



Terms of Reference
for the
Gahcho Kué
Environmental Impact Statement

Oct. 5, 2007

Table of Contents

1	Introduction.....	1
1.1	<i>Purpose.....</i>	1
1.2	<i>Regulatory History.....</i>	1
1.3	<i>Approach.....</i>	2
1.4	<i>Definitions.....</i>	3
1.5	<i>Legal Requirements.....</i>	3
1.6	<i>Document Overview.....</i>	4
2	Scope.....	5
2.1	<i>Scope of Development.....</i>	5
2.2	<i>Scope of Review.....</i>	6
2.2.1	<i>MVRMA Scoping Requirements.....</i>	6
2.2.2	<i>Report of Environmental Assessment Scoping Requirements.....</i>	7
3	General Information Requirements.....	8
3.1	<i>Development and Environment Description.....</i>	8
3.1.1	<i>Developer.....</i>	8
3.1.2	<i>Development Description.....</i>	8
3.1.3	<i>Existing Environment.....</i>	9
3.2	<i>Assessment Methods and Presentation.....</i>	14
3.2.1	<i>Impact Predictions.....</i>	14
3.2.2	<i>Significance Determination.....</i>	15
3.2.3	<i>Uncertainty Analysis.....</i>	16
3.2.4	<i>Valued Components.....</i>	16
3.2.5	<i>Traditional Knowledge.....</i>	17
3.2.6	<i>Alternatives.....</i>	18
3.2.7	<i>Follow-Up Programs.....</i>	19
3.2.8	<i>Presentation and Cross Referencing.....</i>	20
4	Key Lines of Inquiry.....	22
4.1	<i>Introduction to Key Lines of Inquiry.....</i>	22
4.1.1	<i>Caribou.....</i>	22
4.1.2	<i>Water Quality and Fish in Kennady Lake.....</i>	25
4.1.3	<i>Downstream Water Effects.....</i>	27
4.1.4	<i>Long Term Biophysical Effects, Closure and Reclamation.....</i>	28
4.1.5	<i>Family and Community Cohesion.....</i>	30
4.1.6	<i>Social Disparity Within and Between Communities.....</i>	32
4.1.7	<i>Long Term Social, Cultural and Economic Effects.....</i>	33
5	Subjects of Note.....	35
5.1	<i>Introduction to Subjects of Note.....</i>	35
5.2	<i>Biophysical Subjects of Note.....</i>	35
5.2.1	<i>Impacts on Great Slave Lake.....</i>	35
5.2.2	<i>Air Quality.....</i>	36

5.2.3	Carnivore Mortality.....	36
5.2.4	Species at Risk and Birds.....	37
5.2.5	Permafrost, Groundwater, and Hydrogeology	38
5.2.6	Waste Rock and Processed Kimberlite Storage	38
5.2.7	Climate Change Impacts	39
5.2.8	Alternative Energy Sources.....	40
5.2.9	Other Ungulates	40
5.2.10	Waste Management and Wildlife.....	41
5.2.11	Traffic and Road Issues.....	41
5.2.12	Vegetation.....	42
5.3	<i>Socio-Economic Subjects of Note</i>	42
5.3.1	Employment, Training and Economic Development	42
5.3.2	Impacts on Tourism Potential and Wilderness Character	43
5.3.3	Demand on Infrastructure	44
5.3.4	Culture, Heritage and Archaeology.....	45
5.3.5	Aboriginal Rights and Community Engagement	46
5.3.6	Proposed National Park.....	46
6	Sustainability and Cumulative Effects Analysis.....	47
6.1.1	Integrated Project-Specific Analysis and Sustainability	47
6.1.2	Cumulative Effects Assessment.....	47
7	Remaining Issues.....	49
8	Deliverables	56

1 Introduction

1.1 Purpose

The Gahcho Kue Environmental Impact Review Panel (the Panel) is conducting an environmental impact review of the proposed De Beers Gahcho Kue diamond mine. The Panel was established by the Mackenzie Valley Environmental Impact Review Board. The Panel is responsible for assessing the potential impacts of the proposed development, and is an independent body. This is the first time that a proposed diamond mine is being assessed by an environmental impact review established under the *Mackenzie Valley Resource Management Act (MVRMA)*.

The Panel has released this *Terms of Reference* document to provide instructions to DeBeers Canada Inc. (the developer) for preparing an Environmental Impact Statement (EIS) for the environmental impact review of the proposed Gahcho Kué diamond mine. The document sets the scope of the development under review, as well as that of the review itself. It provides the developer with instructions on the assessment methods to be used, the type of information that is required, and the presentation of this information.

The developer is required to produce an EIS based on the reasonable interpretation of these instructions. If necessary the Panel and the parties will address any shortcomings of the EIS through the gap analysis and subsequent information requests of the review process. The developer is encouraged to contact the Panel's office and ask for clarification in writing if necessary.

1.2 Regulatory History

DeBeers Canada Inc. applied to the Mackenzie Valley Land and Water Board for a type A Land Use Permit (MV2005C0032) and a type A Water License (MV2005L20015) on November 24, 2005. The Mackenzie Valley Land and Water Board deemed the applications complete on December 1, 2005 and notified the Review Board that it had started a preliminary screening. On December 22, 2005, Environment Canada referred the proposed development to environmental assessment before the Mackenzie Valley Land and Water Board finalized its screening report. In Environment Canada's opinion the proposed development might have significant adverse impacts on the environment.

The Review Board initiated the environmental assessment and notified the developer on January 4, 2006. Following scoping workshops in Yellowknife, Dettah, Lutsel K'e, Fort Resolution, and Behchoko, as well as scoping hearings in Yellowknife during March and April of 2006, the Review Board determined that the proposed development is likely to be a cause of significant public concern. The Review Board ordered an environmental impact review of the proposed Gahcho Kué project pursuant to MVRMA section 128(1)(c) on June 12, 2006. On June 28, 2006 the Review Board issued its *Reasons for Decision and Report of Environmental Assessment for the DeBeers Gahcho Kué Diamond Mine, Kennady Lake, NT (Report of Environmental Assessment)*.

Following the Review Board's order that an environmental impact review be conducted, the developer applied for a judicial review to the NWT Supreme Court on July 28, 2006.

The Supreme Court heard the application on November 22, 2006 and rendered its decision on April 2, 2007 upholding the Review Board's environmental impact review order. The Review Board notified potential parties and the public of the continuation of the environmental impact review on April 20, 2007.

The Panel is composed of seven members. Although members are appointed by the Mackenzie Valley Environmental Impact Review Board, the Panel is an independent body. It is tasked with conducting the environmental impact review of the proposed development, having regard to the protection of the environment from the significant adverse impacts, and to the protection of the existing and future social, cultural and economic well-being of Mackenzie Valley¹ residents and communities. The Panel is also required to ensure that public concerns are taken into account, and to have regard for the importance of conservation to the well-being and way of life of Aboriginal peoples.

1.3 Approach

Prior to ordering this environmental impact review, the Review Board conducted an environmental assessment which included a technical scoping workshop in Yellowknife and community scoping workshops in Dettah, Lutsel K'e, Fort Resolution and Behchoko, as well as technical and community scoping hearings in Yellowknife. The purpose of this extensive scoping exercise was not only to identify all the issues, but also to prioritize them and if possible, focus future work on the most important ones. The public record for the environmental assessment indicates that the participants in the assessment were of the view that all of the issues are important and that not enough information was available to allow excluding any from the scope. The public record also indicates that particular aspects of the proposed development and of the environment require higher levels of effort than others.

Every issue identified in this *Terms of Reference* requires a sufficient analysis to demonstrate whether it is likely to be the cause of significant impacts. However, some issues have been identified in the Review Board's *Report of Environmental Assessment* as issues that require particular attention during the environmental impact review. These special issues are categorized as either *Key Lines of Inquiry* or *Subjects of Note*.

Key Lines of Inquiry are topics of the greatest concern that require the most attention during the environmental impact review and the most rigorous analysis and detail in the EIS. Key Lines of Inquiry are intended to ensure a comprehensive analysis of the issues that resulted in the significant public concern identified by the Review Board. There are seven Key Lines of Inquiry, which are described in section 4.

Subjects of Note do not have the same priority as Key Lines of Inquiry, but are nonetheless issues that require serious consideration and a substantive analysis. There are eighteen Subjects of Note, which are described in section 5.

Previous environmental impact assessments on diamond mines in the NWT generally analyzed and predicted impacts on a subject-specific bases. Communities have expressed

¹ Throughout this document, the term "Mackenzie Valley" refers to the area as defined in section 2 of the MVRMA.

that their primary concerns often are broad and holistic, dealing with interconnecting systems of the land and the people who depend on it, instead of the more narrow subjects often studied by conventional scientific specialists. The Panel has made efforts to structure this document to meet the needs of both types of reviewers. Therefore, the Key Lines of Inquiry and the Subjects of Note focus on questions and issues that often overlap with other subject areas.

The developer's responses for Key Lines of Inquiry and Subjects of Note must be more than just summaries of the issue-specific responses to the items identified in sections 4 and 5. Responses to Key Lines of Inquiry and Subjects of Note must be comprehensive stand-alone analyses which require only minimal cross-referencing with other parts of the EIS. The developer's level of effort in providing an analysis of each issue must be appropriate for the category that the issue falls within. This means that a substantive effort should be directed at addressing Subjects of Note, and the highest level of effort should be directed towards the Key Lines of Inquiry. The appropriate level of effort will be explained in more detail in sections 4 and 5.

In addition to Key Lines of Inquiry and Subjects of Note, this document describes further information requirements regarding sustainability and cumulative effects, as well as on certain remaining issues. Detailed requirements for these are provided in sections 6 and 7 respectively.

1.4 Definitions

The definitions in sections 3 and 111 of the MVRMA apply. In addition, definitions in the following guidelines and reference bulletins issued by the Review Board apply:

- *Environmental Impact Assessment Guidelines*, Mackenzie Valley Environmental Impact Review Board, Yellowknife, NT. March 2004
- *Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment*, Mackenzie Valley Environmental Impact Review Board, Yellowknife, NT. July 2005.
- *Socio-Economic Impact Assessment Guidelines*, Mackenzie Valley Environmental Impact Review Board, Yellowknife. March 2006.
- *Reference Bulletin: Operational Interpretation of Key Terminology in Part 5 of the Mackenzie Valley Resource Management Act*. Mackenzie Valley Environmental Impact Review Board, Yellowknife. April 2006.

Throughout this environmental impact review the term “community” refers to any potentially affects settlement, town, village, or city as well as any First Nation or Métis group within the Tlicho and Akaitcho regions unless otherwise specified.

1.5 Legal Requirements

This environmental impact review is subject to the requirements of Part 5 of the MVRMA. It is also subject to the Review Board's *Rules of Procedure*, which the Panel

adopted as its own. The review process is further described in the Review Board's *Environmental Impact Assessment Guidelines*. Copies of these documents can be obtained by contacting the Review Board or at www.mveirb.nt.ca.

1.6 Document Overview

The remainder of this document is organized as follows:

- Section 2** defines the scope of the development under review, as well as the scope of the environmental impact review.
- Section 3** provides the Panel's general information requirements. It describes the required information about proposed development and the existing environment. This section also discusses various other aspects of assessment, including² how the developer must describe impact predictions, significance criteria, use of traditional knowledge, and follow-up programs.
- Section 4** describes the Key Lines of Inquiry. It provides a description of each issue, an account of why it is particularly relevant, and an account of the Panel's expectations for addressing the issue in the EIS.
- Section 5** describes the Subjects of Note. Similarly to the previous sections, it provides a description of each issue, an account of why it is particularly relevant, and an account of the Panel's expectations for addressing the issue in the EIS.
- Section 6** describes the Panel's requirements for the analysis of the overall sustainability of the development and cumulative effects analysis.
- Section 7** provides information requirements for all remaining issues, organized by subject and listed in tables.
- Section 8** provides guidance on the deliverables required from the developer.

² Throughout this document, the term "including" implies "including but not limited to".

2 Scope

2.1 Scope of Development

The scope of the development under review includes the principal development, which is an open pit diamond mine and any activities or structures associated with the principal development, from pre-construction to closure and reclamation. Table 2-1 provides a brief overview of the development components.

Phase	Components/Activities
Construction	Construction of mine facilities and associated works
	Construction of dikes for dewatering of lake and diversion structures to manage inflows to the watershed
Mining Operations	Removal and transportation of waste rock, kimberlite and mine water from the open pits, including the use of explosives
	Processing of ore to extract diamonds
	Storage and handling of processed kimberlite
	Storage and handling of waste rock
	Removal of diamonds from mine site
Water Management	Dewatering of Kennady Lake
	Handling of mine water
	Surface water management
	Removal of water from Kennady Lake for use at the mine site, both by mining personnel and for mining operations, including dust control
	Water treatment and sewage disposal
Transport and Surface Structures	Use of the current Tibbitt-Contwoyto winter road and any alternate routes
	Construction of an access road from Tibbitt-Contwoyto winter road to development site and any alternate routes
	Construction and upgrading of airstrip and air transport activities
	Solid waste management and containment areas
	Surface structures, including power plant, sewage and water treatment plants, camp facilities, roads, and ore processing plant
Closure and Reclamation	Closure and reclamation of the mine site

Table 2-1: Development Overview

The development scope is based on the *Application Report*³ to the Mackenzie Valley Land and Water Board. Alternatives and any other changes to the proposed development must be included.

2.2 Scope of Review

The scope of the environmental impact review is governed by the requirements of the MVRMA, the Review Board's *Report of Environmental Assessment* of the Gahcho Kué project and the Panel, as well as recognized best practices in environmental impact assessment.

2.2.1 MVRMA Scoping Requirements

The MVRMA defines an impact on the environment to mean “any effect on land, water, air, or any component of the environment, as well as on wildlife harvesting, and includes any effect on the social and cultural environment or on heritage resources” (MVRMA section 111(1)). Moreover, the MVRMA provides the review process with guiding principles, including “*having regard to:*

- a) the protection of the environment from significant adverse impacts of proposed development;*
- b) the protection of the social, cultural and economic well-being of residents and communities in the Mackenzie Valley; and*
- c) the importance of conservation to the well-being and way of life of the aboriginal peoples of Canada [..]” (MVRMA section 115).*

Sections 117(2) and 117(3) of the MVRMA list a number of factors the Panel must consider in the environmental impact review. These include:

- impacts on the environment, including impacts of malfunctions and cumulative impacts, and their significance;
- comments by members of the public;
- the need for mitigative or remedial measures;
- the purpose of the development;
- alternative means of carrying out the development;
- the need for follow up programs; and
- the capacity of renewable resources to meet future needs.

Sections 134(1) and 134(2) of the MVRMA outline a process for the impact review that includes the submission of an environmental impact statement by the developer, an

³ De Beers Canada, 2005: “Application Report for the Mackenzie Valley Land and Water Board”, attachment to Land Use Permit Application MV20050032, DeBeers Canada, November 2005, Yellowknife, NT

analysis of the development by the Panel, as well as a report with the Panel's conclusions and its recommendation whether the proposal should be approved.

The scope of this environmental impact review includes all potential impacts on the bio-physical and the human environment from the development, by itself and in combination with other past, present and reasonably foreseeable future developments. The temporal scope of the review ranges from pre-construction activities to construction, operation, closure, and post closure until reclamation is achieved.

In addition to the items described in this *Terms of Reference*, the Panel may require further additional information or clarification at any time during the review process.

2.2.2 Report of Environmental Assessment Scoping Requirements

The Review Board's *Report of Environmental Assessment* provides a description of the Review Board's effort to scope the issues for this development, including technical and community workshops, as well as public hearings. The *Report of Environmental Assessment* lists all issues raised during the scoping in the form of issues diagrams.

The *Report of Environmental Assessment* lists seven Key Lines of Inquiry and eighteen Subjects of Note. These are the results of efforts to prioritize issues during scoping. Parties to the environmental assessment requested that all issues raised, even if not covered by any key line or subject, be included in the scope of assessment. For this reason, all issues listed in the *Report of Environmental Assessment* and in the corresponding issues tables provided in this *Terms of Reference* are within the scope of the environmental impact review.

The Panel accepts the prioritization of issues prepared by the Review Board and requires the environmental impact statement to emphasize, and provide more detailed information for, Key Lines of Inquiry and Subjects of Note, as outlined in section 1.3, section 4 and section 5.

The *Report of Environmental Assessment* outlines the extent of the geographic area for which further study is required. The Panel accepts this.

Geographic scope of study must be appropriate for the potential impact being assessed. The geographic scope is defined for each topic in sections 4 and 5.

3 General Information Requirements

This section outlines information requirements regarding the developer, the description of the proposed development and the existing environment, the methods used for predicting impacts, and the presentation of information in the environmental impact statement.

If, at any time, the developer is unsure about the requirements of this *Terms of Reference* or the nature of the information requested, the developer should contact the Panel office in writing to seek clarification.

3.1 *Development and Environment Description*

3.1.1 Developer

DeBeers Canada must provide the following information regarding the developer and its partners:

- the ownership of the proposed development and its organizational structure, including the division of responsibilities between the partners to the Gahcho Kué project;
- a summary of the environmental performance and policies (including socio-economic policies) of the developer, its partners and parent companies; and
- a description of the relationship between DeBeers Canada and its contractors and subcontractors, including how the company will ensure that the contractors and subcontractors will be responsible for upholding relevant commitments made by DeBeers Canada.

3.1.2 Development Description

While the *Application Report* contains a general description of the development, the developer is required to provide a comprehensive development description as it is currently proposed. The EIS is intended to be a stand alone document. More detail than provided in the *Application Report* may be required for some development components, including ancillary developments that need to be constructed or improved. Sufficient detail must be provided for the Panel to adequately consider the potential impacts of the development and to adequately address the factors to be considered in the impact review (see section 2.2).

In particular, the developer is requested to provide the following additional information:

- ***Economic and Employment Information:*** This must include expected capital costs, estimated operating costs, and total expected revenues (at current market values for diamonds). The number of person years of work, broken down by life cycle stage, must be reported, as well the number and types of jobs (using a

recognized classification system), worker housing situations, transportation to work, and proposed work scheduling.

- ***Rationale for the need of the development:*** The rationale must describe the developer's motivation and the developer's understanding of how the proposed development meets the needs of potentially affected communities and the NWT in general. The analysis must include a discussion of the proposed timing of this development in relation to other ongoing or proposed developments, such as existing diamond mines and the Mackenzie Gas Project.
- ***Alternative means for carrying out the development:*** The EIS must provide a reasonably detailed analysis of alternatives to individual development components or activities, including but not limited to energy sources, mining, transportation and reclamation methods and rotation schedules.

Where appropriate, video presentations, maps, aerial photographs, and other visual media must be used to facilitate understanding of the proposed development by all parties.

The EIS must also include a description of all regulatory permits, licenses and other authorizations required to carry out the development.

3.1.3 Existing Environment

A detailed description of the existing environment is required, including current status and trends for all valued components. This description must contain sufficient detail for the parties and the Panel to thoroughly assess the potential direct, indirect and cumulative impacts from the proposed development. The description must also be presented in sufficient detail with statistical information to be used for subsequent follow-up programs.

The developer is required to describe the following:

Development Location

- the physical location of the proposed development (with maps), including ecozone(s) and ecoregion(s);

Physical Environment

Bedrock and Subsurface Conditions

- bedrock type, depth, and composition;
- acid rock drainage potential of exposed bedrock;

Surficial Materials & Soils

- unconsolidated materials and terrain types, including thickness;
- landforms, including bogs, fens and peat plateaus;
- soil types, including groups, series and type;

Granular Materials

- locations, type of materials, size and depth of deposit;
- permafrost and ice conditions within deposits, including discussion of material stability;
- quantity and availability of granular materials;

Permafrost

- distribution, thickness and lateral extent on the surface;
- permafrost processes, features and stability, including a description of the active layer;
- extent, locations and dimensions of taliks, included any connections between taliks in terms of groundwater movement;
- the interfaces between frozen and unfrozen ground (including frequency and length of segments,);

Areas of Potential Instability

- areas of geological instability, geological hazard and seismicity;

Climate

- prevailing climatic conditions and seasonal variations, including trends and extreme phases such as 100 year rain falls;
- predominant winds, including direction and speed;
- temperature levels;
- precipitation levels (rain, snowfall, snow depth, fog);
- location of recording stations for climatic data and length of record available;

Air Quality

- airshed(s) within which the project is located and provide a rationale for the delineation;
- any current sources of emissions to the airshed(s), including current seasonal variations, climatic conditions that affect air quality;
- visibility;
- sources of data, including locations of any recording stations and length of record available;

Noise

- existing sources of noise in the project area;
- present noise in terms of frequency, duration, decibel levels throughout the year;

Water Quality and Quantity

- all water bodies, watercourses, major drainage areas and watersheds potentially affected by the proposed development;
- Kennady Lake, including:
 - lake bed bathymetry and composition;
 - lake volumes and seasonal variations;
 - freeze/thaw timing;
 - permafrost conditions beneath or around lake; and
 - flow patterns;
- existing water quality for each water body identified for use in the proposed development, and those immediately downstream;
- existing groundwater resources in the project area, including quality and quantity, flow patterns, recharge and discharge areas, and interactions with surface water; and
- identify relevant federal, provincial or territorial guidelines, criteria or legislation;

Biological Environment

Fish and Aquatic Life Forms

- fish-bearing waterbodies and watercourses that may be affected by the proposed development;
- potentially affected species and local populations, and for each describe:
 - seasonal and life cycle movements;
 - habitat requirements for each life stage;
 - local and regional abundance, distribution, use of habitat;
 - known sensitive habitat areas, species or life stage/activity (e.g. spawning, hatching, feeding);
- key species used for traditional harvesting activities and any ecotourism activities;
- micro-organism community present in Kennady Lake, including planktons, algae and benthic invertebrates;
- any known issues currently affecting fish and aquatic life forms in the development (e.g. contamination of food sources, parasites, disease);

Birds and Bird Habitat

- species present, and for each describe:
 - abundance, distribution, seasonal movements, and habitat requirements;
 - areas of specific use at various life stages (e.g. breeding grounds, moulting periods); and
 - any sensitive time periods or habitat;
- key species used for traditional harvesting activities;
- any known issues currently affecting birds and bird habitat in the development area (e.g. contamination of food sources, parasites, disease);

Caribou

- each herd and subspecies present, and for each describe:
 - current population trends, including abundance, distribution and demographic rates such as calf survival, and adult mortality;
 - habitat requirements, including identifying areas of specific habitat use at different life stages (e.g. calving grounds, post calving and summer ranges);
 - attributes of the seasonal habitats that relate to how caribou use them (e.g. insect relief, travel routes, forage);
 - known population pressures, both natural and anthropogenic; and,
 - gaps in current knowledge of caribou such as assessing impacts disturbance, harvesting, behaviour or abundance;
- migratory routes, patterns and timings in relation to the proposed project activities including typical patterns and the range of known variation;
- traditional harvesting activities in relation to caribou;
- traditional values in the context of respect for caribou and how people should behave toward caribou;
- any known issues currently affecting caribou in the development area, (e.g. contamination of food sources, parasites, disease);

Mammals (Excluding Caribou)

- species present, and for each describe:

- abundance, distribution, seasonal movements, habitat requirements;
 - areas of specific habitat use at various life stages (e.g. denning);
 - any sensitive time periods or habitat; and
 - any other relevant sensitivities or limiting factors, such as behaviours or territory requirements.
- key species used during traditional harvesting activities;
 - any known issues currently affecting wildlife (excluding caribou) in the development area, (e.g. contamination of food sources, parasites, disease);

Vegetation

- vegetation types in the project area (including a map and any classification systems relevant to the area);
- species present in the project area and indicate any species that are valued or rare;
- baseline levels of contamination of local vegetation including lichen indicator species;
- the existing natural fire regime, including frequency and past events;

Biologically Vulnerable Species

- any species present or potentially present in the project area that are listed under the federal *Species At Risk Act* as Special Concern, Threatened or Endangered;
- any species listed by the GNWT with designations “may be at risk”, “at risk” or “sensitive” in the *General Status Rankings for Species in the NWT*;
- any species present or potentially present in the project area that are under consideration or are listed by as well as any species listed by the Committee on the Status of Endangered Wildlife in Canada;
- for species present, describe their specific locations, critical habitat, residences, population status, limits and size, sensitivities and other limiting factors;

Human Environment

- physical infrastructure present in the project area (including roads, buildings, quarries, power lines and other industrial works) and any roads that provide access to the project area. Especially important is an in-depth

analysis of all winter and all season roads along which equipment, supplies and fuel would be trucked. This analysis must indicate the loads currently traveling these corridors and expected increases during development activities;

- socio-economic conditions, including the current capacity to provide social services in the potentially affected communities ;
- historic and present land use, with the identification of traditional land use groups and areas of overlapping land use; and
- cultural, archaeological and heritage resources, with the identification of the cultural groups who associate with these resources.

The developer is encouraged to use the Review Board's *Socio Economic Impact Assessment Guidelines* to help prepare the socio-economic impact assessment (SEIA). Given the size of the proposed development and the public concern leading to the environmental impact review, a comprehensive SEIA is required. Appendices D and E of the *Socio-economic Impact Assessment Guidelines* identify some elements of the human environment to be considered. When developing a portrait of the existing human environment, the developer must use an issues-driven approach, focusing on valued components, criteria and indicators that are both important to the potentially affected communities in question and potentially affected by the development being proposed.

3.2 Assessment Methods and Presentation

3.2.1 Impact Predictions

Methods used to describe the environmental conditions and to identify and measure impacts on the environment should be consistent with high standards and best practice in the relevant subject area. Predictions should be presented in a way that facilitates the formulation of testable questions for future follow-up programs. Pathways of predicted impacts should be shown schematically and described in words. Methods used to predict how environmental changes could affect the development should also be explained.

In describing methodology:

- explain how scientific, engineering, traditional, and other knowledge was used to
 - describe the existing environment,
 - evaluate potential impacts, and
 - reach conclusions;
- document all models and studies so that analyses are transparent, and where appropriate, reproducible;
- identify which studies included the assistance of communities, who was involved, and how participants were selected;

- specify data collection methods and report the uncertainty, reliability and sensitivity of the methods used to reach conclusions;
- identify and justify any assumptions made;
- support analyses, interpretation of results and conclusions with reference to appropriate literature;
- specify and reference sources for any contributions based on traditional knowledge; and
- identify all proposed mitigation measures, along with evaluations of confidence levels in the effectiveness of those measures, and describe the residual impacts.

3.2.2 Significance Determination

The developer must provide its views on the significance of impacts, using the following criteria:

Direction The main focus of the impact review is to assess whether the development is likely to cause significant adverse impacts on the environment or be cause for public concern. The developer is also encouraged to report anticipated positive changes. These may be used by parties or the Panel to evaluate the overall impact of the development.

Magnitude Magnitude refers to the degree of change that may be caused, e.g. amount of water diverted. Where possible magnitude should be reported in absolute and in relative terms.

Likelihood Likelihood refers to the probability of the impact occurring.

Geographical Extent Geographical extent refers to the area affected. In using this criterion “locational intensities” must be considered as well, i.e. where an impact may affect various areas to differing degrees, separate analysis may be required. For example, downstream effects may be separated into several geographic areas of high, medium, low magnitude, rather than reporting an average impact on a large area.

Duration Both the duration of individual events (e.g. waste water discharges) and the overall time frame during which the impact may occur (e.g. during construction, operation, and closure) must be considered. In addition, the length of time effects will last must be reported and considered.

Frequency The frequency of impacts and events causing impacts must be considered, as well as the length of time between occurrences.

Reversibility

The reversibility of any impacts must be considered not only in terms of whether the impact is reversible at all but also in terms of how much time will be required for the affected environmental component to recover.

In terms of the human environment the manageability of impacts may be considered rather than their actual reversibility. Where appropriate the evaluation must also identify the existing social resources that may be diverted due to the proposed development to facilitate maintenance of acceptable conditions.

Ecological Context

Ecological context refers to the type of the impact as well as the nature of the affected environmental component. For example, the mortality of a hundred caribou might be considered significant, while the mortality of a thousand mosquitos might not, although all other criteria such as frequency, geographic extent and even magnitude may appear to indicate otherwise. Generally an impact on a highly valued component may trigger significance at relatively low magnitude, duration, and likelihood.

3.2.3 Uncertainty Analysis

Any impact prediction or impact analysis contains an amount of uncertainty. This may be related to limitations in understanding of natural systems or the inability to predict future events or conditions (e.g. disasters or a very warm winter). The environmental impact statement must provide a reasonably accurate description of the uncertainties associated with each prediction or analysis. Similarly, when making a significance determination the impact statement must report the confidence with which this determination can be made. The uncertainty analysis must include a description of the confidence in underlying assumptions, models, data sources, etc. The uncertainty analysis must also identify parameters that should receive particular attention when developing follow-up programs.

3.2.4 Valued Components

Conventionally environmental impact assessment uses valued components (also referred to as valued ecosystem components or valued socio-economic components) to focus impact predictions on important components of the bio-physical and human environment. Individual species or societal goals are commonly selected as valued components. The environmental assessment of the Gahcho Kué project already identified numerous potential valued components, listed in the various issues diagrams in the *Report of Environmental Assessment* and provided in more detail in the tables in section 7.

The Key Lines of Inquiry involve highly valued components. Similarly, the Subjects of Note provide important information on the selection of valued components. The developer must use the issues identified during the environmental assessment as the basis for the selection of any valued components. Key Lines of Inquiry and Subjects of Note are interdisciplinary, and typically will involve more than one valued component. The developer may select additional valued components not identified in the *Report of Environmental Assessment*, but must ensure that all Key Lines of Inquiry and Subjects of Note are thoroughly reflected in the identification of related valued components.

The EIS must provide a rationale for selecting valued components.

3.2.5 Traditional Knowledge

The Panel will rely on both traditional knowledge and conventional scientific knowledge in its deliberations. In the Panel's view traditional knowledge holders are experts in their own right and must be treated with the same respect as scientific experts.

The developer is encouraged to apply the Review Board's *Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment* wherever applicable when preparing the environmental impact statement. The environmental impact statement is required to:

- provide a summary of efforts made to collect relevant traditional knowledge;
- explain how traditional knowledge influenced project design, impact predictions, and mitigation measures; and
- provide a plan for future cooperation between the developer and traditional knowledge holders covering the full temporal scope of the proposed development.

Traditional knowledge is expected to be particularly helpful in the holistic analysis but use of traditional knowledge must be reported in all relevant sections.

In addition to incorporating traditional knowledge in impact predictions and significance analysis for individual issues, Key Lines of Inquiry, and Subjects of Note, the EIS must contain a comprehensive, stand alone, section on traditional knowledge. This section must provide sufficient information to allow the Panel and parties, particularly those representing traditional knowledge holders, to evaluate acquisition and analysis of traditional knowledge by the developer.

The traditional knowledge summary report must address the following specific items:

- which communities and traditional knowledge holders participated in any traditional knowledge studies and how those participants were identified and agreed upon;
- what approach was taken in working with traditional knowledge holders and in the collection and use of traditional knowledge, and why;
- verify for each community whether there are policies and cultural practices for the acceptable standards for working with traditional knowledge holders and

handling the traditional knowledge. Where these do exist, verify how they were adhered to;

- sources of traditional knowledge that have been used to date, including specific studies, archives, and individuals interviewed;
- when traditional knowledge is collected from existing studies and reports, provide verification that secondary sources are relevant and appropriate;
- evidence that the traditional knowledge was collected and peer-reviewed with the Aboriginal community or traditional knowledge holders, and approved by the appropriate individuals or organizations; and
- how traditional knowledge and traditional knowledge holders have influenced the developer's project design, impact assessment, and mitigation measures, as well as reclamation and closure planning.

The EIS must outline any plans for future cooperation between the developer and traditional knowledge holders (e.g. in monitoring and mitigation programs), and provide any commitments or agreements on which groups will participate in future studies.

Subject to confidentiality considerations the summary report on acquisition and analysis of traditional knowledge must include, or have regard to:

- who traditionally (individuals and communities) has used the area;
- who currently uses the area;
- what types of use are noted (historical and current);
- cultural practices and sacred sites;
- hunting, trapping and gathering;
- social activities;
- land use patterns; and
- cultural significance (including spiritual significance) of the area.

Where traditional knowledge and conventional science come to different impact predictions, the EIS must identify the different conclusions and outline how the developer proposes to deal with the disagreement (e.g. through adaptive management options).

The methods used in the acquisition, analysis, and presentation of traditional knowledge are at the developer's discretion but must be consistent with the Review Board's *Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment*.

3.2.6 Alternatives

Section 3.1 of these *Terms of Reference* requires the description of alternatives to the development and of alternative means of carrying out the development. The developer should use the development as described in the EIS as the baseline case for predicting

impacts and determining significance of alternatives. Development alternatives may be analyzed in terms of how they would alter these impacts, where separate impact predictions are not feasible.

The EIS must provide a reasonably detailed analysis of alternatives to individual development components or activities, including but not limited to:

- energy sources and energy conservation measures;
- disposal methods (e.g. alternatives to back filling of pits, alternative designs for the waste rock pile, alternatives to the use of two on-land processed kimberlite containment facilities);
- alternative transportation methods to reduce impacts along the ice road route;
- alternatives to the conventional two week staff rotation;
- alternative reclamation methods (e.g. alternatives for re-filling Kennady Lake); and
- other alternatives that the developer considered or may be considering (e.g. different extraction rates to extend the life of the mine, underground mining options).

When discussing alternatives the EIS must also provide an overview of how environmental conditions have influenced the project design. The EIS should not limit alternative means for carrying out the development to alternatives the developer currently considers feasible. The EIS must report all alternatives the developer considered and dismissed during the early project design, and must provide reasons for dismissal.

In addition, when analyzing alternatives to the development, the developer needs to do a full accounting of potential opportunity costs to communities and governments associated with the development. This may require a calculation of "futures foregone" (i.e., what alternative future development options would be undermined or otherwise impacted if the proposed development goes ahead). Consideration of potential adverse impacts on eco-tourism, outfitting, and the traditional harvesting economy must be included.

3.2.7 Follow-Up Programs

The MVRMA defines a follow up program as “*a program for evaluating*

- (a) the soundness of an environmental assessment or environmental impact review of a proposal for a development; and*
- (b) the effectiveness of the mitigative or remedial measures imposed as conditions of approval of the proposal.”*

The proposed development would be the fifth diamond mine in the Slave Geological Province and the fourth within the Mackenzie Valley. This fact not only causes concerns related to cumulative effects, it also provides the opportunity to evaluate impact

predictions and mitigation measures from previous developments, and to adapt the design and management of the Gahcho Kué mine accordingly.

The EIS must include a description of any follow up programs, contingency plans, or adaptive management programs the developer proposes to employ before, during, and after the proposed development, for the purpose of recognizing and managing unpredicted problems. The EIS must explain how the developer proposes to verify impact predictions. The impact statement must also describe what alternative measures will be used in cases where a proposed mitigation measure does not produce the anticipated result.

The EIS must provide a review of relevant research, monitoring and follow up activities since the first diamond mine was permitted in the Slave Geological Province to the extent that the relevant information is publicly available. This review must focus on the verification of impact predictions and the effectiveness of mitigation measures proposed in previous diamond mine environmental impact assessments. In particular the developer must make every reasonable effort to verify and evaluate the effectiveness of any proposed mitigation measures that have been used, or are similar to those used at other diamond mining projects in the Mackenzie Valley.

The EIS must include a proposal of how monitoring activities at the Gahcho Kué diamond mine can be coordinated with monitoring programs at all other diamond mines in the Slave Geological Province to facilitate cumulative impact monitoring and management. This proposal must also consider reporting mechanisms that could inform future environmental assessments or impact reviews. The developer is not expected to design and set up an entire regional monitoring system, but is expected to describe its views on a potential system. The developer must also state its views on the separation between developer and government responsibilities.

The term “monitoring” can be applied to several different activities. The developer must clearly distinguish which of the following meanings is meant with each use of the term “monitoring” in the EIS:

1. compliance inspection (i.e. the activities, procedures and programs undertaken to confirm the implementation of approved design standards, mitigation, conditions of approval and company commitments);
2. environmental monitoring (i.e. monitoring to track conditions or issues during the development lifespan, and subsequent adaptation of project management); or,
3. follow-up (i.e. any programs to verify the accuracy of impact predictions and determine the effectiveness of mitigation measures).

3.2.8 Presentation and Cross Referencing

The EIS must include a guide that clearly cross-references the *Terms of Reference* with the impact statement. Where any information required by the *Terms of Reference* cannot be provided, the EIS shall include the reason for the omission. The environmental impact statement must include an index that will allow parties to quickly find relevant sections of

the document. All mitigation measures proposed by the developer must be summarized in a “Table of Commitments” for easy reference.

The developer is encouraged to use modern technologies for presenting the information, including the use of hypertext for easy cross referencing. Similarly the use of maps, satellite imagery, photographs and other graphical depictions (such as Google Earth) is encouraged, as is the use of non-technical plain language.

Where possible, geographic information, or data, should be submitted in a format that allows the Panel and parties to conduct their own geographic information system (GIS) analysis. All GIS data must conform to the standards set by the GNWT’s spatial data warehouse⁴.

To facilitate public participation in this review, the EIS must contain plain language summaries in English, Chipewyan, Tlicho, and French.

⁴ The GNWT’s spatial data warehouse may be accessed at <http://maps.gnwtgeomatics.nt.ca/portal/index.jsp>.

4 Key Lines of Inquiry

4.1 Introduction to Key Lines of Inquiry

Key Lines of Inquiry are areas of the greatest concern that require the most attention during the environmental impact review and the most rigorous analysis and detail in the EIS. Key Lines of Inquiry are identified to ensure a comprehensive, detailed analysis of the issues that resulted in significant public concern about the proposed development during the environmental assessment.

Four Key Lines of Inquiry deal mainly, although not exclusively, with the biophysical environment. These are:

- caribou;
- water quality and fish in Kennady Lake;
- downstream water effects; and
- long term biophysical effects and closure issues;

Another three Key Lines of Inquiry concern mostly the human or socio-economic environment. These are:

- family and community cohesion;
- social disparity within and between communities; and
- long term social, cultural and economic effects.

Because these are top priorities, they require the highest level of consideration. For each of these, the analysis must include substantive modeling combined with expert evaluation in producing reliable predictions. Detailed consideration of public input and traditional knowledge are expected for all of these topics. Any that involve valued components that are influenced by more than one human activity or development will require detailed cumulative effects analyses. As well, all the Panel's expectations regarding assessment methods, as described in section 3.2, must be addressed for each Key Line of Inquiry.

The remainder of this section describes the Key Lines of Inquiry and provides specific information requirements where these have been identified in the environmental assessment.

4.1.1 Caribou

The environmental assessment identified caribou as the single most valued component. Caribou numbers decreased sharply in recent years and there seems to be consensus among Aboriginal groups that caribou are in poor health. Caribou are not only an important food source for traditional land users, they play an extremely important role in Aboriginal culture. Impacts on caribou are likely to result in corresponding economic,

social, and cultural impacts. Threats to caribou are seen not just from the proposed development alone but cumulatively from all the diamond mines, mineral exploration, and other activities within their range.

Within this Key Line of Inquiry the EIS must detail any effects on caribou, as well as their significance and likelihood in accordance with the instructions in sections 3.2 on assessment methods and section 7 on wildlife issues. In addition, the EIS must address how changes to abundance, health, distribution, and behaviour of caribou may affect the social, cultural, and economic well being of residents of the Mackenzie Valley, particularly Aboriginal communities in the regional study area. This must include an evaluation of possible contamination of country foods, and of possible impacts on hunting.

Discrepancies exist between some impact predictions in previous diamond mine assessments and the real or perceived outcomes. The EIS needs to address this by explaining how it incorporated lessons learned. To this end the developer is required to include a summary of caribou research and caribou related monitoring activities and their results for the potentially affected herds since the first diamond mine was permitted, to the extent that relevant information is publicly available.

The EIS must outline management options for dealing with impacts on caribou and related socio-economic impacts. For situations where the proposed development is predicted to be only one of many sources of impacts, direct or indirect, that combine in a cumulative manner, the EIS should outline what contributions this development can make to addressing a cumulative problem.

For potential impacts on caribou the geographical scope includes the potentially affected portion of the range of any herd that may be affected, including but not restricted to the vicinity of the mine site, the access road from Mackay Lake, and the Tibbitt to Contwoyto Road up to the start of the access road at Mackay Lake. Research and monitoring activities must be included for the Tibbitt to Contwoyto winter road corridor. Observations from existing diamond mines must be used to establish how far from a mine site caribou show behavioural changes.

The environmental impact assessment for the BHP Ekati mine in the mid 1990s coincided with a higher population level for the Bathurst caribou herd. The Gahcho Kué project comes at a time when caribou populations are considerably smaller. This may influence the significance of potential effects on the herd.

The following specific information needs were identified and must be included in the caribou-specific impact analysis:

- Information on all caribou herds with ranges that include the area of the proposed development, as well as the Tibbitt to Contwoyto winter road (including population size, demographics, trends, range use patterns and condition).
- A description of any life stages (including calving, post calving, overwintering, and migration) during which each herd may interact with the proposed development.

- An estimate of the amount (absolute and relative) of habitat loss, change, degradation, or effective habitat loss for each potentially affected herd for various life stages resulting from the development.
- An estimate of the existing habitat fragmentation at the landscape (seasonal range) and local (site) scale, the expected increase, and its possible effects on each potentially affected caribou herd for various life stages.
- An analysis of ways the proposed development may influence the energy balance of caribou under different seasonal conditions and to what extent this may affect birthrates, and calf survival. The analysis must include potential behavioural changes resulting from development components or associated activities, including sensory disturbance, effects on foraging, resting, and caribou movements within the development area. Moreover, the analysis must be broken down into disturbance from individual components, including construction and operation of the mine, traffic on the access route, as well as air traffic.
- The identification of all possible sources for increased caribou mortality.
- The identification of all hazards to caribou within the development area and access routes, particularly Tibbitt to Contwoyto winter road crossings, as well as road crossings at the site and hazards that may be posed from waste rock and processed kimberlite containment facilities, materials used to build roads and berms and the exposed lake bottom (e.g. contact with contaminated or hazardous materials).
- The identification of all possible pathways for caribou exposure to contaminants, e.g. from exposure to dust or intake of contaminated forage (e.g. lichens affected by air pollution) or direct intake of tailings, as well as any measures or actions to be taken to minimize exposure. Include a description of any resulting caribou health issues (risk analyses) as well as an evaluation of potential avoidance of caribou as food source by Aboriginal communities.
- An identification of all potential changes to the predator-prey relationship of any potentially affected herd and how this may affect the herds.
- The identification of all components and associated activities of the development (including use of the Tibbitt to Contwoyto winter road) that may have an effect on caribou, regardless of whether they are in the developer's view significant or not.
- The identification of all additive, multiplicative, or synergetic effects that may result from the components or activities associated with the proposed development. Determine the overall effect of all components of the development as a whole on caribou.
- A description of any methods used to distinguish between impacts from development and natural variations in caribou numbers, health or behaviour.
- The identification of potential impacts on caribou from sources other than the proposed development, particularly those that may be influenced by the development. This must include an evaluation of any potential development related changes to harvest levels for each potentially affected caribou herd, e.g. by creating an access

via the Mackay Lake road into an area previously inaccessible to vehicular traffic. Natural factors that increase the vulnerability of caribou must be considered as well.

- The identification of all cumulative effects of other past, current, or reasonably foreseeable future developments within the range of each potentially affected caribou herd in combination with individual components or activities of the proposed development and its effects on other environmental components such as predators as well as the overall effect of the proposed development.
- An outline of any potential measures or actions to minimize impacts, (e.g. various road bed designs). To the extent possible this should include an evaluation of any proposed mitigation against the measures implemented by previous diamond mine developments and a discussion of the likelihood of success for each measure.
- An explanation how any proposed mitigation measures, including plans for progressive reclamation, will contribute to the sustainability of the Bathurst caribou herd as well as other potentially affected herds.
- An outline of any adaptive management strategies (i.e. what management response will occur if adverse effects on caribou are detected) for any of the items listed above, as well as any plans for monitoring effects on caribou. Management strategies must be outlined where observed effects may be linked directly or indirectly to the proposed development.

4.1.2 Water Quality and Fish in Kennady Lake

Lowering the water level of the majority of the lake and exposing the lake bottom for 15 or more years is of great concern to relevant government departments and Aboriginal communities. During the scoping exercise both groups questioned the ability of the ecosystem to recover. Similarly, the question of long term stability of deposited waste rock and processed kimberlite in excavated pits resulted in concern among various parties.

The EIS must provide a detailed analysis of all impacts on fish abundance, health, and fitness for consumption including a comprehensive analysis of potential impacts on water quality of Kennady Lake as a result of possible contamination. Particular emphasis must be placed on the ability of the lake ecosystem, particularly fish and fish habitat, to recover from prolonged exposure of the lake bed and on the viability of the proposed disposal methods for waste rock and kimberlite. The geographic scope for the analysis of this Key Line of Inquiry includes Kennady Lake itself, along with its inlets, outlets and riparian zones. Downstream areas are considered in the next Key Line of Inquiry.

This Key Line of Inquiry is closely related to the one described in 4.1.4. Where appropriate information requirements identified there should also be addressed here via a summary analysis.

Describe the following regarding fish in Kennady Lake:

- any impacts associated with the fish-out, fish salvage and restocking;

- habitat destruction and creation, including potential for interrupting fish migration, alterations to natural drainage, and addition of deep water habitat;
- possible fish contamination and wildlife and human health effects from contaminated fish consumption, including pathways and long and short term exposure levels and health effects of toxic exposure levels on wildlife and humans; and
- possible changes to fish behavior including interruption of migration and spawning patterns and associated effects and changes in the behavior of wildlife species dependent on fish populations.

Describe the following regarding water quality in Kennady Lake:

- water balance for Kennady Lake and analysis of related uncertainties;
- expected changes in turbidity in Kennady Lake with adaptive management options for unexpected turbidity levels (this analysis may use simulation models);
- the hydrogeological dynamics of the lake bottom under freezing conditions, in particular the potential for highly concentrated deep ground water to be expelled into the remaining ponds during freeze up, as well as an assessment of changes in the thermal regime of the lake bottom and the extent of freezing;
- a description of maintenance procedures for long-term frozen conditions of potentially reactive waste rock and barren kimberlite, including the incorporation of frozen conditions under climate change parameters;
- a long-term monitoring plan of thermal conditions of frozen waste rock and PK piles;
- any interactions between ground water and submerged processed kimberlite and waste rock, including the possibility of the pits being a long term contamination source;
- potential contamination sources including: mill effluent, lakebed sediments, backfilled pits, use of explosives, spills (including additive effects of minor spills over time), waste rock and processed kimberlite, and deep ground water, including adequate information to evaluate the potential for dust generation from the exposed lake bed (e.g. substrate characteristics, particle size, sediment chemistry) as well as bench testing of drying behaviour;
- all potential sources for water contamination, particularly hydrocarbon or ammonium nitrate contamination including accidents and malfunctions. This must also include an evaluation of the potential for explosive charges, exploded or unexploded, to contribute to pollution;
- a detailed water management plan with information on treatment surfactants and reagents with enough detail to assess the capability of the treatment system to protect water quality, including back up options for adaptive management;

- any proposed collection system for runoff from processed kimberlite and waste rock storage facilities, including expected contaminant levels and contingency plans;
- any proposed monitoring activities, including monitoring of untreated runoff from roads or other structures (The principles addressed in section 3.2.7 on compliance inspection, monitoring, and follow-up apply);
- the spatial extent of downstream effects and how these effects may change through time (seasonally and annually);
- water balance calculations during present conditions and over time as the project proceeds is required to compare baseline conditions with future downstream effects;
- impacts on riparian vegetation in Kennady Lake, water fowl, semi-aquatic furbearers, terrestrial mammals, and channel stability from downstream effects of water discharges during construction, fluctuating water levels during operation, and reduced water levels while the lake is re-filling;
- impacts on wildlife resulting from a possible change in freeze up and thaw conditions associated with the de-watering of Kennady Lake;
- reversibility of impacts associated with water level changes and the ability of affected ecosystems to recover;
- the effects of lake dewatering and excavation of pits on ground water flow and quality in the Kennady Lake area in the short and in the long term as well as details on how groundwater flows will be managed (including simulations);
- potential interaction between ground water and the open pits, as well as between ground water and submerged waste rock or kimberlite, including the possibility of the pits being a long term contamination source;
- the relationship between taliks (i.e. unfrozen sections of soil beneath water bodies) and ground water flows in the project area, particularly potential for taliks acting as a pathway for contaminants, including the distribution of taliks in the project area and any connection or interactions between taliks of different lakes;
- the chemical stability of co-disposed waste rock and processed kimberlite; and
- confidence in predictions from long term modeling has been conducted for permafrost issues, particularly effects of the pits on the thermal regime, and a verification that robust monitoring program will be in place.

4.1.3 Downstream Water Effects

The release of large quantities of water during the dewatering of Kennady Lake may have effects on downstream creeks and lakes. Large short-term increases in water flow will be followed by a substantial decrease over a longer period of time as the tertiary pit and lake are re-filling. In addition to fluctuations in lake water volume, Aboriginal communities

are concerned about possible water contamination, their experience with older mines being mainly negative. Areas of concern include but are not limited to: water quality and quantity, riparian vegetation, fish abundance and quality, and wildlife effects.

The ‘downstream water effects’ and ‘water quality and fish in Kennady Lake’ Key Lines of Inquiry are related in that similar concerns are raised. Where the analysis of ‘water quality and fish in Kennady Lake’ identifies potential impacts or where uncertainty exists, the EIS must provide an evaluation of the potential downstream effects and extent of impact. All of the applicable information requirements relating to fish and to water quality described with respect to Kennady Lake in section 4.1.2 must be addressed in the this section with respect to downstream water bodies. This section must also include:

- physical effects of increased flows and changes to water quality on downstream water bodies;
- an analysis of the geographic extent of any downstream effects and a water balance for all affected water bodies;
- a detailed assessment of impacts on aquatic life that considers timing and levels of increased flows and changes to downstream water quality relative to sensitive life stages of fish; and
- a detailed assessment of the potential biological impacts of changes, such as effects on riparian habitat and wildlife such as semi-aquatic fur-bearers and waterfowl that use riparian habitat.

The geographical scope of this Key Line of Inquiry includes all water bodies (and associated riparian areas) downstream of Kennedy Lake up to Great Slave Lake.

4.1.4 Long Term Biophysical Effects, Closure and Reclamation

The environmental assessment revealed considerable concern over the long term effects of this development. In particular, the environmental assessment identified uncertainty about the viability of encapsulating processed kimberlite and mine water in the mined out pits, as well as pessimism about the recovery of the lake ecosystem after mine closure. The EIS must include a conceptual closure and reclamation plan and an analysis of the viability of this plan.

The scoping exercise also resulted in the following specific information needs regarding long term biophysical effects:

- A demonstration of the long term physical stability including long-term maintenance of frozen conditions both within and under waste rock and processed kimberlite storage facilities. If long-term waste storage is solely reliant on frozen conditions, stability of frozen conditions in climate change scenarios must be included;
- a description of any plans to restock the lake;
- an evaluation of the long term physical stability of any works constructed in connection with the development, including reclaimed areas;

- an evaluation of the potential for acid generating rock, the resulting impacts, and the management options to deal with acid generating rock and its impacts;
- a summary of the use of public consultation, consultation with first nations, and traditional knowledge in determining standards and methods for reclamation;
- an evaluation of the possibility of speeding up the re-filling of the lake by utilizing additional water sources;
- a description of the type of fish and other aquatic habitat that will be created during reclamation, including a comparison to the existing habitat, as well as a description how DFO's No Net Loss requirements will fully mitigate all predicted impacts on fish habitat;
- an evaluation of the capacity of the ecosystem to fully recover, or a prediction of the type of ecosystem that is expected to be created instead; and
- any long term monitoring plans, need for long term care and maintenance, assurance of long term monitoring and maintenance, including long term structural and environmental stability of waste rock and kimberlite storage facilities.

As outlined in section 3.2.7, the EIS must include a description of follow up and monitoring programs, contingency plans, or adaptive management programs designed to verify the impact predictions of this environmental impact review. A detailed contingency plan, spelling out monitoring and adaptive management strategies, must be developed to address the possibility that partially backfilled pits will adversely impact water quality in the immediate and surrounding areas.

The geographic scope for this Line of Inquiry includes the areas where any valued component may be affected by the development, including the development area, downstream areas for impacts related to aquatics. The geographical scope for cumulative effects on wildlife should reflect the biological range characteristics of each species or herd.

Since cumulative effects were of great concern during the scoping sessions, the EIS must address follow up programs not only in regards to the direct impacts of the proposed development but also in regards to cumulative impacts in combination with other developments. The EIS must include the developer's vision of a coordinated monitoring program for cumulative effects from all diamond mines between the developer, other developers, Aboriginal communities, and government agencies. The developer is encouraged to review the *Mine Site Reclamation Guidelines for the NWT*.⁵ This requirement is closely related to requirements of section 4.3.2 on cumulative effects assessment.

⁵ Indian and Northern Affairs Canada, 2007: "Mine Site Reclamation Guidelines for the NWT", Indian and Northern Affairs Canada, January 2007, Yellowknife.

4.1.5 Family and Community Cohesion

During environmental assessment scoping sessions representatives of Aboriginal communities reported that increased substance abuse has been observed since diamond mines started operating in the NWT. Moreover, the environmental assessment revealed concerns that an additional influx of money combined with rotational work schedules may have an adverse effect on families, communities and individuals. The scoping exercise identified community wellness related issues applying to individual First Nations and Métis communities, whether located in a specific settlement or not.⁶

The scale and scope of this development (alone and in combination with other developments), along with the sensitivity of the potentially affected communities, indicates that a Comprehensive SEIA, as outlined in Section 3 of the Review Board's *Socio-economic Impact Assessment Guidelines* is necessary.

The geographical scope for this Key Line of Inquiry includes (but is not limited to) communities in the Tlicho and Akaitcho regions.

The EIS must provide a detailed analysis of this Key Line of Inquiry including the following specific issues:

- alternatives to two week rotation (see also section 3.2.6 on alternatives);
- influx of outside workers placing increasing demands on community social fabric and facilities;
- absence of workers from their family;
- decreased family cohesion, including breakups of families;
- absence of leaders, volunteers, etc. from communities;
- changes in levels of substance abuse;
- changes in traditional practices and levels of participation in traditional practices;
- migration of workers and their family to larger centres; and
- money management and changes in lifestyle choices.

For this, as well as other socio-economic issues, it is important that the EIS provides a separate analysis for each potentially affected community, including communities not associated with a particular settlement in addition to a regional study. The analysis must address the vulnerability of each community and describe how each community was involved in the assessment of impacts for this Key Line of Inquiry. The EIS must report on indicators of cultural resilience for affected communities, such as practice of language, story telling, and cultural activities, as well as consumption of country foods.

The Panel realizes that the developer cannot be expected to solve pre-existing social problems, such as substance abuse or domestic violence, through the proposed development. Nor can the developer be held responsible for all choices made by individuals, which are influenced by numerous factors beyond the developer's control.

⁶ The table titled "Community Wellness Issues" in section 7 lists the six groups of issues that were identified.

Nonetheless, given the importance of these issues, it is incumbent upon the developer to isolate aspects of its proposed development that might add to the “impact load” being felt by potentially affected communities. The EIS must identify existing vulnerabilities and determine how the proposed development might magnify them.

In addition, the developer is expected to work with communities and relevant government agencies to develop innovative solutions to identified problems. To the extent possible the EIS must outline how the developer might facilitate a cooperative approach to social problems, which may be related to the proposed development. As a minimum the EIS must provide an overview of how similar issues have been addressed in other developments.

While conducting an impact assessment based on identified Valued Components, specific consideration shall be given, but not be limited to, the following, broken down into appropriate geographic and demographic units of analysis. For each chosen component or indicator, the developer is required to identify any development-related changes that may impact on it.

- community and population health and associated indicators such as, but not limited to:
 - population in- and out-migration;
 - alcohol and drug access and use;
 - access to health care;
 - housing pressures;
 - crime rates;
 - access to child care;
 - increased social divisions within or between communities;
 - public safety; and
 - educational access and education completion levels.
- the physical, mental, and cultural well-being of northern mine workers and northern mine workers’ families;
- existing and required social service networks to support community health and wellness (pressures on social services);
- the effect of this and other past, present and reasonably foreseeable developments on political and social development, cultural values, traditional practices and language in potentially affected communities;
- a description, for each identified potential effect, as to how the development may effect valued social and cultural components:
 - at the regional level;
 - at the local level for each potential-affected community; and

- among particularly vulnerable sub-populations within potentially affected communities, such as women, children and Elders;
- an identification of lessons learned from social and cultural impacts of previous mine developments in the NWT and the North, and how they have been incorporated into the impact identification, prediction and mitigation for this development;
- a discussion concerning the development of a Human Resources Management Plan and any programs that will be offered at the mine site to identify and mitigate social problems; and
- a comparison of the likely relative distribution of beneficial and adverse cultural and social impacts among the different potentially affected communities.

4.1.6 Social Disparity Within and Between Communities

The scoping exercise in the environmental assessment identified the issue of increasing social disparity between those participating and benefiting from mine development and those who will not, or cannot, participate. Elders, traditional land users, women, and others who are less likely to participate in mining related activities are not only left behind but have to contend with increased costs of living, causing an effective decrease in standard of living and associated social problems. During the environmental assessment Aboriginal communities expressed concerns that they may not benefit from this development. This concern was based on their experience with previous mines and on the already existing skilled labour shortage in the NWT. (See also section 4.1.7 on lost opportunities.)

The EIS must address this issue in a comprehensive and detailed manner including impact predictions and proposed measures to mitigate any impacts. The EIS must clearly state the criteria and relevant indicators for analyzing increased social disparity. This analysis must address disparity not only between individuals but also between communities. As with the previous Key Line of Inquiry (section 4.1.5) a separate analysis for each potentially affected community addressing vulnerabilities, community engagement, and innovative solutions that may indirectly offset the direct impacts from the proposed development is required.

The geographical scope for this Key Line of Inquiry includes (but is not limited to) communities in the Tlicho and Akaitcho regions.

Socio-economic issues, and this Key Line of Inquiry in particular, resulted in high levels of community concern during the scoping of the environmental assessment. The EIS must, therefore, include a detailed description of the engagement with potentially affected communities to ensure adequate consideration of socio-economic issues. This description must include details regarding the specific concerns raised, mechanisms for their resolution, and any aspects of project design intended to accommodate concerns. Communities in the Tlicho and Akaitcho regions include First Nations and Métis residing in any of the cities, towns or settlements in the respective regions.

4.1.7 Long Term Social, Cultural and Economic Effects

During the environmental assessment process, concerns were raised by community members regarding a potential economic downturn after mine closure, resource extraction at a time when many Aboriginal people cannot participate (or are already working at other mines), and lack of long-term benefit to communities as a whole.

The EIS must provide a comprehensive analysis of the development's long term social, cultural, and economic effects. One area to be evaluated is the issue of potentially lost opportunities. The developer proposes to extract a resource at a time when northerners may not be in a position to fully benefit. That resource may not be available when communities may be in a better position to benefit from such a development. The analysis may include a discussion of opportunities not related to the development but facilitated by it. An analysis of projected benefits, actually accrued benefits, and how the proposed development may improve on previous developments is required.

The geographical scope for this Key Line of Inquiry includes (but is not limited to) all communities in the Tlicho and Akaitcho regions, and the NWT overall.

The EIS must also address the following additional longer term issues related to the human environment:

- contribution of this development to the cumulative long term effects on communities from an increasing pace of development, considering communities' abilities to respond to, plan for and benefit from development;
- lack of capacity for monitoring by communities and government;
- single resource dependency – economic over-reliance on one resource;
- increased demands on social, cultural and economic services (e.g. medical transportation, emergency services, hospital services, education, child care, social service, and public health services);
- the likely level of in- and out-migration as a result of the development, including out-migration of skills, and the likely economic impacts of in- and out-migration among potentially affected communities;
- health effects from changed diet (e.g. less country food);
- pressures on organizations and businesses servicing the region, including those who maintain infrastructure or provide social services, caused by:
 - the mobilization of local labour away from potentially affected communities to the Gahcho Kué workforce; and
 - socio-economic effects associated with increasing disposable income and a larger reliance on the wage economy;
- particular sub-populations within potentially affected communities that are more vulnerable to any of the discussed potential economic impacts;
- an estimate of required contractor and subcontractor goods and services required through the different stages of the project life cycle, and associated direct and

indirect economic effects (e.g., local and regional income multipliers);

- the opportunities for - and capacities of - local, regional and territorial businesses to compete for the right to supply required goods and services, both directly to the proposed development, as well as to meet new demand created by economic growth spurred by the development. Include estimates of what percentage of goods and services might feasibly be provided by northern businesses, and discuss any plans, commitments or strategies the developer has for maximizing this percentage;
- how the development will contribute to opportunities to diversify the economic base at the local, regional and territorial level. New local and regional economic development associated with the development, including the production and supply of new goods and services, must be included in this assessment;
- potential other economic uses of the area that may be affected by the proposed development, including an assessment of opportunity costs;
- a list of estimates of all predicted economic impacts, both beneficial and adverse, stemming from the development, including but not limited to impacts caused by:
 - increased government revenues at the local, territorial and national levels (include at minimum an estimate of total expected direct and indirect taxes to be paid to each level of government as a result of Gahcho Kué activities;
 - increased employment numbers, including a prediction of employment multipliers, and the development's estimated effects on employment levels in potentially-affected communities;
 - predicted increases in local income and disposable income levels (identify income multipliers where possible);
 - potential impacts the development will have on local and regional inflationary pressure and the cost of living; and
 - possible effect of the development on other types of economic activity occurring in the potentially affected communities, with emphasis on the traditional economy; and
- for each of the items listed above, how the economic effects identified will be distributed among potentially affected communities versus other areas.

Similar to section 4.1.5 the EIS must outline how the developer might facilitate a cooperative approach to social, cultural, and economic issues, including an overview of how similar issues have been address in other developments. While formal agreements between developers and communities and governments have become a common vehicle for addressing social, cultural, and economic impacts, their existence cannot be considered as mitigation unless their contents can be provided to the Panel.

Similar to the requirements of section 4.1.4 on long term bio-physical effects, the EIS must include at least an outline or overview of proposed follow up programs to verify the impact predictions and to monitor the effectiveness of any mitigation measures. Also similar to section 4.1.4 this must include an evaluation of possible joint monitoring of cumulative effects.

5 Subjects of Note

5.1 Introduction to Subjects of Note

Subjects of Note require a thorough analysis including a cumulative effects assessment, but do not require the same level of detail as Key Lines of Inquiry. The Review Board's *Report of Environmental Assessment* defined eighteen Subjects of Note based on the input from parties and the public during the scoping exercise. The description of each Subject of Note is based on the results of the scoping session and does not represent a determination by the Panel.

Of the eighteen Subjects of Note, eleven deal mostly with biophysical issues, while seven deal with socio-economic issues.

Biophysical Subjects of Note are:

- impacts on Great Slave Lake;
- air quality;
- carnivore mortality
- species at risk and birds;
- permafrost, groundwater, and hydrogeology;
- waste rock and processed kimberlite;
- climate change impacts;
- alternative energy sources;
- other ungulates;
- waste management and wildlife;
- traffic and road issues; and
- vegetation

Socio-economic Subjects of Note are:

- employment, training, and economic development;
- impacts on tourism potential and wilderness character;
- demands on infrastructure;
- culture, heritage and archaeology;
- Aboriginal rights and community engagement; and
- the proposed National Park.

5.2 Biophysical Subjects of Note

5.2.1 Impacts on Great Slave Lake

The Review Board's *Report of Environmental Assessment* identified impacts on Great Slave Lake as a separate Subject of Note. Under the 'downstream water effects' Key Line of Inquiry the EIS must already address the question of how far downstream any

effects from water flow fluctuation and contamination are likely to reach. Therefore, a summary of the analysis for Great Slave lake suffices here.

5.2.2 Air Quality

During the environmental assessment, concerns over air quality were based, in part, on Gahcho Kué being the fifth diamond mine in the general area contributing to air pollution. The EIS consequently must address the issue of emissions from Gahcho Kué adding to pre-existing emissions.

In particular the EIS must provide air quality modeling for construction and operational phases including worst case scenarios. The air quality assessment must include an assessment of risk to human health, including worker camps. The EIS must further identify best available technologies and best management practices to be used. (Other sections dealing with impacts related to dust include 4.1.1, 4.1.2, and 5.2.12).

The geographical scope for this Subject of Note must include the area of any potentially affected airsheds.

The EIS must provide a comprehensive analysis of air quality issues, including an evaluation of the following items:

- diesel powered equipment and power generation, and the related transportation of fuel;
- dust generated by traffic, use of explosives, the exposed lake bottom and other exposed surfaces including the processed kimberlite;
- release of persistent organic pollutants and metals from waste incineration, including a description how compliance with Canada wide standards for dioxins, furans, and mercury will be achieved; and
- release of various pollutants including NO_x, SO₂, CO, with air quality predictions based on an air quality model comparing predicted ambient pollutant concentrations with applicable ambient air quality and deposition standards.

In addition to providing predictions and a significance evaluation for impacts on air quality, the EIS must provide an analysis of how air quality changes, particularly pollutants with bioaccumulation potential, will affect vegetation, wildlife, and fish. This analysis must be factored into the impact analysis for fish and wildlife issues.

5.2.3 Carnivore Mortality

The potential increased mortality of carnivores, including grizzly bear, wolverine, and wolf, was an important issue in previous assessments of diamond mines, including DeBeers' Snap Lake project. The EIS must evaluate the experiences with carnivore mortality and related mitigation measures at the existing and developing diamond mines, including Ekati, Diavik and Snap Lake. In addition to an evaluation of the mitigation measures prescribed in earlier assessments, as well as any adaptive management activities, the EIS must provide improvements over the methods applied at existing

developments. The EIS must address any differences in impact predictions resulting from the proposed development's proximity to the tree line.

The geographical scope for this Subject of Note includes the development area and all related access routes. In the cumulative context for species with larger ranges, this must include evaluations of the impacts in consideration of the full range used by each species.

Specific information needs identified include:

- potential attraction to wolves, foxes, bear, and wolverines to attractants such as garbage, the creation of habitat in the camp, waste rock storage, etc;
- development components that may cause a sensory disturbance to wolves, foxes, bear, and wolverines;
- effects on movement and hunting success from linear development components, such as the ice road;
- increased carnivore mortality resulting from creating access into a previously largely inaccessible area;
- impacts on prey species such as small mammals;
- effective habitat loss; and
- measures that may be taken to avoid or reduce these impacts.

5.2.4 Species at Risk and Birds

The proposed development is closer to the tree line than existing diamond mines and different species may be involved. The geographical scope for this Subject of Note includes the development area, all access routes and downstream areas.

The analysis provided in the EIS must be of sufficient detail to allow the Panel, as well as relevant other parties, to discharge its responsibilities under the *Species At Risk Act*, which includes:

- determining whether the proposed development is likely to affect a listed species or its critical habitat;
- identifying the adverse effects on the species and its critical habitat;
- ensuring that measures are taken to avoid or lessen those effects, consistent with any applicable recovery strategy and action plan; and
- monitoring the effects.

For the purpose of this environmental impact review, the term "species at risk" includes all species listed under any applicable schedule of the *Species At Risk Act*, as well as any species listed by the Committee on the Status of Endangered Wildlife in Canada. It also includes any species listed by the GNWT with designations "may be at risk", "at risk" or "sensitive" in the *General Status Rankings for Species in the NWT*.

For birds the EIS must provide:

- all potential disturbances during nesting, rearing, molting, staging, and migration, (e.g. from construction activities, air traffic, and downstream effects of water flow changes);
- the potential for increased predation facilitated by the development;
- identification and quantification of all contaminant exposure routes and possible changes in contaminant levels, particularly in harvested species; and
- identification of all potential alterations to bird habitat, including loss of habitat within the mine footprint, the creation of new habitat, and any downstream effects of water flow changes, with particular emphasis on waterfowl.

5.2.5 Permafrost, Groundwater, and Hydrogeology

Limited baseline information creates uncertainty about any impacts on permafrost or ground water movements. The dewatering of the lake, the excavation of large pits, and the re-filling of these pits with waste rock, processed kimberlite, and contaminated mine water was noted to have great potential to disrupt or change permafrost distribution and ground water flow.

Although part of the information relevant to this Subject of Note is already covered in the water quality and fish Key Line of Inquiry, the EIS must provide a comprehensive analysis for this Subject of Note. In particular, the EIS must provide a detailed analysis of the feasibility of sequestering contaminants in the mined out pits over the long term.

The EIS must include a discussion of the potential impacts for accumulation of permafrost into on-site infrastructure and proposed mitigative strategies.

5.2.6 Waste Rock and Processed Kimberlite Storage

While closely connected to other Subjects of Note, such as ‘permafrost, groundwater, hydrology’ or Key Lines of Inquiry (e.g. ‘water quality and fish in Kennady Lake’), the storage of waste rock and processed kimberlite in the mined out pits and in on-land facilities must be treated as a subject in its own right.

During the environmental assessment various parties expressed considerable concern over the feasibility of storing processed kimberlite and/or waste rock in the mined out pits without creating a long term contamination source for Kennady Lake. Although parties generally acknowledged that backfilling pits is preferable to large waste rock piles, they considered this technology as unproven. The EIS must, therefore, provide a detailed description and analysis of how any water contamination will be avoided over the long term, i.e. many decades or even centuries after mine closure. This will include descriptions of interactions between the waste rock and PK and all sources of water, including groundwater, surface water, and permafrost (including taliks).

The EIS must clearly describe the planned long-term maintenance of the waste rock and processed kimberlite under frozen conditions. This description must include different

scenarios, including scenarios occurring decades and centuries into the future and a consideration of the impact of climate change.

The height of the waste rock pile also caused some caribou-related concerns. The EIS must provide a review of available information on the effects of such structures on caribou behaviour. In addition, the EIS must provide a detailed discussion of alternative designs and their potential impacts. Experiences at any of the existing diamond mines in the NWT would be particularly helpful.

5.2.7 Climate Change Impacts

The scientific consensus is that the North is particularly vulnerable to impacts from a changing climate. The EIS must examine and evaluate the development as a potential greenhouse gas contributor. It must also examine potential climate change effects on the proposed development. The EIS must examine quantity of greenhouse gas emissions, the use of alternative energies (as per section 5.2.8), energy conservation initiatives, and linkages between greenhouse gas prevention and other environmental opportunities.

The analysis must include:

- quantity of emissions (in absolute terms, as proportion of NWT industrial emissions, and as proportion of NWT total emissions);
- project alternatives, including greenhouse gases offsetting options and technology innovations (including descriptions of alternative energy initiatives on site); and
- linkages between greenhouse gas prevention and other environmental opportunities (e.g. air and water pollution reduction, sustainable development).

The EIS must include climate change scenarios and their impacts on the development, as well as climate variability and its impacts (e.g. on the operation of the ice road). This analysis must include the effect of changing extremes, such as 100 year rainfall events. The EIS must also include an evaluation of the potential for the development to create a local change in climate at the mine site. In addition the EIS must address climate change impacts in combination with development related impacts on any of the valued components. The EIS must outline any specific adaptations of the development to climate change, as well as management options for a variety of future climate change effect scenarios. The Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment's *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*⁷ may be used for further guidance on climate change issue.

⁷Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003. "Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners". Available from the Canadian Environmental Assessment Agency website www.ceaa-acee.gc.ca/012/newguidance_e.htm .

The development as proposed relies heavily on the Tibbitt to Contwoyto ice road. The ice road and the traffic on it contribute to greenhouse gas emissions and are vulnerable to climate change at the same time. The EIS must provide a detailed analysis of alternatives to transporting goods via road to the development site. See also section 3.2.6.

The EIS must provide a detailed account of energy conservation initiatives on site, addressing subjects such as vehicle idling policies, use of waste oil for heating, etc. Describe how this compares to energy conservation plans at other diamond mines (eg. the Ekati Energy Smart Program).

5.2.8 Alternative Energy Sources

This development would be the fifth diamond mine in the region generating its power from diesel generators, resulting in air quality issues, transportation issues, climate change issues, renewable resource use issues and others. Most of these issues can have a direct or indirect impact on caribou, water and fish which are Key Lines of Inquiry for this EIR.

As already outlined in section 3.2.6, the EIS must provide a thorough analysis of alternative means of carrying out the development. This is especially true for energy sources. In addition to discussion the feasibility of alternatives and how they could be incorporated into the development, the EIS must compare the environmental impacts of transporting and burning diesel fuel to the environmental impacts of renewable energy sources (e.g. hydro power or wind power). The EIS must also provide details regarding any relevant current negotiations and commitments relating to alternative energy sources.

5.2.9 Other Ungulates

The proposed development is closer to the tree line than previous diamond mines in the NWT. There may therefore be different species present, resulting in ungulates other than caribou being affected to a larger extent than was the case with previous diamond mines in the NWT.

Specific information requirements include:

- frequency of muskoxen and moose utilizing the development area and including pertinent information such as time of the year, abundance, and other developments that may impact on the same muskoxen population;
- development components that may cause a sensory disturbance to muskoxen or moose as well as possible sources of contamination and on site hazards;
- potential changes to the predator-prey relationship of any potentially affected ungulate population and predicted long term effects on the population;
- any measures may be taken to avoid or reduce these impacts; and
- potential development-related changes to harvest levels for each potentially affected ungulate population, e.g. by creating an access via the Mackay Lake road into an area previously inaccessible to vehicular traffic.

5.2.10 Waste Management and Wildlife

During the environmental assessment impacts related to waste management and wildlife were recorded in this category. Waste management in this section refers to the management of sewage, camp waste, automotive fluids, and other wastes generated during construction and operation, rather than the management and disposal of waste rock, processed kimberlite, or contaminated ground water. This relates to other Key Lines of Inquiry and Subjects of Note. For example, waste may attract carnivores leading to increased conflicts and mortality.

The EIS must provide a plan of waste management during construction, operation, and closure including:

- camp sewage;
- camp refuse;
- automotive fluids or other hydrocarbons at mine site and on the access route from Yellowknife, including handling of hydrocarbon contaminated soil;
- scrap metal and other discarded machinery or parts;
- discarded construction material;
- any hazardous materials; and
- any other waste generated.

The EIS must include a discussion of alternatives to the proposed waste management plan that have been considered and any adaptive management options. The waste management plan must take into consideration experiences of the existing diamond mines (Ekati, Diavik, Snap Lake) as well as the capacity of the receiving environment (e.g. for sewage disposal).

The proposed waste management, as described in the land use permit application, relies heavily on Yellowknife facilities. The EIS must show that Yellowknife is capable and willing to accept the materials, particularly hazardous material.

5.2.11 Traffic and Road Issues

Traffic and other road related concerns were raised multiple times during environmental assessment scoping, and must be addressed specifically, even though aspects of this subject relate to other Key Lines of Inquiry and Subjects of Note. Most but not all items in this section relate to assessing biophysical impacts.

The geographical scope of this Subject of Note includes all access routes, including all waterbodies and land crossings used for the Tibbitt to Contwoyto Road and the Mackay Lake access road (or any alternative or additional routes) and adjacent areas.

The EIS must describe:

- any efforts by the developer, other developers, or governments to monitor the environmental effects of the Tibbitt to Contwoyto winter road;

- the results of these efforts and any plans for future monitoring;
- how changes in traffic volume and pattern may affect the environment, including caribou, erosion and sedimentation around portages, vegetation, waterbodies, fish, spills, and water withdrawal;
- how construction and operation of the spur road may affect the environment including caribou, erosion/sedimentation around portages, vegetation and benthic environment, spills, and water withdrawal;
- the potential of the spur road to open a previously inaccessible area to hunters or recreational snowmobilers (any data collected during the advanced exploration stage on this issue should be presented);
- how the proposed development will alter traffic volumes and patterns on the Tibbitt to Contwoyto winter road and Ingraham Trail, including potential hazards to other road users and the transport of dangerous goods;
- increases in air traffic, including the estimated number of flights during construction, operation and closure, broken down by season and type of aircraft (ie. jet, large propeller, small airplane and helicopter). This should be estimated based on experience with previous diamond mine developments, taking into consideration ‘normal’ winter road seasons, such as the 2006/07 season, as well as exceptional seasons such as the 2005/06 season that resulted in a significant increase in air traffic, and potential interactions with caribou (e.g. during spring migration); and
- any potential effects related to the use of glycol on the airstrip.

5.2.12 Vegetation

The EIS must include an assessment of the probability of introducing any foreign, parasitic, or invasive species, as well as management options in the case of such an introduction. Similar to water and air quality (4.1.2 and 5.1.2) the EIS must also address the potential of dust (from the lake bed, or any other exposed surface including roads) to adversely affect vegetation by changing snow melt and plant phenology, or by any other means. Any indirect effects of dust on wildlife must also be described.

5.3 Socio-Economic Subjects of Note

5.3.1 Employment, Training and Economic Development

The EIS must provide an analysis of training and education needs for mine employment and mine worker advancement. In addition the EIS must provide an analysis of how the proposed development might affect training and education in the potentially affected communities in general. For example, increased training and education programs for mine employees but not others might increase the social disparity issues discussed in section 4.1.6. Moreover, training and education can contribute to providing opportunities

unrelated to the proposed development that may address some of the lost opportunities issues identified in section 4.1.7.

The EIS must assess the current capacity of training programs and of Aboriginal and northern people to engage in these training programs. The developer is encouraged to present its views on how the development can address the issue in conjunction with existing or possible future government programs.

The EIS must describe the following:

- all employment requirements by skills category over the life of the project;
- which employees will be direct versus contractor employees, and describe whether and how the developer will require its contractors to have similar commitments to maximizing regional and Aboriginal employment;
- where the likely labour pool “draw” is going to be from for this development. This must include an assessment of the available labour pool, at varying geographic scales, to meet the direct mine labour requirements, including: individual communities and the Akaitcho and Tlicho regions as a whole, territorial, and beyond the NWT;
- any identified barriers to employment, advancement and retention for Northern workers (with particular emphasis on residents of smaller potentially affected communities and Aboriginal people), including minimum skill requirements, hiring policies related to criminal records or substance addictions, availability of willing employees, and lack of training opportunities for community members;
- the requirements for any training, education, and other improvements necessary to maximize employment of residents of potentially affected communities in the workforce of the mine, and compare these requirements to existing training initiatives available in the NWT;
- requirements for any training, education or other improvements necessary to maximize engagement of businesses of each potentially-affected community in the economic benefits accruable from the development; and
- the developer’s strategies, plans or commitments with respect to maximizing the proportion of direct mine employees that are NWT residents, Aboriginal persons, and residents of potentially affected communities (e.g. through hiring policies, training initiatives).

5.3.2 Impacts on Tourism Potential and Wilderness Character

Tourism is another viable economic option for some Aboriginal communities. Tourism in the NWT depends heavily on the wilderness character of the land. Increasing mine development and mineral exploration threatens that wilderness character. Industry related air traffic, for example, greatly diminishes the wilderness experience visitors are willing to pay for.⁸ Wilderness also has an intrinsic value to many Canadians.

⁸ In addition to the scoping sessions for the Gahcho Kué project, this topic was also raised as an important issue by the same communities in a subsequent environmental assessment of a mineral exploration program (EA0607-003).

This Subject of Note is related to the ‘long term social cultural, economic impacts’ Key Line of Inquiry. The EIS must provide a summary of any analysis relevant to this subject done under that key line. The EIS must also address any potential for the proposed development to create opportunities not directly related to the proposed development. Specific information needs identified during scoping include:

- impacts from air traffic;
- loss of wilderness character (see also cumulative impacts); and
- decreased hunting success (or fewer wildlife sightings for eco-tourists) reducing attractiveness.

5.3.3 Demand on Infrastructure

Increased development inevitably increases demands on physical and social infrastructure, including physical infrastructure and social services. Infrastructure such as schools, roads, and hospitals undergo increased pressure with the addition of major developments. The concern is especially acute as this development may be going ahead in parallel with other major developments, which by themselves are expected to increase pressures on existing physical and human infrastructure. Moreover, competition for skilled labour will make it more difficult and expensive for government to maintain infrastructure.

In light of the multiple infrastructure demands, the following specific issues identified in the scoping sessions must be addressed:

- infrastructure pressures on regional centres from in migration;
- shortage of locally available labour for community services;
- costs for government to provide services increases and maintain adequate physical infrastructure;
- monitoring and regulatory capacity of government;
- over-extension of human and economic resources by local communities through project and its review process; and
- rotational schedule resulting in absence of critical volunteers, e.g. volunteer fire fighters.

The developer must include an assessment of the socio-economic costs and who will bear them of any increases in physical and social service infrastructure predicted to be required as a result of pressures or requirements of the development (this must include discussion of likely in- and out-migration scenarios to which the development will contribute);

The developer is encouraged, although not required, to identify innovative solutions to infrastructure and capacity issues that may be outside the developer’s purview in a similar fashion to the cooperative approaches described in section 4.1.5.

The developer must describe lessons learned from economic, cultural and social impacts of previous mine developments in the NWT and the North, and how they have been incorporated into the impact identification, prediction and mitigation for the development. For each of the above impacts, the developer must describe any plans, strategies or commitments designed to mitigate the identified adverse impacts.

5.3.4 Culture, Heritage and Archaeology

There is concern over possible impacts on cultural, heritage and archaeological sites in the Lockhart River system, including the original Lutsel K'e settlement at Artillery Lake. Increased participation in the wage economy may also weaken traditional activities, reduce cultural cohesion and adversely affect the existing cultural landscape.

The EIS must provide a comprehensive analysis of these issues, taking into consideration that they are closely related to several Key Lines of Inquiry, e.g. caribou and increasing social disparity. The developer must engage communities and document their cultural, heritage and archaeological information for the area within the geographic scope of this review.

Specific issues, or potential impacts to be evaluated, include:

- reduced involvement in communal activities including communal hunts;
- potential for growing sense of disempowerment;
- increasing out migration and skills drain to regional centres;
- reduced harvesting success and loss of traditional skills;
- loss of language;
- loss of spiritual connections and knowledge;
- physical impact on heritage and archaeological sites;
- loss of spiritual value of place;
- lost of aesthetic value of place;
- hunting restrictions around mine sites;
- effects on Lockhart River sacred site;
- Artillery Lake as the original site of Lutsel K'e; and
- Our Lady of the Falls

The proposed development may not be solely responsible for issues such as language loss, but the developer is called upon to explore innovative solutions in cooperation with affected communities and relevant government agencies.

5.3.5 Aboriginal Rights and Community Engagement

During the environmental assessment, potential impacts were linked to possible infringements on Aboriginal rights. While the responsibility for consultation on aboriginal rights rests with the government, procedural aspects of this consultation may be satisfied by environmental impact review proceedings. For this reason, the EIS must provide a record of community engagement including which concerns or issues were raised and how they would be accommodated through project design or other mechanisms (as described in section 4.1.6).

5.3.6 Proposed National Park

The proposed development is upstream of a proposed national park around the East Arm of Great Slave Lake. A memorandum of understanding between the Lutsel K'e Dene First Nation and Parks Canada indicates that the proposed development would be in close proximity to Parks Canada's preliminary area of interest for the park.

The EIS must provide maps showing the exact location of the proposed development in relation to the national park preliminary area of interest. Moreover, the EIS must provide an evaluation of any potential impacts from the development on the proposed national park. This evaluation must include activities indirectly caused by the proposed development such as activities following increased access into the area.

6 Sustainability and Cumulative Effects Analysis

6.1.1 Integrated Project-Specific Analysis and Sustainability

The EIS must evaluate the development's overall impact on the environment. This includes the combined impact of any part of this development with any other parts of the development. These impacts may be additive or synergetic combinations of effects that arise from individual development parts of this proposed development. By themselves, the impacts of each part may not be considered significant, but taken as a whole they might be.

This integrated analysis will be guided by the MVRMA's requirement to have regard to the protection of the social, cultural and economic well-being of residents and communities in the Mackenzie Valley, the importance of conservation to the well-being and way of life of the Aboriginal peoples of Canada and the capacity of renewable resources to meet future needs.

The proposed development's contribution to sustainability and effects on future generations must be evaluated on the basis of:

- the extent to which it makes a positive overall contribution towards environmental, social, cultural and economic sustainability;
- how the planning and design take into account its effects on achieving sustainable development;
- to what degree it promotes the present generation's ability to meet its needs without compromising the ability of future generations to do so;
- how monitoring, management and reporting systems have incorporated indicators of sustainability; and
- the views of stakeholders and participants in the environmental impact review process.

6.1.2 Cumulative Effects Assessment

Concern over possible cumulative effects arose frequently during the environmental assessment and the fact that the proposed development would be the fifth diamond mine in the general area was cited numerous times as a rationale behind an issue or its priority. Consequently, cumulative impacts must be an important consideration in this EIR. In its *Report of Environmental Assessment* the Review Board chose not to formulate a separate cumulative effects Key Line of Inquiry.

Many Key Lines of Inquiry and Subjects of Note contain important cumulative effects components. In addition to providing a detailed assessment in the response to each of these, a stand-alone assessment of the cumulative effects of the proposed development in combination with past, present and reasonably foreseeable future developments is required.

The EIS must contain a cumulative effects assessment, providing sufficient information to allow the Panel and parties to evaluate the significance of the proposed development's

overall cumulative impact on the environment, without having to refer to other sections extensively. As a minimum, this section in the EIS must provide summaries of the analysis and results for any cumulative effects assessment done and presented under any individual Key Lines of Inquiry or Subjects of Note.

The exact methods for assessing cumulative effects are left to the developer, provided that the method chosen is suitable to incorporate all different types of effects that could contribute to the cumulative impact on a given valued component. The cumulative effects assessment must follow the guidance of the Review Board's *Environmental Impact Assessment Guidelines*. Appendix H of the *Guidelines* refers specifically to cumulative effects assessment.

7 Remaining Issues

This section contains instructions to the developer for analyzing all individual issues identified in the scoping exercise of the environmental assessment. These technical scoping workshops were organized along four themes for the bio-physical environment, including:

- wildlife;
- water;
- fish and other aquatic organisms; and
- ‘other’.

The technical scoping workshop also addressed the human environment with two themes:

- community wellness; and
- regional / territorial socio-economic issues.

This section includes all of the issues and any specific information requirements identified during scoping, organized by the themes of the environmental assessment scoping workshop. These issues, listed in the following tables 1 through 7, are intended to be comprehensive, and include those issues emphasized in the previous sections.

For each issue listed, the developer is required to reconcile whether it was assessed in a Key Line of Inquiry or Subject of Note. If so, the developer must provide a reference accordingly. If not, the developer must provide sufficient analysis to demonstrate whether it is likely to cause significant impacts. Any issues that are not relevant to a Key Line of Inquiry or a Subject of Note do not require in-depth analysis beyond showing that significant impacts can be prevented with standard mitigation or regulatory conditions.

Table 7-1: Wildlife Issues

<p><i>Caribou</i></p> <ul style="list-style-type: none"> • exposure to contaminants • impacts to already vulnerable populations • effects on reproduction • cumulative impacts to population • impacts on caribou behaviour • impacts of hazards on site • impacts on migration • effects of tall waste pile on caribou and their predators
<p><i>Carnivores</i></p> <ul style="list-style-type: none"> • carnivore attraction • human/bear encounters • increased carnivore mortality • noise/sensory impacts • key habitat loss in eskers • loss of prey sources for grizzly bears
<p><i>Birds</i></p> <ul style="list-style-type: none"> • Disturbance • exposure to contaminants • habitat impacts
<p><i>Changing Water Levels</i></p> <ul style="list-style-type: none"> • drawdown impacts on habitat • downstream impacts • wildlife impacts from freeze- and breakup timing changes
<p><i>Other Ungulates</i></p> <ul style="list-style-type: none"> • impacts on muskoxen distribution • impacts on moose • sensory disturbance to muskoxen
<p><i>Traffic & Road Concerns</i></p> <ul style="list-style-type: none"> • impacts from traffic on winter roads • new access from spur road • aircraft traffic disturbance
<p><i>Species at Risk</i></p>
<p><i>General</i></p> <ul style="list-style-type: none"> • waste management impacts • impacts on small mammals

Table 7-2: Fish Issues

<p><i>Watershed Impacts</i></p> <ul style="list-style-type: none"> • fish health • fish behaviour (increase and decrease in flow) • migration interruption • water chemistry alterations from deep ground water • chemistry changes in sediment and water • impacts of backfilling on aquatic biota • fluctuation of water flows
<p><i>Road Effects</i></p> <ul style="list-style-type: none"> • ice road construction • Erosion • water withdrawal • increased ice thickness • watercourse crossings • Spills
<p><i>Operations and Construction</i></p> <ul style="list-style-type: none"> • fish out • contaminant levels • freshwater Lake impacts • habitat destruction and creation • noise and vibration on fish behaviour
<p><i>Data Collection</i></p> <ul style="list-style-type: none"> • baseline data • Monitoring
<ul style="list-style-type: none"> • <i>Long Term Effects</i> • feasibility of recovery • physical changes to lake • addition of deep water habitat post-mine and impacts on the rest of the lake
<ul style="list-style-type: none"> • <i>Reclamation Methods</i> • alternative water sources • habitat creation • restocking of fish

Table 7-3: Water Issues

<p><i>Water Rights</i></p> <ul style="list-style-type: none"> • impacts on Dene water rights and spiritual concerns • impacts on navigability of downstream waters • interference with existing water users
<p><i>Permafrost</i></p> <ul style="list-style-type: none"> • effects of permafrost freezeback on exposed lake bed • adequacy of permafrost monitoring and data to appropriately model mine components • problems with freezeback of processed kimberlite • implications of climate change on reclaimed mine components
<p><i>Groundwater/Hydrogeology</i></p> <ul style="list-style-type: none"> • impacts of pits on movement and quality of groundwater • interaction between groundwater and submerged waste • relationships between taliks and groundwater flow regime • short term and longterm impacts on groundwater flow • management of groundwater flows by DeBeers
<p><i>Public Concern</i></p> <ul style="list-style-type: none"> • implications of water quality on human health • public notification of flooding events
<p><i>Water Quality</i></p> <ul style="list-style-type: none"> • end of pipe contamination • pits as long term contamination sources • geochemistry of waste rock and process kimberlite • turbidity during dewatering and rewatering lake • contamination runoff from PKC and waste rock • dust as water contamination • hydrocarbon contamination • length and adequacy of long-term water quality monitoring
<p><i>Surface Water and Watershed</i></p> <ul style="list-style-type: none"> • downstream effects of large water releases • reduced water flows as lake level is restored • ice quality on Kennady Lake and surrounding lakes • cumulative effects on Hoarfrost and Lockhart rivers and Great Slave Lake • extent of downstream effects
<p><i>Water Use and Management</i></p> <ul style="list-style-type: none"> • water diversion effects • alterations to natural drainage

Table 7-4: Other Issues

<p><i>Climate Change</i></p> <ul style="list-style-type: none">• impact on project design• transportation alternatives• energy alternatives• creation of microclimate at mine site
<p><i>Physical Stability</i></p> <ul style="list-style-type: none">• waste rock and PKC co-disposal• impacts from changing permafrost
<p><i>Geochemistry</i></p> <ul style="list-style-type: none">• impacts from acid-generating rock• composition of lake bed sediments
<p><i>Air Quality</i></p> <ul style="list-style-type: none">• increased dust from exposed lake bed• waste incineration impacts• impacts from emissions
<p><i>Vegetation</i></p> <ul style="list-style-type: none">• increase in invasive species• impacts from increased dust on vegetation• stress to rare plant populations
<p><i>Emergency Measures</i></p> <ul style="list-style-type: none">• impact of spills• accidents and malfunctions

Table 7-5: Community Wellness Issues

<p><i>Employment</i></p> <ul style="list-style-type: none"> • hiring policy and practices – recruitment and retention • cultural difference in workplace affecting job satisfaction • lack of opportunity for advancement • increased need for child care • gender inequities • ability to meet northern/Aboriginal hiring targets
<p><i>Education</i></p> <ul style="list-style-type: none"> • incentives and disincentives to further education • need for increased educational programming to prepare for mine employment • lack of functional literacy
<p><i>Training</i></p> <ul style="list-style-type: none"> • lack of diversity & adequacy of training opportunities • inability to meet educational requirements to access training • limited training available in outlying communities
<p><i>Income and Expenses</i></p> <ul style="list-style-type: none"> • unhealthy lifestyle choices • money management issues (e.g. impacts from poor budgeting skills) • increasing income disparities (haves/have nots) • increased cost of living • availability, adequacy and affordability of housing
<p><i>Cultural/Population Health</i></p> <ul style="list-style-type: none"> • loss of language • reduced harvesting success • loss of traditional skills • decreased transfer of knowledge between generations • loss of spiritual connections and knowledge • physical impacts to health • loss of family cohesion related to rotational work schedules
<p><i>Community Capacity</i></p> <ul style="list-style-type: none"> • reduced involvement in communal activities • lack of control over pace of development • potential for growing sense of disempowerment • increasing out-migration/skills drain to larger centres • infrastructure pressures of increasing in-migration to regional centres • shortage of locally available labour force for community services • lack of capacity to engage in monitoring & enforcement

Table 7-6: Regional/Territorial Socio-Economic Issues

<p><i>Heritage Resources</i></p> <ul style="list-style-type: none"> • physical disturbances to heritage sites • loss of spiritual value of place • loss of aesthetic value of place • loss of alternative uses of land
<p><i>Labour Force</i></p> <ul style="list-style-type: none"> • problems with employee retention • lack of adequate Northern labour pool to staff mine • wage benefit drain from North
<p><i>Government Capacity</i></p> <ul style="list-style-type: none"> • increasing costs and pressures on existing physical infrastructure • increased costs and pressures on existing social services • lack of adequate skills training programs for Northerners • increasing costs and pressures on regulation and monitoring activities
<p><i>Regional Disparities</i></p> <ul style="list-style-type: none"> • widening income disparities between communities and regions • competition for access to benefits between communities • determination of "affected communities"
<p><i>Northern Business</i></p> <ul style="list-style-type: none"> • distribution of spin off effects - flows from North • inflated wages/material costs - effects on local/regional businesses • secondary business development opportunities for Northern firms
<p><i>Sustainable Economy</i></p> <ul style="list-style-type: none"> • over-reliance on one resource economy • impacts on alternative business opportunities/economic diversification

8 Deliverables

The developer is expected to submit the EIS to the Panel office for a conformity analysis. Once in conformity Panel staff will provide direction to the developer for distribution of materials to parties. The EIS submission to the Panel should include:

- 10 copies of the EIS in hardcopy (although once the EIS is determined to be in conformity with these *Terms of Reference*, copies will be required for all parties);
- the EIS in digital format with individual files not to exceed 5 MB in size and ideally with individual files being less than 3 MB in size (using only low-resolution images);
- a concordance table that clearly cross-references the *Terms of Reference* with the impact statement as part of the EIS;
- a commitments table listing all mitigation measures the developer commits to employ as part of the EIS;
- associated maps (not including engineering drawings) as shape files in accordance with GNWT spatial data warehouse specifications;
- a non-technical summary of the EIS in English, Tlicho, Chipewyan, and French; and
- any supporting materials such as videos or animations that might enhance the understanding of the Panel and the parties.

While preparing the EIS, the developer is encouraged to continue consulting with all parties to the EIR. The developer is also encouraged to contact the Panel office when the developer is unclear about any of the requirements of this *Terms of Reference* document, and to seek clarification in writing.