ENVIRONMENTAL IMPACT STATEMENT (EIS) GUIDELINES FOR THE MEADOWBANK PROJECT

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GLOSSARY

This glossary defines the most important technical terms used in the Guidelines. It is designed to assist non-technical readers, and the definitions of terms are, therefore, of a "popular" nature.

Albedo	The amount of light reflected by a surface such as snow.
Aquifer	An underground layer of rock or soil that contains important amounts of water.
Archaeology	The scientific study of the material remains of the cultures of historical or pre-historical peoples.
Avifauna	Birds.
Bioaccumulation	The uptake and retention of contaminants by an organism from its environment.
Biochemical oxygen demand	A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the biochemical oxygen demand, the greater the degree of pollution.
Biodiversity	A measure of the variety of plants and animals in a particular habitat or ecosystem.
Borrow pit	A pit from which material is taken for building roads and for similar activities.
Cumulative effects	The impacts of a development taken in combination with the impacts of other past, current, or reasonably foreseeable future developments.
Delta	A deposit of sediment, usually triangular in shape, at the mouth of a river, stream or tidal inlet.

Demography	The statistical study of populations, with particular reference to births, deaths, migratory movements, age and sex.
Ecosystem	The organisms of a natural community together with their environment.
Esker	A winding ridge made of sand and gravel deposited by a melting 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	Very small particles of rock, mineral or sediment.
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.
Gradient	The angle of a slope, or its steepness.
"Greenhouse" Gas	A gas released into the atmosphere, often by human activities such as burning

	fossil fuels, that increases the capacity of the lower atmosphere to trap heat from the sun, thereby contributing to global warming.
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.
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. 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.
Nitrate	A compound containing nitrogen that can exist in the atmosphere or as a dissolved gas in water, and that can have harmful effects on humans and animals.
Nitrite	A chemical compound produced when ammonia in wastewater is oxidized by bacterial or chemical reactions and ultimately becomes nitrate.
Nitrogen dioxide	The result of nitrate oxide combining with oxygen in the atmosphere. Nitrate oxide is a gas formed by combustion under high temperature and pressure, for example in a vehicle engine. Nitrogen dioxide is a major component of photochemical smog.
Nunavummiut	The indigenous inhabitants of Nunavut.

Ore	A rock or mineral that contains a valuable constituent, such as diamonds or a metal, for which it is mined and processed.
Overburden	Material that must be removed to allow access to an ore body, particularly in a surface mining operation.
Palaeobotany	The study of ancient and fossil plants and vegetation.
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.
Permafrost	Permanently frozen ground.
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.
Pore	A very small hole, such as may occur in some types of rock.
Post-closure	The period of time, considered to be up to 30 years, 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.

Proponent	The individual or organization that wishes to carry out a development project.
Raptor	A bird that hunts by snatching its prey.
Riparian	The land-water interface. Also refers to organisms living or located on the bank of a stream, river or lake.
Rock glacier	Boulders and fine material cemented by ice about a meter below the surface.
Rock heave	The movement of rocks as a result of freezing and thawing.
Rotary-wing aircraft	A helicopter.
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. (See Ittarnisalirijiit Conference on Sacred Sites and Spiritual Places, Rankin Inlet, 1996).
Seismicity	The phenomenon of earth movements, in extreme cases in the form of earthquakes, and their geographic distribution.
Sulfur dioxide	A gas formed when sulfur burns in the presence of oxygen, as for example in the burning of gasoline or diesel fuel in a vehicle engine. It is a major air pollutant that is corrosive and harmful to plants and animals, especially trees.

Tailings pond	An engineered structure for storing those portions of washed, processed or milled ore that are regarded as too poor to be treated/processed further.
Talik	Permanently unfrozen ground in regions of permafrost. Usually applies to a layer that lies above the permafrost but below the active layer.
Thermal inversion	A phenomenon in which a layer of cold air above a layer of warm air close to the ground prohibits the dispersion of atmospheric pollution, such as vehicle exhausts.
Thermal stability	The degree to which something, such as permafrost, has the capacity to remain at the same temperature over time.
Toponym	A place name.
Toxin	A poisonous substance.
Vascular plant	A plant with a particular type of tissue for carrying water and mineral salts and for assisting the plant to stand upright.
Zooplankton	Very small animals that float or drift in lakes.

NOTES

The terms “impact” and “effect” are used interchangeably in the present text.

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1.0 PURPOSE

1.1 NIRB Review

The Meadowbank Project is subject to the environmental review and related licensing and permitting processes established by Part 5 of the Nunavut Land Claims Agreement ("NLCA") (INAC and TFN, 1993). See the decision by the Minister of the Department of Indian Affairs and Northern Development ("DIAND") dated December 12th, 2003.

The present Guidelines are issued for the preparation by the Proponent of a draft Environmental Impact Statement ("EIS") for the Meadowbank Project. An EIS is a documented evaluation of the project proposal, providing detailed information regarding the proposal's environmental and socio-economic impacts (NIRB, 1997a). An EIS shall serve as the means of assessing the environmental impact of project proposals, rather than justifying decisions already made (NIRB, 1997a. Appendix F). The EIS must be a stand-alone document that allows the reader to understand the Project and its likelihood to cause significant environmental effects. Upon receipt of the present Guidelines, the Proponent is required to prepare and submit to the Nunavut Impact Review Board (NIRB) a draft 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 analyses for a complete assessment of the anticipated impacts of the Project. The EIS should be concise and should focus on the assessment of significant environmental effects.

The NIRB will submit the EIS to the NIRB Panel, Inuit organizations, community stakeholders, regulatory bodies, technical advisors, and other interested parties, who will be asked to evaluate whether it meets the Guidelines (conformity review) and is adequate and complete (deficiency review). Should the conformity and deficiency reviews reveal any significant shortcomings, the Proponent will be required to revise the draft and ultimately submit a final EIS. Once the final EIS is received and accepted by the NIRB, the NIRB will give public notice and distribute it to the participants to prepare for their technical review that will culminate in the NIRB hearing.
Finally, if there is any conflict with these Guidelines or any legislation cited herein and the NLCA, the latter prevails.

2.0 PROJECT DEFINITION

The project involves construction, operation, maintenance, reclamation and abandonment of a gold mine in the Kivailliq Region of Nunavut. The proposed project is an open pit gold mine, including a mill, camp, waste management facilities, fuel tank farm, and other key items summarized as follows:

- This Project is located on Inuit-Owned Land approximately 70 km north of Baker Lake. The total gold resource is estimated to be 3.08 million ounces. This resource will be extracted during the roughly 9-10 year operational lifespan of the mine.

- The Project is designed as a "fly in/fly out" operation with an airstrip providing year round access to the site. All construction and operating supplies for the project will be transported on ocean freight systems to facilities constructed at the Hamlet of Baker Lake, which will include barge unloading facilities, laydown area, and tank area.

- A 92 km long winter haulage route from Baker Lake to the Project will provide seasonal access and re-supply, while permanent, on-site mine access roads will connect the open pit areas to site infrastructure.

- Onsite facilities will include a mill, power plant, maintenance facilities, tank farm, fuel storage, water treatment plant, sewage treatment plant, airstrip, and accommodation for 250 people.

- Mine construction and pre-stripping is scheduled to begin in March 2005 and mine/processing in December 2006. Production will be split between open pit mining (87 %) and underground mining (13 %).

- Open pit mining will occur in three separate areas and water retention dykes will be constructed from mined rock at two of these pits to allow for the mining of ore beneath shallow lakes. A low permeability vertical slurry wall will be constructed in the centre of the

dykes to minimize seepage from surrounding lakes into the work area. Construction of the dykes will use floating silt curtains to minimize the release of suspended solids into surrounding lake waters.

- Mined rock will be placed in tailings impoundments and waste rock storage piles. A classification system will be used to identify both potentially acid generating (PAG) and metal leaching rock, and PAG mine rock will be stored designated storage areas designed for long term stability. Acidic run-off will be appropriately handled.

- Ore will be processed according to one of two options involving cyanide leaching, cyanide destruction, and refining dore bars. Details will be provided on the destruction of cyanide to rationalize the chosen option. The combined leach residue slurry will be treated with an air/SO_2 process to detoxify the free cyanide in the tailings stream.

- The treated tailings will either be disposed under a minimum cover water in the Second Portage Lake impoundment area or be used for underground hydraulic backfill.

- The freshwater supply for the mine and camp will be pumped from the Third Portage Lake. Mine process water will be primarily reclaimed from the tailings pond, and treated sewage will be discharged to the tailings pond.

- The Proponent has conducted environmental baseline studies in the project area, the results of which have been integrated into the current project design.

- Valued Ecosystem Components (VECs) have been identified in consultation with regulatory authorities and members of the local community. They include fish and wildlife species populations, habitat, air quality, water quality, surface water quantity and distribution, vegetation cover, and permafrost.

- With the use of scientific and traditional knowledge gathered to date, the Proponent has identified archeological sites, traditional use areas, employment/training opportunities, and traditional/ current lifestyle as valued social and economic components (VSECs).

- The Proponent plans to implement a project environmental management system consisting of three key elements: an integrated environmental management plan, a formal environmental awareness program, and an ongoing environmental monitoring program.

- Upon conclusion of activities, the Proponent plans to fully decommission the mine by sealing the underground mine facilities, removing the mill and ancillary buildings, recontouring disturbed areas, and reclaiming the vegetation.

3.0 EIS OVERVIEW

3.1 Presentation of the EIS

The Proponent shall provide an EIS that is complete, including scientific works and the Proponent's sectoral studies, and all other sources of information, including Traditional Knowledge. All scientific and sectoral studies shall be rendered current and shall be numbered and dated prior to their submission for examination. Maps, other than those used for orientation and context, shall be contained in a separate volume. The EIS shall, wherever necessary for a full understanding, be supplemented by a series of complementary documents providing technical and scientific support and containing appropriate bibliographic references. The Proponent shall prepare and incorporate in the EIS a complete and detailed annotated bibliography of all studies and reports, including community consultations, carried out in relation to the Project, and shall make such studies and reports available.

The EIS shall be made available both electronically, if possible on searchable CD-ROM, and in hard copy.

3.2 Conformity

The Proponent is expected to observe the intent of the Guidelines, which will then lead to the preparation of a draft EIS. Specific issues or directions described in the Guidelines must be easily identifiable in the draft EIS and incorporated into the final EIS.

3.3 Length

The *Guidelines for Environmental Impact Statements* (NIRB, 1997b, Appendix F) do not permit the Proponent's EIS to exceed 150 pages without the permission of the NIRB.

3.4 Format

The EIS shall be double-spaced**,** and its sections numbered. Subject to any other instructions given by NIRB, the following format shall be adopted, based on NIRB (1997a) and adapted as much as possible to the specific circumstances of the Meadowbank Project:

- Title page;
- Executive summary;
- Popular summary;
- Table of contents, including list of tables, list of figures, list of maps, list of acronyms**;**
- Concordance table;
- The proponent;
- Sustainable development and precautionary principle;
- Baseline data collection;
- Traditional knowledge;
- Public consultation;
- Regional context;
- Regulatory regime;
- Land tenure;
- Project justification;
- Project description;
- Alternatives including “no-go”;
- Description of physical environment;
- Description of biological environment;
- Description of socio-economic environment;

- Spatial boundaries;
- Temporal boundaries;
- Data acquisition methodology and documentation**,** covering biophysical and socio-economic aspects;
- Data analysis and reporting;
- Impact assessment methodology**,** including determination of impact significance, covering biophysical and socio-economic aspects;
- Indicators and criteria;
- Impact assessment**,** distinguishing biophysical and socio-economic aspects;
- Cumulative effects assessment;
- Summary of impacts;
- Environmental management and mitigation;
- Residual effects;
- Monitoring or post-project analysis, and follow-up;
- Auditing and continual improvement;
- Closure and reclamation;
- Value-adding opportunities;
- Outstanding issues;
- List of consultants;
- List of organizations and individuals to whom copies of the Project proposal were sent;
- Glossary;
- Literature cited;
- Appendices.

3.5 Data Presentation

The Proponent shall provide charts, diagrams, aerial and other photographs and maps wherever useful to clarify the text. Where feasible, maps shall be of a common scale and projection to facilitate comparisons.

3.6 Summaries

3.6.1 Executive Summary

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.

3.6.2 Popular Summary

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 and, if possible, in the form of a video. The Popular Summary shall form part of the EIS, but it shall also be made available as a separate document.

3.7 Translation

The Popular Summary shall be translated into the local languages and dialects prevalent in the Kivalliq Region. Maps should indicate common and accepted place-names usually referred to by the local populations in their own language, in addition to their official toponyms.

4.0 SUBSTANTIVE DIRECTIVES

4.1 The Proponent

The Proponent shall identify itself and shall 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 that of any parent company 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.

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

- Its record of compliance with governmental policies and regulations pertaining to environmental and socio-economic issues;
- Mine safety, major accidents, and spills and emergencies, including 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.

4.2 Sustainable Development and Precautionary Principle

The Proponent shall explain how the Project will be made compatible with:

- The preservation of ecosystem integrity and the maintenance of biological diversity for Nunavut and the Project region;
- Respect for the right of future generations to the sustainable use of Nunavut's resources;
- The attainment of durable social and economic benefits in the Kivalliq Region; and
- The well-being of the residents of Canada outside the Nunavut Settlement Area.

The Proponent shall discuss the precautionary principle; namely that, where there are threats of serious or irreparable damage, a lack of scientific certainty shall not be invoked as a reason for not implementing measures to prevent environmental degradation. In particular, it shall illustrate how that principle was applied to Project design and management, and how it would be applied during the construction, operation, temporary closure, final closure, and post-closure phases. Claims must be fully documented, and undertakings must be sufficiently specific to be verifiable.

If possible, the Proponent shall demonstrate how the Project relates to any international commitments that Canada has made respecting sustainable development and the precautionary principle.

4.3 Baseline Data Collection

The EIS shall use an ecosystem-based approach**,** meaning that it shall describe the ecological function of each ecosystem component and shall indicate the ecological pathways of the impacts that it predicts.

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 debate continues with respect to key issues, the Proponent shall provide a balanced discussion of the issues and state its position.

The Proponent shall strive to give sufficient time depth to baseline data, in order to permit the identification of natural fluctuations**,** trends and cyclical and other recurrent phenomena. Some species populations fluctuate in abundance every 3 to 4 years, for other populations longer. It shall also strive to evaluate the degree to which the baseline data characterize ecosystems that are relatively free of impacts and 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.

4.4 Traditional Knowledge

The Proponent shall present and justify its definition of Traditional Knowledge in the Kivalliq Region and shall explain the methodology used to collect it, including the format and location of meetings, the types of background information provided at meetings, the level of community participation, the design of studies on Traditional Knowledge, and the selection process for

participants in such studies, and shall summarize what kinds of Traditional Knowledge were collected. The Proponent shall indicate whether special efforts were made to collect Traditional Knowledge from women.

The Proponent shall discuss how it treated 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 western-based science, including the manner in which it reconciled any apparent discrepancies between the two. Any assumptions shall be identified and justified. Further, 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 describe a program to pursue the collection of Traditional Knowledge and to integrate it into ongoing baseline data collection, mitigation, and monitoring programmes, and shall describe the roles and responsibilities of all concerned individuals and organizations in collecting, analyzing, interpreting, and synthesizing data, including Traditional Knowledge. The Proponent shall 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 (Wismer, 1996).

4.5 Public Consultation

Public consultation is required when: identifying current and historical patterns of land- and resource-use; identifying Valued Ecosystem Components ("VECs") and Valued Socio-Economic Components ("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 an 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.

The Proponent shall describe the communications programme that will be implemented if the Project is approved, with particular reference to initiatives to communicate changes to information, plans, or strategies. It shall also discuss how the public, particularly the residents of the Kivalliq Region, could contribute to Project implementation, including the design of management and monitoring strategies.

4.6 Regional Context

The Proponent shall describe in general terms the regional biophysical and socio-economic environments of the Central Kivalliq Region and Nunavut as a whole, including: ecological land classifications; ecological processes and relationships; the status of ongoing land claims discussions in the southern part of the Central Kivalliq Region; the location of other precious metal finds and other existing and potential developments; and current and future land-use plans. The proponent should follow current directions or guidelines from the NPC, especially the Keewatin Regional Land-Use plan.

4.7 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, such as the NLCA, the Mine Site Reclamation Policy for Nunavut (DIAND), and the Metal Mining Effluent Regulations (Environment Canada), among others. 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 shall also identify relevant self-international regulatory regimes, such as the International Cyanide Management Code for the Gold Mining Industry developed by the United Nations Environment Programme and the International Council on Mining and Metals, and explain how it would comply with them.

4.8 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. It shall further describe those areas by providing such information as file numbers, start and end dates, fees, name of right holder, renewals, etc.

4.9 Project Justification

4.9.1 Project Purpose and Rationale

The Proponent shall state the purpose of the Project and shall explain the rationale for undertaking it.

4.9.2 Project Need

The Proponent shall justify the need for the Project in terms of the economy of Nunavut and of the Kivalliq Region in particular, its economic viability and potential. It shall submit any feasibility studies and supporting documentation. The Proponent shall also demonstrate that financing has been secured for all Project phases, including reclamation and security.

4.10 Project Description

4.10.1 Project Components and Activities

The Proponent shall describe Project components and activities, distinguishing where appropriate between the exploration, construction, operations, and closure phases, including where appropriate:

- Exploratory work;
- Mineral resources (geology, geochemistry, drilling, and bulk sampling);
- Site preparation and clearing, and site plan;
- Earth works;
- Blasting, including a description of the types and quantities of explosives that will be used;
- Roads and airfields;
- Work force requirements, including training required to maximize employment of Nunavummiut;
- Air, marine, and land transportation of workers and materials, with estimates of traffic types and frequencies;
- Use, transportation, handling, and storage of fuel, hazardous materials, concrete, and aggregates;
- Housing;
- Water supply and sewage- and waste-handling/treatment/disposal facilities;
- Water retention dykes and natural drainage diversions;
- Water diversions, intakes, and outlets;
- Power generation and transmission facilities;
- Off-site facilities related to expediting, transport, and storage of materials, including waste, and fixed housing and transport facilities;
- Pits and quarries, including ore-removal methods;
- Mining methods;
- Processing operations;
- Stockpiling of ore and acid rock drainage;
- Stockpiling of overburden and waste rock and acid rock drainage;
- Tailings/processed ore handling/treatment/disposal;

- Effluents and emissions;
- Marine and ocean-going activity, including marine shipping plans;
- Site rehabilitation; and
- Project life expectancy.

The Proponent shall give a rationale for the selection of Project components and activities, with specific consideration given to industry best practices.

The Proponent shall specifically address the following in describing Project components and activities:

4.10.1.1 Geology/Mineralogy of the Ore Deposit and Mining Methods

The Proponent shall characterize the ore from the Meadowbank sites, including where appropriate:

- Location, including detailed maps of the mine area;
- Resource assumptions**;**
- Mineralogy**;**
- The type of deposit and associated bedrock (including faulting or fracturing);
- Identification of the ore deposit material, dimensions, and location;
- The lithologies and mineral associations found in the region**;**
- The average extraction rate and the amount of ore to be processed daily and the expected amount of ore to be extracted each year;
- A mine management plan indicating the sequence of development of the open pits and underground mine.

The proposed characteristics of the mine shall be described, bearing in mind the need to control hazards, such as rockfalls.

Many of the foregoing can be described in the context of a mine management plan.

4.10.1.2 Ore Recovery Plant, Extraction and Concentration

The Proponent shall describe:

- The proposed recovery plant, including processing capacity and methods;
- The location of the recovery plant and the site-selection criteria, the differing processing stages, and the different compounds emitted to the environment during ore processing, and the related quantities, concentrations, and dispersion paths after emission; and
- The location of the ore storage pads and plans to control and, if necessary, treat water run-off and seepage.

4.10.1.3 Processed Ore Containment (and Tailings Ponds)

Bearing in mind the final paragraph of Subsection 4.16, the Proponent shall:

- Describe the processed ore containment management plan, including a comprehensive description of the proposed process, structures, and operations. The Proponent shall include a contingency plan in the event that discharges from the containment area do not meet licensing criteria;
- Describe all aspects of the processed ore composition**,** including the size and quantities of fines and their predicted settling characteristics, and anticipated water quality, providing data on the quantity and quality of material to be disposed of, and describing conservation and recycling options;
- Present a chemical stability analysis;
- Discuss how geotechnical factors, including permafrost, clay slippage and pooling, the seasonal seepage conditions of sand, and water and ice in pores, were considered in the design and selection of the structures to contain the processed ore. It shall also discuss the stability of the structures, including, if applicable, the question of talik zones;

- Describe methods of controlling and monitoring groundwater seepage from the processed ore and other containment area, 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 modelling information, and the results of research on the long-term thermal stability of the underlying permafrost and frozen materials.

4.10.1.4 Overburden and Waste Rock Disposal

The Proponent shall:

- Provide a plan for 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 modelling information, and the results of research on the long-term thermal stability of the underlying permafrost and frozen materials;
- Describe the 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 potential of the waste rock, bearing in mind the latest monitoring results from mines near by or at least in the same general region, and present a water management plan. It shall also explain the relationship between the timing of acid generation and permafrost encapsulation and cold temperatures, where possible in reference to the region in which the Project will take place;
- Describe and assess 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**;**
- Describe in qualitative and quantitative terms the chemistry of frozen groundwater from joints and fractures in the waste rock disposal area.

4.10.1.5 Water Supply and Management

Bearing in mind the trend described in the final paragraph of Subsection 4.16, the Proponent shall:

- Present a water balance and provide a water management plan for the mine, processing facilities, stockpile and containment areas, and infrastructure. The water supply source, on-site use, storage, final discharge to the environment, alteration of drainage patterns, water treatment (including water containing nitrate residues from explosives), diversions, and water conservation and recycling measures shall be addressed;
- Water balance estimates for the water supply source;
- Include estimates of mine water volumes and potential uses of the mine water**;**
- Address the issue of discharge or seepage of water;
- Methods used to calculate the above volumes;
- Describe the facilities for washing bulk trucks and other equipment, as well as any treatment of water used for washing vehicles/equipment; and
- Describe how melt water, particularly with high metal content, and hydrocarbons will be managed.

4.10.1.6 Mine De-Watering

If applicable, the Proponent shall provide:

- Information about de-watering methods, specifying the volumes to be pumped, the areas that may be affected, the quantities of bottom sediment requiring disposal, and the disposal methods;
- Fish salvage programs;
- Mine inflow volumes and quality, considering seepage into the pits, pit water quality, as well as seepage from retention dykes.

4.10.1.7 All-Weather Roads and Winter Roads

The Proponent shall describe, where useful with the assistance of maps and drawings:

- How the selected route(s) correspond to the needs of other developers and of the Nunavummiut;
- Proposed construction of all-weather road, including laydown aeas, on-site and off-site roads, alternative routes, with particular reference to stream crossings;
- 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 routes, including the total number of trips expected daily and seasonally;
- Accident/incident reporting;
- Wildlife impact mitigation procedures and/or structures;
- Site reclamation.

4.10.1.8 Airport Facilities

The Proponent shall describe:

- Airport facilities at the mine site. The duration, frequency, and extent of use of airport facilities and volumes of goods and passengers shall be estimated;
- 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**;**
- Construction methods;
- Accident/incident response reporting.

4.10.1.9 Fuel and Explosives Storage Sites

The Proponent shall describe**:**

- The location and characteristics of fuel and explosives storage infrastructure and systems, as well as the explosives factory**;**
- Handling and containment methods**;**
- The quantities of fuel, explosives**,** and other similar materials required**;**
- Accident/incident response reporting;
- Spill response training;
- Location of spill kits on the site.

4.10.1.10 Borrow Pits and Quarry Sites

The Proponent shall**:**

- Describe and map at a scale of 1:5,000 all sites that are to be used for borrow pits or quarries, including a description and explanation of sites that were studied but rejected;
- Estimate the quantities that will be extracted from quarry sites**;**
- Describe access routes to those sites;
- Present quarry management plans that describe proposed operations, methods of handling massive ice, and plans to manage water released by the thawing of permafrost and ground ice.

4.10.1.11 Waste (Domestic and Hazardous) Management

The Proponent shall describe:

- Plans for sewage treatment and disposal, including the technology to be employed, the location of the facility and any point of discharge, and the volumes and chemical composition of the effluent;
- Plans for the handling, storage, treatment, and disposal of solid wastes and sewage sludge;

- The hazardous waste management plan, including a description of the types and volumes of hazardous wastes to be used or produced by all Project activities. Storage and disposal methods and destinations for each type of hazardous waste, including disposal of containers used to transport or store hazardous materials, shall be described**;**
- Accident/incident response reporting;
- Spill response training;
- Location of spill kits on the site.

4.10.1.12 Power

The Proponent shall describe:

- Any studies into sources of power other than diesel generators that it conducted;
- The location of the power house in relation to prevailing winds and other infrastructure;
- 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; and
- The anticipated types and quantities of emissions to the atmosphere.

4.10.2 Project Design

The Proponent shall explain how the physical environment influenced Project design, and how design, engineering, and management plans are consistent with ecosystem function and integrity, bearing in mind the possibility of long-term climatic change.

4.10.3 Pace, Scale, and Timing of Project

The Proponent shall give a rationale for the pace, scale, and timing of the Project, including consideration of technical, marketing, and economic factors, and shall specify how many tonnes of ore would be processed each day, and which factors would be considered in deciding whether to develop other ore bodies (e.g., respect of regulations, approval by affected communities of management and reclamation plans, compliance with conditions of Impact and Benefits Agreements ("IBAs")).

4.10.4 Future Development

Notwithstanding the currently planned short life-cycle of the mine, the Proponent shall evaluate, indicating the associated level of uncertainty, the potential for exploration and development of additional ores at the Project site and shall consider the associated impacts. Among other things, the Proponent shall specify the additional quantities of ore that might be mined and any foreseeable expansions of the Project infrastructure.

The Proponent shall also consider whether proceeding with the Project, including the associated access infrastructure, might stimulate other development projects, either exploration/mining or other, in the region..

4.10.5 Technology

The Proponent shall describe the state-of-the-art of proposed technologies and shall evaluate the reliability of each. It shall also discuss programmes to monitor developments in technology in such areas as tailings management, closure, reclamation and beneficial landscaping of Arctic landscapes, emissions-control, ore processing, dams/containment structures, permafrost management, environmental monitoring, and community development.

4.11 Alternatives

The Proponent shall describe alternatives to the Project, including the "No-go" or no-project alternative and other locations within the Kivalliq Region or Nunavut, if any, where the Proponent could conduct the types of activities proposed. It shall also consider alternative ways of carrying out

the Project (i.e., alternatives to Project components or activities, including different locations or timings for such activities or components, that might have differing environmental or socio-economic effects). In each case, the Proponent shall give the reasons for selecting the preferred alternative and for rejecting the others, including economic and technical analyses of each alternative and the associated biophysical, social, economic, and cultural impacts.

The Proponent shall present the preferences of those consulted respecting alternatives to the Project including the "no-go" alternative.

4.12 Description of Physical Environment

The Proponent shall describe the components of the physical environment and the processes affecting them, as they exist without the Project so as to justify its selection of VECs and to serve as a baseline against which the potential impacts of the Project can be measured. Such components and processes shall include:

- Bedrock lithology, morphology, and structures;
- Geomorphology and soils (including eskers);
- Permafrost (including areas of discontinuous permafrost, high ice-content soils, ice lenses, thaw-sensitive slopes, talik zones, and stream banks);
- Evidence of potential for ground and rock instability (e.g., slumping, landslides, and potential slippage planes);
- Hydrology/limnology (e.g., lakes and streams, lake sediment geochemistry, watershed boundaries, surface water flow, groundwater movement and aquifer recharge zones, flood zones, ice formation and melt patterns);
- Water quality and quantity (from surface and groundwater sources);
- Sediment and soil quality and quantity;
- Air quality and noise levels;
- Sites of palaeontological or palaeobotonical significance;
- Current climatic conditions and foreseeable future trends, bearing in mind the final paragraph of Subsection 4.16; and
- Any other issues identified through public consultation.

4.13 Description of Biological Environment

The Proponent shall describe the components of the biological environment and the processes affecting them, as they exist without the Project so as to justify the selection of VECs and to serve as a baseline against which the potential impacts of the Project can be measured.

4.13.1 Vegetation

The description of vegetation communities, including wetlands, shall include:

- Ecological zones, including ecozones, and ecoregions, or other appropriate ecological areas;
- The local and regional presence of species/communities;
- The health of these species/communities and their contaminant loadings;
- Rare or regionally unique species or species assemblages, including species with federal, territorial, regional, or local designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern, as designated by the Committee on the Status of Endangered Wildlife in Canada ("COSEWIC") or other agencies);
- Species that perform particularly significant ecological functions;
- Species that are valuable for cultural reasons known to the Inuit, and
- Any other issues identified through public consultation.

4.13.2 Wildlife

The Proponent shall describe:

- The local and regional presence of species populations;
- The relative trends in seasonal/annual abundance, and distribution of these species populations;
- The health of these species populations and their contaminant loadings;

- 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 when the routes cross habitats affected by the Project;
- Significant habitats for these species, such as eskers, calving and rearing areas, denning sites, and staging areas, and such special locations as licks, water crossings, and insect relief habitats;
- Wildlife management areas or similar areas for these species;
- Habitats of any rare or regionally unique species or species with federal, territorial, regional, or local designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern);
- Species that perform particularly significant ecological functions; and
- Any other issues relating to these species identified through public consultation.

4.13.3 Birds

The Proponent shall describe:

- The local and regional occurrence of species populations;
- The relative seasonal/annual abundance and distribution of these species populations;
- The health of these species populations and their contaminant loadings;
- 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 when 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;

- Habitats of any rare or regionally unique species or species with federal, territorial, regional, or local designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern) or cultural status;
- Species that perform particularly significant ecological functions; and
- Any other issues relating to these species identified through public consultation.

4.13.4 Fish and Other Aquatic Organisms

The Proponent shall describe:

- Periphyton, phytoplankton, zooplankton, and fish;
- The local and regional occurrence of species populations;
- The relative seasonal and annual trends in abundance and distribution of these species populations, and the estimated productive capacity of the water bodies;
- Stream and lake bottom substrates and littoral zones, including aquatic and riparian vegetation;
- Affected watercourses, including depths, widths, and maximum and minimum flows;
- 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;
- Habitat areas for these species, including spawning, nursery, feeding, and over-wintering areas, and any sensitive periods for each of the habitat areas;
- Management or other protected areas for these species;
- Habitats of any rare or regionally or locally unique species or species with federal, territorial, regional, or local designated status (e.g., vulnerable, threatened, endangered, extirpated, of special concern);
- Species that perform particularly significant ecological functions; and

- Any other issues relating to these species identified through public consultation.

4.14 Description of Socio-Economic Environment

The Proponent shall describe the components of the socio-economic environment and the processes affecting them, as they exist without the Project so as to justify its selection of VSECs and to serve as a baseline against which the potential impacts of the Project can be measured. It shall present baseline data on a community-by-community basis on such components as:

- Human health, defined broadly to include mental health and well-being;
- Demographics;
- Archaeological, cultural, heritage, and burial sites, as well as sites identified by Elders as being sacred or spiritual places (e.g., Aglinaqtut). Each site shall be described and delineated on a map, using, where appropriate, the Borden system of designation. Moreover, the identified sites shall be placed within the context of a regional overview of prehistory and history;
- Land and resource use, including national parks and similar areas;
- Local and regional economy (distinguishing between the traditional and wage economies and specifying the value or the replacement value of the traditional economy in dollars and in terms of local consumption and cultural and physical well-being);
- Employment, education, and training;
- Services and infrastructure;
- Government; and
- Other components identified through public consultation.

The Proponent shall provide a rationale for the selection of communities for which baseline data are provided.

The Proponent shall describe the interactions between the socio-economic and biophysical environments, including the roles of the land- and wage-based economies and the nature of the mixed economy of the North.

The Proponent shall identify and justify indicators, which, to the extent feasible, shall be identical or complementary to those used or being developed by the NPC. Indicators might include the following:

- Average income of residents;
- Employment levels and participation rates in both the wage- and land-based economies;
- Rates of high school completion;
- Housing (e.g., number of dwellings, average number of persons per dwelling, average number of persons per bedroom, percentage of units with full plumbing and heating systems);
- Teen birth rates;
- Number of children in care;
- Number of suicides;
- Number, type, and severity of accidents;
- Life expectancy;
- Types and frequencies of communicable diseases;
- Social Assistance cases;
- Number of alcohol- and drug-related crimes;
- Number of property crimes;
- Number of complaints of family violence;
- Types and quantities of wildlife harvested; and
- Seasonality and geographic distribution of harvesting activities.

Whenever relevant, data shall be disaggregated by age, gender, and ethnic affiliation.

The foregoing is not to suggest that the Proponent is responsible for the current socio-economic situation of the Kivalliq Region or of Nunavut, or that it is expected to resolve any problems that are identified. Nevertheless, a proper understanding of the structure and functioning of the potentially affected societies is needed in order to identify the potential of the Project to affect them, whether positively or negatively, and to ensure that any socio-economic mitigating measures put in place by the Proponent have a reasonable likelihood of attaining their objectives.

The indicators selected must be adequate to address all types of foreseeable impacts, including cumulative and residual impacts.

4.15 Spatial Boundaries

Spatial and temporal boundaries must be determined on the basis of the potential impacts on the particular biophysical or social phenomenon being addressed. Ecoregions and ecozones should be considered as factors, where relevant, in determining spatial boundaries.

The types of data collected and the methodologies, including public consultation and discussions with technical experts, for collecting, presenting, and analyzing such data must, to the extent possible, be consistent with the General Monitoring Program of Article 12 of the NLCA.

The Proponent shall define the spatial boundaries of the maximum area potentially affected by the Project, based on the boundaries for each individual type of impact, taking into account an analysis of such impact pathways as pollutant transport and accumulation mechanisms. Spatial boundaries may vary according to seasons and impact pathways. For example, the spatial boundaries for hydrographical studies related to tailings pond design will probably differ from those for studies on caribou migration. The boundaries for socio-economic assessment shall be based on an analysis of the socio-economic effects directly and indirectly associated with the Project. In all cases, priority shall be given to potential impacts within Nunavut, but the NLCA requires that potential impacts outside Nunavut shall also be considered wherever there is reason to anticipate that they might occur.

The spatial boundaries for assessing the cumulative effects on a VEC or VSEC should be set at the maximum range or distribution of the potential cumulative effects.

4.16 Temporal Boundaries

Like spatial boundaries, temporal boundaries may vary with, among other things, the type of impact and with season. 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, and its predicted impacts and of the predictive capability of the various disciplines at play. The Proponent shall determine the temporal boundaries separately for the construction, operations, temporary closure, final closure, and post-closure periods. The closure period covers decommissioning, abandonment, and reclamation. The post-closure period 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 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. Some General Circulation Models predict continued warming at high latitudes over the next century. There may be no immediate danger of permafrost degradation, but the Proponent must incorporate that possibility into the design of certain Project components.

4.17 Data 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 (repeatability), 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, or preferably 95 % 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. As noted in Subsection 4.15 every effort must be made to harmonize the types of data collected and their statistical treatment with the NPCs General Monitoring Program outlined in Article 12 of the NLCA.

4.18 Data Analysis and Reporting

Wherever the Proponent makes use of qualitative criteria 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 identified in relevant literature or regional policies.

The Proponent shall provide clear statements regarding the availability, relevance, and quality of the data.

4.19 Impact Assessment Methodology

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

All studies used in the prediction of impacts must be specified, a database organized, 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.

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 determination of significance shall take into account the following attributes of each impact: magnitude; geographic extent; timing**;** duration; frequency; reversibility; probability of occurrence; effect on ecosystem functioning and integrity; 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. Hence, the concerned communities, as well as other individuals and organizations, shall be fully consulted in defining impact significance. The Proponent shall describe how it will ascertain the significance that different interveners assign 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.

The dynamic change of ecosystems and their components must also be considered in determining impact significance. Changes in ecosystems can be cyclical, gradual, or the result of disasters; they can be local, regional, universal, anticipated, or unexpected. 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. EISs often "freeze" ecosystems and societies at a specific moment in time, often providing “snapshots” when collecting baseline data, and therefore evaluate the significance of the potential impacts upon them at that specific time. 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 components and societies 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, and overall trends, in an effort to increase understanding of the dynamism of the ecosystems in question and the nature and severity of the predicted impacts.

The Proponent shall identify potential impacts separately for each Project phase, including exploration. It shall also assess the potential impacts arising from accidental events and malfunctions.

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

4.20 Indicators and Criteria

The Proponent shall identify the indicators and/or criteria selected for assessing the potential impacts of the Project, including its cumulative 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. In every case where a potential impact or an area of ignorance or 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.

4.21 Impact Assessment

The Proponent shall employ a matrix or a comparable tool that highlights interactions between the components of the Project and those of the relevant ecosystems, especially VECs and VSECs.

Consistent with the principle expressed in the first paragraph of Subsection 4.3, the consequences of each predicted impact for the functioning and integrity of its ecosystem must be considered in addition to the consequences for the VEC or VSEC in question.

4.21.1 Project Components and Activities

4.21.1.1 Underground Mining

The Proponent shall assess the potential impacts of underground mining, taking into account the following:

- Mine permeability;
- The immediate and downstream effects of de-watered areas on habitat, aquatic organisms, and water circulation;
- Plans for managing mine water and groundwater seepage into the mine;
- Salinity and general characterization of groundwater;
- Permafrost intrusion and winter operations**;**
- The effects on receiving water bodies of water pumped from the mine;
- Any effects of exposure to air or water on ore;
- Rock stability;
- The impacts of blasting on air and water quality, with particular reference to dust and wastewater containing nitrites or nitrates from explosives.

4.21.1.2 Processed Ore Containment (and Tailings Ponds)

The Proponent shall assess the potential impacts of the processed ore containment area, taking into account:

- Its design, location, and capacity;
- The permeability of the impoundment structure and the effectiveness of seepage containment;
- The technique and plans for filling the facility, including winter operations;

- The characteristics and toxicity of the processed ore, including fines, and windblown dust;
- Effluent treatment and discharge;
- Any effects of talik development on the long-term stability of the processed ore containment area.

Typical questions that arise include:

- Current and predicted water quality;
- Discharge point for effluent;
- Microclimate;
- Fish and fish habitat;
- Need for control or retention structures;
- Anticipated volume of tailings in relation to the storage capacity of the lake;
- Use/rejection of polishing pond;
- Supernatant retention time and natural cyanide destruction rates in Arctic environments.

Particular attention shall be paid to potential impacts on wildlife, including caribou, muskox, and waterfowl.

4.21.1.3 Waste Rock, Ore and Overburden Storage

The Proponent shall assess the potential impacts of the waste rock, ore, and overburden storage, taking into account:

- The design (height, topography, spatial extent, volume, etc.) and location of the waste rock, ore, and overburden storage sites;
- The characteristics of the material to be stored;
- Plans for transporting and handling materials;

- The characteristics and volumes of seepage, techniques for collecting and disposing of seepage, and the effectiveness of drainage containment;
- Acid rock drainage;
- The metal content of frozen groundwater in the waste rock;
- Windblown dust;
- The suitability of the overburden as a substrate for reclamation activities; and
- The potential for re-vegetation.

Particular attention shall be devoted to potential disruptions to the movements of wildlife.

4.21.1.4 Processing and Plant Infrastructure

The Proponent shall assess the potential impacts of the processing and plant infrastructure, including**:**

- Noise from plant operations and transportation to and from the plant**;**
- Runoff from the plant or stored materials**;**
- Sources and disposal of water and effluent;
- Wastes produced and their storage; and
- Chemicals used, with particular reference to hazardous materials.

Particular attention shall be devoted to potential disruptions to the movements of wildlife.

4.21.1.5 Natural Drainage Diversion

The Proponent shall assess the potential impacts of any diversions of natural drainage systems. The analysis must consider the challenges encountered by other mines and comparable operations in constructing drainage diversions (such as mass erosion and

melting ice lenses and the resulting nutrient loadings in water bodies), and the potential for mobilizing sediments and disturbing terrain.

Particular attention shall be paid to the impacts on fish, waterfowl, and aquatic mammals resulting from the modification or redirection of natural flows.

4.21.1.6 Sewage and Solid Waste Management

The Proponent shall assess the potential impacts of solid waste and sewage**,** identifying whether either might act as an attractant to certain species of wildlife. The analysis shall consider the challenges encountered by comparable mining operations in treating and disposing of sewage and solid waste in a northern ecosystem, as well as the nutrient levels, biological oxygen demand, and winter oxygen levels of any receiving water bodies. The Proponent shall also consider the potential impacts of any recycling options, back hauling, landfill segregation, and leaching.

4.21.1.7 Hazardous Materials Management

The Proponent shall assess the potential impacts associated with the transporting, handling, storing, using, and disposing of hazardous materials, including explosives, hydrogen cyanide, and hydrocarbons. The analysis shall include the potential impacts on water quality from blasting residues, and the possibility that some such materials may act as attractants to some species of wildlife.

4.21.1.8 Power

The Proponent shall assess the potential impacts associated with power production**,** transmission, and distribution.

4.21.1.9 Air and Ground Traffic

The Proponent shall assess the potential impacts, including those resulting from interactions with wildlife, relating to air and road traffic, taking into account the type, frequency, and timing of traffic, particularly low-flying fixed- and rotary-wing aircraft, noise levels, and, in the case of road traffic, stream crossings.

4.21.1.10 Borrow Pits and Quarry Sites

The Proponent shall assess the potential impacts of borrow pits and quarry sites, including noise and dust levels, slope stability, thawing of permafrost and ground ice, melt water runoff, habitat loss, and interactions with wildlife.

4.21.1.11 Other Site Facilities and Infrastructure

The Proponent shall assess the potential impacts, including those resulting from interactions with wildlife, of all other site facilities and associated infrastructure.

4.21.1.12 Processing Operations

The Proponent shall assess the potential impacts of processing operations, including those resulting from interactions with wildlife.

4.21.1.13 Accidents and Malfunctions

The Proponent shall assess the potential impacts, including those resulting from interactions with wildlife, of accidents and malfunctions, including worst-case scenarios, and shall evaluate their probability of occurrence. Internal and external reporting procedures shall also be described.

4.21.1.14 Exploration Programme

The Proponent shall assess the potential impacts of exploration activities, whether by the Proponent or others that utilize Project infrastructure.

4.21.1.15 Temporary Closure, Final Closure and Reclamation Programmes

The Proponent shall assess the potential impacts associated with temporary closure, final closure, and reclamation of the Project.

4.21.2 Physical and Biological Environmental Components

4.21.2.1 Landscape and Terrain

The Proponent shall assess the potential impacts on such factors as terrain stability, permafrost and ground ice (including ground ice in eskers, kames, or deltas used as quarries or borrow pits), ice lenses, seismicity, rock heave, and geochemistry. Attention shall be paid to sites of palaeontological and palaeobotanical significance.

The Proponent shall pay attention to such potential impacts as disturbance to the active layer of permafrost and the resultant ecological effects, permanent changes in the local use of the landscape by wildlife, and permanent aesthetic and physical changes to the landscape. Other potentially important impacts are those on eskers (e.g., by quarrying for granular material) and the resultant effects on wildlife. Eskers are important to wildlife, as they provide migration routes for caribou, offer habitat for small mammals, and are used by carnivores, including Grizzly bears, foxes and wolves, for travelling, denning, and feeding. The Proponent shall also discuss the use of Traditional Knowledge in assessing eskers in relation to both wildlife use and as burial grounds, as studies have shown that eskers are in some areas the landforms with the greatest archaeological potential.

4.21.2.2 Air

The Proponent shall quantify the gaseous emissions from fuel consumption, air-borne dust from road transportation, blasting and crushing operations, and wind erosion of

waste rock dumps and exposed tailings, and shall discuss the possible effects of such activities (e.g., effects on lichen, effects on workers' safety.

The analysis shall also address the following:

- The atmospheric dispersion of emissions on a local and regional scale;
- Atmospheric conversion processes of emissions (e.g., secondary particulates) and linkages between chemicals, the environment, and human health;
- Potential biological receptors, such as vegetation and wildlife;
- The potential for the release of any "greenhouse" gases; and
- The effects on plant phenology and wildlife if changing albedo alters the timing or pattern of snow melt.

Relevant indicators may include the *Canadian Environmental Quality Guidelines* and *Guidelines Respecting Ambient Air Standards for Sulphur and Total Suspended Particulate Matter in the Northwest Territories*, under the *Environmental Protection Act*.

4.21.2.3 Water Quality and Quantity

The Proponent shall assess the potential impacts on surface and ground waters. The analysis shall include the impacts on water quality and quantity, catchment areas, and permafrost in relation to:

- Site facilities and infrastructure;
- In-filling and blasting;
- Collecting and treating wastewater and surface runoff;
- Mine water;
- Groundwater seepage;
- Water management (inputs, outputs, re-use);
- Contaminant loading and dispersion (including surface runoff and airborne contaminants);

- Acid rock drainage, metal leaching (including metal leaching from frozen groundwater in the waste rock), and geochemistry;
- Sedimentation (plumes and dispersion);
- Changes in water flow caused by stream diversions or otherwise;
- Processed ore containment area operation, discharge, and de-watering;
- The release of contaminants, including ores, that could affect water quality and/or potable water, and human health; and
- The contamination of waste rock drainage by residual nitrogen in the form of nitrates or nitrites from ammonium-nitrate-based explosives.

Moreover, the Proponent shall indicate where day-to-day operational problems might occur, particularly regarding runoff control and treatment, and predict the effects of a worst-case scenario in which there is an uncontrolled release of contaminants, including, for example, hydrocarbons, nitrate-contaminated water, or cyanide into the aquatic environment.

The Proponent shall identify water quality objectives from the perspectives of socio-economic/human health and ecological health. For example, the receiving water criteria of the Canadian Council of Ministers of the Environment and the *Canadian Environmental Quality Guidelines* for fresh water and aquatic life for total suspended solids, total arsenic, total copper, and any other relevant metals shall be referred to for comparative purposes.

4.21.2.4 Vegetation

The Proponent shall assess the potential impacts on:

- Local plant communities (i.e., vascular, non-vascular, wetland, and riparian);
- Plant phenology;
- Any rare, endangered, or highly valued species; and
- Wildlife dependent, whether seasonally or otherwise, on specific habitats or species of vegetation.

The analysis shall address the loss of vegetation due to mine development and haul and access roads, covering of vegetation by waste rock dumps, and contaminant uptake by vegetation. The Proponent shall include a quantitative account of the loss of plant communities in different ecozones, and ecoregions.

4.21.2.5 Wildlife

Special consideration shall be given to species listed as vulnerable, endangered, or a species of special concern by COSEWIC, to those that residents of the Kivalliq Region record as being vulnerable or endangered locally or regionally, and to species of particular social, cultural, and economic importance, including those for human consumption purposes.

The analysis of the potential impacts shall include:

- Habitat loss or alteration (e.g. fragmentation, connectivity);
- Mortality (including sport hunting by Project staff);
- Displacement and/or crowding;
- Disruption of movement (e.g. migratory, or within home ranges);
- Altered inter-specific relationships (e.g., predator-prey), including those with humans;
- Noise or other forms of disturbance on the ground or by aircraft; and
- Bioaccumulation and biomagnification of toxins.

The Proponent shall assess the implications of the above on the overall health of wildlife populations, communities, and ecosystems.

The Proponent shall give special consideration to the following:

Caribou

Potential impacts on caribou could include: disruption of movements and migration corridors (due to the mine site, roads, or air traffic, particularly low-level flying by fixed- or rotary-wing aircraft); deflection of migratory routes from traditional hunting areas; loss or alteration of habitat or calving grounds; deaths or injuries due to collisions with vehicles; disturbance when feeding or resting; and the possibility that caribou may be trapped in the tailings. The Proponent shall evaluate how the potential effects could affect caribou harvesting, as well as the potential effects of diverting caribou around the mine site on their energy balance, which, among other things, can affect the quality of the meat and reproductive success. This evaluation should also consider different seasons and life processes (e.g., migration, calving, winter foraging), focussing on periods when thermo-energetic factors may be important determinants of population trends.

Indicators could include: the number of caribou using a specific crossing, calving ground, or winter range; the number of caribou in a herd; physical condition as evidenced by body or marrow fat or other indicators; and the level of contaminants in tissues and organs.

Grizzly Bear

Grizzly bears are listed as a species of special concern by COSEWIC based on their low densities and productivity. Baseline data shall relate to such topics as movements, habitat use, diet, and den locations (dens are often found near eskers). The effects of camp infrastructure, attractant sources, including the possibility of habituation, and human-bear interactions shall be considered. The cumulative effects of habitat loss and of the increased frequency of interactions with humans shall also be considered.

Musk-Oxen

Potential impacts on musk-oxen may include loss or alteration of habitat**,** collisions with vehicles, and the susceptibility of herds to mine-related sources of disturbance during calving.

Wolves, Wolverines, and Foxes

Potential impacts may relate to habitat, including denning and other critical areas. Wolverines are listed as a species of special concern by COSEWIC based on their low densities and productivity.

4.21.2.6 Birds

Potential impacts on birds include: loss, alteration, or alienation of habitat, such as staging or nesting habitats (e.g., wetlands); disruption of migration routes; disturbance by human activity, such as blasting and air and road traffic the alteration of habitats; and bioaccumulation.

4.21.2.7 Aquatic Organisms and Habitats

The analysis of potential impacts on aquatic organisms and habitats shall include:

- The productive capacity of aquatic ecosystems, with particular reference to species of fish that are important for recreational or subsistence purposes;
- Water quality, bearing in mind the *Canadian Environmental Quality Guidelines*;
- Habitat loss, alteration, or alienation;
- Rare and/or sensitive aquatic organisms and habitats;
- Mortality (including sport fishing by Project workers);
- Noise and blasting;
- Bioaccumulation and biomagnification of toxins.

The Proponent shall evaluate potential impacts against the *Policy for the Management of Fish and Fish Habitat* (1986) as well as the applicable Metal Mining Regulations (June 2002).

4.21.3 Biological Diversity

The Proponent shall consider potential impacts on the biodiversity and richness of local and regional flora and fauna.

4.21.4 Social, Economic and Cultural Components

The Proponent shall assess the potential impacts on socio-economic and cultural components, taking into account the following:

- The health of the workers, their families, and other residents (human health includes physical, psychological, emotional, spiritual, and mental health);
- Demographics, such as Project-induced changes in population numbers, migration, and distribution, and the effects of those changes, including interactions between local residents and non-residents;
- The traditional way of life of the residents of the Region especially their use of the land for economic, cultural, and other purposes, including the Project's contribution, if any, to increased levels of contaminants in traditional foods;
- The cultural well-being of the communities, based on indicators defined in collaboration with the concerned communities;
- The social life of the concerned communities, family and community stability, problems of substance abuse, and crime and violence, including the effects of a major employment base away from the communities;
- Archaeological, burial, cultural, heritage, and sacred sites;
- Changes in (a) hunting, trapping, or guiding areas; (b) commercial, Nunavummiut, and sport fishing areas; (c) conservation areas, territorial and federal parks, International Biological Program sites, or other ecological reserves or preserves; (d) recreation and tourism areas and recognized scenic areas; (e) the "wilderness experience" (including the potential for compromising the development of protected areas in the region); (f) navigable waters; and (g) industrial and commercial areas. The Proponent shall pay particular attention to local perceptions of the preceding effects;

- The likely evolution of the local, regional, territorial, and national economies over the life of the Project, having regard to direct, indirect, and induced effects on income and employment, in particular the effects on: (a) wage and salary employment by skills category over the life of the Project (including estimates of Nunavummiut and other participation); (b) 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 employees and suppliers; (c) opportunities to diversify the economic base of Nunavut to produce and to supply new goods and services; and (d) prices and the cost of living;
- Opportunities for participation by Nunavummiut workers from the Central Kivalliq Region and Nunavut in wage and salary employment, considering such factors as: the number of jobs to be created and the required skills; the effect of competition for labour between the Project and existing businesses, institutions, and traditional activities; the adequacy of training opportunities available to Nunavummiut to take advantage of jobs created by the Project, including apprenticeship opportunities and training organized by the Proponent; the extent to which the skills of the available workers match job requirements; the level of interest in mining work; commuting arrangements for workers; and barriers to employment, such as issues pertaining to the care of children and Elders;
- Increased pressure on existing social, institutional, and community services, transportation facilities and services, and infrastructure;
- Any permanent changes to infrastructure and services;
- Revenues accruing to federal, Nunavut, and local governments, and net incremental costs imposed on governments by the Project, including savings realized and incremental costs of infrastructure and services; and
- Community and local government organizations.

The impact of an industrial development in this region, particularly where human populations are low, is directly related both to its pace and scale. For example, given the small and relatively untrained work force, the scale of the Project might affect employment benefits,

whereas its pace, if abrupt, could cause social or cultural disruption and prove to be more significant than its scale.

The Proponent shall address the potential for social and cultural disruption by, among other things, discussing social problems and evaluating the potential impacts of the Project on exacerbating or relieving such problems. The fear that the difficulties of coping with prolonged absences of family members might increase stress in families already dealing with cultural disruption should also be addressed.

If a community, such as Baker Lake or Rankin Inlet, is to serve as the main point of hiring for non-Nunavummiut, Nunavummiut living there might suffer from the effects of in-migration by job-seekers, which could include housing shortages, prostitution, an increase in poverty, and strains on community resources to deal with such issues. Even if the foregoing are not considered to be probable direct effects of the proposed Project, they should be addressed in the assessment of its indirect and cumulative effects.

The Proponent must evaluate how the temporary or final closure of the mine would affect workers and communities. For example, how does it perceive its responsibility to its work force and the local economy once operations shut down either temporarily or permanently? Would it put in place a programme of work force adjustment for the last few years of operations, assuming that the Project life extends, to provide such things as employee assistance, career counselling, educational subsidies, and re-training programmes?

It would be desirable to use an input-output model to assess potential economic impacts, including indirect and induced effects.

4.21.5 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 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 processed ore containment impoundment and waste rock piles.

4.22 Cumulative Effects Assessment

The Proponent shall provide a brief overview of the theory and practice of Cumulative Effects Assessment ("CEA") especially as it applies to the ecosystem model of evaluating environmental impacts, and shall justify the methodology adopted in relation to the design of the Project, its management, and the proposed approach to impact assessment.

The Proponent shall demonstrate how Project-specific CEA fits into regional planning initiatives. It shall assess the potential cumulative effects of the Project to determine its impacts in combination with past, current, or probable future developments of mines and other projects within a designated distance of the site of the Project determined in conformity with Subsection 4.15. The Proponent shall determine which other human activities have affected or are likely to affect the same VECs, VSECs, or ecosystems as the Project. The Proponent shall then predict the impacts of the Project in combination with those of the other past, present, and reasonably foreseeable future projects, using the most appropriate methodology on a case-by-case basis that is capable of incorporating all of the relevant impacts. At a minimum, it shall consider the cumulative effects of: other existing and reasonably foreseeable mines and exploration camps in the region.

The term "probable future development" is defined to mean: projects or activities that are currently under regulatory review, and those that will be submitted for regulatory review in the near future, as determined by the existence of a project description in the possession of a government department or agency. Nevertheless, where less precise information about a possible development exists, the Proponent shall refer to it and shall offer its opinion on whether it might need to be taken into account at a later date.

The Proponent shall give due consideration to trans-boundary 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. Trans-boundary effects originating from the Project should be clearly identified.

The discussion of cumulative effects shall include a comparison of the incremental contribution of the Project to regional thresholds for VECs and VSECs, as established by the Proponent or by any other authoritative source, and shall indicate to what degree a threshold is likely to be approached or exceeded. It shall also acknowledge the influence of biophysical cumulative effects on socio-economic systems, and shall evaluate how cumulative socio-economic effects might influence the regional environment.

The Proponent shall describe and justify all assumptions, models, and information limitations and associated levels of uncertainty. It shall explain its approach to handling the uncertainty associated with CEA.

4.23 Summary of Impacts

The Proponent shall present a documented summary of the potential impacts, addressing fully their significance in the light of Subsection 4.19. The summary shall clearly highlight those impacts judged to be of greater importance and those that may require extensive mitigation measures and monitoring.

4.24 Environmental Management and Mitigation

4.24.1 Overview

The Proponent shall present environmental management plans to prevent or mitigate all the potential impacts of the Project identified in Subsection 4.21, and shall identify residual effects. Mitigation is defined as the elimination, reduction, or control of the adverse effects of the Project. It includes restitution for any damage to the environment …through replacement, restoration, compensation, or any other means. In the case of water, the Proponent shall take into account Article 20 of the NLCA. The description of mitigation measures shall include procedures to avoid environmentally sensitive areas or seasons, contingency programmes to respond to accidents and emergencies, restorative procedures to be implemented on disturbed sites, and compensation programmes for damage caused by the

Proponent's activities to the environment, property, or the land- and resource-use of others. Any impacts that cannot be mitigated should be clearly identified.

Management plans shall target at a minimum the following, as well as any other VECs or VSECs identified by the Proponent or any other stakeholder/intervenor/participant:

- Tailings;
- Waste rock;
- Domestic and industrial solid wastes;
- Liquid waste;
- Spill contingency plan (transport and storage of fuels and other hazardous materials);
- Hazardous waste (including the use, handling, transportation, storage, production, and disposal of toxic substances, chemicals, and fuel);
- Acid rock drainage;
- Emergency response plan;
- Water supply (including potable and process water);
- Landscape;
- Permafrost;
- Water quality;
- Water management plan, including natural and on-site drainage;
- Air quality;
- Vegetation;
- Caribou and their habitats;
- Grizzly bears and other scavengers and wildlife potentially attracted to the site;
- Other bird and wildlife species and their habitats;
- Aquatic organisms and habitats;
- Archaeological sites and sacred or spiritual sites;
- Traffic;
- Human resources;
- Nunavummiut involvement;

- Public involvement, including a communications strategy;
- Education and orientation;
- Occupational health and safety;
- Emergency response and contingency plans (including plans for wildlife encounters, fires, aircraft/vehicle crashes, medical emergencies, mine rescue, hazardous materials spills, malfunctions of key Project components, natural disasters, and discoveries of historic resources);
- Site rehabilitation; and
- Ability to post full security.

The Proponent shall evaluate the costs and economic and technical feasibility of the mitigation measures considered, specify who would be responsible for their implementation, and provide a timetable for implementing them.

The Proponent shall discuss the flexibility of the proposed environmental management plans to respond to changes in the mine development plan, the regulatory regime, the natural or socio-economic environment, technology, research results, or the understanding of Traditional Knowledge. It shall discuss how the results from the environmental management plans would be used in applying adaptive environmental management[1], and identify criteria or indicators to trigger management action.

The Proponent shall give a rationale for the proposed management 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.

[1] Adaptive environmental management revises traditional conceptions conditioning environmental impact review procedures. Its principles are outlined by Holling (1978) and refer to intra-ecological connections, spatial behaviour of events, erratic alterations in natural systems, and dynamic variability. Holling also identifies several misconceptions commonplace in the environmental review process.

Moreover, the Proponent shall discuss the negotiation of an agreement or agreements with the concerned communities that would permit them to participate fully in the planning, execution, and evaluation of mitigation measures.

Though it was much larger, and by way of *example*, is the Voisey's Bay project. In its EIS for a mine/mill project in Labrador, the Voiseys Bay Nickel Company proposed an Environmental and Health & Safety ("EH&S") Management System composed of 11 integrated plans:

- Environmental Protection Plans;
- Emergency Response and Contingency Plans;
- Occupational Health & Safety Plan;
- Impact and Benefits Plan;
- Human Resources Plan;
- Reclamation Plan;
- Education and Orientation Plan;
- Aboriginal Involvement Plan;
- Public Involvement Plan;
- Monitoring and Follow-Up Plan;
- Auditing and Continual Improvement Plan.

Each EH&S Plan is related to VECs and VSECs and identifies management needs by project phase, thus taking a life-of-project horizon.

Though it was a diamond mine, another *example* is the Diavik Diamonds Project at Lac de Gras, NWT, which committed to the following adaptive Environmental Management Plans:

- Waste Management Plan;
- Water Management Plan;
- Hazardous Materials Management Plan;
- Blasting/Explosives Management Plan;

- Quarry Management Plan;
- Emergency Response Plan;
- Processed Ore Containment Management Plan;
- Country Rock and Till Storage Management Plan;
- Dredged Lakebed Sediment Management Plan;
- Abandonment and Restoration Plan(s);
- Biotite Schist Management Plan;
- Exploration Environmental Management Plant;
- Traffic Management Plan;
- No Net Loss Plan;
- Construction Area and Activity Management Plan;
- Operations Area and Activity Management Plan.

Environmental Protection Plans are practical documents that set out detailed site-specific protection measures or procedures that can be designed for such things as: clearing of vegetation; storage, handling, and transfer of fuel and other petroleum products; sewage disposal; solid waste disposal; quarrying and aggregate removal; erosion prevention; drilling and exploration; dust control; noise control; blasting; permafrost; mineralized rock and acid mine drainage; and stream crossings.

4.24.2 Management of Impacts on Physical Environment

The present Subsection is *only* illustrative of what might be done. The Proponent should present specific measures for each VEC that is likely to be significantly impacted.

4.24.2.1 Caribou

Mitigation measures for impacts on caribou could include**:**

- Fencing of roads, landing strips, and other potentially dangerous areas;
- Education of employees;

- Speed restrictions (the Proponent must show how they will be enforced) during caribou migration to reduce the risk of vehicles' colliding with caribou; and
- Designing roads and other infrastructure in ways that discourage caribou from interacting with them.

The Proponent shall integrate mitigation measures into a detailed caribou management and monitoring plan. The use of Traditional Knowledge in minimizing the effects of the Project on caribou (e.g., diverting caribou from tailings) and in establishing a monitoring programme shall be discussed. The Proponent shall discuss how it intends to use and/or support such initiatives as the Bathurst Caribou Management Committee.

4.24.2.2 Fish

The Proponent shall discuss measures to compensate for the loss of aquatic habitat, including habitat replacement. The principle of No Net Loss (Policy for the Management of Fish Habitat, Department of Fisheries & Oceans, 1986) for fish habitat shall be applied.

4.24.2.3 Bears

Mitigation measures designed to prevent bears from becoming habituated to the mine site might include fencing, the removal of solid wastes, and devices to frighten them.

4.24.3 Management of Impacts on Socio-Economic Environment

The Proponent shall present policies and programmes to minimize potential negative socio-economic effects and to optimize potential positive effects. The general areas that shall be considered are human resources, occupational health and safety, Nunavummiut involvement, public involvement, and IBAs.

4.24.3.1 Human Resources

The Proponent shall prepare a Human Resources Plan, which might consider: human resources legislation; organization planning; succession and career plans; compensation plans and profit-sharing; benefit programmes (e.g., health care plan, work clothing and safety equipment, vacation leave); work rotation and pay schedules; health and safety programmes; hiring practices and procurement; skills and entry requirements; training and development; control of movements to and from the Project site; on-site public safety with respect to firearms, while respecting the rights and needs of harvesters from adjacent communities to travel freely through the country; alcohol and drugs; smoking; sexual and gender harassment; employment for women; human resource information systems; labour relations (e.g., procedure for submitting grievances or concerns, disciplinary procedures); employee communications; incorporation of relevant IBA terms and conditions; and the use of and payment for municipal facilities and services in local communities.

The Proponent shall also develop an Education and Orientation Plan to help all employees to understand their responsibilities in environmental and health and safety management.

The Proponent shall give special consideration to promoting the participation of Nunavummiut in Project employment and related business opportunities by addressing, for example: employment preferences to Nunavummiut; recruitment strategies to overcome entry barriers; education and training programmes (e.g., partnerships with local schools and other educational institutions, on-the-job learning, and apprenticeships); cross-cultural orientation; preference to northern businesses; commuting arrangements; northern allowances; the types of food available to workers at the mine site; and the pursuit 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 all applicable regulations, including the use of local guiding services.

The Proponent might note that hunting and fishing are usually prohibited at the Nunavut mining sites. And for example, recreational angling was determined to have the greatest single potential impact on fish populations of all the activities associated with the Diavik project. For this reason, prohibiting recreational angling by all employees at or near the Project site might go a long way towards avoiding impacts on fisheries resources.

The Proponent shall discuss the extent to which its policies regarding such things as preferential hiring, northern allowances, safety, and alcohol and drugs would be applied to contractors and sub-contractors. It shall also discuss criteria for selecting contractors.

Some mines have initiated a Job Development Strategy under the stewardship of northern businesses, which aims to identify and cultivate employment and business opportunities for northern workers and entrepreneurs that reflect the goals and desires of northern residents and of the business community. The strategy also has the potential for creating opportunities for those who prefer not to work at the mine site.
The Proponent should evaluate the feasibility of becoming a partner in the Job Development Strategy or, if that is not feasible, coordinating its activities with it so as to avoid competition and duplication.

The Proponent shall describe a programme to invest a specified portion of the wealth created by the Project in the natural and human capital of the region. Such a programme can be likened to an economic diversification or development trust fund. The Proponent shall also consider the necessity and/or desirability of an economic transition fund upon final closure of the mine. Should said fund be necessary/desirable, the Proponent shall set out how it would be established.

The Proponent shall describe mitigation and monitoring measures to reduce social and cultural disruption, which could include: 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; assistance to communities to address social problems, whether solely related to the Project or not; and counselling services to employees and their families regarding financial management, substance abuse, and work-related stress management.

The Proponent shall discuss environmental management and monitoring techniques designed to mitigate potential cumulative effects and to increase understanding of cumulative effects. That discussion shall include follow-up plans to verify the accuracy of the environmental assessment and determine the effectiveness of mitigation measures. The Proponent's responsibilities shall reflect the Project's anticipated contribution to cumulative environmental effects from an ecosystem perspective.

4.24.3.2 Occupational Health and Safety

The Proponent shall present an Occupational Health and Safety Plan that focuses on good safety practices, safety awareness, risk management, mine rescue, employee involvement, and management commitment. It shall address: safety reporting; safety orientation; hazard analysis; training in first-aid, cardio-pulmonary resuscitation, fire-fighting and -prevention, and spill response; workplace monitoring and control; and medical surveillance.

4.24.3.3 Nunavummiut Involvement

In discussing means to involve Nunavummiut, the Proponent might consider on-site observers (who would be responsible for monitoring certain Project activities), liaison committees (to facilitate communications, consultation, and the resolution of environmental matters), and the compilation, review, and use of Nunavummiut place names and other Traditional Knowledge.

4.24.3.4 Public Involvement

The Proponent shall describe a Public Involvement Plan, the objectives of which shall be to: provide information to the public and concerned communities on Project design and activities; identify mitigation needs; gain understanding of public concerns; develop two-way communications with the concerned communities; and obtain input to environmental and health and safety management decisions.

Public involvement techniques could include: mail or hand-outs to households; videos on Project components; communication sessions to explain the results of the EIS; information sessions on specific subjects; corporate public offices in the Region or in Nunavut; open houses; workshops on Project development; meetings with government officials, interest groups, and other parties; presentations to interest groups and the public; community forums; site visits; toll-free telephone lines; a company newsletter; annual environmental reporting; release of Project documents; local monitoring committees; and media releases.

Wherever the Proponent undertakes public consultation and involvement, it shall ensure that participants and the public in general are subsequently informed how their views and knowledge were taken into consideration and applied.

Appendices to the EIS must contain full documentation on public consultation, including records of any follow-up.

4.24.3.5 Impact and Benefits Agreements

The EIS must respect all of the provisions of the NLCA relating to impact and benefits agreements, including Article 6, Part 4 of Article 9, Part 3 of Article 20, Article 26, and Article 27.

The Proponent shall discuss the negotiation of IBAs, including with whom such agreements might be negotiated and whether they will be concluded prior to the construction of the Project.

The NLCA empowers the NWB to request from the applicant, when considering a water application, information regarding the …*steps which the proponent proposes to take to compensate interests adversely affected by water use* (NLCA, s. 13.8.1(d)) and the …*interests in the lands and waters which the proponent has secured or seeks to secure* (NLCA, s. 13.8.1(f)). This might be an issue since the NWB will have water and waste-in-water jurisdiction and otherwise might be conducting joint hearings with the NIRB.

Issues that shall be covered in IBAs include: assurances that local communities are able to take advantage of job opportunities; training; preferential hiring programmes; financial transfer payments; royalties; equity participation; new business development and contract arrangements; compensation for declines in harvests of fish and wildlife; participation in monitoring activities; dispute-resolution; and the other issues raised by the signatories.

In discussing compensation, the Proponent shall address such issues as eligibility, burden of proof, access by individuals to resources to help them to pursue claims, and dispute-resolution mechanisms.

4.24.3.6 Pollution Prevention

The Proponent shall highlight any pollution prevention measures to be implemented. Pollution prevention is defined by the Federal Government in the document *Pollution Prevention: A Strategy for Action* (Environment Canada, June, 1995), which links the concept of pollution prevention with sustainable development - a vision that includes a clean healthy environment and a strong, healthy economy**,** and that focuses on avoiding the creation of pollution rather than trying to manage it after it has occurred.

4.25 Residual Impacts

Residual impacts are those for which feasible mitigation measures could not be conceived and for which compensation has not yet been determined. They also include the effects that persist after mitigation measures have been successfully applied. Both short-term and long-term residual impacts must be considered.

The Proponent shall describe the residual effects of the Project in a way that permits comparisons with the Project's potential effects in the absence of mitigation, and shall express their significance in the same manner as for the said potential effects, using the same criteria. It shall also assess the reliability of the planned mitigation measures and the environmental consequences of their failure.

4.26 Monitoring and Follow-Up

4.26.1 Overview

The Proponent shall present a Monitoring and Follow-Up Plan that includes compliance, biophysical and socio-economic monitoring programmes, and a follow-up programme to integrate the monitoring results into a coherent programme of action and to evaluate the effectiveness of mitigation measures during operation and after the final closure of the Project. In every case, the Proponent shall explain what is to be monitored, why it needs to be monitored, and how it will be monitored.

Compliance monitoring refers to verifying the Proponent's conformity with regulatory standards. Biophysical monitoring involves the monitoring of such biophysical components as air, water, and land. Socio-economic monitoring involves the monitoring of socio-economic parameters, for example employment of Nunavummiut and other northerners and the purchase of goods and services in the Region.

The Proponent shall discuss how its monitoring programme would distinguish between natural environmental changes and those caused by the Project, how it would assess the validity of impact predictions, how monitoring results would be used to modify management

programmes and Project policies, and how it would respond to unexpected adverse effects. It shall also discuss the use of criteria or thresholds to assess impacts (e.g., the use of lichen as an indicator species due to its sensitivity to sulphur dioxide and nitrogen dioxide and its importance in the diet of caribou).

The Proponent shall strive at every phase of the Project to collect data in a manner that is consistent with existing data-bases, including those of the West Kitikmeot Slave Study, the NPC and the Department of Sustainable Development, provided that doing so will not significantly compromise its ability to monitor effectively given Project-specific conditions.

The description of the approach to monitoring shall address:

- Monitoring methodologies, standards, objectives and a corresponding data-collection schedule. The schedule shall describe the frequency of data-collection and analysis, sampling locations, and shall distinguish between on- and off-site activities, describing the logistics for carrying out both types of activities;
- The subjects and parameters to be monitored, and the criteria used in their selection;
- The geographic extent of monitoring;
- Internal and external reporting and response mechanisms and structures, including procedures to be followed in the event that monitored results deviate significantly from predicted results;
- Approaches and methods for monitoring the cumulative effects of the Project;
- Integration of monitoring results with other aspects of the Project, including adjustments to operating procedures and refinements to mitigation measures;
- Experience gained from prior and current monitoring programmes;
- The roles of independent experts, government agencies, communities, holders of Traditional Knowledge, and renewable-resource users, and any joint monitoring programmes;
- Procedures to assess the effectiveness of monitoring programmes, mitigation measures, and recovery programmes for disturbed areas; and

- The role of communications plans in monitoring, and procedures to communicate the results of monitoring to interested parties.

In the case of post-closure monitoring, the Proponent shall describe how long term monitoring will continue and shall identify who will assume the costs and responsibility, especially in the event of changes of corporate ownership.

The Proponent shall consult with all concerned regulatory authorities and stakeholders to maximize the chances that it proposes a clear, comprehensive, and proactive Monitoring and Follow-Up Plan.

4.26.2 Community Liaison Committees

If the Proponent proposes that one or more Community Liaison Persons or Committees ("CLCs") be established to participate in monitoring activities, then the following shall be considered:

- The level of community support for participating on a CLC. The community shall treat the CLC seriously and the community appointees shall be accountable in practical and identifiable ways to the community. Community appointees shall be given time and assistance to familiarize themselves with all of the relevant aspects of mining;
- Reaching a clear understanding among all involved of the role of the CLC, its purpose and its limitations. Impact monitoring shall be clearly defined and written into the mandate of the CLC, and all participants shall agree on the meaning. Consensus shall be reached regarding the framework for the monitoring activities, such as about what is being monitored, what data and how much of it is required, and whether the monitoring activities themselves are sustainable;
- Methods for maintaining the CLC's visibility in the community;

- The Proponent's accountability to the CLC and to the community. The Proponent must be as a matter of policy willing to respond to the findings of monitoring;
- The provision of information and reporting on the activities of the CLC to the communities. For example, if community members are to be involved in monitoring impacts, they must be adequately informed of the types of effects that they are likely to encounter. Likewise, community members must have access to the results of the monitoring to which they contribute;
- The provision of sufficient financial, technical, and administrative resources to the community members so that they can participate in a meaningful way in the CLC. The budget for the CLC should depend on the scale and complexity of the mining operation and should be reassessed from time to time (adapted from Penn, 1996).

The Proponent shall also set out the mechanisms by which a CLC would be created (e.g., environmental agreements, IBAs).

4.27 Auditing and Continual Improvement System

The Proponent shall prepare an Auditing and Continual Improvement System to review and continually improve environmental and health and safety management. Such a system shall address: monitoring and measurement; non-conformance reporting; corrective and preventive action plans; record-keeping and documentation control; and audits of environmental and health and safety management.

The Proponent shall describe the implementation of the system by discussing such things as training, awareness, competence, documentation, operational control, and records.

4.28 Closure and Reclamation

The Proponent shall present a Closure and Reclamation Plan that respects all applicable regulations, standards, and policies and addresses the mine, mine rock, overburden, and tailings disposal facilities

and areas, water retention and diversion structures, buildings and site infrastructure, fuel and hazardous materials storage facilities, wastes, borrow pits and quarries, roads and airport, and all disturbed areas. It shall state its goals for reclamation, such as the re-establishment of stable physical landforms and land-use productivity, and the long-term physical and chemical stability of water resources. It shall discuss reclamation methods and the schedule and time frame (e.g., progressive reclamation). It shall also discuss how the Closure and Reclamation Plan would be updated periodically by, for example, incorporating ongoing research and technological advances. Moreover, the Proponent shall describe the extent to which it believes that the Project site can be restored to its previous ecological diversity and ecological productivity.

The Proponent shall specify when a temporary closure should be considered to be permanent.

The Proponent shall discuss a research programme that is consistent and compatible with broader efforts under way within Nunavut to address challenges to reclamation, such as the cold environment, poor soil development, limited topsoil resources, slow growth rates, limited seed production, low soil moisture, and short growing seasons.

The Proponent shall evaluate the cost and feasibility of going beyond mere reclamation by enhancing wildlife habitats and undertaking other forms of beneficial landscaping.

The Proponent shall discuss post-closure monitoring of such environmental components as wildlife, re-vegetation, landform stability, and water quality. Issues such as the introduction of exotic species of plants for purposes of re-vegetation shall be discussed.

4.29 Outstanding Issues

The Proponent shall describe any outstanding issues that are not identified elsewhere in the EIS and shall indicate how it intends to address them.

4.30 List of Consultants

A list of all the consultants who contributed to the preparation of the EIS, including their role and contact information (mailing address, telephone number, fax number, and e-mail address), shall be presented.

4.31 List of Organizations

The Proponent shall prepare a list of the organizations consulted, including: the time, place, and purpose of the consultation; the number and, subject to confidentiality, other details of the participants; and a list, including mailing address, telephone number, fax number, and e-mail address, of all organizations to which the Project proposal was sent. An appendix shall contain copies of the materials presented at such meetings, showing the date on which they were submitted, photographs of the meetings, and other relevant materials.

5.0 LITERATURE CITED

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