelines, which will then lead to the preparation of an EIS. Specific issues or directions described in the Guidelines must be easily identifiable in the EIS. In accordance with the NIRB's *Guide 7: Guide to the Preparation of Environmental Impact Statements* (NIRB 2006), the EIS shall contain a concordance table directing reviewers to the location (document, section, and page number) where specific information addressing the Guidelines. The Proponent is cautioned that any significant deviation from these Guidelines could result in a negative conformity decision and subsequent requirements for revision. Where any differences in direction are encountered between the NIRB's *Guide 7* and these EIS Guidelines issued under NLCA Section 12.5.2, these Guidelines shall prevail.

In the concordance table, the Proponent shall also indicate the locations of contents required by 3.5.11 in Appendix C, and in accordance with Appendix J of NBRLUP for an amendment application to facilitate the NPC to review the completeness of the related submission.

4.3 LENGTH

In accordance with the NIRB's *Guide 7: Guide to the Preparation of Environmental Impact Statements*, the Proponent's EIS Main Document (i.e. Volume I) shall be concise and not exceed 150 pages without permission from the NIRB. The 150 page limit shall not include: the Title Page, Executive Summary, Popular Summary (in English, French and Inuktitut); Glossary (in English, French and Inuktitut); Table of Contents; Concordance Table; Consultants and Organizations; and References. To ensure the main document within the EIS report remains manageable for reviewers, communities, and the general public, any data of a detailed nature shall be contained in separate volumes as appendices and technical reports submitted in support of the main document.

4.4 FORMAT

The EIS shall be double-spaced**,** and its sections numbered. Subject to any other instructions given by the NIRB, the following format shall be adopted, based on the NIRB's *Guide 7: Guide to the Preparation of Environmental Impact Statements* and adapted as much as possible to the specific circumstances of the Project:

- Cover sheet with project description;
- Plain language summary (in English, French and Inuktitut);
- Executive summary (in English, French and Inuktitut);
- Table of Contents;
- Concordance table which lists each of the Guideline requirement and location within the EIS;
- Purpose of and need for the Project;
- Detailed project description including potential future development;

- Alternatives considered in the development of the Project proposal;
- Discussion of the public consultation initiatives with the communities potentially affected by the Project. Provide the results of the public consultation, as well as, evidence that community concerns where addressed in the planning of the Project activities;
- Baseline of the existing environmental and socioeconomic information, based upon proper studies, given the environment in the region;
- Anticipated ecosystemic and socio-economic impacts of the Project proposal, including its impacts on the valued ecosystem components (VEC) and valued socio-economic components (VSEC) potentially affected by the Project (and as identified by public consultation process);
- Anticipated effects of the environment on the Project;
- Anticipated cumulative effect of the Project on the region/regions;
- Anticipated transboundary effects;
- Steps which the Proponent proposes to take to avoid and mitigate adverse impacts, including any Contingency Plans (spills, fires, floods, etc.) and adaptive management;
- Statement of residual impacts and significance;
- Steps which the Proponent intends to undertake in order to restore the area affected by the Project activities during operation and upon project closure and abandonment; including Abandonment and Reclamation Plan;
- Steps which the Proponent proposes to take to optimize benefits of the Project, with specific consideration being given to expressed community and regional interests;
- The monitoring program that the Proponent proposes to establish with respect to ecosystemic and socio-economic impacts;
- The interests in lands and waters which the Proponent has secured, or seeks to secure;
- List of permits, licenses and authorizations required to undertake the Project proposal;
- List of consultants or individuals who assisted in preparation of the EIS;
- List of agencies, organizations, and persons to whom copies of the EIS will be sent;
- Index; and
- Supporting documentation and appendices.

4.5 DATA PRESENTATION

The Proponent shall provide charts, diagrams, aerial and other photographs and maps wherever appropriate and useful to clarify the text; and specifically, shall include maps or diagrams showing all project related infrastructure and/or activities (e.g., camp sites, drilling activities, port site, mine site, transportation routes including the railway, marine shipping and air transport). Where feasible, maps shall be of a common scale and projection to facilitate comparisons. Where included in a separate volume, all charts, diagrams, photographs, and maps must be clearly referenced in the text of the EIS.

4.6 SUMMARIES

4.6.1 Executive Summary (in English, French and Inuktitut)

The Proponent shall prepare an Executive Summary that describes the key Project elements and key findings of the EIS, with particular reference to the overall conclusions of the assessment and a clear rationale relating those conclusions to the predicted impacts and the measures proposed to address them. The Executive Summary shall focus on items of known or expected public concern and shall focus on the significant potential impacts of the Project and the methods proposed to

address them. It shall also address outstanding issues and the strategies proposed to address them. The Executive Summary shall form part of the EIS, but it shall also be made available as a separate document.

4.6.2 Popular Summary (in English, French and Inuktitut)

The Popular Summary shall have the same general structure and objectives as the Executive Summary, but it shall be written in non-technical language and shall include such things as a glossary and additional explanatory text to assist non-specialists in appreciating the content of the EIS as a whole. The Proponent shall consider presenting the Popular Summary in hard copy. Map indicating major project components including shipping routes (in English, French and Inuktitut) and project impact region should be included. The Popular Summary shall form part of the EIS, but it shall also be made available as a separate document.

4.7 TRANSLATION

The popular summary, executive summary and glossary shall be presented in English, French, and Inuktitut. Maps shall indicate common and accepted place-names usually referred to by the local populations in their own language, in addition to their official toponyms, especially where traditional Inuit place-names have been made official through the process outlined in Section 33.9 of the NLCA.

5.0 EIS CONTENT

5.1 THE PROPONENT

The Proponent shall identify itself and explain current and proposed ownership of rights and interests in the Project, operational arrangements, and corporate and management structures. It shall specify the mechanisms used to ensure that corporate policies are respected. It shall present its environmental policy and shall specify whether and how it applies to all businesses for which it has an operating responsibility, to employees, to contractors, and to suppliers. It shall also describe its reporting systems. Furthermore, the Proponent shall provide complete contact information, including telephone and fax numbers, postal and email addresses, and shall include, where necessary, separate addresses for corporate and operations (or other relevant) offices.

The Proponent shall describe its past experience in exploration and mining, with particular reference to:

- Its record of compliance with governmental policies and regulations pertaining to environmental and socio-economic issues in past operations;
- Operation safety, major accidents, and spills and emergencies and corresponding responses;
- Its record in honouring commitments on environmental and socio-economic matters in the event of planned or premature mine closure, whether temporary or permanent, or change of ownership;
- Relations with Aboriginal peoples, including prior experience with Impact and Benefits Agreements if appropriate;
- Operations in Arctic and Sub-arctic regions;
- Its record in incorporating environmental and socio-economic considerations into construction, operations, temporary closure, final closure, and post-closure;
- Corrective actions undertaken in the past, distinguishing between those taken voluntarily and those taken at the insistence of a third party;

- The provision of security to ensure payment of compensation in the event of accidents.

The Proponent shall identify and describe any obligations or requirements that it must meet to post a bond or other form of financial security to ensure payment of compensation in the event of accidents that directly or indirectly result in major damage by the Project to the environment, as well as to cover the cost of planned or premature closure, whether temporary or permanent**.**

If the Proponent does not have prior experience in exploration or mining, particularly for this region, it shall explain the safeguards that it intends to put in place to compensate for that lack.

5.2 REGULATORY REGIME

The Proponent shall present its understanding of the regulatory regime in which it would be operating by identifying all relevant federal, territorial, and local environmental and socio-economic standards, laws, regulations, policies, and fiscal regimes relating to Project approval, construction, operations, monitoring, and closure. It shall further explain how such requirements would be met and what specific governmental permits and approvals would be required. A list of currently-held permits and licences, including dates of issue and expiry, should be appended.

The Proponent should also include a discussion of the steps it proposes to take to ensure it meets its Project related tax obligations (including fuel and payroll taxes) with the Government of Nunavut (GN), providing relevant non-confidential details of its relationship to the GN and the fuel-rebate program to demonstrate an understanding of the program.

5.3 REGIONAL CONTEXT

The Proponent shall describe in general terms the regional biophysical and socio-economic environments of the Baffin Region and Nunavut as a whole, including: ecological land classifications; ecological processes and relationships; the location of other basic and precious metal finds and other existing and potential developments; and current and future land use plans.

5.4 ASSESSMENT BOUNDARIES

5.4.1 Spatial Boundaries

The spatial boundaries of the Project (and its components) must be determined on the basis of its potential impacts on the particular biophysical or social phenomenon being addressed. The Proponent must consider, but shall not be limited to, the following criteria in establishing spatial bounds for the Project:

- The physical extent of project activities;
- The extent of ecosystems potentially affected by the Project;
- The extent to which traditional land use and Inuit and Aboriginal harvesting could potentially be affected by the Project; and
- The size, nature and location of past, present, and reasonably foreseeable projects and activities which could interact with the items listed above.

The EIS shall define the spatial boundaries of the maximum area potentially affected by the Project and any alternatives being considered, based on the boundaries for each individual type of impact, and taking into account an analysis of the migratory nature of wildlife (where applicable), and such impact pathways as pollutant transport and bioaccumulation mechanisms. The Proponent is not required to provide a comprehensive baseline description of the environment at each of the above scales, but must provide sufficient detail to address the relevant environmental effects, and cumulative effects of the project. For example, the spatial boundaries for archaeological studies related to burial grounds in the Project area might reasonably be expected to differ from those for studies on migration of caribou in the area.

The boundaries for the assessment of socio-economic impacts shall be based on an analysis of the socio-economic effects directly and indirectly associated with the Project. In all cases, priority focus shall be directed to potential impacts within Nunavut, but the EIS shall also take consider any potential impacts outside Nunavut, wherever there is reason to anticipate that they might occur. The EIS must contain a justification and rationale for all boundaries and scales chosen.

The following general spatial boundaries are suggested:

- **Local Study Area** (LSA): the Local Study Area shall be defined as that area where there exists the reasonable potential for immediate impacts due to project activities, ongoing normal activities, or to possible abnormal operating conditions. The Local Study Area includes the Project facilities, buildings and infrastructure, and all areas proposed for Project activities.
- **Regional Study Area** (RSA): the Regional Study Area shall be defined as the area within which there exists the potential for direct, indirect, and/or cumulative biophysical and socio-economic effects. This area includes lands, communities, and portions of Nunavut and other regions of Canada that may be relevant to the assessment of any wider-spread effects of the Project. The Proponent is advised to duly consider the transboundary implications of impacts to identified VECs/VSECs resulting from marine shipping for the Project.

The LSAs and RSAs may vary between disciplines and between VECs/VSECs, as they represent the likely distribution of Project effects on individual VECs/VSECs.

5.4.2 Temporal Boundaries

Like spatial boundaries, temporal boundaries may vary with, among other things, the type of impact being considered and with seasonal changes. The establishment of temporal boundaries has two aspects: the time-horizon that will be used in predicting change; and the temporal variability and periodicity that characterize the predicted impacts (Whitney and Maclaren 1985). The time-horizon used for predicting change must be a function of the anticipated duration of the Project, including the final closure and post-closure phases, the predicted impacts and of the predictive capability of the various disciplines at play.

The EIS shall determine the temporal boundaries separately for the construction, operation, temporary closure, final closure, and post-closure periods, and also for any exploration work to be undertaken in conjunction with the Project. The closure period covers decommissioning, abandonment, and reclamation; post-closure covers the period after the mine has been decommissioned and the site reclaimed and returned as much as possible to its natural state. The temporal boundaries of the post-closure period may encompass many years, depending on the site and on the methods of closure. The Proponent shall also consider where applicable, the temporal bounds of Project alternatives under assessment, noting where they differ from those for the preferred option.

The description of the existing baseline and the environmental trends should include a consideration of past projects and activities carried out by the Proponent and/or others within the RSA. As is the case for the determination of spatial boundaries, the temporal boundaries must indicate the range of appropriate scales at which particular baseline descriptions and the assessment of environmental effects are presented.

For all temporal boundaries, the EIS shall give a rationale and justification for the boundaries chosen, including a description of any consultation with members of the public or technical experts. In doing so, the Proponent shall recognize that, over the past 50 years, the western Arctic has experienced a warming trend accompanied by increased annual precipitation and

increases in the magnitude and frequency of extreme weather events (CEAA 2000). There may be no immediate danger of permafrost degradation, but the Proponent must incorporate that possibility into the design of Project components where applicable.

5.5 LAND TENURE

The Proponent shall delineate on a map of suitable scale the legal boundaries of any areas to which it will acquire rights through lease or other tenure arrangements, to include Crown land, Inuit Owned Land, and Commissioner's land. It shall further describe those areas by providing such information as file numbers, start and end dates, fees, name of right holder, renewals, etc.

5.6 ANALYSIS OF NEED AND PURPOSE

The following points must be addressed in discussing the need for and purpose of the Project:

1) General feasibility from an economic perspective, including how this Project will benefit the communities in Nunavut, either directly or indirectly;
2) An assessment of the longer term strategic implications of the Project, and how it may affect or lend to transportation networks (existing and proposed) in Nunavut;
3) Identification of past, current and potential future users of the LSA, RSA, and project infrastructure, including commercial, government, public, and private;
4) Analysis of community support for and in opposition to the Project, with particular emphasis on the proposed Steensby Inlet shipping route, with a description of how the Proponent has sought input from a broad range of socio-economic groups and public, and relieved the public concerns;
5) How the Project will provide a net economic benefit to Nunavut and Canada as a whole; and,
6) Demonstrate that financing has been secured for all project phases, including reclamation and security.

Discussions addressing the above points shall be supported by an analysis of the positive and negative social and economic effects on existing industries, markets, and communities over the life of the Project. This analysis should also indicate the distribution and magnitude of benefits and/or losses to specific socio-economic groups in the relevant study area.

6.0 PROJECT COMPONENTS AND ACTIVITIES

The description of the Project components and activities shall address all phases of the Project in sufficient detail to allow the Proponent to predict potential adverse environmental effects and address public concerns about the Project. The Proponent shall describe the Project as it is planned to proceed through the site preparation, construction, operation and maintenance, and any potential modifications, closure, reclamation and post closure monitoring. The description must include a timeline for all phases of the Project. This section must include a discussion of the planned uses of the railway sea port as related to the project and any potential use other than for the project.

This section contains explicit requirements for the Project components and all activities associated with each project component through the life of the project.

6.1 ALTERNATIVES

The EIS shall include an explicit analysis of all alternative means of carrying out the project components, including a "no-go" alternative, the identification and application of criteria used to determine the technical feasibility and economic viability of the alternatives to the Project (e.g.

transportation, natural, social, economic and cultural environment). This analysis must be done to a level of detail which is sufficient to allow NIRB and the public to compare the Project with the alternatives in terms of the economic costs and the environmental, social and economic impacts and benefits. The Proponent must include reasons for selection of the Project as the preferred alternative, and the reasons for rejection of other alternatives.

The EIS shall present alternatives for the following project elements:

- Alternatives of railway routing and the location of the sea port, including:
  - Routing the rail line from the Mary River mine site to a seaport at Milne Inlet;
  - Using/updating existing shipping facilities at Nanisivik and routing the railway from the Mary River mine site to Nanisivik across the lower portion of Borden Peninsula.
  - Routing the rail line from the Mary River mine site to a seaport on the east coast of Baffin Island;
- Alternatives to year round shipping (including ice breaking) from Steensby Inlet, including:
  i. open water shipping only in Foxe Basin and Hudson Strait
  ii. Decreasing the shipping frequency by extending mine life and decreasing the production rate
- Alternative iron ore mining methods rather than conventional drilling and blasting;
- Alternatives to diesel power generation, including solar energy, wind energy, hydro and geothermal energy, etc;
- Alternative closure and reclamation options;
- Options of ballast water treatment and discharge;
- Alternatives to antifouling coatings of ore ships; and
- Any other alternatives to project components.

When the Proponent assesses the economic viability of each alternative option in the alternative analysis, considerations must be given to the vulnerability of the arctic ecosystem, the potential for extension of the mine life and/or increased iron ore production rates, and associated cumulative effects of each option, particularly the potential for cumulative impacts on the marine ecosystem and Inuit harvesting activities in the Foxe Basin and Hudson Strait.

Furthermore, as indicated in public consultation (Subsection 7.4), the public opinions and preferences shall also be taken into consideration as a criterion in the assessment all the alternative options. Therefore, the alternative amylases shall include a discussion how public consultations by the Proponent have influenced the Project planning, and how public preferences have been considered by the Proponent in determining the preferred project alternatives.

6.2 PROJECT DESIGN

General Project design issues discussed in the EIS shall include:

- An explanation of how the environment has influenced the design of the Project. This should include, but is not limited to, geographical, geological, meteorological, and oceanographic conditions;
- Global climate change. The discussion must describe and assess, on the basis of current knowledge, how the potential of climate change (global warming) could affect permafrost and soils with high ice content, as well as marine ice flow regimes, and the long-term

impacts of such changes on the Project; in addition, the proponent shall identify the Project sensitivity to changes in specific climate-related parameters (CEAA, 2004)

- The Proponent should design and apply multiple scenarios in impacts assessments, where these scenarios span the range of possible future climates, rather than designing and applying a single "best guess" scenario (EC,2007)
- A discussion of how design, engineering, and management plans are consistent with the maintenance of eco-systemic integrity focusing on various wildlife habitats, including freshwater habitat, marine habitat and terrestrial habitat;
- A demonstration of how the Proponent has applied the Precautionary Principle in its Project design and management;
- How socio-economic conditions have influenced the Project design (how have work rotations, pace of construction, employment policy, etc. been designed to meet local preferences and capacity);
- An explanation of how public consultation and Traditional Knowledge have influenced the planning and design of the Project; and
- The consideration for future development.

All assumptions underlying design features should be explicitly stated.

6.3 PROJECT PHASES

The Proponent is required to present the overall development plan including the Project development phases, relating timeframe in each phase, and involved works and undertakings in each phase. The Proponent should also clarify all associated monitoring/ mitigation plans to be implemented in each phase to eliminate or minimize adverse effects occurred at various project stages at each project elements respectively.

6.4 FUTURE DEVELOPMENT

The Proponent shall evaluate any foreseeable expansions of the current Project, the needs of required infrastructure, and associated eco-systematic and socio-economic impacts. The Proponent shall also evaluate the potential for development of additional ores deposits in the Project area (i.e., Deposit #2, #3 and # 4) in accordance with previous and current exploration activities. Such an evaluation should be based on the Proponent's business strategic plan, other predictions and the development realized by projects of a similar nature.

In addition, the Proponent shall discuss how any foreseeable future development scenarios have been taken into consideration when designing the infrastructure and ancillary utilities for the Project. The Proponent's assessment of cumulative impacts of the Project shall also include the future development scenarios as outlined above.

6.5 DETAILED PROJECT PROPOSAL DESCRIPTION

The Proponent shall describe the Project components and all activities associated with each in a systematic way. The description shall encompass all stages of development, from site preparation through to construction, operation and maintenance (including any potential modifications/expansion that may be required during operation based on exploration results), closure and reclamation. The description must include an approximate timeline for all phases of the Project, including closure, reclamation and post closure monitoring if applicable. Where specific codes of practice, guidelines and policies apply to items to be addressed, in particular if involving thresholds and quantitative limits to be applied, those documents must be cited and may be included as appendices to the EIS. The description shall be based on the following project components and associated activities:

6.5.1 Milne Inlet and Tote Road

The Proponent shall describe the followings aspects of facilities/activities at Milne Inlet and the Tote Road:

- Barge Handling facilities:
  - Design, construction, maintenance, operation, abandonment
  - Unloading and transport of materials
  - Operation and safety management
- Laydown areas;
- Oil Handling Facility (OHF), bulk fuel storage facilities and management;
- Camp facilities operation;
- Water supply and associated sources and facilities;
- Waste management faculties: industrial waste segregation recycling and management facility; inert waste landfills, camp incinerator, and sewage treatment facilities;
- Communication systems;
- Power generation unit; and
- Milne Inlet Tote Road operation and maintenance:
  - Traffic volume
  - Road maintenance
  - Dust suppressing
  - Snow and surface runoffs management
  - Wildlife safety management

6.5.2 Mary River Mine Site

6.5.2.1 Geology/Mineralogy of the Ore Deposit

The Proponent shall describe the iron ore resources from the Mary River sites, including where appropriate:

- Deposit locations, including detailed maps of the mine area;
- The lithologies and mineral associations found in the Project area;
- The types of deposits (hematite and magnetite) and associated bedrocks;
- The nature, depth, and thickness of the ore deposit to be mined;
- The estimated volumes and characteristics of the waste rock to be removed;
- Acid rock drainage (ARD) and metal leaching (ML) characteristics of ore and bed rock;
- Ore body delineation;
- Mineralogy;
- The daily and yearly average extraction rate(s);
- Characteristics of the open pit mine design and operation;
- The permeability of the open pits;
- Anticipated salinity and general characterization of pit water; and
- Permafrost intrusion and winter operations.

6.5.2.2 Ore Mining, Transport and Processing

The Proponent shall describe the ore mining, transport and processing associated with the Project, using maps and diagrams whenever applicable:

- A mining plan indicating the sequence of development for the proposed open pit mine;
- Design, location, and capacity of iron ore and processed ore product stockpiling facilities, and related surface disturbance;
- The permeability of the impoundment structure(s) and the effectiveness of seepage containment, including the needs for control or retention structures if applicable;
- Means of drilling, blasting, extraction, loading and transport or ore, and dust prevention measures;
- The location of the Run of Mine (ROM) ore stockpiles, waste rocks stockpiles, and plans to control snow deposition, spring freshet, pooling, water run-off and storm flooding;
- The location of processing facilities and the site-selection criteria, ore processing facilities (i.e., crashing and screening, stockpiling, conveying, loading etc.), including processing equipment capacities, processing rate;
- Dust suppression technologies to be used during ore crushing process, and technical measures to prevent the wind blowing of fine materials;
- Processed ore composition, including the size and quantities of fines and their predicted particle settling characteristics, and associated dust prevention measures;
- Chemical stability analysis of the waste rocks, relevant technical measures to prevent potential acid drainage to environment and metal leaching;
- Discussion of how geotechnical factors, including permafrost, taliks related seasonal thawing and seepage conditions of ramps and runs of open pit, high walls of cut, and other facilities, were considered in the design and selection of the structures to contain the processed ore;
- Description of methods of controlling and monitoring groundwater seepage from ramps of the open pit, the processed ore and other containment areas, and the capacity to cope with storms, floods, and other intermittent natural events, using a return period that is adequately conservative (e.g., 1/100 years), including a review of similar operations elsewhere, applicable modeling information, and the results of research on the long-term stability of the underlying permafrost and frozen materials; and
- Measures and management plans to control natural hazards, such as rock falls and collapses, extreme climate events (i.e., storm, flooding, earthquake and other worst case scenarios).

6.5.2.3 Overburden and Waste Rock Disposal

The Proponent shall present:

- Overburden and waste rock handling, including the design and location of the storage sites, describing the options for each. The Proponent shall include a review of similar operations elsewhere, applicable modeling information, and the results of research on the long-term thermal stability of the underlying permafrost;
- Physical and chemical stability of the types of materials to be stored and those to be used for containment construction with regard to the long-term acid-generation and metal-leaching potential of the waste rock, bearing in mind the latest monitoring results from mines in the same general region and climate condition, and present a water management plan;

- Explain the relationship between the timing of acid generation and permafrost encapsulation and cold temperatures taking account the consideration of climate change, where possible in reference to the region in which the Project will take place;
- Describe the physical and chemical characteristics of seepage and runoff from the waste rock piles, and describe appropriate control measures. The potential for "rock glacier" phenomena; and
- Describe, in qualitative and quantitative terms, the chemistry of frozen groundwater from joints and fractures in the waste rock disposal area.

6.5.2.4 Water Supply and Water Treatment Facilities

The Proponent shall present, in combination with its Site Water Management Plan (Subsection 9.4.3), details on the water supply and water treatment facilities for the Project, including the followings:

- Estimates for the water supply source(s);
- Water uses including the camps, open pit mine, processing facilities, stockpile and containment areas;
- The water supply source(s), on-site use, storage, final discharge to the environment;
- Alteration of drainage patterns, water treatment (including water containing nitrate residues from explosives if it is required), diversions, and water conservation and recycling measures, should be addressed;
- Estimates of mine water volumes and potential uses of the mine water and methods used to calculate the volumes;
- The facilities for washing mine trucks and other equipment, as well as any treatment of water used for washing vehicles/equipment;
- How melt water, particularly with high metal content and/or hydrocarbons will be managed; and
- The disposal method for brine water from the proposed sea water desalination plant at Steensby Inlet.

6.5.2.5 Natural Drainage Diversion

The Proponent shall provide information on:

- A description of any planned diversions of natural drainage systems;
- Potential challenges expected in constructing drainage diversions (such as melting ice lenses and the resulting nutrient loadings in water bodies); and,
- Potential for mobilizing sediments, erosion generating and disturbance to terrain.

6.5.2.6 Mine De-Watering

The Proponent shall describe:

- Information about de-watering methods, specifying the estimate of volumes to be pumped based on the metrological baseline data, and geotechnical works, the areas that may be affected, the quantities of bottom sediment requiring disposal, and the disposal methods; and
- The contingency plan should the mine water quantity be significantly larger than estimated.

6.5.2.7 Landfills/land farms

The Proponent shall describe:

- Locations of any landfills and landfarms, with estimates of containment capacities, associated design basis and considerations to minimize impact on surround environment;
- Inventory of to be land filled, taking into account the Project stages, with details on waste segregation and landfill procedures;
- Construction materials and specifications, facility layout and cross-section engineering drawings; and
- The effectiveness of landfarm operation facilities taking account the climate, and similar facilities in comparable geological regions;

6.5.2.8 Other Facilities at Mary River Mine Site

The proponent shall present the following information on Project infrastructure and facilities where excluded from the above descriptions.

a) Temporary Facilities during Construction Stage

Construction camp; Contractor offices; Temporary fuel storage (iso-containers and manufactured tanks); Explosive plant; Aggregate crusher and stockpiles; Concrete batching plants; Portable lighting plants; Construction workshops and maintenance shops; Warehouses/stores; Construction equipment and vehicles; Equipment maintenance facilities.

b) Permanent Facilities during Operation Stage

Ore crushing and screening facilities; Ore stockpiling facilities; Railway loading and unloading facilities (for mine operation supplies transported from the Steensby Inlet port); Permanent worker accommodations; Communication systems (including satellite ground station); Heavy equipment fleet parking lot; Laydown areas; Bulk fuel storage and distribution facilities; Explosive manufacturing and storage; railway terminal facility including train loading and unloading facilities; Transportation and service vehicles.

6.5.3 Airstrip Traffic

There will be total three (3) airstrips in the project (including the existing ones), the Proponent shall describe:

- All airport facilities;
- Construction methods;
- The duration, frequency, and extent of use of each airport facility;
- The airport and infrastructure characteristics, service roads, fuel storage, de-icing and containment systems, methods of dust suppression, drinking and waste water disposal systems and solid waste management plans;
- Estimates of the number of passengers to be transported to the airport facilities, corresponding the recruitment plan from communities;
- Estimates of the volume of goods to be frequenting the airport facilities, on a daily or weekly basis; and
- Accident/incident response reporting.

6.5.4 Ground Traffic (Except the Rail Transportation)

The Proponent shall describe:

- Design specification and construction materials;
- Construction methods maintenance;
- The duration, frequency, extent of use, abandonment and reclamation;
- Estimates of traffic volume and type of vehicles;
- Types of water crossing and quantity or each kind;
- Dust suppressing methods;
- Operation management and wildlife protection measures; and
- Accident/incident response reporting.

6.5.5 Railway

The proponent shall provide the following information:

6.5.5.1 Railway Corridor

The Proponent shall describe with appropriate things like maps of the routing, pictures, topography, etc:

- The proposed transportation corridor, its use, general routing options (alternatives);
- Comparison of studied alternatives for the proposed railway corridor, and ratifications for the preferred (proposed railway corridor);
- All infrastructure and railway facilities, and respective locations of the proposed railway corridor;
- General characteristics of ecosystem and terrain conditions in the corridor;
- Wildlife resources and associated habitats, and significance to ecosystem health, and well being of local communities;
- Historical and current land/ice use activities;
- Identified cultural and spiritual sites, archaeological and paleleogical sites;
- The potential impacts on current and future use in the railway corridor from proposed railroad construction and operations; and
- Potential environmental and social impacts.

6.5.5.2 Railway and Train Operation

In the Project area, permafrost presents unique engineering challenges to numerous surface facilities construction and maintenance. Any alteration of the thermal regime at the ground surface, including even moderate disturbance of the pre-existing ground surface energy balance can induce permafrost thawing with consequent settlement and damage to roadway or railway embankments (J. Cold Reg, 2003). Among these facilities, transportation routes are likely to be particularly susceptible to destructive frost action under conditions of changing climate, railway embankments are particularly susceptible to thaw settlement damage because of the need to maintain the alignment and even grade of the rails (Arne Instanes, et al, 2005). Tremendous efforts have been made in both scientific research (Saboundjian and Georing, 2003), and engineering fields (GuoDong Cheng et al, 2009) to conquer these challenges around the world. Therefore, in its EIS, the Proponent shall provide detailed information pertaining to railway design and construction technologies addressing these issues, with emphasis on the potential impacts to the environment, and technical and operational measures to mitigate these impacts.

This information shall include:

a. Design and Construction:

- All facilities along the railway, including safety, signalling and communication systems, auxiliary facilities for wildlife, ski-doos, sledges and ATV passes, and emergency facilities for malfunction and other similar situations;
- Consideration of how the following issues are addressed in the design and construction of the railway:
    - The forecasting of possible geo-disaster scenarios and associated countermeasures
    - Mechanism of freeze–thaw damage, the prevention and countermeasures along the railroad corresponding various terrain conditions
    - Anticipate interaction between climate change (global warming) and permafrost deterioration along the railroad during the life of the project
    - the stability of railway embankment under dynamic loading and the engineering characteristics of underlying soils in the permafrost region
- Thermo stabilizing technology targeting embankment and underlying permafrost;
- Design and construction technology to enhance the thermo stability, associated thawing prevention measures and building technologies of embankment and tunnel structures; in particular the technical measures for construction of rail embankments over thaw-susceptible and ice-rich soils areas;
- Settlement prevention technology of bridges.
- Construction technology and machinery to build railway track, bridges and tunnels in arctic condition and permafrost terrain condition;
- Signalling and communication technology and equipment to ensure safe operations;
- Safety monitoring systems (for safe passage of wildlife), and related inspection and maintenance technology of railway equipment in harsh climate;
- Braking technology and equipment for emergency reaction;
- Locomotive technology and performance in arctic climate operation;
- Vibration damping and noise reduction technology & equipment;
- Railway alerting ,alarming system and treatment mechanism for natural disasters;
- Design considerations and construction methods for construction of sidings, bridges, other water crossing works, railway yards and terminals etc.;
- Erosion control measures along the rail line for all drainage facilities, include bridges, culverts, ditches, dikes and berms etc;
- Any lessons learned from other railway operations employed in comparable geological regions and meteorological conditions, and how those lessons have been incorporated in the proposed railway design; and
- Other issue related to railway and train operation.

b. Operation:

- Routing operation plan and regular maintenance activities;
- Safety measures /management plan for dangerous goods transport;
- Specific measures of spill contingency plan, and security plan to minimize negative impacts on wildlife and environment from railway spill and other accident with consideration of bulk fuel and chemical transport;

- Operation/management plans to minimize chronic impacts on wildlife from noise and vibrations from daily railway operation, particularly during critical life stagese when concentrations of wildlife (e.g. caribou) are migrating, or staying in immediate or proximity of rail line areas;
- Operation measures planned to protect wildlife and minimize collision related mortalities;
- Mitigation measures to secure the safety of cross rail traveling, fishing, hunting/trapping activities by snow machines, sledges and ATVs; and
- Other management plans required by federal and territorial government agencies for railway operation.

The Proponent shall access the impacts from construction through operation phases of the railway, and develop comprehensive mitigation measures to be incorporated into the required Railway Management Plan (Subsection 9.3.14)

6.5.6 Sea Port at Steensby Inlet

The Proponent shall provide the following information regarding Steensby Inlet site:

a) Site Facilities

- *Temporary Facilities during Construction Stage*: Construction docks; Quarry and borrow sites, and related access roads; Concrete batch plant(s); Construction and maintenance shops; warehouses/stores; Temporary power generators; Portable lighting plants; Laydown areas/freight storage; Parking areas for construction fleet; Temporary fuel storage (iso-containers); Equipment maintenance facilities; Explosives and magazines plant; land based disposal of dredged spoils.
- *Permanent Facilities during Operation Stage*: Ore management facilities including dual rotary rail car dumper, ore stockpiles and rail-mounted stacker/reclaimer system, secondary screening plant, and an ore loading dock; Ship loading and unloading facilities; Freight and tug docks; Cargo (container) handling facilities; Permanent worker accommodation and office buildings; Corridors/utilidors (used for connecting all buildings at port sites); Railway yard and maintenance facilities; with shops and maintenance infrastructure; Communication systems; Causeway; Laydown areas/freight storage; Airstrip and related access road; Tank farm and distribution facilities; Waste management facilities (include incinerator); Power plant; Navigational aids (shipping lane and port); Potable water desalination plant and supply facilities; Ammonium nitrate storage; Wastewater treatment plant; Site roads and other ancillary facilities.

b) Port Design and Operation

- Design characteristics of port facilities, based on the impact analysis, how precautionary principles has been incorporated into the port design;
- Operational details including: listing of materials to be transported to and from harbor including hazardous/dangerous goods cargo;
- Description of how general sanitation in harbor area will be managed;
- Dedicated shipping waste management in accordance with the provisions of the *International Convention for the Prevention of Pollution from Ships*, as amended by the 1978 Protocol (MARPOL, 1973/78).
- Port ice management plan and facilities;
- Ballast water management facilities; and
- Port security management.

6.5.7 Marine Shipping (including Ice Breaking Shipping)

The Proponent shall describe:

- Applicable environmental legislation, including:
  - International legislation, such as: MARPOL Convention, Protocols and Annexes (IMO, 2008)
  - Canadian legislation, such as: Canada Shipping Act, Arctic Waters Pollution Prevention Act, etc.
- Detailed description of proposed shipping routes and preferred routes both for open water and year round operations, focusing on the route from Steensby Inlet, through Foxe Basin to Hudson Strait, eastward into the Atlantic Ocean;
- Bathymetric study results of chosen dock sites and preferred shipping routes;
- Evaluation of alternative dock construction sites with consideration of bathymetric studies and minimizing underwater blasting and dredging;
- Bathymetric studies results for the area where shallow waters and/or strong current exist, (e.g. the Foxe Channel) with consideration given to the size of ore carriers, and the implications for shipping safety;
- All undertakings/works that would have to be accomplished to make port accessible for shipping (i.e. under water blasting/dredging, installation of land-based or sea-based navigational aids at the port site, and along the proposed shipping corridors);
- Dredging material disposal, included the proposed sites for disposal of dredged materials, capacities, the site selection criteria, means of offshore and ashore transport of dredged materials, and associated access roads, anticipated impacts on associated ecosystem;
- Detailed disposal plans for onboard solid waste and waste water (i.e., onboard sewage and grey water);
- Detailed ballast water management plan with emphasis on the proposed ballast water exchange locations in mid-ocean (at least 200 miles from shore and in waters having a depth of 2,000 metres or more before entering waters under Canadian jurisdiction), and alternative exchange zones within waters under Canadian jurisdiction, as required by existing regulations (Transport Canada, 2006));
- The measures the Proponent will take to ensure the fuel conforms with Canadian regulations (i.e. Sulphur in Diesel Fuel Regulations- (EC,1999) given the most of fuel will be shipped to the port from international sources;
- Measures to eliminate or reduce the risk of harmful aquatic and non aquatic species being introduced into Canada.
- Measures to prevent smuggling and other illegal activities related to international shipping;
- Detailed loading and offloading procedures for dangerous goods, fuel and explosives if applicable;
- Potential third parties responsible for ensuring safe shipping beyond the immediate port site;
- Detailed safety measures, including setting of local, land-based navigational aids, and electronic charting display information system given exist of shallow waters an strong currents on proposed Foxe Basin shipping route, taking the size of iron carrier and local weather conditions into account;

- Measures preventing the ship beset in pack ice from carrying into rocks, shoals and small islands where the proposed shipping is close to the shoreline (e.g. at Cape Dorset), and if applicable, the plans to hire personnel with local knowledge of the area and weather condition to assist the shipping deal with urgent situations;
- Discussion of whether the shipping route is a compulsory or non-compulsory pilotage area by determination of the Atlantic Pilotage Authority (Atlantic Pilotage Authority Regulations, 2009).
- Accident, malfunction and incident management and reporting.

6.5.8 Borrow Pits and Quarry Sites

Borrow pits and quarry sources will be developed for construction and maintenance and reclamation of various site facilities from Milne Inlet to Steensby Inlet. The Proponent shall present the following information for each borrowing pit and quarry source, and a summary of all such sites used for the Project, in combination with the Borrow Pits and Quarry Management Plan (Subsection 9.3.12):

- Borrow pits and quarry sites design;
- Maps at a scale of 1:5000 for all sites that are to be used for borrow pits or quarries, noting which are located on or near eskers;
- Estimates of the quantities that will be extracted from quarry sites;
- Description of potential adverse impact on the environment and wildlife habitat at sites, and how precautionary principle is applied in the designs;
- Describe access roads to those sites, and how the surface disturbance will be minimized in the roads design and construction.
- Other issues required to address in the Borrow Pits and Quarry Management Plan;

6.5.9 Access Roads

For access roads, including the mine hauling roads, site service roads, airstrip access roads, railway construction and maintenance roads, the Proponent shall describe the following, including relevant maps and drawings where useful:

- The proposed construction of all access road(s), including laydown areas, temporary construction camps, paying particular attention to stream crossings and diversions of watercourses;
- The quantities and types of materials required for construction and maintenance;
- Construction and maintenance methods for all site roads, frequency of use, road width, and dust-suppression methods;
- The types and numbers of vehicles to be used to transport materials and ore along the all-weather access route(s), including the total number of trips expected daily and seasonally, the allowable and expected speeds, and best estimates of load weights (full and empty, if applicable);
- Wildlife impact mitigation procedures and/or structures such as caribou crossing;
- Site reclamation, especially temporary construction camp and quarry sites which are used for extracting construction materials;
- Disposal of construction waste materials; and
- Accident/incident reporting and Spill contingency plan.

6.5.10 Power Generation

The Proponent shall describe, in with conjunction with its Air Quality Monitoring and Management Plan (Subsection 9.4.3):

- The location of the power generating plants/stations relative to prevailing winds and other infrastructure (e.g., camp accommodations);
- Utility corridors, including transmission lines;
- All diesel power generation facilities, including sources, volumes and transportation of fuel, transfer points, and equipment and facilities for emergency clean-up;
- The energy balance for the proposed Project, including strategies for optimization and conservation;
- The anticipated types and quantities of emissions to the atmosphere; and
- Accident/incident management and reporting.

6.5.11 Fuel and Explosives Facilities

The Proponent shall describe, in conjunction with its Hazardous Material Management Plan (Subsection 9.4.9) and Explosive Management Plan (Subsection 9.4.10):

- The location and characteristics of fuel and explosives storage/manufacturing infrastructure and facilities;
- Safe handling and spill containment preventing methods;
- The types and quantities of fuel, explosives, and other similar materials required for the duration of the Project;
- Methods of fuel transfer and transportation from source(s) to, and around site;
- Security measures to be implemented, if applicable;
- Accident/incident response reporting;
- Spill response training; and
- The location of spill kits on site.

6.5.12 Waste Management Facilities

The Proponent shall describe the wastes generated from construction and operation of the Project, in combination of related mitigation and management plans (Subsection 9.4), which include but not limited to:

- Waste rocks
    - An inventory of waste rock, including but not limited to overburden, waste rock, off grade iron ore, low grade mineralized material, processing wastes and excavated material generated during construction of the transport system and other infrastructure;
    - ARD and LM characterization of waste rock, the method of testing in terms of both static and kinetic tests, and number of samples tested, the company and personnel to carry out the tests, and implications to possible use and disposal;
    - Management plan, including stockpiles design, locations, capacities relating to the volume/ tonnage of and physiochemical character, waste rock stockpile methods and procedures, runoff management, progressive reclamation, and other components and activities related to the waste rock management;
    - Mitigation measures technically achievable and able to accommodate the projected volumes of material; and,

- Contingencies for the proposed control measures with a conceptual plan to monitor and audit the mine wastes.

- Sewage/grey waters treatment
  - Sewage/grey water treatment facilities both in construction and operation stage, including the technology to be employed, the location of the facilities, point(s) of discharge, solids (sludge) disposal methods, and the volumes and quality of the effluent, as well as the applicable discharge standards; and,
  - Contingency measures for the disposal of sewage/grey water in periods of sewage plant malfunction and/or disturbances, the associated disposal and treatment technologies and facilities.
- Contaminated soil, snow, ice and surface runoffs:
  - Facility, technologies and applicable standards; and,
  - Collection, handling, storage, treatment, and disposal.
- Hazardous waste management:
  - Inventory of the types and volumes of hazardous wastes generated or produced by the Project activities, including shipping operations;
  - Storage, transport and disposal methods; and
  - Destinations for each type of hazardous waste, including disposal of containers used to transport or store hazardous materials.
- Domestic waste and incineration facilities:
  - Inventory of domestic waste, including both land-based and onboard generated waste;
  - Incineration technologies, equipment and applicable emission regulations;
  - Disposals of incineration ash; and
  - Training program for operation personnel.

6.5.13 Exploration

The Proponent shall describe:

- The anticipated areas to be explored and focuses of exploration in different project stages;
- Temporary/field facilities; ground and air transport;
- Equipment to be used;
- Minimum flight altitudes if aircraft is planned for the exploration program;
- Wildlife mitigation and monitoring plan associated with exploration program; and
- Drilling waste disposal and drilling site reclamation plan.

6.5.14 Other Project Facilities and Infrastructure

The Proponent shall describe other project undertakings/works, and assess the potential impacts, including those resulting from interactions with wildlife, of all other site facilities and associated infrastructure not detailed in Subsection 6.5.

7.0 IMPACT ASSESSMENT APPROACHES

7.1 BASELINE INFORMATION COLLECTION

The Proponent shall present baseline data, including Traditional Knowledge about the existing biophysical and socio-economic environments, including changes in baseline conditions due to exploration activities related to the Project. The EIS shall explain methodologies for baseline data collection, evaluate the adequacy and confidence levels of the baseline data, identify all significant gaps in knowledge and understanding and the associated uncertainties, and identify the steps to be taken to fill such gaps. Where technical, scientific, or Traditional Knowledge appears to be in conflict with respect to key issues, the Proponent shall provide a balanced discussion of the issues and state its position.

In order to identify natural fluctuations, trends and cyclical and other recurrent phenomena, the Proponent shall strive to give sufficient time depth to baseline data. It shall also strive to evaluate the degree to which the baseline data characterize ecosystems that are relatively free of impacts. Also, the Proponent shall specify, where relevant, the sources of prior impacts where those can be identified with reasonable confidence, so as to assist in evaluating the thresholds of ecosystem components. Further, the Proponent shall present the likely future conditions of baseline data in the absence of the Project.

7.2 VALUED ECOSYSTEM COMPONENTS AND SOCIO-ECONOMIC COMPONENTS

This description should include, but not necessarily be limited to, those Valued Ecosystem Components (VECs) and Valued Socio-economic Components (VSECs), processes, and interactions that are likely to be affected by the Project. If relevant, the location of these VECs/VSECs should be indicated on maps or charts. The Proponent should indicate to whom these components are valued and the reasons why, including social, economic, recreational, tourism and aesthetic considerations. The Proponent should also indicate the specific geographical areas or ecosystems that are of particular concern, and their relation to the broader regional environment and economy.

The Proponent should justify the methods used to predict potential adverse and beneficial effects of the Project on the VECs and VSECs, on the interactions among these components and on the relations of these components with the Environment. In particular, the Proponent must validate the selected VECs/VSECs, especially those VECs/VSECs that will be used to assess the significance of Project component interactions, through consultation with the potentially affected communities. Any uncertainties in the validation must be documented. In this regard, NIRB suggests that the Proponent continue to seek input from the potentially-affected communities, and in particular, those community members with Traditional Knowledge respecting the identification of the VECs/VSECs to be discussed in the EIS.

The Proponent is expected to identify the components of the Project that may be expected to interact in adverse or beneficial ways with the VECs/VSECs. The components could be grouped into the following categories:

- Components and works related to construction, operation, closure and reclamation of the Project;
- Components related to the impacts of the Project; and
- Components related to developments induced in the reasonably foreseeable future by the Project.

The following list of VECs and VSECs related to the Project were identified through public scoping conducted by NIRB, and shall be included in the Proponent's assessment. This list is not meant to be exhaustive, but rather shall give the Proponent an appropriate starting point for the identification of relevant VECs and VSECs. The Proponent shall provide a rationale for the selection of communities and relevant studies for which baseline data are provided. The Proponent shall describe the interactions between the socio-economic and bio-physical environments.

7.2.1 Valued Ecosystem Components

- Terrestrial environment, including landforms and soil;
- Freshwater and marine environments, including surface water quality;
- Air quality;
- noise;
- Vegetation;
- Terrestrial wildlife and habitat, including terrestrial mammals including: caribou, foxes, wolverines and wolves;
- Migratory birds and habitat;
- Freshwater fish and other aquatic organisms;
- Marine habitat including sea ice;
- Marine fish and invertebrates;
- Marine mammals including polar bears, seals, bowhead whales, walrus, beluga whales , narwhals;

7.2.2 Valued Socio-economic Components

- Inuit harvesting;
- Traditional hunting grounds;
- Country food consumption;
- Traditional Knowledge;
- Education and training;
- Employment opportunities;
- Economy and self-reliance;
- Public consultation and participation:
- Archaeological resources;
- Local food security;
- Local economy and community livelihoods;
- Taxes and royalties; and
- Closure and reclamation security bonds.

7.3 METHODOLOGY

In describing methodology, the Proponent shall explain how it used scientific, engineering, Traditional, community, and other knowledge to reach its conclusions. Any assumptions shall be clearly identified and justified. All data, models, and studies must be documented so that the analyses are transparent and reproducible. All data collection methods shall be specified, and the uncertainty, reliability and sensitivity of methods and models used to reach conclusions shall be indicated. All conclusions shall be substantiated.

The Proponent shall, to the extent possible, consider other available information, including knowledge on what types of data other project proponents, governments, and other researchers are collecting and have collected, in making choices with respect to the types of data it will collect for Project-specific monitoring programs as well as any regional monitoring initiatives it will participate in.

The EIS shall identify all significant gaps of knowledge and understanding where they are relevant to key conclusions presented in the EIS. The steps taken by the Proponent to address these gaps shall also be identified. Where the conclusions drawn from scientific and technical knowledge are inconsistent with the conclusions drawn from community and/or Traditional Knowledge, the EIS shall contain a balanced presentation of the issues and a statement of the Proponent's conclusions.

7.3.1 Acquisition Methodology and Documentation

The Proponent shall specify and justify all sampling methods and statistical processes employed in both the biophysical and social contexts. The reliability and scope of the results, the possibility of reproducing the analyses, and quality control of laboratory analyses shall be analyzed critically. All data based on environmental sampling necessarily involve some variability, which must be determined to assess the reliability and scope of the data. The Proponent shall, for all data obtained from environmental sampling, provide a dispersion or variability coefficient (variance, standard deviation, confidence interval, etc.) and indicate the size of the sample used. Similarly, when using mathematical models, the Proponent shall indicate the assumptions employed, the prototype used, the accuracy, and the inherent limits of interpretation. Every effort must be made to harmonize the types of data collected and their statistical treatment with the NPC's General Monitoring Programme outlined in Article 12 of the NLCA.

7.3.2 Data Analysis and Presentation

In its EIS, the Proponent shall ensure that whenever qualitative criteria are used to compare various design and development options, to describe the environment, or to assess impacts, each of these criteria shall be defined, their relative importance stated, and the differences between the categories (e.g., desirable, acceptable, unacceptable) indicated. The Proponent shall justify the classification of each criterion.

The Proponent shall support all analyses, interpretations of results, and conclusions with a review of the relevant literature, providing all references required and indicating the public availability of all works consulted. Any contribution based on Traditional Knowledge shall also be specified and sources identified, subject to any concerns relating to ownership or confidentiality.

The Proponent shall correlate its conclusions about impact significance with any thresholds referred to/adopted from relevant literature or regional policies. The Proponent shall provide clear statements regarding the availability, relevance, and quality of the data.

7.4 PUBLIC CONSULTATION

Public consultation is required when:

- Identifying current and historical patterns of land- and resource-use;
- Identifying VECs and VSECs;
- Determining criteria for evaluating the significance of potential impacts;
- Deciding upon mitigating measures;
- Formulating compensation packages; and
- Identifying and implementing monitoring measures, including post-project audits.

The Proponent shall explain where, how, why, and with whom it conducted public consultation, documenting its efforts to inform participants how the information that they supplied was or will be used. It shall demonstrate an understanding of the rights, interests, values, aspirations, and concerns of the potentially affected communities, with particular reference to those emanating from the NLCA, and ability to recognize and respect them in planning and executing the Project. Moreover, the Proponent shall explain the results of the consultation process, how the consultation process has influenced its decisions, and how it intends to address the unresolved concerns expressed.

7.5 TRADITIONAL KNOWLEDGE

The Proponent shall present and justify its definition of Traditional Knowledge and shall explain the methodology used to collect it, including:

- format and location of meetings;
- description of background information provided at meetings;
- level of community participation and composition of participants;
- special efforts were made to collect Traditional Knowledge from Inuit elders, women or special groups, or harvesters familiar with the Project area
- design of studies on Traditional Knowledge;
- selection process for participants in such studies; and,
- types of Traditional Knowledge collected.

The Proponent shall discuss how it weighted and incorporated Traditional Knowledge in baseline data collection, impact prediction, and significance assessment, and the development of mitigation and monitoring programmes. It shall explain how it integrated Traditional Knowledge and popular science, including the manner in which it reconciled any apparent discrepancies between the two. Any assumptions shall be identified and justified. Furthermore, the Proponent shall describe any other past or current Traditional Knowledge studies in which it has participated or played a supporting role.

The Proponent shall outline its program to pursue the collection of Traditional Knowledge and to integrate it into ongoing baseline data collection, mitigation, and monitoring programs, and shall describe the roles and responsibilities of all concerned individuals and organizations in collecting, analyzing, interpreting, and synthesizing data, including Traditional Knowledge.

7.6 IMPACT ASSESSMENT APPROACH

The required impact assessment, including the significance analysis, shall cover each project component and activity contained in the Project as described in Section 6, and extending across all the Project phases (pre-construction staging if applicable, construction, operation, modification, decommissioning, reclamation and abandonment, post closure monitoring). This assessment should be referred to environmental and socio-economic elements potentially impacted by the Project components, activities and undertakings listed below.

As part of assessment, the Proponent shall discuss the potential impacts of the environment on the Project, considering such factors as seismicity, severe weather events, sea ice conditions, and global climate change. The discussion must specifically describe and assess how the potential for climate change (global warming) could affect permafrost and soils with high ice content and the long-term impacts of such changes on Project infrastructure, particularly the open pit mine, waste rock stockpiles, railway, tunnels, bridges convert, and other sensitive project components.

Longer-term effects of climate change must also be discussed up to the projected abandonment phase of the Project. The sensitivity of the Project to long-term climate variability and effects must be identified and discussed. The Canadian Environmental Assessment Agency Procedural Guide, "*Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*" (CEAA, 2003) provides guidance for incorporating climate change considerations in an environmental assessment.

The impact assessment should be combined with the list of project activities to produce an interaction matrix that identifies all possible interactions between the project activities and the VECs/VSECs. This matrix may serve as a checklist to ensure that all possible interactions are addressed.

7.7 IMPACT PREDICTION

The Proponent shall explain and justify the methods used for impact prediction, which can include mathematical or mechanical modeling, previous experience, statistical modeling (e.g., variance and correlation analyses), the analysis of sequential series, expert opinion, the prediction of tendencies, and Traditional Knowledge if applicable.

All studies used in the prediction of impacts must be specified, and the original authors identified, and the studies made public. All statements based on public consultation shall be justified and the sources and methodology specified. The choice of methodologies and interpretation of results shall be justified in light of current theories, knowledge, and standards.

The Proponent shall assess the direct, indirect, short-term, and long-term impacts of the Project on the biophysical and socio-economic environments, and the interactions between them, focusing on the anticipated response of the VECs and VSECs. It shall also assess the degree of uncertainty associated with each predicted effect. Whenever the potential for cumulative effects is identified, a discussion must be provided related to the CEA outlined in Subsection 7.8 of these Guidelines.

The Proponent shall identify potential impacts separately for each Project phase, including exploration, as well as impacts arising from accidental events and malfunctions. The Proponent shall use accepted practices to draw impact predictions. Predictions will be presented with appropriate explanation and justification. When justifying impact predictions, the Proponent shall:

- Explain how scientific, engineering, community and Inuit knowledge was used;
- Document model assumptions and study methodologies;
- Identify which studies included the assistance of communities and individuals, who was involved (if the information can be made public), and how participants were selected;
- Document data collection methods and limitations thereof;
- Support analyses, interpretation of results and conclusions with reference to appropriate literature;
- Specify and reference sources for any contributions based on Traditional Knowledge;
- Identify all proposed mitigation measures and adaptive management strategies, if applicable; and
- Describe the potential residual effects.

7.8 CUMULATIVE EFFECTS ASSESSMENT

A cumulative impact (or effect) can be defined as the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable

future actions (Tilleman 2005). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The Proponent is expected to carry out its Cumulative Effects Assessment (CEA) with consideration for the following factors:

- A larger spatial boundary (Regional Study Area rather than Local Study Area): which will enable the Proponent to assess the project impacts in relations to other activities in the geographical region, this implies that spatial assessment boundary may cross jurisdictional boundaries for a better understanding of additive and interactive pathways of different types of cumulative effects (NIRB 1997);
- A longer temporal scale: it would allow the CEA to take all factors in assessments from present time into the past and reasonably foreseeable future for a more accurate analysis, as ecological systems and social system usually exhibit large temporal and spatial variability. Short term CEA might results in misinterpretation of real impacts due to data variability.
- Alternative analysis: CEA requires the explicit creation of alternative development scenarios and analysis of potential cumulative effects associated with each option (Greig *et. al* 2002). Therefore, the Proponent shall ensure its CEA clearly addresses the alternatives presented under Subsection 6.13.1 of these Guidelines.
- Consideration of effects on VECs and VSECs: determine the various project components and activities will affect or likely affect the same VECs/VSECs, then CEA can predict the impacts of the Project in combination with those of the other past, present, and reasonably foreseeable future developments in combination or interactions with other events and activities;
- Evaluation of significance: Significance of residual impact must be taken into consideration rather than just local, direct effects. Effective CEA requires identifying and predicting the likelihood and significance of potential cumulative effects. The Proponent shall also consider and determine the significance of the cumulative effects by the criteria described in Subsection 8.5.

In terms of the Mary River project, the following areas, among others, shall be addressed in the CEA:

- The cumulative effects related to future development of other identified deposits (#2, #3 and #4), possible new deposits to be identified from ongoing geotechnical program at or near Mary River;
- Consideration of cumulative effects from increased use of railway and port facilities resulting from possible expansion of the currently proposed project;
- The cumulative effects associated with other ongoing or planned major project development in the region, including: federal naval facility at Nanisivik , and Roche Bay Mining project, etc.;
- the Proponent shall also evaluate the cumulative impacts of the Project, that would provide for or contribute to the overall use of larger marine transportation corridors taking into account the improved accessibility for other marine traffic;
- Anticipated cumulative effects on the distribution, abundance and harvesting of both terrestrial and marine wildlife (i.e. including mammals, migratory birds) from escalated project activities, including habitat loss, changes to migration patterns and population

health with a focus on cumulative impacts related to shipping with ice breaking at the proposed rate;

- The potential for cumulative effects on Species at Risk (EC, 2004);, and
- The cumulative effect related to different temporal scenarios for shipping (including an option for no ice breaking in winter and spring); and
- Cumulative effects of monitoring programs planned for identifying and mitigating effects of the project on wildlife.

As per the objective and methodologies for a CEA, the Proponent shall present in the EIS:

- Justify the environmental components that will constitute the focus of the CEA. The Proponent' assessment should emphasize the cumulative effects on the main VECs/VSECs that could potentially be most affected by the project.
- Present a justification for the spatial and temporal boundaries of the CEA. It should be noted that these the boundaries can vary depend on the VECs/SVECs assessed;
- Discuss and justify the choice of projects and selected activities for the cumulative effects assessment. These shall include past activities and projects, those being carried out and any future project or activity likely to be carried out; and
- Discuss the mitigation measures that are technically and economically feasible, determine the significance of the cumulative effects. If the any impact is identified and verified beyond the Proponents sole responsibility or capacity, the Proponent shall identify the involving parties to mitigate the cumulative impact collectively.

7.9 TRANSBOUNDARY IMPACTS

Transboundary impacts, for the purpose of the current Guidelines, are defined as those effects which occur across provincial, territorial, or international boundaries and which may occur outside of the Nunavut Settlement Area. The Project's proposed shipping route through the Hudson Strait locate within the boundaries of the Nunavut Settlement Area (NSA), however, this shipping route may cause impacts outside the NSA , into neighbouring jurisdictions (i.e., Northern Quebec, and the northern coast of Labrador).

The Proponent shall give due consideration to the potential for transboundary impacts, including the effects of the Project outside Nunavut and the interactions between the effects of the Project and the effects of projects located outside Nunavut. In addition, any residual effects which have the potential to occur outside of the NSA shall also be included in the Proponent's evaluation of transboundary impacts.

The potential for transboundary impacts should be considered for all VSECs and VECs identified by the Proponent , with specific consideration given to the potential for transboundary impacts associated with marine shipping, marine mammals, and migratory birds. In addition, the potential for transboundary impacts related to cumulative effects associated with this Project shall be clearly defined.

7.10 INDICATORS AND CRITERIA

The Proponent shall identify the indicators and/or criteria selected for assessing the potential impacts of the Project, including any cumulative and transboundary impacts, and shall justify their selection. In doing so, the Proponent shall describe the role played by consultation with members of the public and technical experts. Furthermore, in its discussion of indicators, the Proponent shall emphasize the linkage between those indicators chosen and the relevant VECs or VSECs, thereby addressing any concerns identified through community consultation.

In every case where a potential impact or an area of uncertainty is identified, the Proponent must give a clear commitment in the appropriate section of the EIS as to how it will address it. The Proponent must clearly distinguish the impacts at each stage of the Project, including temporary closure, final closure and post-closure.

7.11 SIGNIFICANCE DETERMINATION

Impact significance is based on comparing the predicted state of the environment with and without the Project and expressing a judgment as to the importance of the changes identified. Assessing the significance of potential impacts is, arguably, the single most important aspect of an Environmental Impact Statement.

The Proponent shall provide evidence that its definitions of impact significance are consistent with those of the communities potentially-affected by the Project, as well as other relevant individuals and organizations. The Proponent shall describe how it will ascertain the significance that different interveners assigned to each impact and how it will proceed if different interveners ascribe varying significance to VECs, VSECs, or the associated impacts. If it is impossible to attain a consensus on the significance of certain impacts, the Proponent shall present the range of viewpoints expressed and shall present and justify its preference, if any. Finally, the Proponent shall describe the significance it ascribes to each effect, and justify how the significance of the effect was determined, taking into consideration and avoiding duplication of, the information provided above.

The dynamic change of ecosystems and their components must also be considered in determining impact significance. The Proponent shall evaluate the significance of potential impacts in the light of data on the dynamism and the current “state of health” of ecosystems and their predictable evolution in the light of, among other phenomena, global climate change. Consistent with the ecosystem approach required above, the Proponent shall strive to highlight the interactions within and between ecosystem components in an effort to increase understanding of the dynamism of the ecosystems in question and the nature and severity of the predicted impacts.

The terms used to describe the level of significance such as "low", "medium", or "high", must be clearly defined, where possible in quantitative terms. The following attributes shall be taken into consideration in determining the significance of each impact:

- Nature of impact (i.e. positive/beneficial vs. negative/adverse);
- Magnitude and geographic extent;
- Timing, duration and frequency;
- Probability of occurrence;
- Reversibility and complexity of residual effects;
- Historical, cultural, archaeological or ecological significance of the area;
- Effect on ecosystem function and integrity;
- The effect on the capacity of resources to meet present and future needs; and
- The value attached to the impacted VEC or VSEC by those who identified them.

7.12 CERTAINTY

The Proponent shall also assess the degree of uncertainty associated with each predicted effect. The level of certainty with predictions is related to limitations in the overall understanding of the ecosystem and limitations in accurately foreseeing future events or conditions. The Proponent shall provide a reasonable description of the uncertainties associated with each prediction.

7.13 IMPACTS OF THE ENVIRONMENT ON THE PROJECT

The Proponent shall discuss the potential impacts of the environment on the Project, considering such things as seismicity, severe weather events, sea ice conditions, and global climate change. The discussion must specifically describe and assess how the potential for climate change (global warming) could affect permafrost and soils with high ice content and the long-term impacts of such changes on Project infrastructure, particularly the railway and waste rock piles.

Longer-term effects of climate change must also be discussed up to the projected abandonment phase of the project. The sensitivity of the project to long-term climate variability and effects must be identified and discussed. The Canadian Environmental Assessment Agency Procedural Guide, "*Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*" (CEAA, 2003) provides guidance for incorporating climate change considerations in an environmental assessment.

8.0 PROJECT ENVIRONMENT AND IMPACT ASSESSEMNT

8.1 BIOPHYSICAL ENVIRONMENT

The Proponent shall describe the following components of the biophysical environment and associated processes as they exist presently, to serve as a baseline against which the potential impacts of the Project can be measured. In describing the biophysical environment, the Proponent shall take an ecosystemic approach that takes into account both scientific and Traditional Knowledge perspectives regarding ecosystem health and integrity. The EIS should identify and justify the indicators and measures of ecosystem integrity it uses, and further relate them to Project monitoring and follow-up measures.

8.1.1 Meteorology and Climate (including Climate Change)

8.1.1.1 Baseline Information

- A description of the baseline meteorological and climatic conditions at the Local and Regional Study Areas, including the methods of determination and uncertainties associated with the description of baseline conditions and an evaluation of climate variability and extreme events that may have an impact on project components. the Local and Regional Study Areas shall encompass all project components proposed by the Project, including the shipping routes;
- Meteorological data including but not limited to: temperature (both air and permafrost), precipitation, evaporation and sublimation rates, directions and velocity winds, prevailing wind directions at key project components areas, and along proposed shipping routes;
- Baseline meteorological and climatic conditions including annual, seasonal, monthly and daily average/mean values; seasonal and yearly fluctuations; the variability; and extreme climate events over the same period of time in which the data is collected in the Regional Study Area of the Project;
- Trends in key climate parameters in the Project area and their implications to the Project; and
- The predicted climate change and related changes in mean and extreme climate parameters, and metrological phenomena including flooding, storms, etc.

8.1.1.2 Impact Assessment

- Assessment of effects of climate on the Project in general, and on the design and planning of the Project elements in specific, including (but not limited to): railway embankment,

water crossings (bridges), port facilities; open pit mine; waste rock stockpile; airstrips roads, rail line and auxiliary facilities, and year round sea port;

- Assessment of meteorological impacts on the Project design and planning from extreme temperature and precipitation events, storm winds and waves, ice-ride up and pile-up events, extreme ocean water levels (positive and negative), severe fog or white out conditions;
- A discussion on the likelihood of all possible climate changes based on various possible scenarios, rather than designing and applying a single "best guess" scenario;
- Impacts from climate changes, consequences and its long term implication to the Project;
- Impact on mean and extreme metrological parameters, such as air and ground temperatures, precipitation. the timing of ice formation, active layer thickness, and frequency of storms;
- Impacts from climate change on sensitive ecosystem features in both terrain ecosystem and marine ecosystem.
- Assessment of impacts on climate and climate change from the Project, especially the impact on climate change due to greenhouse gas emission from the Project;
- Evaluation of the effects of permafrost thawing due to climate change on stability of project components such as: railway embankment, water crossings/tunnels, waste rock stockpiles and other facilities and sensitive ecosystem features; and
- Any uncertainty related to climate change predictions, and the related effect on other predictions in the EIS, including water quantity and permafrost thawing, from uncertainties and potential changes.

8.1.2 Air quality

8.1.2.1 Baseline Information

- Description of the background air quality data and atmospheric conditions data in the Regional Study Area;
- Description of any current sources of emissions and seasonal variations or climatic conditions associated with variations in air quality.
- A summary of air quality data that has been collected to establish background conditions;
- Description of all possible pollution emission sources and emission rate from the Project at various stages, including:
    - Gaseous emissions from fuel consumption from mobile equipment such as vehicles, ships, aircrafts, and from stationary equipment such as diesel generators and other combustion sources.
    - Fugitive dust emissions from ore processing, handling, waste rock and ore stockpiles, quarries and other project component and works.
    - Dust emissions from ground transportation and wind erosion at various project component including the Milne Inlet Tote Road, access roads and mine hauling roads.

8.1.2.2 Impact Assessment

- Discussion of the standards, guidelines and regulations that the Proponent will incorporate before, during and after operations to minimize and mitigate effects to air quality;

- Effects from fossil fuel combustion from project activities(including shipping) on air quality, with reference to each of the following: greenhouse gases (GHG) emission, increase of concentrations of air contaminants, such as Sulphur dioxide (SO_2), Nitrogen dioxide (NO_2), Carbon monoxide (CO), other sulphur and nitrogen compounds, Total Suspended Particulate (TSP), PM_{10} and $PM_{2.5}$, etc;
- Predictions how project emissions will disperse from the development on a local and regional scale by numeric modeling, the effects of such emissions and strategies for mitigating those impacts;
- Discussion of atmospheric photochemistry and the conversion process for Project emissions, linkages among stratospheric ozone, GHG, global warming as well as implications in the context of the Project;
- A discussion of Project operations which may act as a source for acidic precipitation as well as an evaluation of those effects;
- Assessment of greenhouse gas contributions to Nunavut and Canada;
- Effects on air quality due to incineration of combustible domestic waste, such as food waste on various camp sites, and effects on air quality of incineration onboard the ships;
- Effects on air quality, in particular the TSP, due to ore crushing, hauling, transportation, loading and unloading of fine iron ore, airborne dusts from potential soil erosion resulting from various project disturbances, as well as fugitive dust from ground traffic and other disturbed surface areas; and
- The impacts of blasting on air and water quality, with particular reference to wastewater containing nitrites or nitrates from residual explosives.

8.1.3 Noise/Vibration

8.1.3.1 Baseline Information

- Description of the area noise regime, noise data that has been collected on background conditions, the variability, if applicable, relationship with metrological conditions and other related effecting factors;
- Any available studies/research upon noise impacts on wildlife behaviours and health both terrestrial and marine environment by railway and shipping respectively, in comparable climate and geographical regions with the Project; and
- List of noise level and vibration inventory including all project equipment including aircrafts, and activities which create noise and vibrations.

8.1.3.2 Impact Assessment

- A discussion of the standards, guidelines, thresholds and regulations that the Project will comply with before, during and after operations to minimize and mitigate noise and vibration impacts;
- Assessment of the changes and impacts to atmospheric noise levels due to project activities at different project stages, including:
    - Ground transportation: such as mine hauling trucks, service tracks and railway, use of the Milne Inlet Tote Road, and other access roads.
    - Air transportation.
    - Equipment use at mine sites and construction sites: such as power generation equipment use.
    - Mine site operation: blasting, drilling, crushing, screening, transport and stockpiling.

- Assessment of the changes in marine noise levels due to activity at the dock, blasting, and shipping, including noise propagation in the marine environment;
- Comprehensive assessment of noise impact on the following receptors:
    - Human;
    - Terrestrial mammals, especially caribou and migratory birds
    - Marine fish and marine mammals
    - Marine mammals
- Assessment of the noise from processing operations and transportation to and from the facilities.

8.1.4 Geology and Geomorphology

- A description of the bedrock, surface/subsurface geology, topography, petrology, geochemistry, hydrogeology and geomechanics of the areas that will be disturbed by the Project components;
- Structural geology, such as fractures and faults in ore bodies, infrastructure site at port site , cutting and tunnelling locations along the railway route;
- Geotechnical properties of the bedrock and soil (related to slope stability and bearing capacity of facility foundations and railway line route under both static and dynamic conditions); and,
- Geotechnical and geophysical hazards within the Project area, including potential seasonal subsidence, seismicity and faulting, risks associated with cut/fill slopes and constructed facilities. Where appropriate, the descriptions should be supplemented by illustrations such as maps, figures, cross sections and borehole logs.

8.1.5 Hydrology and hydrogeology

8.1.5.1 Baseline Information

- Hydrology of the RSA (e.g., streams, surface water flows, subsurface water movement, ice formation and melt patterns);
- Hydrological regimes, drainage basins, watershed boundaries and site water balance;
- Natural fluctuations, variability, and sources of variability in flow and ice cover (including seasonal fluctuations and year-to-year variability, and the interactions between surface water and groundwater flow systems, if applicable);
- Hydrology characteristics of streams, rivers, and lakes in each watershed in the RSA (e.g., freeze/thaw timing; flood zones; ice conditions and typical thicknesses, formations and melt patterns). Items listed should be considered within the context of the range in climate conditions expected (i.e. include both climate variability, including extreme events, and changes);
- A projection of the amount of water required from each water source; and
- Description of any proposed diversions of surface flows from project facilities;

8.1.5.2 Impact Assessment

- Discussion of the potential impact of variable and extreme stream-flows on Project design and planning, including water crossing designs;
- Assessment of how run-off water from disturbed areas, stockpiled material, and operating surfaces will be managed;

- Evaluation of storm water run-off and surface waters through the Project area relative to potential receiving water effects, (including: flow rates and flow characteristics, water quality, hydrology and erosion and sedimentation);
- Evaluation of the impact on receiving water from mining activities based upon predictions of discharges from potential sources (e.g., waste rock areas, mine dewatering facility), and established performance targets for the Project discharges to meet prior to being received into surface water systems.;
- Assessment of the potential for pit water accumulation and seepage due to permafrost thawing as a result of mining;
- Assessment of changes in quantity and direction of runoff change in channel regimes from construction and operation of mine facilities;
- Assessment of the potential for ice damming and its consequent effects on other resources;
- Assessment of changes in surface water quantity (lake and stream levels and volumes, stream flows) from project activities such as: water withdrawal, diversion of streams and water crossing works;
- Assessment of changes to navigability of watercourses due to water crossing works;
- Impact on the original water sheds and potential surface diversion from waste rock, ore and overburden storage;
- Impacts on aquatic life, fish, waterfowl, and terrain mammals resulting from the modification or redirection of natural flows; and
- The impacts of the railways on hydrology regime by draining diversion, ditching and rechanneling.

8.1.6 Groundwater/Surface waters

8.1.6.1 Baseline Information

- Physical and chemical characteristics of surface, sub-surface, ground waters and seasonal variations;
- Groundwater existing forms, distribution characteristics at Mary River area; especially the frozen groundwater within the Deposits;
- Interactions between permafrost, surface water and ground water and topography; presence of rock fractures, talik zones between different surface/ground water bodies;
- Watershed boundaries, natural fluctuations, variability, in flow and ice cover (seasonal patterns and spatial);
- A description of freeze/thaw timing; flood zones; ice conditions and typical thicknesses, formations and melt patterns;
- Surface waters of importance to local fishing and wildlife hunting activities by surrounding communities;
- Streams, rivers and lakes, which support overwintering fish or are used by fish as migration routes, identification of all fish species using affected streams;
- Lake bathymetry and limnology; and
- Fluvial geomorphology and stability of stream and river crossings.

8.1.6.2 Impact Assessment

- Potential changes to permafrost and ground ice conditions as a result of Project activities, and of the potential for groundwater inflow into the open pit;

- Impacts on surface/ground water quality including sediment quality in surrounding lakes and rivers from escalated contaminants from surface runoffs, road activities spanning construction, operation, closure and post-closure stages.
- Potential changes in water quality in Sheardown Lake, Mary River, Ravn River, and other receiving water bodies from discharges of wastewater treatment plants;
- Impacts on surface/ground water quality from the potential acid rock drainage (ARD) and metal leaching (ML) from waste rock stockpiles, ore stockpiles, open pit dewatering, construction fills, embankment of roads and railway, and open quarry sites;
- Potential changes to surface/groundwater quality due to surface rock exposure to oxygen and associated ARD effects;
- Impacts on surface freshwater quality of nearby lakes and streams as a result of nutrient input from blasting activities and chemical leaching from rail sleeper coatings;
- Impacts from increases of suspended sediment load of water bodies as a result of construction and maintenance of the mine facilities, Milne Inlet Tote Road, railway and associated water crossings;
- Impacts on surface from spills, accidents and malfunctions along the Milne Inlet Tote Road, access roads and railway line;
- impacts on surface water quality from the deposition of particulate matter from the incomplete combustion of wastes via incineration;
- Potential effects on surface water and sediment quality in relation to other site waste management activities including the storage, handling, land filling of waste, landfarming contaminated ice/snow/soil, and/or the management of historical contaminated material (ie., previous spills, mishaps, releases, etc.);
- Potential impact on surface water and sediment quality from construction and operation of camps;
- Impacts on surface water quality from the deposition of particulate matter from the incomplete combustion of wastes via incineration;
- Impact of dust etc from rail cars traffic on the land and water along the rail route; and
- Impact of continuing exploration on water quality from drilling waters.

8.1.7 Landforms, Soils and Permafrost

8.1.7.1 Baseline information

- Description of general landforms, existing unique or valuable landforms (eskers and or fragile landscapes), their distribution in the Project study areas;
- The geomorphologic and topographic features at areas of each project component;
- Bedrock lithology, morphology, and structures; geomorphology and soils (excluding eskers) at borrow and quarry sites, and other major area where earthworks are proposed;
- Existing or proposed protected areas, special management areas, and conservation areas;
- Evidence of the potential for ground and rock instability (e.g., slumping, landslides, and potential slippage) in all project components, and associated scientific studies, with emphasis on campsites, railway alignment, port site;
- Relationship between identified permafrost, surface water bodies, and topography, as well as permafrost processes including the active layer;
- General type, thickness, and distribution of soil over the affected lands;

- Suitability of topsoil and overburden for establishment and maintenance of plant growth in reclamation;
- Permafrost distribution (including areas of discontinuous permafrost, high ice-content soils, ice lenses, thaw-sensitive slopes, talik zones, and stream banks) in project affected areas;
- Fluvial geomorphology and stability of stream and river crossings; and
- Sites of paleontological or palaeobotanical significance to local communities.

8.1.7.2 Impacts assessment

- Assessment of the potential effects on planning and design of project components from baseline data of landforms and soil characteristics in the Project areas;
- Potential effects on abundance and distribution of unique or valuable landforms (eskers and or fragile landscapes) associated with surface disturbances;
- Discussion of how special, sensitive, or unique geological or landform features (including inventory of wetlands and their function in the Local Study Area) may be changed/disturbed by the Project;
- The potential effects on stability, abundance and distribution of permafrost sensitive landforms from surface disturbance activities, and associated implications of those impacts on stability of permafrost sensitive landforms (i.e. resulting landscape instability) on engineering design and performance of project components including (but not limited to) railway embankments and water crossings;
- Impact on occurrence and distribution of snow drift and snow banks (in relation to and in vicinity of infrastructure and project components), including related impacts on thermal regimes of permafrost terrain;
- The potential effects on shoreline erosion as a result of wake effects and increased open water due to ice breaking activities along proposed shipping routes;
- Potential impact on the stability of terrain within or in vicinity of the major Project components, with emphasis on the tunnels and water crossings; and potential trigger of terrain hazards (e.g. rock falls, rockslides, snow avalanches) on infrastructure and project components (e.g. railway near Cockburn Lake);
- The potential effects on occurrence, frequency and distribution of terrain hazards from infrastructure construction activities, such as cut/fill and final reclaimed slopes, high walls and waste rock stockpiles;
- The potential areas to be disturbed through borrow resource extraction and associated impacts on valuable landforms, wildlife habitat, etc.;
- Potential increases in soil erosion resulting from surface disturbance associated with construction, operation and maintenance of project components including mine facilities, railway, and water crossings (including stream bank erosion);
- Impacts on terrain from surface disturbances caused by continuing exploration;
- Potential impact of railway on landscape and aesthetic values of lands;
- Impacts on permafrost thermal stability along the rail alignment, especially over thaw-susceptible and ice-rich soils areas, and other sensitive area from rail embankments, cuts and fills;
- Impacts of the railway on soil and permafrost due to erosion, overburden stripping, cuts/fills as a resulting surface disturbance;

- Surface disturbance due to construction of the railway, including temporary construction quarry and pits, access roads, etc;
- Discussion on how appropriate blasting, vibration, geotechnical, and structural engineering techniques will be implemented to minimize impacts on offsite areas;
- Evaluation of any material that will be exposed by mining, stockpiled, or disposed of on the affected land relative to its potential to cause acidic drainage or to release metals or materials to the environment in excess of performance targets:
- Evaluation of impacts on disposal site from dredged material (land based disposal); and
- Any other issues related to impact on landforms, soils and permafrost.

8.1.8 Vegetation

8.1.8.1 Baseline Information

- Ecological zones, and classification system for plant associations and phenologies in the Project LSA
- Description of the vegetation types present, including estimated percentage cover and height for principal species, the importance to wildlife, and the relationship of present vegetation types to soil types;
- Indication of rare or regionally unique species or species assemblages, including species with federal, territorial designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern – as designated by the Committee on the Status of Endangered Wildlife in Canada or other agencies), and species listed in the Draft General Status Ranking for Vascular Plants of Nunavut, or other relevant publications;
- The health status of these species/communities and their contaminant loadings;
- Discussion on the plants that perform particularly significant ecological functions, and/or are important to wildlife;
- Species that are valuable for cultural reasons known to Inuit;
- Any other issues related to vegetation and identified through public consultation; and,
- Traditional knowledge collected regarding plants and plant use in the North Baffin.

8.1.8.2 Impact Assessment

- The potential effects on abundance and diversity of vegetation due to project activities causing surface disturbance;
- The anticipated effects on specific vegetation coverage and species composition from any adverse effects due to construction, operation, and closure activities in project area;
- Assessment of the potential loss, disturbance, and/or changes to vegetation abundance, diversity, and forage quality as a result of Project components and activities, including potential effects from airborne fugitive dust fall, airborne contaminants from emission sources, and changes to water quality and quantity, permafrost, or snow accumulation;
- Evaluation of the potential impact on vegetation abundance and diversity due to transfer/introduction of invasive or exotic species to the LSA, by Project equipment and vehicles, including aircraft and ships;
- Effects on vegetation of cultural or practical value to Inuit;
- The anticipated direct and indirect loss of vegetation and wildlife habitat from construction of the railway
- Impacts on vegetation quality due to dust accumulation as a results of fine iron ore transport on the railway with consideration of wind blowing;

- Discussion of vegetation quality monitoring with emphasis on vegetation species directly consumed by humans and/or indirectly by food chain take ups; and
- Discussion of the management measures for minimizing/mitigation of disturbance to plant associations, progressive reclamation/re-vegetation plan in the project disturbance areas, and measures to reduce the possibility of invasive species entering the area.

8.1.9 Freshwater Aquatic (including Fish) and Habitat

8.1.9.1 Baseline Information

- Description of existing fresh aquatic environment including streams, rivers and lakes, lake bottom substrates characteristics for areas of fish habitat;
- Description of littoral zones in the LSA, including aquatic and riparian vegetation;
- Description of biological composition of fresh aquatic environments in the LSA, including: nutrition condition, periphyton, phytoplankton, zooplankton, fish, the interactions and relative significance of each species within food chains;
- Description and population distribution of fish species in the LSA: forage fish, non forage fish, non-native species, and species of primary and secondary producers and consumers;
- The relative seasonal and annual trends in abundance and distribution of these species populations, and the estimated productive capacity of the water bodies;
- The migratory patterns and routes of these species, identifying preferred corridors, and the corresponding sensitive periods when the routes cross habitats affected by the Project;
- The health of these species populations and their contaminant loadings;
- Streams which support overwintering fish or are used by fish as migration routes - all fish species using affected streams should be identified;
- Characterize habitat for each fish species, including areas used for spawning, rearing, feeding and over-wintering, and any sensitive times for these habitats;
- Habitats and populations of any rare or regionally or locally unique species, or species with federal, territorial, regional, or locally designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern) or any species at risk as defined by the Species at Risk Act;
- The spatial and seasonal distribution and relative abundance of Arctic char in the RSA, its migration patterns and routes, critical habitats and sensitive time periods;
- Available published information on species and location of harvesting by subsistence fishers, guides, and outfitters;
- Species that perform particularly significant ecological functions; and,
- Any other issues relating to these species identified through public consultation.

8.1.9.2 Impact Assessment

- Potential changes to fresh aquatic environment (including primary and secondary producers) from changes of water quality and sediment quality in habitat due to the Project development;
- Effects on aquatic species, fish health and populations, including rare and/or sensitive species;
- Potential direct or indirect habitat alteration, disruption, or destruction changes to fish, fish habitat, aquatic life and aquatic species at risk due to project activities within and in proximate of waters such as the construction of bridges, culverts and other water crossings;

- Potential changes in water chemistry (nutrients, bacteria, major ions, metals) as a result of the Project;
- Potential effects on freshwater fish and aquatic life from nutrients input due to residual explosive (nitrate ammonia) and sewage effluent discharges within waters from the Project;
- The potential direct or indirect impacts on quatic life and their habitats due to water use such as water withdrawals and discharges;
- Evaluation of the potential impacts on identified spawning, rearing, and over winter habitat, nursery and feeding habitats, and seasonal migration areas, winter refuges and migrations corridors of fish;
- An assessment of the potential effect of blasting, noise and potential accidental spills on aquatic biota and habitat from ground traffic;
- Evaluation of the ability for fish to pass at water crossings along Project roads and the railway;
- Impacts of the railway on soil and surface water quality due to erosion, overburden stripping, cuts/fills as a resulting surface disturbance;
- An assessment of the changes in fishing activity; and,
- Effluent treatment and discharge and predicted water quality changes; impact on fish and fish habitat.

8.1.10 Terrestrial Wildlife and Habitat

8.1.10.1 Baseline Information

- The local and regional presence of resources and populations of terrestrial wildlife, including terrestrial mammals (carnivores and herbivores). All terrestrial species should be considered in the EIS, including those species designated in Species at Risk, including species listed as vulnerable, endangered, or a species of special concern by COSEWIC. Special consideration should be given to those species of the great importance for Inuit life and culture;
- Wildlife habitat in the LSA important for forage, shelter and reproduction. This includes terrestrial and water habitats (e.g., sea ice, fresh and salt water), and areas designated as: Sirmilik National Park of Canada, Critical Wildlife Areas, Migratory Bird Sanctuaries,
- Locations of key habitats in the RSA for wildlife VECs, such as Caribou Calving Grounds, eskers, calving and nursing areas, denning sites and staging areas, and such special locations as salt licks, water course crossings, and insect relief habitats. The baseline discussion should include areas important to the natural life cycle of species (e.g., areas used by females and their young) and to Inuit harvesting;
- Habitats of any rare or regionally unique species or species with federal, territorial, regional, or locally designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern) or cultural status;
- A description of historic and current seasonal/annual trends in range or habitat use, movements, and distribution of all identified terrestrial wildlife VECs, with reference to scientific reports and Traditional Knowledge;
- The health of VECs species populations and their contaminant loadings;
- The present and historic trends within the study area for selected species through baseline data and Traditional Knowledge;

- The migratory patterns and routes of these species and the corresponding sensitive periods when the routes cross habitats affected by the Project;
- Timing and extent of the North Baffin caribou herds in the Regional and Local Study Areas (including areas of potential mine development or exploration related to the Project, and all shipping routes);
- Species that perform particularly significant ecological functions and or which play a significant role in Inuit culture; and
- Any other issues relating to these species identified through public consultation.

8.1.10.2 Impact Assessment

- General impact on wildlife in the RSA, including but not limited to: temporary and permanent loss of food and habitat, interference with migratory routes and disturbance and interruption from increased human activity, particular noise from shipping and activities at port, during all phases of the Project. Special consideration shall be given to species listed as vulnerable or endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- The potential effects on population size, abundance, wildlife behaviour (including stress to animals), foraging and distribution from:
    - Direct and indirect loss of habitat from the presence of and use of infrastructure, the conduct of project activities and their associated sensory disturbances.
    - Direct and indirect impacts from noise/vibration, and contaminants from mine facilities.
    - Ice-breaking associated with shipping (with special attention to caribou migration, if applicable);
- The potential effects on wildlife from injury or mortality caused by project activities, particularly the use of the Milne Inlet Tote Road, railway line, mine hauling roads and other access roads, or the intentional killing of wildlife to defend human life or property by mine personnel;
- Evaluation of how the proposed development is likely to affect a listed species or its habitat, including identification of any adverse effects on the species and its habitat;
- Evaluation of biodiversity in the RSA, and associated food chain relations among those species;
- The potential impacts on wildlife from air traffic, especially the low level flight of aircrafts;
- Impacts of noise and vibration on wildlife from drilling and blasting; during railway construction;
- Impacts on wildlife from frequent noise and vibration generated from year round railway operations, with a focus on disturbance/disruption to caribou calving and migration;
- Potential accidental kills of wildlife by trains used for the Project;

8.1.11 Birds

8.1.11.1 Baseline Information

- The local and regional occurrence of species populations, and the health of these species populations;
- The relative seasonal/annual abundance and distribution of the species populations;

- The seasonal and annual trends in range or habitat use, movements, and population status of these species;
- The migratory patterns and routes of these species and the corresponding sensitive periods where the routes cross habitats affected by the Project;
- Significant habitats for these species, such as breeding and nesting sites and staging areas for raptors, waterfowl, and other avifauna;
- Established or proposed sanctuaries, refuges, or similar areas for these species in the RSA and along the proposed shipping routes;
- Habitats of any rare or regionally unique species or species with federal, territorial, regional, or locally designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern) or cultural status;
- Critical terrestrial and marine migratory bird sites along the shipping route, including those which may be affected by marine spills as a result of current and/or wind patterns;
- Species that perform particularly significant ecological functions; and
- Any other issues relating to these species identified through public consultation.

8.1.11.2 Impact Assessment

- Potential loss, alteration, or alienation of habitat such as staging or nesting habitats (e.g. wetlands) as results of project development;
- Potential disruption or alteration of migration routes due to the Project components and activities;
- Potential impacts due to escalated air contamination level, degraded water quality and ground contamination;
- Disturbance by human activity such as blasting, air traffic, and land and marine transportation;
- Potential for project facilities to act as an attractants to raptors/birds, its effect changes to the behaviour of raptors/birds;
- Attraction of birds by domestic waste at camp sites;
- Potential for collision with aircraft;
- Potential effects of port activities and shipping operation on coastal birds and habitat, , disturbance due to shipping on key migratory bird habitat areas and sanctuaries in proximity of ship routes;
- Potential disturbance/destruction of nests, especially those with young; and
- Any other issues related to impact on birds and habitat.

8.1.12 Freshwater Biota (including fish as defined in the *Fisheries Act*) and Habitat

8.1.12.1 Baseline data

- Available published information and/or information resulting from community IQ studies on limnology, freshwater biota, fish and other fresh water species, in particular species that perform particularly significant ecological functions; associated habitats and habitat distribution in the RSA and the LSA. In accordance with the *Fisheries Act*, fish is intended to include:
    - Shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and
    - The eggs, sperms, spawns, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.

- Fish habitat includes spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry their life processes.
- habitats of any rare or regionally or locally unique species or species with federal, territorial, regional, or locally designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern) or cultural status;
- Information on fish species and locations of harvesting by subsistence fishers, guides, and outfitters;
- The health of these species populations and their contaminant loadings;
- The migratory patterns and routes of these species, identifying preferred corridors, and the corresponding sensitive periods when the routes cross habitats affected by the Project; and
- Any other issues relating to these species identified through public consultation.

8.1.12.2 Impact assessment

- The potential direct or indirect effects on fish and fish habitat, including aquatic species at risk from any changes to surface and ground water quality, quantity or physical habitat that results from construction, operation, modification/maintenance, decommission/abandonment of the Project;
- The potential effects on aquatic ecosystems (including primary and secondary producers) from nutrient inputs to surface waters;
- The potential direct or indirect impacts on aquatic biota and habitat from project activities including but not limited to water intake, blasting, noise, and potential accidental spills;
- Evaluation of the potential changes to identified spawning, rearing, and over winter habitat, nursery and food supply habitats, and seasonal migration patterns of fish;
- Impacts on fish and aquatic, and associated habitats at all drainage and water crossing works include bridges, culverts, and the ability for fish to pass through those water crossings along project roads, rail line; and
- An assessment of the changes in fishing activity, health and populations.

8.1.13 Marine environment, marine water/ice and sediment quality

8.1.13.1 Baseline Data

- Marine physical processes, biological diversity and composition, and associated interactions in RSA and shipping routes;
- Baseline information of climate conditions at port site; coastal hydrology; marine and coastal ecology; air quality; noise level;
- Port site bottom sediment quality and thickness, grain size, mobility, and the presence of subsea permafrost, coastal and sea bottom stability at Steensby Inlet, and to lesser extent at Milne Inlet;
- Physical and chemical oceanographic properties including temperature, salinity, suspended solids and dissolved solutes sufficient to assess the impacts of discharges of ballast water, and any other potential discharges or effects from shipping;
- Detailed bathymetry of the Steensby Inlet port site and proposed shipping route through Foxe Basin and Hudson Strait;

- Marine surface and subsurface current patterns, currents velocities, waves, storm surges, long shore drift processes, in proximity to port and facilities areas, and along shipping routes;
- Ice climate in the Regional Study Area (covering sea port and shipping routes) including ice formation, thickness, ridging, break-up, and movement. Ice conditions along shipping route(s) (using scientific studies as well as Traditional Knowledge if possible) predicted climate change and its possible effect on the timing of ice formation in the future;
- Land fast ice characteristics, including extent and seasonal duration at vicinities of proposed sea port and shipping routes;
- Sensitive habitat areas for marine mammals at sea port area and along the shipping route; and,
- Traditional Knowledge collected regarding coastal areas and ice conditions.

8.1.13.2 Impacts Assessment

- Potential risk and impact on the marine ecosystem through the introduction of exotic species, including pathogens, to the arctic through year-round shipping with frequent voyages;
- Impact on marine resources and habitat, particularly the effects from increased turbidity due to underwater blasting, dredging, transportation and disposal of spoils at marine terminal and shallow areas on marine shipping routes;
- Contaminant loading in sea water and ice from dust plume settlement at the port site;
- Potential indirect effects on marine water and sediment quality due to alteration of circulation by off shore structures;
- Potential impacts to marine water quality due to changes in sediment transport regime as a result of wake effects due to shipping activities and other undertakings;
- The potential effects on marine water quality, in particular, suspended solid concentrations and sediment quality from off shore construction and operation activities for docks and shipping infrastructure at Steensby Inlet and Milne Inlet;
- Evaluation of the potential water quality effects due to waste discharge, brine discharge (desalination plant, if applicable), contaminant input from surface runoff;
- Potential propeller wash effects to the surficial geology of the seabed;
- Potential impact on marine water quality and sediment quality from under water blasting and dredging , and potential disposal of spoils within Steensby Inlet;
- The potential effects on marine water quality due to ballast water discharge, in particular polluted ballast water and/or other contaminants related to ship operations and maintenance;
- Ecological impacts on marine ecosystem caused by chronic (operational) spills, port activity, and by potential accidental oil and chemical spills from grounding/stranding, along the shipping routes; and
- Potential impact on marine environment and bio accumulation in marine food chains, in particular on benthic organisms, from antifouling toxins (e.g. TBT, etc.,) leaching from ships.

8.1.14 Marine Wildlife and Marine Habitat

8.1.14.1 Baseline Data

- Marine biological communities, ranging from benthic (epifauna, infauna) and plankton communities, pelagic fish; benthic invertebrates, marine fish, coastal birds, to marine mammals in Steensby Inlet and Milne Inlet, and shipping routes at a lesser extent;
- Corresponding marine habitat including, but not limited to, fish habitat as defined by the Fisheries Act, existing and proposed areas with special designation (i.e., Sirmilik National Park of Canada, National Marine Conservation Areas, and Key Marine Habitat Sites for Migratory Birds), emphasis shall be given to those identified as important to the natural life cycle of a species, and Inuit harvesting activities to be potentially impacted by port and shipping operation;
- Characterization of habitat for marine mammals, including habitat for each species used for feeding, calving, nursing, over-wintering, and any sensitive times for these habitats;
- Habitats of any rare or regionally or locally unique species or species with federal, territorial, regional, or locally designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern), or any species at risk as defined by the Species at Risk Act;
- Marine mammals species (such as ringed seals, beard seals, bowhead whales, walrus, belugas, narwhals, killer whales etc.), historical and current habitats distributions, seasonal migration patterns, critical areas (feeding area, calving areas, over winter areas etc.), potential interactions with offshore facilities and shipping operation;
- Risk assessment of introducing and intrusion of non-native, nuisance and exotic species due to ballast water discharge and ship wash;
- The relative seasonal and annual trends in abundance and distribution of these species, and the estimated productive capacity;
- The migratory patterns and routes of these species, identifying preferred corridors, and the corresponding sensitive periods when the shipping routes cross habitats affected;
- Identified species which are significant to Inuit culture and nutrient source; and
- The health of those identified species, populations and their contaminant loadings.

8.1.14.2 Impact Assessment

The proponent is required to present a comprehensive adverse impact analysis for its shipping activities, environmental factors could refer to *Environmental Considerations for Port and Harbour Developments*, which contains a check list of the potential adverse effects port development may generate (Davis et al. 1990), including but not limited to: water pollution, contamination of bottom sediment, loss of bottom biota, damage to fisheries, beach erosion, current pattern changes, waste discharges, waterfront drainage, oil leakage and spillage, hazardous materials, emissions of dust and gases, smoke and other air pollution, noise, odour, traffic increases, landfills, landscape etc. this analysis should include the following:

- The potential habitat loss or deterioration of critical lifecycle of marine wildlife, such as feeding, calving and nursing due to ashore and offshore infrastructure related to sea port and shipping routes. Special consideration shall be given to species listed as VECs or endangered on the list of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) list;
- The potential effects on coastal processes and stability from near shore dredging of sediments and bedrock blasting;
- The potential direct and indirect effects on fish and fish habitat, including aquatic species at risk, from all project activities at Steensby Inlet or Milne Inlet, during the construction, operation , modification/maintenance and decommissioning of the project;

- Potential impact on marine wildlife and marine habitat from under water blasting and dredging, and potential disposal of spoils within Steensby Inlet;
- The potential risks and impacts on species composition due to introduction/intrusion of invasive species from ballast water exchange;
- The potential effects on marine mammals resulting from marine shipping, particular ice-breaking shipping and escalating noise level on the proposed shipping routes;
- The potential effects on marine wildlife and their habitats resulting from due to ballast water discharge in particular polluted ballast water and/or contaminated ballast water.
- The potential effects on marine wildlife and their habitats resulting from spills, malfunction and other accidents associated shipping operations;
- The potential interactions with shipping operation, and associated accidental injuries and mortality of marine mammals directly or indirectly from proposed shipping (open water and ice breaking shipping) activities, in particular those marine mammals, which congregate in North Foxe Basin and Hudson Strait where shipping routes pass through;
- The potential effects on marine wildlife behaviour, distribution, abundance, migration patterns, species health and reproduction from direct and indirect impact result from marine shipping, particular ice breaking shipping activities;
- The potential impacts on polar bears and polar bear habitat by year -round shipping , especially ice-breaking in winter and spring with frequent voyages and likely impacts on other wildlife and wildlife habitat (i.e., polar bear prey [i.e. seals], walrus, narwhals and other marine species) and the environment; this includes the effects of increasing noise and repeated disturbance on wildlife;
- The potential for habitat loss (including seal dens) and its resultant impacts, resulting from marine shipping, particularly ice-breaking and the elevated noise levels;
- The potential effects on marine wildlife and their habitats resulting from spills, malfunction and other accidents associated with shipping operations.
- Potential for shipping proposed by the Project to contribute to cumulative impacts on marine mammals owing to a significant increase in ship traffic on "established" shipping routes;
- Cumulative effects of escalated marine traffic from the project in a time frame as long as mining lifecycle , and potential extended mine operation period;
- Social-economic impact from shipping, taking into account the impact on marine species which local residents rely on as nutrient sources, and associated harvesting; and
- Any other issues and impact resulting from shipping operation.

8.2 SOCIO-ECONOMIC ENVIRONMENT

The Proponent shall provide baseline information on the functioning and stability of the socio-economic environment in the Regional Study Area, and predicted impacts on Socio-Economic aspects from the Project, project components and related project activities spanning all the project phases in project region, To assess and predict impacts from the Project, the Proponent shall present each possibly impacted components of the socio-economic environment and the processes interconnected without the Project which serve as baseline information, against the potential changes and impacts of the Project, the socio-economic impact can be measured by the designed indicators, those indicators can also justify the selection of VSECs. Baseline data shall be presented based on readily available information and engagement with local communities.

8.2.1 Population Demographics

8.2.1.1 Baseline Information

- The national, regional, and local community populations, demographics structure, composition, characteristics and population trends;
- Cultural, ethnic, religious, and language characteristics;
- Diversity of education levels, dietary habits, religious characters and other social aspects in different demographics categories in the RSA;
- The social life of the potentially affected communities, households, family and community stability, problems of substance abuse, crime and violence, and other social factors. including the effects of a major employment base away from the communities;

8.2.1.2 Impact Assessment

- Assessment of project-induced demographics changes in population, migration, re-distribution, and the effects of those changes, including interactions between local residents and non-residents;
- Assessment of the effects on community self-reliance, community and family stabilities, and culture integrity due to the demographic changes;
- Assessment of the effects from various project phases, including unemployment due to temporary suspension of operations, and mine closure; and
- Assessment of effects on lifestyle, including the effects of a major employment base away from the communities.

8.2.2 Education and Training

8.2.2.1 Baseline Information

- Existing education (early childhood through post-secondary) system, available training programs and evolution trends;
- Local education infrastructure, institutional capacity, funding resources and administration system;
- Education and skill levels of the residents in RSA, and experience of the local labour force in different demographic categories based on available data; and
- Requirements for education levels, skills and experiences for labour force from the Project in short, medium term and foreseeable future, taking account the vision of expansion for the Project lifespan, and regional economy development the RSA.

8.2.2.2 Impact Assessment

- Assessment of local labour force source to satisfy the requirement of the Project development, and identified gap between availability and project needs;
- Discussion of planned local labour force training for the Project, required training resources, available facilities, schedules and potential infrastructure renewals, expansions and renovations to meet the designed training programs during different project phases;
- Evaluation of training programs, challenges and possibility of success to satisfy the Project needs and regional economy development with consideration of cultural and language barrier;
- Discussion of the longer term community capacity building programs that will be implemented by the Project; and

- Discussion of possible solutions filling up the gap between requirements of project needs, and education level and qualifications of local labour force, with consideration of the minimum Inuit employment percentage in entire labour force which will be determined by IIBA.

8.2.3 Livelihood and Employment

8.2.3.1 Baseline Information

- Local household incomes, income sources, and compositions of income in project region;
- Local and regional economy characteristics with consideration of both traditional land use activities and wage incomes;
- Description of the significance and dependence on country food as nutrients sources by local residents in the RSA;
- The employment status in terms of relative genders, ages and other demographic categories;
- Existing local employment opportunities and labour supply status; and
- Expectations and perceptions to the employment at the Project by the residents in RSA.

8.2.3.2 Impact Assessment

- Assessment of the potential for development of local labour force;
- Evaluation the number of jobs to be created directly and indirectly with consideration of local business and supplying contracting;
- Discussion of the requirements for employment (e.g., education levels, criminal records, drug and alcohol policies, language abilities etc.), and the potentials of needs to be met by local recruitment;
- Assessment of the extent to which the skills of the available workers match job requirements;
- Assessment of opportunities afforded to women;
- Discussion of the commuting arrangements for local requited workers; especially those who live in the communities without direct air transport to mine sites;
- Evaluation of the effect of changes in income earnings on patterns of savings, expenditure and other consumption values;
- Assessment of the barriers and incentives to healthy financial management;
- Evaluation of the effects of competition for labour between the Project and existing businesses, institutions, and traditional activities; and
- Assessment of potential effect on family values, tradition and heritage coherence due to influence of work environment.

8.2.4 Economic Development and Self-Reliance

8.2.4.1 Baseline Information

- Current economy structure and development trends in the project region and variability in the impacted communities;
- The economic development level of the project region in comparing to other region in Nunavut, advantages and constraints of economy development;
- The roles of renewable resources exploit (wildlife) play in economy and the significance for local economy; and

- Community and resident self-reliance;

8.2.4.2 Impact Assessment

- Positive and negative impact on the local economy from regional level and community level;
- Potential impact on the traditional economic activities including hunting, fishing and sport hunting, etc;
- Impact on the tourism from mine development which impairs the "wilderness experience" of tourism in the project region;
- Potential impacts and barriers for across rail line traveling, fishing, hunting/trapping and other activities by surround communities;
- Potential impacts on local harvesting activities both in freezing water seasons by shipping on shipping routes, and interference with offshore fisheries/boating in open water season at both Milne Inlet and Steensby Inlet;
- Disruption of on ice travel routes caused by shipping through land fast ice, including dangers to ice users created by both the track itself and new cracks created in unpredictable places radiating from or even distant from the track, resulting from the action of winds and currents on the adjacent ice;
- Potential impacts on local and regional economy due to temporary closure, final closure, and reclamation programs; and
- Simulation to local businesses which developed for the Project and depend on the operation of the Project.

8.2.5 Human Health and Well-being

8.2.5.1 Baseline Information

- The current status of human health, broadly including mental, psychological health and well-being in project impact regions;
- The nutrient conditions and diet habits of residents in the Project region;
- Existing infrastructure and health services available in the Project impact regions;
- Potential demands for infrastructure and health services of communities from the project development; and
- The local health statistics compared with other parts of Nunavut and Canada as appropriate.

8.2.5.2 Impact Assessment

- A discussion of the standards, guidelines and regulations that the Project will incorporate during construction and operations, at various project sites to minimize the impacts and protect worker health;
- Assessment of the health, safety and security of workers at the job sites taking into account different project phases and locations, i.e. explosive manufacturing plant, drilling and blasting operation, and heavy equipment operations etc;
- Assessment of human health from impacts due to escalated air contamination, fugitive dusts as a results of to air and ground traffic, as well as potential impacted potable water quality;
- Impact on human health from escalated noise level and vibration relating to air and road traffic;

- Assessment of human health impact due to expose to extreme weather conditions on various project components;
- Assessment of the effect from potential substance or drug/alcohol abuse at project sites and communities;
- Assessment of human health due to impacts from bioaccumulation and take-ups in country food, associated with changes to the level of contaminants loading in vegetation, freshwater, and the marine environment;
- Assessment of emotional and psychological stress from work place disciplines, cultural conflicts among local workers and those non local workers;
- Assessment of community safety and security with consideration of foreign personnel involved in the Project;
- Assessment of individual, family and community well-being in RSA, broadly including local and regional ranges impacted by both mining operation and shipping route; and
- Evaluation of human safety due to railway accidents, malfunction, taking consideration of the worst scenarios, such as derail, as a result of malfunction, natural disasters, such as earth quakes; and hazardous weather events, for example storm, flooding, blizzards etc.;

8.2.6 Community Infrastructure and Public Services

8.2.6.1 Baseline Information

- Local housing conditions and capacity in the Project RSA;
- Camps and other facilities, which facilitate hunting, boating and recreation activities in the LSA;
- Public services and associated facilities in communities with the Project RSA, including law enforcement, health care, dependency assistance, welfare utilities, temporary accommodation and food services etc;
- community services and infrastructure, including the demands for new infrastructure;
- The extent and capacity of the local transportation systems and community infrastructure; and
- Demand for community infrastructure and public services from the project directly and indirectly.

8.2.6.2 Impact Assessment

- Assessment of incremental costs imposed by the Project on public infrastructure and services;
- Evaluation of the effect of the Project on public and private sector services and/or infrastructure due to the use by the Proponent directly or indirectly;
- An assessment of increased demand for emergency services and community infrastructure;
- A discussion of the potential to bring in freight for communities by return shipping, and possibility to share shipping costs with local communities, which will likely reduce the life expenditure of local communities;
- Discussion the potential needs for establishing public service facilities to facilitate hunting activates within or in proximity of project areas; and
- Assessment of building new and updating the existing structures/shields in hunting routes/grounds to facilitate local hunting activities/traveling in project area.

- A discussion of community access to Project infrastructure upon closure, including the Milne Inlet tote road, railway and sea port facilities,

8.2.7 Contracting and Business Opportunities

8.2.7.1 Baseline Information

- Most up-to-date statistics and data from socio-economic studies of communities in the Project RSA;
- The economy structure and characteristics of local and regional economy, existing business types, scales of the different sectors of economy, potential capacities to meet the need for project;
- Estimate of economic needs for goods supply, project-related procurement, services contracting, and other economy activities from the Project; and
- Studies of roles of the substantial and commercial hunting activities in local economy.

8.2.7.2 Impact Assessment

- Assessment of both negative and beneficial economic effects from the Project through project lifespan;
- Opportunities for local, regional, and territorial businesses to supply goods and services both directly to the Project and to meet the demand created by the expenditure of new income by employment in the project;
- Assessment of the Project effects on other local and regional economic sectors, in particular the competition to other business needs due to limited capacity of local business;
- Assessment of the contributions made to public, communities and Inuit from the Project;
- Evaluation of the effects of increased income on the local business and economic activities;
- Assessment of the of project-related procurement, and potential the capacity to meet the Project needs;
- Discussion on barriers to local business capacity building;
- Assessment of existing country food supply sources from the Project region and Nunavut, and opportunities to supply for Inuit worker in project;
- Assessment of opportunities for local communities to diversify their economic sources and to supply new goods and services; and
- Potential impacts on local businesses which developed for the Project and depend on the operation of the Project.

8.2.8 Cultural, Archaeology/Paleontology Resources

8.2.8.1 Baseline Information

The Proponent shall present:

- Summary of archaeological/ paleontological, burial, cultural and historic, sacred and spiritual sites in project areas by Traditional Knowledge (TK) studies and scientific survey, each site shall be described and delineated on a map;
- Local and Regional land/ice and resource use, including national parks and similar areas in project impact areas;
- Assessment of the availability and accessibility of carving stone;

- Inuit culture and its relationship to the land/ice;
- Traditional activities, current and traditional uses of the land/ice and its resources;
- Current and traditional hunting areas and the importance of those areas to food security; and
- Procedures for data recovery and the removal of artifacts and/or fossils that conflict with the development activities.

8.2.8.2 Impact Assessment

- Potential effects on burial sites, sacred sites, archaeological /paleontological sites and other cultural sites within the Project area from ground disturbing activities, in particularly at Milne Inlet, along the tote road and railway corridor to Steensby Inlet;
- Potential direct and indirect effects on paleontological/archaeological resources from increased number of human activities using the areas associated with mine, land transportation and marine transportations and ongoing exploration;
- Potential effects on cultural well-being, cultural and traditional values and heritage coherence in the potentially affected communities taking account the changes to economy structure, consumption style, diet and nutrient, and other social evolutions;
- An assessment of potential effects of the Project on current land/ice uses activities (e.g. hunting, trapping, fishing, recreation and traveling among communities); and
- Assessment of use sustainable resources such as food security, traditional clothing in context of general impacts to wildlife and substantive harvesting.

8.2.9 Benefits, Royalty and Taxation

8.2.9.1 Impact Assessment

- Evaluation the positive impacts from increasing revenues accruing through taxes to governments, royalties and benefit to potentially impacted communities resulting from the Project;
- Scope, progress, and potential success of the development of the IIBA with Qikiqtani Inuit Association (QIA), with a discussion of considerations made for potentially impacted communities in the Kivalliq Region in IIBA negotiations; and
- Issues related to compensation by the project.

8.2.10 Governance and Leadership

8.2.10.1 Baseline Information

- The current social and governmental regime in the Project region, structure and functions of the governments, Inuit organizations, other co-management organizations and coordination among those organizations;
- The role of the governments in regional socio-economic development; and
- The leadership of Governments Nunavut (GN) in policies making; responsibilities on contraction, operation and management of community infrastructure, community and regional development planning; mechanism, processes and structures for conflict resolution, and other social and economic responsibilities.

8.2.10.2 Impact Assessment

- Guidelines and Regulations regarding the governance of governments in the process of the Project development;

- Discussion of revenues accruing to federal, territorial, and local governments from the project, and how the proponent will fulfill the obligations;
- Discussion of potential effects on social structure, regulatory regime from the Project development, incremental costs to those governments arising from the project, and financial capacity of those public sector to deliver their mandates;
- Discussion of how the Project planning meets the needs of regional economy development strategic plan (community wellness initiatives, Hamlet programs, housing etc),, if applicable, which are managed by Federal and territorial governments agencies, and Inuit organizations;
- Assessment of how conflicts will be managed in current governance regime regarding potential interest conflicts during project development; and
- Assessment of efforts will be made by the Proponent with existing regulatory framework and government's initiatives, in terms of education and skill training, community facility development and other initiatives planned by the Proponent.

8.2.11 Other Socio-Economic Issues

8.2.11.1 IIBA

- The Proponent shall briefly discuss the negotiation of an Inuit Impact and Benefit Agreement (IIBA). This discussion should include with whom such agreements might be negotiated, whether these negotiations are expected to be concluded prior to the construction of the Project, and what items are included in the negotiation: employment, training and education, contracting and business opportunities, workplace conditions for Inuit employees and contractors, as well as community support.
- In addition, Proponent shall inform the Board and public how the interests of Inuit outside the Baffin region, but potentially impacted by the Project and its shipping are considered in the course of IIBA negotiation.

8.2.11.2 Development Partnership Agreement

The Proponent shall demonstrate a clear understanding of the opportunities the project presents to Nunavut communities, as well as undertake a thorough review of options for partnership with the Government of Nunavut, including the two-way negotiation of a Development Partnership Agreement as a way to maximize the benefits of the Project.

9.0 ENVIRONMENTAL MANAGEMENT SYSTEM

9.1 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan (EMP) provides a systematic approach to consistently manage all environmental affairs for the Proponent, addressing concerns through the allocation of resources, assignment of responsibility and ongoing evaluation of practices, with the objective of improving its environmental performance by continual improvement of the system. The Proponent shall present its environmental policy and its preliminary EMP and associated environmental management system through which it will deliver this plan. The EMP must provide an overall perspective on how potentially adverse environmental effects will be managed over the course of whole project phases.

The Proponent shall discuss the flexibility of the proposed EMP to respond to changes in the mine development plan, the regulatory regime, the socio-economic environments, technology, research results, and the understanding of Traditional Knowledge. It shall discuss how the results

from the EMP would be used in applying adaptive environmental management throughout all phases of the Project, and identify threshold criteria or indicators to trigger management actions.

The EMP shall be comprised of individual monitoring and mitigation plans, specific to various aspects of the Project and the environment. The Proponent shall also give a rationale for each of the proposed plans and shall assess their likely effectiveness. It shall also give a rationale for the rejection of mitigation measures and justify trade-offs between cost savings and effectiveness. It shall provide a risk assessment of those economic or other conditions that might impair the effectiveness of mitigation measures.

9.2 ENVIRONMENT PROTECTION PLAN

The Proponent shall, based on its impact prediction for identified VECs and VSECs, prepare an Environmental Protection Plan (EPP) in accordance with its EMP and for each main construction site before starting construction. The EPPs shall be integrated into construction and operation procedure documents which target the site foreperson, the Proponent's occupational health, safety and environmental compliance staff, as well as government environmental surveillance staff. The EPPs shall address construction, operation and modification phases of the Project. If appropriate, a table of contents and an annotated outline for the EPPs is to be presented in the EIS which shall address the major construction and operational activities, permit requirements, mitigation measures and contingency planning in combination of other management plans.

9.3 MONITORING AND MITIGATION PROGRAMS

In accordance with the EMP, the Proponent shall present individual monitoring and mitigation plans, specific to various aspects of the Project and the environment, to be incorporated into all phases of the Project. In these plans, the Proponent is required describe how results from monitoring will be used to refine or modify the design and implementation of mitigation measures and management plans.

These plans will also help the Proponent ensure that the Project is conducted as proposed, the predicted adverse environmental effects are promptly mitigated at the earliest possible time, and that the conditions set at the time of the project's authorization and the requirements pertaining to the relevant laws and regulations are met. The plans will also make it possible to ensure the proper operation of works, equipment and facilities connected to the Project. If necessary, the plans will help reorient the work and possibly make improvements at the time of construction and implementation of the various elements of the Project.

In its monitoring and mitigation plans, the Proponent should clearly specify the action mechanisms to trigger the mitigation measures based on its monitoring results, responsible person for the implementation of these mitigation measures, the system of accountability and the phase and component of the Project to which the mitigation measure would be applied.

Each of the monitoring and mitigation plans shall include:

- Objectives of the monitoring program, applicable laws, regulations and/or ccts;
- The selection of the VECs and VSECs for monitoring, and the associated indicators to be monitored, as well as the criteria used to determine those indicators, including the role played by ecological risk monitoring in determining subjects and indicators;
- Description of the frequency, duration, and geographic extent of monitoring and the justification for these decisions; personnel to conduct the monitoring and data analysis etc;

- Proposed actions in the event of the observed non-compliance with the law or regulations, performance targets or with the obligations imposed on contractors by the environmental provisions of their contracts;
- Proposed reporting scheme for the monitoring results, including format, reporting intervals, and responsible territorial and federal authorities,
- Integration of monitoring results with other aspects of the Project including, adjustments for operating procedures and refinement of mitigation measures;
- Procedures/mechanism to assess the effectiveness of monitoring programs, mitigation measures, and recovery programs for areas disturbed by the Project;
- The relationship between monitoring and EMP (subsection8.1); and
- Quality assurance and quality control measures to be applied to monitoring programs.

With consideration for the appropriate spatial and temporal scales, and anticipated impact to the ecosystemic and socio-economic environment, the Proponent shall include the following monitoring and mitigation plans in its EMP.

9.4 BIOPHYSICAL ENVIRONMENTAL MANAGEMENT PLANS

The Proponent shall present environmental management plans developed to prevent or mitigate all potential adverse impacts of the Project as identified in sub Section 8.1, and shall also clearly identify any residual effects after appropriate mitigation measures are implemented. Management plans shall target identified VECs.

9.4.1 Risk Management and Emergency Response Plan

The Proponent shall provide a comprehensive assessment of the potential risks from natural hazards and both marine environment and land-based occurrences. This plan must span the whole of the mine life to evaluate the potential ecological and human health risks, and vulnerability of infrastructure and workers at risk. In addition, the Proponent shall identify and describe the probability of possible malfunctions and accidents occurred independently, or associated with those natural hazards.

The following issues shall be included in the Risk Management Plan:

- Assessment of potential natural hazard risks in project region and shipping corridors, and possibilities of occurrence, the natural hazards including but not limited to extreme weather events, natural seismic events, landslide, flooding etc;
- Analysis of malfunctions and accidents of mine facilities and transport means and ships, occurred independently or associated with natural hazards;
- Anticipated frequency and magnitude of potential adverse environmental effects of occurrence of these events;
- Alerting, notification and reporting procedures, and associated responsible organizations and personnel;
- Contingency responding procedures corresponding to each risk, and associated security systems and prevention measures (monitoring systems, hazard detection systems, leak detection systems, fire-control systems, standby emergency systems, etc.);
- How appropriate government agencies, Inuit organizations and local communities will be involved in the development of the plans; and
- Any other contemplated loss prevention practices including insurance.

9.4.2 Spill Contingency Plan

The Proponent shall develop a comprehensive Spill Contingency Plan based on its Environmental Policy, to promote environmental awareness and safety, as well as facilitate efficient cleanup for spill incidents at the Project and related activities, this plan should include the following elements:

- federal and territorial regulations;
- The substances covered by the plan which includes but not limited to: oil, hazardous materials, chemicals and other deleterious substances etc.;
- This plan should apply to all spill (on land, on water, and on ice) and cover all project components including railway and marine shipping;
- Alerting, notification and reporting procedures;
- Duties and responsibilities of key spill response organizations and personnel;
- Cleanup strategies, technologies and corresponding inventory of spill response equipment and kits based on different substances of spills and environment conditions where spill possibly occur;
- Spill site restoration.

9.4.3 Air Quality Monitoring and Management Plan

This Air Quality Monitoring and Management Plan shall include the following key elements, which are associated with the baseline date and impact assessment required in Subsection 8.1.2:

- An air quality monitoring and adaptive management plan, which will include thresholds for action and mitigations strategies, as well as reporting of the monitoring results;
- An Emissions reduction strategies sub plan that the Proponent will employ appropriate technologies and operating practices, in effort to minimize emissions of air contaminates and complies with adopted criteria, and reduce amount of GHGs;
- A dust depressing plan which addresses the dust Suppressant suppressing agents, procedures and applicable guidelines in all the Project areas where fugitive dust is a concern for air quality and human health; and
- An incineration management plan describing how emissions will be minimized and the Canada-wide Standards for Dioxins and Furans and the Canada-wide Standards for Mercury emissions will be achieved through the use of appropriate technologies and operating practices.

9.4.4 Noise Abatement Plan

This Plan should be designed to provide information on monitoring and mitigating of noise impact based on impact assessment in Subsection 8.1.3. The intents of this plan should be set to:

- Applicable standards, guidelines and regulations that the Project will incorporate to minimize and mitigate noise effects from the Project;
- The environmental noise follow-up monitoring program described in the Plan indicates location, duration, timing and type of noise monitoring to be conducted;
- Description of noise control methods based on the climatic conditions and available technologies can be employed should mitigation be required;
- Noise attenuation and minimization measures by choosing appropriate equipments, installation of noise silencing devices, scheduling of takeoff and landing aircrafts, blasting timing etc; and
- Occupational related noise management programs.

9.4.5 Site Water Management Plan

The Proponent shall develop a Water Management Plan for the Project. This Plan should provide a consolidated source of information on the strategy to be applied at the Project to intercept, collect, containment, monitoring and release of potential contaminated waters from following sources, the plan must combine with the surface water assessment required in Subsection 8.1.6 :

- Surface runoffs, snowmelt and rainwater that come in contact with contaminated areas such as, camp site, ore processing , workshops etc.;
- Runoffs from waste rock stockpile area and quarry sites, in particular the waste rock stockpiles with RAD and ML potential;
- The lined fuel tanks farms, fuel transfer stations; the landfarm facility and the landfill facility; and
- Storm water/freshet from roads, borrow areas and airstrips with emphasis on those areas relating to iron ore fines stockpiles and other contamination sensitive areas; and
- Considerations of management measures to reduce these impacts to receiving environment, such measures should include collection and monitoring of drainage water, and installation of settling ponds/sumps and/or silt curtains, characterization of construction material etc.

9.4.6 Sewage/Grey Water Management Plan

- Sewage/grey water treatment technologies and facilities, the location of the facilities and any point(s) of discharge, and the volumes and treatment target of the effluent, as well as the applicable discharge standards; and potential impact to receiving water quality;
- Sewage/grey management in construction stage at construction camps, including treatment/disposal methods, associated facilities, locations and point(s) of discharge and applied effluent standards etc.;
- Operation and maintenance procedures, waste management options for sewage sludge and contingency measures in case of sewage plant failure, malfunction, and or /disturbances, associated spill response measures, as well as responding treatment technologies and facilities;

9.4.7 Incineration Management Plan

- Regulations for emission requirement of incineration operation;
- Inventory of domestic waste, both land-based and onboard generated waste to be incinerated;
- Incineration technologies, facilities and applicable regulations;
- Disposals of incineration ash; and
- Adequate personnel training programs for management, operation.

9.4.8 Waste Rock Management Plan

The comprehensive Plans shall systemically encompass all waste generated or produced at project site through all project phases, this section can be associated with the description of waste rock management facility in Subsection 6.4.13. The major elements of this plan should include, but is not limited to:

- An inventory of waste rock, including overburden, waste rock, off grade iron ore, low grade mineralized material, processing wastes and excavated material generated during construction of the transport system and other infrastructure;

- Stockpiles design, locations, capacities relating to the volume/ tonnage of and physiochemical character, waste rock stockpile methods and procedures, runoff management, progressive reclamation, and other components and activities related to the waste rock management;
- Mitigation measures technically achievable and able to accommodate the projected volumes of material; and
- Contingencies plan for the proposed control measure should it be found to be inadequate. A conceptual plan to monitor and audit the mine wastes should be presented.

9.4.9 Hazardous Materials Management Plan

The Proponent shall develop a Hazardous Materials Management Plan. This plan should be in combination with "*Emergency Response and Contingency Plan*" providing instruction on the prevention, detection, containment, response, and mitigation of accidents that could result from handling of hazardous materials at the Project both during the life of the Project:

- The Hazardous Materials should include but not limited to: Fuel and Lubricants, chemical reagents used for site laboratory, solvents and paints, medical wastes, batteries, and other office generated hazardous waste etc.
- Inventory of the types and volumes of hazardous wastes generated or produced by the Project activities
- Characterization of potential environmental hazards posed by these materials through the environmental management system;
- Purchasing controls, shipment tracking procedures;
- Fuel storage monitoring program;
- safe handling and storage procedures;
- Allocation of clear responsibility for managing shipment, storage, handling and use of potentially hazardous materials;
- Defined methods for transport, storage, handling, and use;
- Identification of disposal methods for potentially hazardous waste generated from use of these products;
- Preparedness of contingency and emergency response plans;
- Adequate type and delivery of training for management, workers, and contractors whose responsibilities include handling potentially hazardous materials;
- Maintenance and review of records of hazardous material consumption and incidents in order to anticipate and avoid impacts on personal health and the environment; and
- Procedures to track and manage wastes generated through use of these products, including regular shipments of potentially hazardous waste to appropriate licensed disposal facilities following all relevant regulations.

9.4.10 Explosives Management Plan

The Proponent shall develop an Explosives Management Plan for the Project to provide information on explosives transport, storage and handling at the site. It should include but not limited to:

- Applicable federal and territorial Regulations and Acts;
- Defined methods and procedures for manufacture, transport, storage, handling, and use;
- Manufacture and storage facilities of Ammonium Nitrate and Fuel Oil (ANFO);
- Spill reporting and clean up procedures;

- Personnel training program; and
- Internal audit and inspection.

9.4.11 Landfill Management Plan

The Proponent shall develop a landfill Management Plan for the Project on how non-combustible, non-hazardous industrial wastes will be handled in a safe and environmentally sound manner at the Project site including:

- Inventory of the types and volumes of non-combustible, non-hazardous industrial wastes generated by the project and to be land filled in the life of the Project;
- Landfill design including construction materials, locations, capacities;
- Operation management;
- Rainwater, snow and spring freshet management; and
- Final reclamation and re-vegetation.

9.4.12 Borrow Pits and Quarry Management Plan

With consideration of the project scale and demand for aggregate and quarry materials, The Proponent shall develop a Borrow Pits and Quarry Management Plan, the plan should included, but is not limited to the following the following information:

- Regulations and Guidelines to be complied with;
- Principle of borrow pits and quarry development: to using existing pits and quarry sites to the extent possible to minimize the number of opened pits, minimize haul distances and surface disturbance;
- Erosion preventions and control measures;
- Acid base accounting testing results of quarried materials and pit walls, associated mitigation measures;
- Environmental and archaeological impacts mitigation;
- Aggregate extraction and quarry methods, mitigation measures to minimize resulting impacts on environment and wildlife;
- Proposed methods for handling massive ice, and plans to manage water released by the thawing of permafrost and ground ice; and
- Progressive reclamation strategy and technologies.

9.4.13 Railway Management Plan

The proponent shall develop Railway Management Plan for the Mary River Project, it should provide the information that encompasses construction and operation phases of the proposed railway with intention to protect environment and promote the safety in its operation, in conjunction with *Spill Contingency Plan, Wildlife Mitigation and Monitoring Plan* (Subsection 9.3.15), and other related plans. Key elements in this Plan should include but not limited to:

- Applicable Regulations and Acts, Guidelines;
- Mitigation and monitoring plan, as part of Wildlife Mitigation and Monitoring Plan, to monitor the noise and vibration impacts on caribou and other species in the proposed railway corridor;
- Mitigation measures to minimize the chromic adverse impacts from noise and vibrations on wildlife, as a result of railway operation by appropriate scheduling and timing of train operation, in daily operation, and in particular in critical life cycle when concentration of

wildlife (i.e., caribou) approaching, staying and passing cross in immediate or proximity of rail line areas;

- Specific measures to be employed to protect wildlife from accident injury and kill, and minimize the collision related motilities;
- Measures to prevent spills of fuel/dangerous goods transported by train during operation, taking into fragile ecosystem;
- Mitigation measures to mitigate impacts, to secure the safety of traveling, fishing, hunting/trapping activities by residents of local communities by ski-doos, sledges and ATVs crossing rail facilities;
- Contingency Plan/ Safety Plan to deal with natural disasters, hazardous weather conditions, and malfunction and accidents from failures of mechanical and communicational equipment;
- Technical measure to prevent the wind blowing of fine iron ore and other bulk materials; and
- Other management plan to mitigate/ manage the adverse impacts on the ecosystem and human health directly or indirectly resulting from railway operation.

9.4.14 Shipping Management Plan

The proponent shall develop a shipping Management Plan for its proposed shipping operation, with objectives to protect marine environment, in combination with *Spill Contingency Plan*, *Wildlife Mitigation and Monitoring Plan*, and other related plans. Key elements in this Plan should include but not limited to the followings:

- Legislation and regulations relating to shipping operation, and applicable national and internal guidelines;
- Protocols for transport of Fuel and other dangerous goods;
- Ballast water management plan;
- Onboard waste management plan (including solid waste, sewage and other domestic waste);
- Detailed marine wildlife mitigation and onboard monitoring plan, including but not limited to the monitoring personnel, monitoring protocols, responding equipment, accident reporting procedures and action plan;
- Smuggling prevention measures;
- Third parties liabilities;
- Emergency/contingency plan and preparedness plan, spill kit and equipment for operational spill and a big accidental fuel spill;
- Detailed contingency plans for extreme weather condition and malfunction during shipping operation, reporting/action procedure, preparedness of adequate resources to respond to a large fuel oil spill from a cargo vessel transiting; and
- Other shipping related issue.

9.4.15 Wildlife Mitigation and Monitoring Plan

Wildlife Mitigation and Monitoring Plan including selected territorial and marine species, taking account the detailed potential impacts described in the subsection Terrestrial wildlife (Subsection 8.1.11), birds (Subsection 8.1.12) and marine wildlife (subsection 8.1.15), which includes, but is not limited the following aspects:

- Local Study Areas and Regional Study Area, and environmental setting in the Wildlife Mitigation and Monitoring Programmes;
- Selection of wildlife species for Monitoring and Mitigation (including, terrestrial animals, marine mammals, fish and migratory birds), and rationales for the selection criteria;
- How Traditional Knowledge collected from community consultation is integrated in baseline data collection, impact prediction and significance assessment, and the development of mitigation and monitoring programmes.
- How the local hunters will be hire in wildlife baseline study and monitoring program;
- Plans for coordinated wildlife studies/monitoring activities with other organizations, institutions and researchers which carry out the wildlife studies in the project areas, to minimize the impact on wildlife from studies/survey activities;
- Whenever possible, use of aircrafts should be combined among studies/surveys to minimize overall air traffic – such flights are disruptive to wildlife, significant concerns have been raised by local communities;
- A minimum altitude should be followed when carrying out any wildlife surveys/studies by the aircraft to avoid any likelihood of collisions with ground traveling/hunting by ATVs and Ski-Dos;
- Plans to facilitate the wildlife pass cross the railway, and associated mitigation measures preventing the training collisions with wildlife;
- Studies/monitoring design and field methods, including frequency and measured indicators;
- Data analysis methods, trigger/ thresholds for adaptive management;
- Mitigation measures;
- Evaluation of effectiveness of mitigation measures;
- Quality assurance and quality control measures; and
- Reporting/updating procedure.

9.4.16 Fish Habitat No Net Loss Plan

The Proponent shall develop a Fish Habitat No Net Loss Plan to outline the proposed fisheries mitigation and compensation program developed in consultation with DFO and QIA. This plan should identify the following key elements:

- Requirement of the DFO policy;
- The estimated of fish habitat loss and estimated methods;
- The fisheries compensation program to ensure that "No Net Loss" in fish habitat productive capacity relating to the DFO policy for the management of fish habitats; and
- The components of proposed compensation program, locations and conceptual design for implementing the compensation program, such as rearing habitat, and migration channels etc.

9.5 SOCIO-ECONOMIC ENVIRONMENTAL MANAGEMENT PLANS

The Proponent shall present policies and programs to minimize potential negative socio-economic effects and to optimize potential positive effects. These plans and policies should be reflective of those VSECs and indicators which, through the Proponent's public consultation, are shown to be significant to potentially affected communities. These plans and policies shall be presented in a Socio-Economic Impact Management Plan. The Socio-Economic Impact Management Plan should correspond to the socio-economic impacts described in Subsection 8.2.

The general areas that shall be considered are human resources, occupational health and safety, community and public involvement, IIBAs, and Development Partnership Agreements etc. the Management plans shall include, but is not limited the following:

9.5.1 Occupational Health and Safety Plan

The Proponent shall present an Occupational Health and Safety Plan; this plan should focus on the following elements in conjunction with Spill Contingency Plan, Risk Management Plan, and Noise Abatement Plan etc.

- Good safety practices, safety awareness programs;
- Employee involvement and training programs regarding awareness of employee responsibilities in environmental and health and safety management, such as safety orientation; hazard analysis; first-aid training etc;
- Risk management, mine rescue action plan, spill response, fire-fighting and prevention;
- Preparedness of mine safety equipment and devices:
- Safety procedures and emergency reporting, and actions.
- workplace monitoring and control; and
- First aids training and occupational medical surveillance.

9.5.2 Community Involvement Plan

The Proponent shall present a Community Involvement Plan, and the major objective should include but are not limited to:

- Mechanism for providing information to the public and potentially affected communities the regular update of project progress, initiatives and future work plans;
- Identify the communication methods for communication with public and communities;
- Establish effective two-way communications approaches for collecting public concerns, and address those concerned issues to public;
- Assistance to communities to address and solve social problems related to project development, and counselling services to employees and their families regarding matters such as financial management, substance abuse, and work-related stress management, supporting the elders etc.;
- Identify other community needs and provide solutions such as allocating resources to meet the needs;
- Promote the participation of Nunavummiut in Project employment and set up preference recruitment policy to provide access for northern and local businesses, contracting opportunities and purchases from local product (e.g., country food);
- Setup appropriate approaches to engage the public and communities, and mechanism to incorporate the input from communities to update its Environmental Management Plan.
- Obtain public input to environmental and health and safety management decisions.
- This plan should also discuss procedures for community-based monitoring of social, cultural, and ecological conditions in order to determine if, when, and how mining can contribute to community sustainability and development; and
- Discussions on how the public, particularly the residents of the North Baffin Region, could contribute to Project implementation, including the designing, implementing management and monitoring strategies.

9.5.3 Cultural and Heritage Resources Protection Plan

The Proponent shall present a Cultural and Heritage Resources Protection Plan aiming to identify the possible impacts to archaeological sites, and mitigate the impacts from the Project activities, this plan should include but not limited to:

- Applicable regulation and Guidelines for impact management;
- Results of archaeological investigations and studies;
- Inventory of status of recorded archaeological Resources in project areas;
- Possible Impacts from this Project ;
- General and site specific measures for archaeological sites protection and mitigation; and
- Procedures for mitigation and protection.

9.5.4 Human Resources Plan

The Proponent shall develop a Human Resource Plan aiming to achieve the following objectives:

- Applicable human resources legislation and organization policy, compensation and benefit programs (e.g., health care plan, insurance, vacation/maternity leave etc);
- Recruitment strategies to overcome entry barriers; education and training programs (e.g., partnerships with local schools and other educational institutions, on-the-job learning, and apprenticeships); Education and Orientation Plan to help all employees to understand their responsibilities in environmental and health and safety management;
- work rotation and pay schedules; health and safety programs; preferential recruitment policy and practices procedures; gender equality; skills and entry requirements; training and career development;
- work schedules that are adapted to traditional activities; the provision of no-cost commuting to allow workers to continue to live in their own communities and to participate in their traditional economic and cultural activities;
- On-site public safety and well being policies with respect to cross-cultural orientation; firearms control; sexual and gender harassment; alcohol and drugs control measures etc. supply of country food to Inuit workers at the mine site, and accommodation to site visit by relatives of Inuit workers;
- Provision and management of the rights and needs of substances hunting activities, and traveling through project areas by the residents form adjacent communities;
- Employee communications with incorporation of relevant IBA terms and conditions; and the use of and payment for municipal facilities and services in local communities;
- Permission and regulation of on-site sport hunting and fishing by non-Nunavummiut employees, while respecting the rights and needs of Nunavummiut employees to harvest and pursue traditional activities, and discuss how such policies or regulations were designed and mange to minimize potential impacts to fisheries or wildlife resources.
- The plan shall also discuss any proposed policies or regulations regarding the prohibition of recreational hunting, fishing and other recreational activities by employees at specific locations and timing in project area;

9.6 MINE CLOSURE AND RECLAMATION PLAN

The proponent shall develop a Mine Closure and Reclamation Plan for the Mary River Project, to outline how the Project will be closed and reclaimed should the project proceed. The plan can be

preliminary with key issues addressed for the Environmental Assessment in NIRB's Part 5 Review, and NWB Type A water license application, with following targets:

- To ensure that issues associated with the effective closure and reclamation of the sites are considered in sufficient detail at the earliest possible stage in the mine development process, thereby influencing mine design to take into account environmental issues related to mine closure and reclamation.
- To setup the targets on lands affected by the mining operations are to be reclaimed to achieve the following objectives:
    - Protection of public health and safety through the use of safe and responsible reclamation practices;
    - Reduction or elimination of environmental effects once the mine ceases operation;
    - Re-establish conditions that permit the land to return to a similar pre-mining land use; and
    - Reduce the need for long-term monitoring and maintenance by establishing physical and chemical stability of disturbed areas.
- The Plan is considered to be a "living" document, the level of detail should undergo further revision to reflect the progress of the Project as it moves through implementation phrases;
- Further revisions should also considerate the input from the ongoing local communities consultation, and other stakeholders on how the Project is ultimately reclaimed, and what infrastructure should be designated to community for future use etc. This document provides a basis for continuing discussions with stakeholders and communities regarding closure and reclamation that were initiated during the Environmental Assessment process.
- It is also required to reflect how the lessons learned at each phase of the mine development process will be incorporated;
- The plan should integrate information on acid generation or metal leaching potential of rocks into the development, in association with related waste rock management strategy.
- Mine Closure and Reclamation Plan should also reflect the current land/ice use of the project area by wildlife (both resident and migratory), and by local communities for traditional activities, including hunting, fishing and recreation; reclamation of the Project should target for leaving a reclaimed site that is protective of the surrounding water, air and land to enable for such traditional activities to continue; and
- Aesthetics is of concern to local communities and tourism industry in the project region, it also should be included in the considerations of the Plan.

9.7 FOLLOW-UP PROGRAM

A follow-up program is a formal, ongoing process to: verify the accuracy of the environmental the impact predicted in the EA and permitting stage of the Project, and to determine the effectiveness of proposed mitigation measures. If either of these two steps identifies unforeseen adverse environmental effects, then the existing mitigation measures must be adjusted or, if necessary, new mitigation or compensation measures must be developed. In order to offset the likelihood of mitigation failure and the potential severity of the consequences, The Proponent must identify from their perspective the following issues as a "contingency plan" to address:

- The need for such a follow-up program and its objectives;
- How it will be structured including, enforcement and penalties for non-compliance;
- Which elements of the monitoring program described in Chapter 9, it would incorporate;

- The roles to be played by the Proponent, regulatory agencies, and others in such a program;
- Possible involvement of independent researchers; and
- The sources of funding for the programs and reporting.

9.8 SIGNIFICANCE OF RESIDUAL IMPACTS

After having established the mitigation measures, the EIS shall present the residual effects of the project on the components of the biophysical and human environments.

The EIS shall include a summary of the project's residual effects so that the reader clearly understands the real consequences of the Project, the degree of mitigation of the effects and which effects cannot be mitigated or compensated for. A summary table that presents the effects before mitigation on the various components of the environment, the mitigation measures applied and the residual effects shall be included in the study.

Impact significance is based on comparing the predicted state of the environment with and without the Project and expressing a judgment as to the importance of the changes identified. Assessing the significance of potential impacts is, arguably, the single most important aspect of environmental assessment to be documented in an EIS. The determination of significance shall take into account the following attributes of each impact:

- Magnitude;
- Geographic extent (spatial extent);
- Timing, duration and/or frequency;
- Reversibility;
- Probability of occurrence;
- Effect on ecosystem function and integrity(resilience) ;
- The effect on the capacity of resources to meet present and future needs;
- Uniqueness or rarity of the component
- Value of the component at the local and regional levels;
- Formal recognition of the component by an act, policy, regulation or other official decision (park, ecological reserve, threatened or vulnerable species, etc.);
- Risks to health, safety or well-being of the local communities;
- The probability of occurrence and analysis confidence; and
- The dynamic change of ecosystems and their components must also be considered in determining impact significance.

The significance of an effect on an ecosystem component can, therefore, change through time and can vary according to the "state of health" of the ecosystem or the component at the time of the impact. The Proponent shall therefore further evaluate the significance of potential impacts in the light of data on the dynamism and the current "state of health" of ecosystems and their components and societies and their predictable evolution in light of global climate change. Consistent with the ecosystem approach required above, the Proponent shall strive to highlight the interactions within and between ecosystem components in an effort to increase understanding of the dynamism of the ecosystems in question and the nature and severity of the predicted impacts.

Any terms used to describe the significance of impacts, such as "low", "medium", or "high", must be clearly defined, and, wherever possible, in quantitative terms.

10.0 **CONCLUSION**

The EIS should end with a conclusion presenting summary analysis of the overall projected biophysical and socio-economic impacts, anticipated transboundary and cumulative effects, proposed mitigation measures, and residual impacts. While highlighting the impacts in the Baffin Region, this conclusion should clearly present the importance of the EIS findings to Nunavut and Canada.

11.0 **LIST OF CONSULTANTS AND ORGANIZATIONS**

A list of all the consultants who contributed to the preparation of the EIS, including their role and contact information shall be presented. The Proponent shall prepare a list of the organizations consulted, including: the time, place, and purpose of the consultation; and contact information for the organisation. An appendix shall contain copies of the materials presented at such meetings and other relevant materials.

12.0 **LITERATURE CITED**

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