

**ENVIRONMENTAL IMPACT STATEMENT  
TERMS OF REFERENCE**

**for the**

**MACKENZIE GAS PROJECT**

*Issued by:*

*the Inuvialuit Game Council*

*the Mackenzie Valley Environmental Impact Review Board*

*and*

*the Minister of the Environment*

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# 1. INTRODUCTION

## 1.1. Background

On 18 June 2003, the proponents for the proposed Mackenzie Gas Project filed a Preliminary Information Package describing the Project and related environmental and socio-economic issues. The Mackenzie Gas Project includes natural gas development on the Mackenzie River Delta in the Northwest Territories, gathering lines, processing and transportation of gas south through the Mackenzie Valley to northern Alberta. Additionally, Nova Gas Transmission Limited intends to apply for the construction of certain facilities in northern Alberta that would be required to allow the natural gas transported by the Mackenzie Gas Project to enter the Northern Inventory Transfer, or market in Alberta (see Appendix 1). Together, these proposed facilities are referred to as the Project.

The proposed Mackenzie Gas Project is subject to three environmental impact assessment (EIA) jurisdictions: the *Canadian Environmental Assessment Act* (CEAA), the *Mackenzie Valley Resource Management Act* (MVRMA), and the *Western Arctic (Inuvialuit) Claims Settlement Act - Inuvialuit Final Agreement* (IFA). A single joint panel review that meets the needs of all three regimes has been established for the Environmental Impact Review (EIR) of the Project. As described in the Agreement between the Minister of the Environment, the Inuvialuit and the Mackenzie Valley Environmental Impact Review Board<sup>1</sup>, a Joint Review Panel (JRP or Panel) will conduct the EIR. Additionally, a Memorandum of Understanding between the Inuvialuit and the Minister of the Environment would give the Panel responsibility to address certain provisions of the IFA<sup>2</sup>.

The Mackenzie Gas Project will also be subject to the regulatory requirements of other authorities with mandatory public hearing requirements, including the National Energy Board, the Mackenzie Valley Land and Water Board and the Northwest Territories Water Board. Other regulators for the Project include the Gwich'in Land and Water Board, the Sahtu Land and Water Board, the Inuvialuit Land Administration, Indian and Northern Affairs Canada, Fisheries and Oceans Canada, Environment Canada, Transport Canada, Natural Resources Canada and the Government of the Northwest Territories. The Alberta Energy and Utilities Board will consider the applications of Nova Gas Transmission Limited for facilities in relation to the Project located in Alberta (Appendix 1), once they are filed.

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<sup>1</sup> Agreement for an Environmental Impact Review of a Northern Gas Project, between the Mackenzie Valley Environmental Impact Review Board, the Inuvialuit as represented by the Inuvialuit Game Council and the Minister of the Environment, August 2004 (Joint Review Panel Agreement)

<sup>2</sup> Memorandum of Understanding between the Inuvialuit and the Minister of the Environment for Inuvialuit Participation in the Environmental Review of any Transregional Gas Pipeline Project and any accompanying Gas Field Development in the Inuvialuit Settlement Region, October 2002.

In recognition of the complex regulatory and environmental assessment regime for a northern gas project, a Cooperation Plan for the Environmental Impact Assessment and Regulatory review of a Northern Gas Pipeline Development through the Northwest Territories (Cooperation Plan) was released in June 2002. The key purposes of the Cooperation Plan are to avoid duplication and ensure coordination among the parties. As discussed in the Cooperation Plan, the Panel will conduct the EIR process, in a manner consistent with these purposes, to the extent possible.

## **1.2. The Joint Review Panel Process**

The Joint Review Panel has been charged with two main responsibilities. First, the Panel must identify, evaluate and report on the potential impacts of the Project on the physical, biological and human environments. Second, the Panel must carry out specific responsibilities under the IFA, including an estimation of the potential liability of the proponent, determined based on a worst case scenario and taking into consideration the balance between economic factors, including the ability of the proponent to pay, and environmental factors, as referred to in paragraph 13(11)(b) of the IFA.

Public participation is an important and integral component of the EIR process and the JRP process will be conducted in a manner that promotes public participation. As described in the Agreement, the Panel will provide opportunities for the public to comment on the adequacy and content of the EIS and also to provide information with respect to potential impacts of the Project. The Panel will also hold hearings in the Project area to allow the public the opportunity to address the Panel with views and information.

At the conclusion of the EIR process, the JRP will prepare a Panel Report that includes its finding and recommendations, and comments received from the public and submit the report to the government.

## **2. PURPOSE OF THE TERMS OF REFERENCE**

The Terms of Reference (TOR) contain guidelines for the preparation of an Environmental Impact Statement (EIS) for the Project. The TOR establish the nature and scope of the issues that the Proponent must address in the EIS. It is the responsibility of the Proponent to provide the information described in the TOR and to prepare the EIS for submission to the Panel.

The EIS will serve as a basis for the Panel's review and evaluation of the potential impacts of the Project on the environment. Environmental impact assessment is a planning tool intended to identify and encourage the mitigation of significant adverse environmental impacts. The level of detail required for this evaluation may differ from that required for the regulatory process.

The definition of 'impact on the environment' forms the basis for the EIS and includes consideration of physical, biological and human elements, or systems (Appendix 3).

The EIS will also help regulators and members of the public to understand the Project, the receiving environment and potential adverse or beneficial impacts, including how the Project could change the lives of the people in the Project area.

### **3. Scope of Project**

The scope of the Project is described in 'Annex 1 to the Schedule: Project Description' in the Joint Panel Agreement and in Appendix 1.

### **4. Scope of Assessment**

The factors to be considered by the Joint Review Panel during the environmental impact review are found in Annex 2 to the Joint Review Panel Agreement and in Appendix 2. These factors, and the requirements in sections 11 to 19 and 21 to 25 below, define the scope of the assessment for the Project.

## **5. PRINCIPLES**

The purpose of this section is to identify principles that can provide context for the EIR process. The principles to be considered are:

- contribution to sustainability
- use and respect for traditional knowledge
- recognition of land claims and treaties
- recognition of diversity
- the precautionary approach

### **5.1. Contribution to Sustainability**

Promotion of sustainable development is a fundamental purpose of EIA, which provides an effective means of integrating environmental, socio-economic and cultural factors into decision-making. The EIR process allows for the consideration of a project's contribution towards achieving sustainability.

The CEAA defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The guiding goals and principles of the MVRMA and the IFA are to ensure that the EIR process has regard for the following:

- protecting the environment from significant adverse impacts of proposed developments
- protecting the social, cultural and economic well-being of residents and communities
- preserving the cultural identity and values of aboriginal people within a changing northern society
- enabling aboriginal people to be equal and full participants in the development of the economy and society

Reconciling economic development, social equity and environmental quality is at the core of sustainable development. Considering sustainable development in the EIR process includes recognizing:

- the potential impacts of the Project in relation to the social, economic, cultural and environmental goals and values of affected communities, the North and the rest of Canada
- the capacity of natural systems to maintain their structure and functions and to support indigenous biological diversity and productivity
- the capacity of the social and economic systems of the human environment to achieve, maintain or enhance conditions of self-reliance and diversity
- the capacity of human environments, including local and regional institutions, to respond to and manage externally induced change
- the attainment and distribution of lasting and equitable social and economic benefits from projects
- the rights of future generations to the sustainable use of renewable resources
- protection and conservation of wildlife and the environment for present and future generations

A project's contribution to sustainability can be evaluated on the basis of the following:

- the extent to which a project makes a positive overall contribution towards environmental, social, cultural and economic sustainability
- how the planning and design of a project have considered how it affects achieving sustainable development
- how monitoring, management and reporting systems have incorporated indicators of sustainability
- the views of stakeholders and participants in the EIR process



## **5.2. Use and respect for Traditional Knowledge**

Many Aboriginal persons and communities have unique knowledge about the local environment, how it functions, and the ecological relationships that characterize it. This traditional knowledge is an important part of project planning and EIR processes.

In this case, traditional knowledge refers to a broad base of knowledge held by individuals and collectively by communities that may be based on observation and experience. It may be acquired through experience, observation, from the land or from spiritual teachings. Passed from one generation to another through oral and/or written traditions, it is a dynamic, substantive, and distinct living knowledge.

Traditional knowledge, in combination with other information sources, is valuable in achieving a better understanding of potential impacts of projects. Traditional knowledge may, for example, contribute to the description of the existing physical, biological and human environments, natural cycles, resource distribution and abundance, long and short-term trends, and the use of lands and resources. It may also contribute to Project siting and design, identification of issues, the evaluation of potential impacts, and their significance, the effectiveness of proposed mitigation, cumulative impacts and the consideration of follow-up and monitoring programs.

Certain issues relevant to the EIR process are firmly grounded in traditional knowledge, such as harvesting, cultural well-being, land use, heritage resources, and others. Although the basis for traditional knowledge and science-based knowledge can differ, they may on their own or together, contribute to the understanding of these issues.

The Joint Review Panel will promote and facilitate the contribution of traditional knowledge to the environmental impact review process. It is recognized that approaches to traditional knowledge, customs and protocols may differ among Aboriginal communities and persons with respect to the use, management and protection of this knowledge. The Joint Review Panel can consider the views of communities and traditional knowledge holders during the environmental impact review process and determine which information should be kept confidential.

## **5.3. Recognition of Land Claim Agreements and Treaties**

Land claim agreements and treaties govern the relationship of aboriginal people to the land where much of the Project will be located. Within the Northwest Territories, there are four settled land claims, three of which apply where the Project is located: *Western Arctic (Inuvialuit) Claims Settlement Act - Inuvialuit Final Agreement*, the *Sahtu Dene and Metis Comprehensive Land Claim Agreement*, the *Gwich'in Comprehensive Land Claim Agreement* and the *Tli Cho Final Agreement*. Also in place in the geographic location that may be affected by the pipeline are the *Deh Cho Interim Measures Agreement*, the *Interim Resource Development Agreement* and Treaties 8 and 11.

Many of the goals, objectives and principles of the land claim agreements recognize the traditional way of life of Aboriginal people that is based on the cultural and economic relationship between the people and the land. All of these agreements incorporate measures for the protection and conservation of wildlife, the environment and biological productivity for present and future generations. In addition, these agreements establish co-management institutions that affect the activities of all residents of the NWT. The agreements have specific provisions that enable beneficiaries to be meaningful participants in the northern and national economies, and to contribute to their ability to participate fully in all aspects of the economy while encouraging self-sufficiency

The *Deh Cho Interim Measures Agreement* and the *Interim Resource Development Agreement* reflect the ongoing negotiation of land claims in the Deh Cho region and include temporary measures that reflect the desire on the part of the Deh Cho to protect the ecological integrity and manage resource development in the Deh Cho region.

Treaty 8 covers two-thirds (2/3) of Alberta and a large portion of the southern and southeastern Northwest Territories. The Treaty also protects hunting, fishing, trapping and other land based activities.

#### **5.4. Recognition of Diversity**

One of the fundamental purposes of the EIR process is to understand how the Project could impact the environment and the lives of people in the project area.

From the Mackenzie Delta to northern Alberta, the Project area supports a rich diversity of culture, language, heritage and values. Ways of life, experience and aspirations for the future can all influence attitudes and perceptions about development, as can age, gender and ethnicity.

During the EIR process, understanding and taking into account perspectives of the people in the Project area will be very important. To the extent possible, concerns and view about the Project, as seen through the eyes and experience of the people in the Project area, should be recognized.

#### **5.5. The Precautionary Approach**

There is not one universally agreed upon definition of the precautionary approach or principle. The term has been used in environmental decision-making to address the increasingly prevalence of scientific uncertainty. In some cases, use of the term informs the decision-maker to take a cautionary approach, or err on the side of caution especially where there is a large degree of uncertainty or high risk. In other cases, the term has been used to inform a particular approach, as stated for example in the Rio Declaration, " where there are threats of serious or

irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

The EIR approach and decision-making is by its nature precautionary in several respects. One of the main purposes of an EIR is to carefully consider the likelihood of environmental effects of a project before decisions are taken. Moreover, environmental assessment legislation generally requires the consideration of key factors and mitigation measures to address risks and uncertainties associated with a proposed activity. There is, to date, no systematic or well-developed practice or methodology that can guide application of the precautionary approach or principle in environmental assessment in general. Furthermore, some management approaches such as adaptive management may be used to respond to some of the challenges of uncertainty and addressing the mitigation of likely significant adverse environmental impacts.

For the purposes of this EIR, a precautionary approach may be relevant in circumstances where it is identified that a Project activity could cause serious or irreversible adverse impact on the environment and the cause and effect relationships cannot be clearly established (see section 12.9 Application of the Precautionary Approach).

## **6. GUIDANCE ON THE PREPARATION OF THE EIS**

The EIS must provide sufficient information to identify, describe and determine the significance of potential impacts on the environment that could arise from the Project, (please see section 11 Existing Environment and section 12 Methodology). The Proponent shall, with the cooperation of other parties, use and incorporate traditional knowledge into the EIS.

The EIS will be placed on the public registry established for the Project and will be made available for public comment and review. The Panel will determine whether the Proponent has provided sufficient information in its EIS and may give the Proponent additional instruction or clarification with respect to the expected content of the EIS and its expectation for meeting those requirements. Any changes to the description of the Project may entail a change to the TOR.

For clarity and ease of reference, the EIS shall include a guide that cross-references the TOR with the EIS, so that information may be easily located. This cross-reference should be in the form of a concordance table and should be at an appropriate level of detail to facilitate the location of information relevant to each section of the TOR. Reference to appendices and supporting documents should be included, as appropriate. Where any information required by the TOR is not provided with the EIS, the Proponent shall include the reason for the omission.

The EIS shall reference rather than repeat information that has already been presented in other sections of the document. A key subject index is recommended.

Supporting documentation shall be provided in separate volumes, and shall be referenced by volume, section and page in the text of the main EIS. This shall include the preparation of a

commitments table that summarizes the proposed mitigation and other company commitments with cross reference to environmental issue or potential impacts. This table shall be kept current throughout the review process.

The EIS should be written in the clearest language possible. Charts, diagrams, site plans, photos and maps should be provided wherever useful to clarify the text, including perspective drawings that convey what the developed sites would look like. Maps shall be of a limited number of common scales to allow for comparison and overlay of mapped features.

The EIS shall be submitted in English. The Panel may require the Proponent to translate some key sections of the EIS or other documents presented during the EIR process into French and Aboriginal languages. A glossary of definitions should be provided to ensure a clear understanding of terminology related to the Project.

The EIS shall be provided in both print and digital format. The digital format specifications will be provided by the Panel. The Executive Summary of the EIS shall also be prepared in both video and audio-tape formats. The Panel may also require the Proponent to provide other sections of the EIS or other documents in audio and/or visual format. The Panel will specify the number of copies required.

## **7. EXECUTIVE SUMMARY**

Provide a plain language Executive Summary that provides the reader with a concise but complete overview of the EIS and includes the following information:

- background on the Proponent(s)
- Project overview
- Project setting: geographic, physical, biological and human environments
- key findings of the EIA

As it may be used as a stand-alone document, the Executive Summary should present the information in a general manner focusing on the main issues and findings. The use of maps and figures to aid in the presentation of information is encouraged.

## **8. INTRODUCTION**

The Introduction should provide information related to the Proponent, Project Overview, Project Setting, Outline of EIR process and approvals, Study Strategy and Methodology.

### **8.1. The Proponent**

This section shall introduce readers to the Proponent, its consultants, and any contractors engaged for the Project.

Identify the ownership arrangements for various portions of the Project (e.g., field development, gathering system, process and compression facilities, transmission pipelines, etc.). Specifically, provide details on ownership of rights, operational arrangements, corporate and management structures, and relevant experience with similar large-scale operations in Canada and in other countries with similar regulatory and social policy regimes.

Identify key personnel, contractors, and/or sub-contractors responsible for preparing the EIS.

Provide a record of the environmental performance of the Proponents in conducting this type of project and in northern environments.

### **8.2. Project Overview and Purpose**

This section of the EIS is not intended to be a detailed description of the Project, but rather a contextual summary of the Project and component parts. Direction with respect to the content of the full detailed description of the Project is provided in section 9, Project Description.

In this section, briefly summarize the Project, including its purpose, location, components and phases, workforce and equipment, associated activities, schedule and cost.

### **8.3. The Project Setting**

This section of the EIS is intended to introduce readers to the Project setting. Additional information requirements are identified in section 11, Existing Environment.

Provide a general overview of the geographic, ecological, social, economic and cultural setting in which the Project is proposed to take place.

Provide a list of communities in the Project area and indicate the distance between those communities and the Project, including specific project components as appropriate (e.g. fields, compressor stations).

### **8.4. The Environmental Impact Assessment Process and Approvals**

Summarize the main steps in the EIR process leading to the establishment of the Panel and the main approvals required to undertake the Project.

As an Appendix, identify the permits and authorizations required for the Project. This information may be presented in table format and must include:

- Project component/facility or activity requiring approval, and when it is required (e.g. by project phase or milestone)
- name of approval or permit and the authorization period
- regulatory authority, board, agency or issuing body
- associated legislation
- geographic area in which the approval is required (i.e., ISR, Gwich'in Settlement Area, Sahtu Settlement Area, Deh Cho region, Alberta)

### **8.5. Study Strategy and Methodology**

Describe the main steps carried out in the preparation of the EIS. For each step, describe the approach, strategy and methodology used.

## **9. PROJECT DESCRIPTION**

The Project description should, when read in combination with the description of the existing environment (section 11), allow the Panel to reasonably identify and understand the selection of Valued Environmental Components (VECs) (section 12.1), potential interactions, and potential impacts that may be caused by the Project. Specific details can be provided in various portions of the EIS with appropriate cross reference.

### **9.1. General Requirements**

Provide a description of the Project components and related undertakings and physical activities. The description shall be provided by location and Project phase, including construction, operation, modification, decommissioning and abandonment. Include both permanent and temporary facilities and activities for each phase.

Use plans, diagrams, photos, maps, preliminary designs and/or design codes, as appropriate, to support the description. Scale and detail of maps should facilitate the identification of the location of Project facilities and activities in relation to features of the physical, biological and human environment.

## **9.2. Proposed Facilities**

Describe the main components of the Project, including:

Permanent structures and infrastructures:

- wells (e.g., production, disposal/injection)
- production facilities
- gathering lines (length, diameter, above ground/buried, etc.)
- transmission pipelines
- processing and storage facilities
- compressor and pumping stations
- power supply and distribution
- cathodic protection
- valves and meters
- pigging facilities
- communications systems
- access roads
- quarries and borrow pits
- other transportation infrastructure (air strips, barge landing sites etc.)

Describe the properties, temperature, pressure and anticipated volumes of any product to be produced transported or disposed of during the operation of the proposed facilities (e.g., natural gas, liquids, produced water).

For temporary facilities and infrastructure, please refer to specific Project phases (section 9.6 through 9.8).

## **9.3. Land Requirements and right-of-way (ROW) dimensions**

Provide:

- dimensions and location of the facility sites and ROW
- size and location of any temporary work room
- ownership of lands needed for permanent or temporary use
- zoning and/or other planning designations

#### **9.4. Schedule and Boundaries**

For each Project phase, describe

Schedule

- the scheduling and relative timing and duration of major activities
- the factors that influence scheduling or that could cause schedule changes

Boundaries

- the spatial and temporal boundaries for Project facilities, undertakings and activities, including the rationale for their delineation

#### **9.5. Cost and Workforce**

For each Project phase, describe:

Cost

- the capital cost of the Project by phase and location
- any other costs that may be incurred

Workforce

- the number of workers required by occupation and/or skill
- the duration of work, including rotation length
- full time vs. part time work
- the locations of work
- education requirements by occupation or skill
- literacy and language requirements
- an estimate of the proportion of local, regional, Northwest Territories, Alberta and out-of-Project-area workers

#### **9.6. Construction Phase**

Identify and describe all physical works and related undertakings, as well as, physical activities carried out in respect of the Project during the construction phase including:

Activity

- type
- location
- timing
- frequency and duration



### Transportation of Materials, Equipment and Workers

- access type (land, water, air) and location
- type of material transported
- amount of material or equipment and the number of workers being transported at a given time
- timing
- frequency and duration
- locations
- type of transportation

### Equipment Requirements

- types
- numbers
- duration of work

### Temporary facilities and physical works:

- access roads, including winter roads
- equipment and material receiving, handling and storage areas, including barge landing sites
- pipe storage areas
- temporary work room
- shoo-fly
- disposal sites for domestic and construction waste
- drinking water sources, treatment and distribution facilities
- wastewater treatment facilities
- borrow pits or any other sources of granular materials
- fuel and hazardous materials handling and storage areas
- indicate whether temporary facilities would be made available for local parties interested in reusing them

### Work Camps

- location and distance to nearest community
- description of the facilities
- size and capacity
- duration and timing of use
- transportation of goods and workers to/from camps (type, routes, frequency)
- drinking water supply source
- method of managing wastewater and sewage, including factors such as discharge areas, water quality, water quantity;
- location and operating conditions of the solid waste disposal site
- power supply

- management of any other installations (including fuel storage depots) required for the camps to function properly
- indication whether some of the camps, or camp components would become permanent or be made available for various local parties interested in reusing them

#### Major Activities

- site and ROW preparation and clearing including slopes with consideration to vegetation, soil and rock removal and associated disposal and storage methods;
- forest clearing, recovery and elimination of wood wastes for all Project areas;
- moving of Project components
- transportation (air, land and water) with estimates of traffic types, frequency, duration and anticipated routes
- blasting activities, including explosives transportation, manufacture and storage
- drainage and erosion control
- trenching and backfilling
- excavation and grading
- solid and liquid waste storage, handling and treatment facilities
- water withdrawal

#### Field Development

- drilling of wells
- construction of gathering systems
- construction/installation of facilities
- installation and operation of sumps
- disposal of waste

#### Dredging

- dredging and disposal locations
- quantity of material to be moved
- dredging method

#### Watercourse Crossings

- crossing methods
- number and size of crossings
- equipment requirements
- timing and duration
- erosion control

#### Testing of the Pipeline Prior to Use

- methods
- timing

- water use

### Clean-up and Restoration

Describe clean-up and restoration of work areas (e.g., ROW), including activities, timing and final condition. Identify any criteria selected to measure clean-up success (quantitative and qualitative).

In particular, discuss clean-up and restoration with respect to temporary facilities and work areas, including:

- work camps
- access infrastructure (e.g., airstrips, roads, barge slips)
- fuel storage areas
- borrow pits and quarries
- sumps
- waste disposal
- equipment staging or storage areas
- temporary work room
- temporary watercourse crossings (i.e. for equipment, vehicles)

### **9.7. Operation and Maintenance Phase**

Describe the operation of the major Project components and activities, including:

#### Operation of Facilities

- wells, pipelines, valves, compressor stations, pump stations, processing, cooling/refrigeration and storage facilities
- access and transportation systems (air, land and water), with estimates of traffic types, frequency and duration
- worker accommodation
- communication systems
- solid and liquid waste storage, handling and treatment facilities
- Project systems with air and water effluents and emissions
- storage, handling and disposal of hazardous materials including explosives and petroleum products
- power generation and distribution

#### Maintenance and Repair

- anticipated repair and maintenance activities, and associated undertakings, that could result in interactions with the environment, including replacement of Project components, blowdowns or venting of natural gas, maintenance dredging, vegetation control and ROW maintenance

- general locations
- modes of transportation

Inspection, Monitoring and Surveillance (see also section 23.1 Facility Monitoring)

- methods and related mode(s) of transportation
- general locations
- timing and frequency

Modification

- description of any anticipated modifications to the physical works or activities described above
- locations
- description of scenarios for the addition of Project facilities (Appendix 1) should construction of facilities be phased during the lifespan of the Project.

### **9.8. *Decommissioning and Abandonment Phase***

Describe the proposed approach to, and conceptual plans for, decommissioning or abandoning Project facilities including timing, demolition, site clean-up and rehabilitation activities. Describe regulatory frameworks applicable to decommissioning and abandonment of Project facilities (Appendix 1).

Specify ownership, transfer, and control of the different Project components and responsibility for maintaining the integrity of decommissioned or abandoned facilities.

Include information with respect to:

- wells
- field development facilities
- pipelines (gathering and transmission)
- compression and processing facilities
- valve and meter station sites
- communications systems
- access
- worker accommodation

### **9.9. Need for, purpose of, and alternatives to the Project**

Describe, from the perspective of the Proponent, the need for and purpose of the Mackenzie Gas Project. The need for the Project is defined as the problem or opportunity that the Project is intending to solve or satisfy from the perspective of the Proponent and should clearly identify the fundamental rationale for the Project.

Describe alternatives to the Project, which are defined as functionally different ways to achieve the Project need and purpose.

For each alternative, the Proponent shall describe criteria used to identify the major positive and/or negative environmental, social, cultural, economic and technical aspects of the alternatives considered.

### **9.10. Alternative Means of Carrying out the Project**

Identify the technically and economically feasible ways that the Project can be carried out and summarize the Proponent's consideration of alternative means.

Discuss how the environment influenced the choice of alternative means. Specific issues may be cross-referenced and provided in other sections of the EIS (e.g., selection of construction methods at watercourse crossings).

At a minimum, the discussion of alternative means should include:

Facility Siting and Routing:

- wells
- pipeline routes (gathering, liquids and natural gas transmission)
- processing facilities at the northern terminus
- facility monitoring equipment
- compressor stations, pump stations and valve sites
- access roads (temporary and permanent)
- temporary work room
- airstrips
- borrow pits and quarries
- work camps
- equipment and materials landing and storage areas
- disposal sites, including sumps, injection wells, solid and liquid waste

Methods to transport materials and personnel

Power sources for operation (e.g. compression, processing, equipment monitoring)

For each Project Phase:

- methods to carry out activities (e.g. watercourse crossings, see section 14.2)
- timing and scheduling
- selection of mitigation
- transportation of workforce and supplies

The analysis to determine feasibility of alternatives, including any criteria and assumptions used, should be provided.

For each technically and economically feasible alternative means, describe the broad environmental, social and economic impacts. The selection of any preferred alternatives must be based on clearly identified criteria, supporting information and analyses. Supporting studies to establish criteria (e.g., seismicity, permafrost) should be summarized and referenced.

In addition, a discussion should be provided about how community knowledge or vision of the future was considered and how communities were involved, in the identification and selection of alternative means. Describe the methods and processes by which the preferred alternative means have been, or will be, selected including any participation or engagement of local communities and residents.

## **10. PUBLIC PARTICIPATION**

Public participation is an important component of the EIR process and a means by which the concerns and interests of the public are taken into account. In this section, outline the engagement activities undertaken in respect of the EIS, identify and report on key issues raised, and describe how those issues were addressed.

More specifically:

- describe the methods used to identify, inform and solicit input to the EIS i.e., whether the participation method was an information session, for the purpose of issues scoping, or for the purpose of problem solving
- provide an evaluation of the effectiveness of the methods used to secure public participation in the EIR process
- outline the types of support provided by the proponent to communities, organizations or individuals involved in the public participation process
- identify and document those who provided comments and input including residents and organizations in affected communities, other organizations, resource users and government agencies
- document outcomes of public engagement including any additional information provided to those consulted and any information provided by them

- document and track issues and describe any issues that may be outstanding and relevant factors contributing to the status of outstanding issues
- document how public engagement was used in the identification of issues, impact prediction and mitigation, and how the results affected the design of the Project
- describe the principles and methods that will be applied to provide information to, obtain input or to otherwise engage communities and groups about project activities over the lifespan of the Project, particularly elders, youth, women and co-management bodies.

## **11. EXISTING ENVIRONMENT**

### **11.1. Introduction**

The description of the existing environment characterizes the setting and state of the physical, biological and human environments in which a Project is proposed to be situated. It provides the foundation for predicting Project-related impacts on the environment and identifying how the environment could cause changes in the Project.

The description of the environment should, when read in combination with the Project description (section 9), allow the Panel to reasonably identify and understand the selection of Valued Environmental Components (VECs) for the physical, biological and human environments (section 12.1), potential interactions, and potential impacts that may be caused by the Project. Specific details can be provided throughout the EIS, with appropriate cross-reference.

Where possible, the description should identify and explain important interrelationships in the environment, its processes and systems (e.g., the contribution of the Mackenzie Delta to critical habitat, permafrost and terrain stability, population stocks, the presence of particular species in select areas, the harvesting economy in important community harvest areas, or the levels and range of services provided by regional centres). The inclusion of maps, photos or other diagrams to illustrate key points is encouraged.

In describing the existing environment, consideration must be given to its current state, including trends and recent changes. The description of the baseline, while necessarily relying on recent and current data and traditional knowledge, must recognize the dynamic nature of the environment. To assist in identifying and accounting for trends and changes in the environment that are not caused by the Project but that may either combine with those impacts related to the Project or cause a change to the Project:

1. describe any substantive changes to the physical, biological and human environment of the Project area that have occurred since circa 1940, to the extent known, and indicate whether those changes are ongoing;
2. specifically, describe any changes to wildlife and fish habitat and to distribution, movements or abundance since circa 1970, as appropriate;

3. describe how the environment has changed in relation to recent hydrocarbon exploration and transmission, and mining activities;
4. predict the condition of the environment within the expected lifespan of the Project, if the Project did not proceed. Considerations shall include but not be limited to global climate change and variability (see section 16.1 Climate Change), permafrost distribution and characteristics, variation in wildlife and fish abundance and distribution, water quality, ecological connectivity and demographic and socio-economic trends; and
5. discuss substantive changes in human use of the land, settlement patterns and social and cultural conditions, to the extent known, since circa 1940 and circa 1970.

An important objective is to distinguish between the Project's effects on the environment and the effects of other factors, particularly those referenced in (1) through (4) above and the analysis should reflect this intent, without requiring new research for this purpose.

Identify sources of information used to describe the existing environment.

## **11.2. *Ecoregions and Ecozones***

Provide a description, including characteristics, features and maps, of the ecoregions and ecozones in which the Project is located.

## **11.3. *Physical Environment***

### **11.3.1. *Terrain, Geology, Permafrost and Soils***

Describe the existing terrain, geology, permafrost and soils in the Project area, including a description, location, and geographic extent of the following features, including:

Regional/area setting, topography and geological, including key terrain features such as mountains, rivers, lakes and wetlands (also see section 11.3.6 Water Quality and Quantity) and other important processes and features.

#### **Bedrock and Subsurface Conditions**

- bedrock type and depth
- hydrocarbon reservoirs that may subside due to Project activities
- subsurface formations that may be used for Project-related disposal and their hydrogeological conditions (see also section 11.3.6 Water Quality and Quantity)
- regional assessment of acid rock drainage potential of exposed bedrock

#### **Surficial Materials and Soils**



- unconsolidated surficial materials and terrain types, including thickness
- landforms
- soil types, including group, series and type, as applicable

Physical, thermal, mechanical and geotechnical properties of surficial materials and bedrock, as applicable

#### Granular Materials

- locations
- type of material
- size and depth of deposit
- permafrost conditions and ice content within deposits
- quantity
- ownership and availability

#### Permafrost

Provide a description of permafrost and ice-rich soils in the Project area, including:

- distribution (thickness and lateral extent) on land, water, shoreline and slope crossings, including a discussion of taliks
- permafrost processes, features and landforms and their stability, including slopes, shorelines and stream banks
- frozen/unfrozen interfaces (i.e., frequency, length of segments)
- ground ice conditions (massive and other forms) and ice content
- temperature and ground thermal regime (both frozen and unfrozen ground)
- active layer thickness
- seasonal frost penetration in unfrozen ground
- thaw sensitivity
- frost susceptibility of unfrozen and frozen ground
- how forest fires and tundra fires affect ground temperature regimes and permafrost

Describe existing spatial and temporal trends related to the distribution and characteristics of permafrost in the Project area. The use of maps and diagrams is highly encouraged.

Areas of geotechnical and geological instability, geological hazards and seismicity, including:

- landscape processes and areas of occurrence, such as landslides, mudflows, creep, slumping and debris flows;
- karst
- fault zones
- active seismic areas
- areas susceptible to water, ice or wind erosion and scour
- fluvial, coastal and marine processes and geomorphology, including stability of floodplains and channel bottoms

The sources of information and any classification systems relied upon must be referenced and, as necessary, described to assist in understanding the information provided.

### **11.3.2. Marine Sediment Quality and Quantity**

Provide a description of marine sediments in the Project area, including an overview of the physical and biological processes related to sediment deposition, movement, and quality.

In marine areas that could be disturbed by the Project, including areas to be dredged or used for dredge spoil disposal, characterize sediments in relation to parameters identified in the Canadian Sediment Quality Guidelines, the *Canadian Environmental Protection Act*, 1999, and its *Disposal at Sea Regulations*.

### **11.3.3. Climate**

Provide a description of the existing or baseline climate conditions and climatic variability and trends, including, but not necessarily limited to:

- the location of recording stations and length of record for any meteorological data presented
- prevailing climatic conditions, seasonal variations, predominant winds including direction and velocity, temperature and precipitation (snowfall, snow depth, rain, fog)
- spatial and temporal boundaries for the description of climate
- any current climate-related extreme events that may affect the Project, and frequency of occurrence

In support of the baseline description:

- identify the spatial boundaries for the description of climate conditions (e.g., any regional scale(s))
- define the 'current' climate normal period (baseline period) relied upon and describe how it was determined
- define the variability/trends within the 'current' climate normal period and within the period of instrumental record
- discuss the contribution of traditional knowledge to the understanding of climate conditions and variability
- identify any guidelines followed when describing the baseline period (e.g., IPCC<sup>3</sup> 1999 guidelines)

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<sup>3</sup> Intergovernmental Panel on Climate Change (IPCC)

- identify the location of recording stations and length of record for any meteorological data presented
- identify any synthetic climate data generated for the purposes of establishing the baseline climate conditions and describe the models used to generate this information

Changes in climate, in terms of direction, magnitude and climate element affected, can be expected to vary at a regional scale. Accordingly, the description of baseline conditions should be presented in a manner that reflects this variability and facilitates subsequent discussion of how changes in climate could change the Project, or particular Project components (see section 16.1 Climate Change).

#### **11.3.4. Air Quality**

Provide a description of the existing air quality in the Project area, including:

- the spatial boundaries of the airsheds within which the Project would be located, including a rationale for their delineation
- for each airshed, identify current sources of emissions, seasonal variations, climatic conditions affecting air quality (e.g., wind direction and velocity) and, if known, assimilative capacity
- the existing air quality in each airshed, based upon, but not limited to, parameters identified in territorial, federal or other relevant air quality standards and objectives,
- visibility
- the recording stations and length of record for any air quality data presented

#### **11.3.5. Noise**

Provide a description of the existing ambient acoustical environment for sites at which proposed facilities would generate noise (e.g., compression or processing facilities). Further, at these sites, describe:

- existing noise sources, including duration, frequency and levels of noise
- the sources and types of variation in existing noise levels
- any relevant standards, guidelines or objectives with respect to noise levels
- the spatial boundaries of existing noise levels

Identify recording stations and length of record for any noise data presented.

#### **11.3.6. Water Quality and Quantity**

Provide a description and maps of the existing water resources within or near the boundaries of the Project area including:

- waterbodies, watercourses and major drainage areas
- watercourses that have year round flow
- the extent of connectivity to adjacent watercourses

- seasonal and perennial springs
- naturally occurring icings

Provide a description of major drainages and watercourses, including the basis for their selection. For each major drainage or major watercourse, as appropriate, provide a description of its hydrological characteristics, including:

- flow regimes
- variability and sources of variability
- seasonal flow patterns
- channel and bed morphology and stability
- sediment load – suspended and bed load
- active and historical floodplains
- freeze/thaw timing
- taliks/permafrost distribution and stability beneath waterbodies
- the role of wetlands (e.g., bogs, fens and peat plateaus)

In the vicinity of communities and site-specific Project components (e.g., field development, compressor stations, valves), describe:

- flood regimes
- ice-jamming and scour

In each major drainage, identify locations of existing and planned water use (domestic, municipal, camp, etc.) in relation to proposed facilities. For each area of water use that may be affected by the Project, identify:

- quantity of use
- existing water quality, including relevant federal, provincial and territorial guidelines, criteria and legislation
- seasonal or other temporal variation of water quality and use
- existing sources of water quality impairment and their locations in relation to Project facilities

Provide a description and maps of existing groundwater resources within the Project area, including:

- quality and quantity
- hydrogeological conditions, including depth, flow patterns, recharge and discharge areas
- existing and planned water usage

Discuss hydrogeological conditions in near-surface materials or deeper formations, where relevant to Project components and activities.

#### **11.4. Biological Environment**

##### **11.4.1. Fish and Fish Habitat**

Provide a description of the existing fish and fish habitat within the Project area, including:

- Fish species including forage fish (non-harvested) and any other aquatic resources of value present
- seasonal and life cycle movements and sensitive periods
- habitat requirements for each life stage
- local and regional abundance, distribution and use of habitat types, including aquatic and riparian vegetation
- known sensitive or important areas in terms of habitat type (e.g., spawning, overwintering, refugia, feeding), species and timing of use
- for species of concern (see section 14.1), also describe specific location, population status, limits and size, sensitivity and limiting factors
- baseline contaminant concentrations in harvested species, that may change as a result of the Project and as available
- any known issues with respect to health of harvested species (e.g. parasites, disease, condition)
- species of particular importance to subsistence harvesters
- species subject to exclusive or preferential rights granted by land claims
- species of particular importance to the guiding or outfitting industries
- areas subject to exclusive harvesting rights granted to land claim beneficiaries
- harvest pressures (subsistence, sport fishing and commercial harvesting<sup>4</sup>) by species, season and geographic area
- listing of existing non-native species

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<sup>4</sup> For the purposes of the EIS, “subsistence” refers to domestic harvesting by Aboriginal people; “non-resident harvesting” includes commercially guided hunting; “resident or sport harvesting” refers to harvest by those holding licenses; and “commercial harvesting” meaning all harvesting activities (excluding non-resident hunting) of a commercial nature.

#### **11.4.2. Birds and Bird Habitat**

Provide a description of the existing bird resources with the Project area, including:

- bird species present
- abundance and distribution, seasonal movements, habitat requirements (breeding, moulting, staging, feeding) and sensitive periods
- for species of concern (see section 14.1), also describe specific location(s), population status and trends, limits and size, critical habitat, sensitivity and limiting factors status and trends;
- species subject to exclusive or preferential rights granted by land claims;
- habitat types including local and regional abundance and distribution
- baseline contaminant concentrations in harvested species, that may change as a result of the Project and as available
- any known issues with respect to health of harvested species (e.g. parasites, disease, condition)
- areas subject to exclusive harvesting rights granted to land claim beneficiaries
- species of particular importance to subsistence harvesters
- habitat or sites of special value or sensitivity, including species use and timing
- harvest pressures (subsistence and sport hunting) by species, season and geographic area
- listing of existing non-native species

##### **11.4.2.1. Kendall Island Bird Sanctuary**

Certain Project facilities are proposed to be located within the Kendall Island Bird Sanctuary (KIBS). The description of the existing environment for KIBS should allow an understanding of the relative importance, for migratory birds, of areas that could be impacted by the Project in relation to KIBS as a whole. Accordingly, describe:

- migratory bird habitat types within KIBS
- migratory bird species present
- the spatial distribution and amount of each habitat type
- distribution and density of each migratory bird species
- a comparison of the density of each migratory bird species by habitat type, in the Project area (footprint plus zones of influence – see section 14.5.1) and in similar habitats elsewhere in KIBS

Identify and describe, with maps, important areas and their use (e.g., nesting, brood-rearing, moulting and staging) for waterfowl, waterbirds, shorebirds and songbirds within the Project area (footprint plus zones of influence) and in KIBS as a whole.

Describe how habitat types, bird density, important areas and bird use were determined.

#### **11.4.3. Wildlife and Wildlife Habitat**

Provide a description of the existing wildlife resources<sup>5</sup> within the Project area, including:

- Wildlife species present
- abundance and distribution, seasonal movements, habitat requirements (e.g., breeding, calving, feeding) and sensitive periods
- for species of concern (see section 14.1), also describe specific location(s), population status and trends, limits and size, critical habitat, sensitivity and limiting factors
- species subject to exclusive or preferential rights granted by land claims
- species of particular importance to the guiding or outfitting industries
- habitat types including local and regional abundance and distribution
- species of particular importance to subsistence harvesters
- habitat or sites of special value or sensitivity, including species use and timing
- areas subject to exclusive harvesting rights granted to land claim beneficiaries
- migratory patterns, routes and timing in relation to Project facilities and activities
- harvest pressures (subsistence, resident and non-resident harvesting and commercial harvesting) by species, season and geographic area
- listing of existing non-native species
- current levels of natural and human-caused fragmentation and connectivity
- baseline contaminant concentrations in harvested species, that may change as a result of the Project and as available
- any known issues with respect to health of harvested species (e.g. parasites, disease, condition)

#### **11.4.4. Marine Mammals**

Provide a description of the existing marine mammal species and their habitat within the Project area, including:

- marine mammal species
- abundance and distribution, seasonal and life cycle movements, and sensitive periods
- local and regional abundance, distribution and use of habitat types

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<sup>5</sup> Birds and marine mammals are addressed separately in section 11.4.2 and 11.4.4 respectively

- habitat or sites of special value or sensitivity, including species use and timing
- known sensitive areas in terms of habitat type, species, and timing of use
- for species of concern (see section 14.1), also describe distribution, population status, sensitivity to disturbance, and factors limiting their distribution and population
- baseline contaminant concentrations in harvested species, that may change as a result of the Project and as available
- any known issues with respect to health of harvested species (e.g. parasites, disease, condition)
- species subject to exclusive or preferential rights granted by land claims
- areas subject to exclusive harvesting rights granted to land claim beneficiaries
- harvest pressures by species, season, and geographic area
- listing of existing non-native species

#### **11.4.5. Vegetation**

Provide a description and maps of the existing vegetation in the Project area, including:

- vegetation and vegetation assemblages
- any classification system followed, as appropriate
- identification of species or assemblages that are rare, valued, protected or designated (e.g., vulnerable, threatened, endangered)
- for species of concern (see section 14.1), also describe specific location, population status, limits and size, sensitivity and limiting factors
- historic and current human use of vegetation, including subsistence and commercial harvesting, (e.g., medicinal herb gathering, berry picking, forestry)
- baseline contaminant concentrations in harvested species or vegetation (e.g. berries) that may change as a result of the Project and as available
- locations and quantities of merchantable timber
- listing of existing non-native species
- frequency of forest and tundra fire
- post-fire vegetation succession



## **11.5. Human Environment**

### **11.5.1. General**

The description of the human environment shall take a comprehensive approach that takes full account of the distinctive ways of life of the local communities, the critical requirements for their maintenance and enhancement, and the aspirations and plans of the communities. This approach shall have due regard for the distinctive economic and social role of subsistence and commercial harvesting at the household, community and regional levels, and other uses of lands and resources for traditional purposes by aboriginal and other local persons. It shall also consider the status, health, persistence, vulnerability and resilience of those features of the local economy. Context-sensitive information shall be provided in sufficient detail to address common and diverse public interests and concerns, and the variable significance of the potential impacts affecting communities throughout the Project area.

Describe the profile of the existing human environment, including conditions at the community, regional (e.g., Mackenzie Delta), land claim settlement regions, territorial, provincial and national levels, in such a way that the potential impacts on the functioning and health of the human environment and the significance of these impacts can be assessed. The capacity of local, regional, territorial and federal governments to maintain services and service level should be considered. The profile should employ, as appropriate, social and economic indicators to help define the features of the system, and these shall be relevant to the selected VECs (see section 12.1), direct and indirect potential impacts, affected communities and to public concerns identified during public consultations.

Social and economic indicators should include, but not be limited to, demographics, employment, income, education and skills, use of land (including water and ice) and resources, including fish and wildlife harvesting, housing, quality of life, literacy levels, health, morbidity and mortality, diet including country food, and substance abuse, and the interrelations of these indicators. Social and economic information provided should be broken down where possible by age, gender, and ethnicity, and by community, land claims settlement region, and territorial, provincial and federal regions.

Identify, to the best of the Proponent's understanding, the various perspectives and aspirations for the future within the region. In this context, consider the relationship between the Project and any land claims agreements respecting the general area, as well as the relevant community and regional social and economic development strategies and plans.

Some information on social and economic matters must be obtained from a combination of the following sources: existing literature; existing administrative and monitoring data held chiefly by responsible governments and agencies; social surveys; and traditional knowledge. Ethical social research standards require that the last two can only be obtained with the consent and cooperation of local residents. Accordingly, demonstrate that the Proponent has made best efforts either to obtain this information itself, or where appropriate, to assist the appropriate aboriginal organizations and persons, to provide it for inclusion in the EIS, or to present it directly to the Panel during the course of the review.

In addition to the elements listed below, the description should also include any other issues identified through public consultations.

### **11.5.2. Demographics**

Provide a description of the social and demographic profile(s) in the area of the Project including trends, including:

- population and population trends by community and by region
- number of persons per household and number of households
- age and gender
- ethnicity
- births, teen births and deaths
- in/out migration by community and region, and factors that could contribute to migration patterns

### **11.5.3. National, Regional and Community Economies**

Provide a description of the local and regional economies and their performance, including:

- national, provincial and territorial gross domestic product (GDP)
- employment rate (e.g., part-time, full-time, seasonal, self-employment)
- employment by industry and occupation, including occupations related to traditional activities
- employment by age, gender and ethnicity
- job vacancy and unfilled positions
- labour force growth
- labour force participation and labour force balance between wage and non-wage sector activities
- income and income balance from all sources on a household and per capita basis
- earnings growth
- annual level of social assistance benefits on a household and per capita basis

- annual level of social assistance recipients
- poverty levels (also see section 11.5.8 Human Health and Community Wellness)
- level of local households consuming harvested meat and fish
- local consumer prices and cost of living, particularly with respect to housing, affordable housing, , food, fuel, utilities and transportation
- current status of the renewable resource sector and related harvest activities, and the factors that affect them
- local and regional economic development goals and objectives as identified in public consultations, land claims agreements and community, regional and territorial economic development plans and strategies
- current and projected land-based enterprises and economic activities, including those related to tourism, outfitting, commercial harvesting, recreation, renewable resources and non-renewable resources
- number of licensed businesses
- number of licensed businesses by aboriginal ownership and gender

#### **11.5.4. Education, Training and Skills**

Provide a description of the education, skills and training levels in the communities relevant to the Project, including:

- graduation and achievement rates including high school or higher
- trade certification levels
- education, training and skill levels as these relate to existing employment patterns and opportunities
- adult basic education and literacy programs

Identify education, training and/or certification programs available within the region to residents of the Project area.

Describe the timing and duration of education and skills development programs that would be required for Project-related employment.

### **11.5.5. Harvesting**

Provide a description of current and historic harvesting, with special attention to subsistence and commercial harvesting, including:

- harvesting activities and other traditional uses by Aboriginal people within areas affected by the Project and their viability, with special consideration to:
  - the relation of subsistence, sport, and commercial harvesting to the household and community economy
  - current resource accessibility and quality for harvesters
  - level of harvests (see also sections 11.4.1 through 11.4.5)
  - level of participation in harvesting activities, by age, gender and ethnicity as available
  - reliance on harvesting activities for household food supply
  - location of harvest areas, with particular attention to areas where exclusive or preferential harvesting rights were granted by land claims, high use areas, areas of sensitivity, and seasonal access
  - recent and current encroachments and restrictions of harvesting activities by competing and incompatible uses of land and resources or related regulations
- recreational hunting and fishing and other harvesting activities by non-Aboriginal people within areas affected by the Project
- outfitting and trapping activities and related use areas (active and fallow)

### **11.5.6. Land Use**

Describe historic and current land use patterns, designations and special management areas in the Project area, including:

- land uses and designations (e.g., protected areas, traditional use areas, special harvesting sites, transportation corridors, granular resources, parks and recreational areas, ecologically important areas, critical wildlife habitats and movement areas, caribou protection measures, industrial zones)
- seasonal and permanent camp areas (i.e., individual work, recreational, commercial)
- traditional trails
- land use categories, as identified in relevant community and regional, conservation and land use plans and strategies
- land use areas as described in the approved Gwich'in and draft Sahtu Regional Land Use Plans
- valued aesthetic locations and their attributes
- lands and features of special interest or value, and their attributes

Identify areas of high conservation value, ecological sensitivity (see also section 11.4 Biological Environment) and traditional use, including any in the Ecoregions affected by the Project and in the Ecoregions set out in the NWT Protected Areas Strategy Mackenzie Valley Five Year Action Plan.

#### **11.5.7. Heritage Resources**

Describe the existing archaeological, paleontological and historic resources, collectively referred to here as heritage resources, within the Project area. Include:

- archaeological, paleontological and historic sites and resources
- culturally important sites
- burial sites
- heritage resource potential

#### **11.5.8. Human Health and Community Wellness**

Provide a description of the status of human health and community wellness in the area of the Project, including:

- the physical, mental and social health of residents of the areas affected by the Project, based on local perceptions of health and well-being and quantitative indicators that include
  - mortality, morbidity and social pathology or dysfunction (e.g., family violence; suicide, family violence, crime rates)
  - indicators of personal health practices such as smoking rates and levels of leisure time and physical activity
  - children's health, including breastfeeding, infant mortality and dental health
  - sexual health, including sexual transmitted infections and teen pregnancies
- nutrition (e.g., the availability and significance of traditional and country foods as well as store-bought food sources – see also section 11.5.5 Harvesting)
- diseases that include diabetes and infectious diseases
- alcohol, drug and other substance abuse
- support systems and programs available regionally and locally to address human health and community wellness (e.g., health services, elder care, child care, counselling, alcohol and drug treatment, healing centres – see also section 11.5.10 Infrastructure and Institutional Capacity)
- age, gender and ethnicity
- homelessness and poverty

This description of health status should include indicators of determinants of health, including physical, social, cultural and economic aspects.

### **11.5.9. Socio-cultural Patterns**

Describe socio-cultural patterns and social organization in the communities in the Project area to assist in understanding social stability and cohesion, including:

- cultural and spiritual life of the communities, including language
- patterns of family and community life, such as community and household social organization, including the organization of work, both paid and unpaid and its distribution between men and women, and the patterns of sharing and mutual aid
- participation in traditional activities, by age and gender (see also 11.5.5. Harvesting)
- social relations between residents and non-residents, between men and women, among generations and between aboriginal and non-aboriginal persons
- support systems and programs available regionally and locally to address social and cultural development issues

### **11.5.10. Infrastructure and Institutional Capacity**

Describe the local and regional infrastructure and institutions, including:

- the role of different orders of government (federal, territorial, provincial, local, aboriginal) in providing financing, public services and maintaining local and regional organizations and infrastructure that may be impacted by the Project
- fiscal relationships between federal, territorial and provincial governments including formula-funding and financial transfer arrangements and revenue-sharing formulas that may affect or be affected by the Project
- status of community and local government institutions and organizations, including their powers, responsibility, financing and fiscal capacity
- current levels of use of existing social, institutional, family, health and community services and local, regional and territorial infrastructure and the capacity of these to meet current, additional and new needs. Particular attention shall be given to:
  - emergency response and law enforcement services
  - waste disposal and management
  - transportation systems (barging, roads, airports)
  - telephone/ communication service
  - fire protection
  - housing stock, costs and availability
  - safe houses and shelters
  - health facilities and services, including medivac
  - child care and elder care services
  - schools and education facilities
  - recreational facilities
  - churches

- water and sewage facilities
- power and fuel services
- management of renewable resources
- supply of aggregate and granular materials
- planned major capital projects or planned major social or institutional changes in the Project area

## **12. IMPACT ASSESSMENT METHODOLOGY**

### ***12.1. Selection of Valued Environmental Components***

Valued Environmental Components (VEC) can be used to focus the EIR on those elements of the physical, biological and human environments that could be affected by the Project or could have an important effect on the Project, and are recognized as important for physical, ecological, cultural, social or economic reasons.

In general, the use of the VEC approach provides the foundation for predicting Project-related impacts on the environment. Through the identification of those VECs that may be impacted by the Project and describing the impacts of the Project on those VECs, it may be demonstrated whether or not there would be a likelihood of significant adverse impacts on the environment.

The selection of appropriate VECs is a critical component of scoping in EIA, to ensure that the assessment remains focused and the analysis remains practical and manageable.

The particular value of a VEC may relate not only to its role in the ecosystem, and social and economic systems, but also to the value placed on it by humans. The culture and way of life of the people using the area affected by the Project are themselves considered valued components. Accordingly, these linkages may result in overlap of VEC attributes, or overlap in considerations relevant to potential impacts on those VECs.

Describe:

- the methods by which VECs were identified; and
- the basis, or justification, for their selection.

Identify any indicators used in the assessment of impacts on VECs and provide the basis for their selection.

### ***12.2. Impact Analysis Methodology***

Explain and justify the methods used to predict potential impacts of the Project on the VECs on interactions among these components and on any broader relationships with the physical,

biological and human environments. Describe linkages between Project-related impacts (e.g., how impacts on the biological environment could affect the human environment).

In describing methodology:

- explain how scientific, engineering, traditional and other knowledge was used to describe the existing environment, evaluate potential impacts and reach conclusions
- identify and justify any assumptions made
- document all models and studies so that, to the extent possible, the analyses are transparent and reproducible
- identify which studies included the assistance of communities and who was involved
- specify data collection methods and report the uncertainty, reliability and sensitivity of the models used to reach conclusions
- support analyses, interpretation of results and conclusions with reference to appropriate literature and providing all relevant references
- specify and reference sources for any contributions based on traditional knowledge

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. To the extent possible, use current, accepted methods of practice in the Northwest Territories and Alberta or relevant to the Project area.

Include any methods used to predict how the environment could change the Project (see section 16.1 Climate Change).

### **12.3. Assessment Boundaries**

Identify the spatial and temporal boundaries used in the EIR and the rationale for their selection.

Identify the boundaries for

- the Project area
- each VEC
- assessment of impacts
- assessment of cumulative impacts

It is recognized that boundaries may vary with Project component or activity and with each VEC. For each VEC selected, identify its ecological, social and economic, and administrative boundary, as appropriate.

In identifying the spatial boundaries give particular attention to: (a) home range size and migratory patterns, (b) important habitat and range areas (e.g. proportion of population or critical habitat in a specified area); (c) the extent of land use for subsistence, commercial, sport, cultural and recreational purposes; (d) traditional use areas; and (e) the zones of socio-economic impact, including local, regional and territorial/provincial scales.



The proponent shall assess the potential impacts on the environment for all phases of the proposed Project. Temporal boundaries should recognize the proposed lifespan of Project activities and facilities, and duration of potential impacts. Where potential residual impacts could persist after decommissioning and abandonment, identify their anticipated duration.

#### **12.4. Mitigation Measures**

Describe proposed measures to mitigate adverse impacts of the Project to create or enhance beneficial impacts over the lifespan of the Project. Also, identify proposed methods to mitigate changes to the Project caused by the environment

Indicate which mitigative measures are proven and which are experimental. Provide references or analysis that would support any statements regarding the effectiveness of proposed mitigation measures.

Identify and describe any policies, guidelines, applicable codes of practice and/or best management practices that are proposed to be followed with respect to Project activities.

For specific VECs, identify any relevant objectives, policies, guidelines, management plans, timing restrictions proposed to be followed when carrying out the Project.

Where measures within access or benefit agreements with the Inuvialuit and First Nations, or socio-economic agreements and environmental agreements with the federal and territorial governments will be relied upon as a mitigative measure, provide the following information:

- the impacts which will be mitigated
- a general description of the mitigation measure(s)
- the parties to the agreement
- an overview of implementation and monitoring plans for any such agreement

### **12.5. Residual Impacts**

Residual impacts are those that remain following the application of mitigation. To assist in characterizing residual impacts, provide a description based on:

- direction (i.e., adverse, beneficial, neutral)
- magnitude
- geographic extent
- timing and duration
- frequency
- reversibility
- other social and economic descriptors of residual impacts

Additional descriptors may be used, if explained and supported.

### **12.6. Significance**

Assess and provide the Proponent's views with respect to the significance of the residual Project-related impacts on the VECs selected for the physical, biological and human environments. This assessment must provide, for each VEC, an explicit, traceable link between potential impacts and views of significance.

Describe and document:

- how significance was determined (i.e., the process carried out or the methods used)
- the basis for the determination of significance (e.g., thresholds, stakeholder input, traditional knowledge, standards, guidelines, quantitative risk assessment). Provide documentation for existing thresholds.
- where professional opinion or experience is the basis for significance determination identify the individuals involved in making that determination and the assumptions upon which they based their opinions

Both the process and the basis for significance may vary among VECs. Therefore, describe specific methods, where appropriate. In part, the discussion of residual impacts and significance should indicate how the Project could contribute to sustainable social and economic development in the Project area.

### **12.7. Likelihood**

For any residual adverse impacts that are predicted to be significant, describe the likelihood of occurrence. Likelihood should be based on clearly identified criteria that incorporate probability of occurrence and scientific uncertainty.

### **12.8. Confidence in Prediction**

Indicate the degree of certainty in the impact predictions and determination of significance.

### **12.9. Application of a Precautionary Approach**

For the purposes of this EIR, a precautionary approach may be relevant in circumstances where it is identified that a Project activity could cause serious or irreversible adverse impact on the environment and the cause and effect relationships cannot be clearly established (see section 5.5 Precautionary Approach).

Identify elements of the EIS where the application of a precautionary approach may be warranted. For those circumstances, discuss whether the potential serious or irreversible adverse impact to the environment related to the Project can be avoided. Where potential adverse impacts cannot be avoided, describe ways to reduce the risk to the environment, including a discussion of Project design and available technology with respect to effectiveness and cost.

## **13. PHYSICAL ENVIRONMENT IMPACT ANALYSIS**

Assess the potential impacts of the Project on the VECs selected for the physical environment including those related to section 13.1 through 13.5.

For each VEC, the information must be sufficient to allow the Joint Review Panel to understand the nature of the potential impacts and how the Proponent's conclusions were reached. The assessment must provide a clear, traceable path of information from the baseline conditions through the identification of potential impacts, mitigation, residual impacts and determination of significance. As appropriate, consider how natural variation or events (e.g., Climate Change, see section 16.1) could affect the characteristics of Project impacts.

### **13.1. Terrain, Geology, Permafrost and Soils**

Describe and evaluate the potential impacts of the Project on terrain, permafrost, geology and soils, including a consideration of:

- slope and soil stability
- erosion on overland low angle sloping terrain
- subsidence resulting from hydrocarbon extraction and reservoir compaction
- granular resource extraction areas
- sumps
- subsurface injection of waste fluids

With respect to potential impacts of the Project on permafrost, specifically include a consideration of:

- thermal condition, active layer thickness, thaw depth, distribution and stability
- ice rich soils (thaw settlement, thermokarst) permafrost thaw and related settlement
- frost heave of frost susceptible soils in thin permafrost as well as seasonally frozen soils
- temperature of gas and liquids transported in the pipelines
- impacts of flaring on local microclimate and permafrost thermal regime
- thaw or settlement-related impacts on drainage and surface hydrology – see also section 13.5 Water Quality and Quantity)
- shorelines, channels, taliks
- combined impacts of the Project and forest fires or tundra fires

### **13.2. Marine Sediment Quality and Quantity**

In marine areas that could be disturbed by the Project, including areas to be dredged or used for dredge spoil disposal, characterize sediments in relation to parameters identified in the Canadian Sediment Quality Guidelines, the *Canadian Environmental Protection Act*, 1999, and its *Disposal at Sea Regulations*.

### **13.3. Air Quality**

Describe and evaluate the potential impacts of the Project on air quality, including a consideration of:

- the Project activities and components which would be sources of air emissions
- emissions of concern by source for each Project phase, including quantity, timing and duration, normal operation conditions and upsets
- air quality parameters that could be affected by these emissions (e.g., dust, particulates (PM10 and PM2.5), sulphur oxides, nitrogen oxides, methane, carbon dioxide, carbon monoxide, volatile organic compounds, formaldehyde, ground level ozone (O3), odour, etc.)
- acid deposition
- how changes in air quality could impact humans, wildlife and vegetation (short-term and over Project lifespan)
- ice fog, visibility
- terrain

Relevant territorial, provincial and federal air quality standards or guidelines should be discussed, as appropriate, including their purpose and use in relation to the Project phases.

Provide an assessment of the potential health impacts to humans, wildlife and vegetation related to Project emissions.

The identification of environmental and human health impacts of the Project related to air emissions should consider how the environment could affect air quality (e.g., season and weather patterns).

Describe the regulatory or permitting regime related to Project emissions.

Identify and describe proposed participation in national or territorial air emission and reporting programs, such as the National Pollutant Release Inventory program.

#### **13.4. Noise**

Describe and evaluate the potential impacts of Project-related noise, including a consideration of:

- Project components or activities that could produce noise levels of concern, including source location, timing and duration
- Terrain and weather
- disturbance to fish, marine mammals, wildlife and birds (see also sections 14.2 through 14.5)
- disturbance of harvest and recreational activities, including tourism (see also section 15.4)
- impacts on communities

Relevant territorial, provincial and/or federal noise standards or guidelines should be discussed, as appropriate, including their purpose and use in relation to the Project phases.

Provide a comparison of anticipated noise levels at compressor stations with current industrial or municipal noise levels (e.g., power generation in communities).

Provide an assessment of the potential health impacts related to Project-related changes in noise levels, including potential impacts of sleep disturbance and annoyance. Describe the proximity of the Project to sensitive receptors (e.g., residences, camps, schools, hospitals).

### **13.5. Water Quality and Quantity**

Describe and evaluate the potential impacts of the Project on water quality and quantity, including a consideration of:

- changes to surface drainage patterns and surface water hydrology including changes caused by Project-related impacts on terrain, soils and permafrost (also see section 13.1 Terrain, Geology, Permafrost and Soils and Section 14.2 Fish and Fish Habitat)
- hydrogeological resources including aquifers
- drinking water quality for humans and wildlife
- discharge or seepage of wastewater effluent, contaminants, chemical additives, etc.
- in-stream activities (e.g. watercourse crossings)
- erosion, sediment deposition, sediment re-suspension
- increased turbidity
- subsidence
- slope stability
- flow or water levels including the formation of frost bulbs and related icings at watercourse crossings (also see Section 16 Changes to the Project caused by the Environment)
- water withdrawal and volume of withdrawal (pipeline testing, ice roads, drilling, potable water, etc.)
- possibility of inter-basin transfer of water
- gravel extraction

## **14. BIOLOGICAL ENVIRONMENT IMPACT ANALYSIS**

Assess the potential impacts of the Project on the VECs or their indicators, selected for each of the headings in sections 14.1 through 14.7. For each VEC, the assessment must provide a clear, traceable path of information from the baseline conditions through the identification of potential impacts, mitigation, residual impacts and determination of significance.

In describing potential impacts to biological VECs, consider sensitivity to the Project, ability to recover from Project impacts, trends and natural variation. For each VEC, the information must be sufficient to allow the Joint Review Panel to understand the nature of the potential impacts and how the Proponent's conclusions were reached. The assessment must provide a clear, traceable path of information from the baseline conditions through the identification of potential impacts, mitigation, residual impacts and determination of significance. As appropriate, consider how natural variation or events (e.g., Climate Change, see section 16.1) could affect the characteristics of Project impacts.

Describe any relevant policies, management plans or other measures to protect or manage biological VECs, including timing restrictions, protected areas or legislation.

#### **14.1. Species of Concern**

The federal *Species at Risk Act* (SARA) came into force in June 2003 and was brought into force through a phased approach. Phase 3, the final phase, came into force on June 1, 2004

The purpose of SARA is to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from being endangered or threatened. SARA provides lists of wildlife species at risk that include mammals, birds, reptiles, amphibians, fish, lepidopterans, plants, lichens, mosses and molluscs.

The EIS must consider any change that the Project may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of SARA (see definition of impact on the environment in Appendix 3, Definitions). Accordingly, take into account the requirements of SARA and provide the information necessary to evaluate the potential impacts of the Project on the species contemplated by this Act including mitigation and monitoring.

Additionally, provide the information necessary to evaluate the potential impacts of the Project on species of concern listed or tracked by the Northwest Territories or the Province of Alberta.

Discuss the potential impacts of the Project on species of concern and proposed mitigation in relation to applicable legislation, policy, management plans, recovery strategies, action plans or land use planning initiatives.

#### **14.2. Fish and Fish Habitat**

Describe and evaluate the potential impacts of the Project on VECs related to fish and fish habitat, including a consideration of:

- the proposed watercourse crossing and temporary vehicle crossing methods:
  - for each proposed method, describe timing and duration, the anticipated extent of physical disturbance, blockages or changes to flow patterns, need for blasting and the factors that would influence these issues
  - for each method, describe how habitat could be altered
  - identify any criteria that would be used to select the methods to be used for each watercourse crossing (e.g., stream classification)
- standards or guidelines related to watercourse crossings that would be applied
- relevant policies, management plans or other measures to protect or enhance fish and fish habitat, including timing restrictions, protected areas or regulations

- disruption of sensitive life stages or habitat (e.g., spawning and incubation, rearing, refugia, overwintering) including loss of seabed habitat, known sensitive or important sites
- features such as in-stream structure, riparian zones, water quality and flow regimes
- impacts on food resources
- impacts on water quality or quantity (see section 13.5)
- distribution or abundance
- sensitive or important areas or habitat
- contaminant levels in harvested species that could be changed by the Project, as available
- fish health and condition
- blockages to movement
- blasting
- dredging or disposal of sediments
- underwater noise associated with Project activities
- water withdrawal
- how Project-related changes in harvest pressures could impact the resource

Specifically, the duration and geographic extent (distance downstream impacts can be anticipated) of potential impacts should be discussed in relation to how fish populations and harvest activities could be affected.

With respect to restoration of fish habitat, describe:

- the condition(s) to which the ROW (instream and riparian) and temporary work areas would be reclaimed or restored, and maintained once construction has been completed
- criteria for evaluating the success of mitigation or reclamation measures, and indicate when and how this evaluation would be conducted (see also section 25 Monitoring)

### **14.3. Marine Mammals**

Describe and evaluate the potential impacts of the Project on VECs related to marine mammals and their habitat, including a consideration of:

- disruption of sensitive life stages or habitat
- disruption of feeding activities
- distribution and abundance
- contaminant levels in harvested species that could be changed by the Project, as available
- marine mammal health and condition
- sensitive or important areas or habitat
- migratory patterns



- how Project-related changes in harvest pressures could impact the resource
- relevant policies, management plans or other measures to protect or enhance marine mammals and their habitat, including timing restrictions, protected areas or regulations

In particular, describe and evaluate the potential impacts of dredging, disposal of sediments and Project-related increases in ambient underwater noise on marine mammals.

#### **14.4. Wildlife and Wildlife Habitat**

Describe and evaluate the potential impacts of the Project on VECs related to wildlife or wildlife habitat, including a consideration of:

- direct and indirect alteration of habitat including footprint impact
- visual or auditory disturbance, including habitat avoidance in relation to Project facilities or activities
- disruption of sensitive life stages or habitat (e.g., calving, overwintering, migrating)
- wildlife movement patterns, home ranges, distribution or abundance
- sensitive or important areas or habitat
- population cycles
- predatory-prey relationships
- how Project-related changes in harvest pressures could impact the resource
- contaminant levels in harvested species that could be changed by the Project
- wildlife health and condition

Specifically, discuss the duration and geographic extent (e.g., distance of noise related disturbance) of potential impacts in relation to how wildlife populations and harvest activities could be affected.

#### **14.5. Birds and Bird Habitat**

Describe and evaluate the potential impacts of the Project on VECs related to birds and bird habitat, including a consideration of:

- disruption of sensitive life stages or habitat (e.g., nesting, rearing, staging, moulting, migrating)
- direct and indirect alteration of habitat (e.g., siting of Project facilities, watercourse crossings, habitat quality) including footprint
- sensitive or important areas or habitat
- visual or auditory disturbance, including habitat avoidance in relation to Project facilities or activities and light disturbance
- bird distribution or abundance
- contaminant levels in harvested species that could be changed by the Project

- bird health and condition
- how Project-related changes in harvest pressures could impact the resource
- Project-induced subsidence (see section 13.1)
- ROW maintenance and access

#### **14.5.1. Kendall Island Bird Sanctuary**

Identify, with maps, the spatial and temporal zones of influence for Project-related impacts on waterfowl, waterbird, shorebird and songbird habitat in KIBS, including a consideration of:

- facility type (e.g., compressor unit, gathering pipeline, access road)
- Project activity (e.g., drilling, barging, aircraft activity, gas compression)
- noise levels
- visual disturbance (including light)
- Project phase (e.g., construction, operation)
- bird type (i.e., waterfowl, waterbirds, shorebirds, songbirds)

Provide any supporting modeling used to determine the zones of influence. Quantify the Project footprint and zones of influence and describe how they may differ between Project phases or otherwise change over the lifespan of the Project. Describe how migratory bird habitat was considered during the siting and design of Project facilities (see also section 16 Changes to the Project caused by the Environment).

Describe and evaluate the potential impacts of the Project on migratory bird habitat and habitat use within KIBS, including a consideration of:

- the relative distribution and use of migratory bird habitat, by species (see also section 11.4.2.1)
- Project phase
- sensitive periods (e.g., nesting, brood-rearing, migration, moulting, staging)
- management plans, objectives, initiatives or agreements in relation to KIBS and activity within KIBS
- Project induced subsidence (see section 13.1)
- changes to the environment not related to the Project (see also section 16.1 Climate Changes)

Based upon habitat availability and density, estimate the number of each migratory bird species that could be lost or displaced in KIBS as a result of the Project, in relation to KIBS, national and continental population estimates. Identify factors that influence the spatial extent, timing or duration of displacement.

#### **14.6. Vegetation**

Describe and evaluate the potential impacts of the Project on vegetation, including a consideration of:

- alteration or loss of species, or vegetation assemblages that are rare, valued, protected or designated sensitive or important areas or habitat
- sensitive or important areas
- introduction of non-native species
- changes to the soil, hydrological or permafrost regimes
- re-establishment of vegetation
- how Project-related changes in harvest pressures could impact vegetation resources
- changes in contaminant levels in harvested species that could be changed by the Project, including parts of plants such as roots, leaves and berries, as appropriate
- vegetation control

#### **14.7. Biodiversity**

Describe how the Project could result in changes to biodiversity, including a consideration of:

- ecosystem and habitat loss
- habitat fragmentation / barriers to movement
- ability of habitat or species recover
- response to edge effects
- species distribution
- invasive/non native species
- changes to special management areas (e.g., Kendall Island Bird Sanctuary)
- pollution – water and emissions to air
- species of concern
- Project-related changes in harvest levels
- changes to important habitat areas

### **15. HUMAN ENVIRONMENT IMPACT ANALYSIS**

Describe and evaluate the beneficial and adverse impacts of the Project on those VECs selected for the human environment, including those related to social, cultural and economic systems as described in sections 15.1 through 15.9. Additionally, describe and evaluate changes to health and to socio-economic conditions that may occur as a result of Project-related impacts to the biological and physical environments.

For each VEC, the information must be sufficient to allow the Joint Review Panel to understand the nature of the potential impacts and how the Proponent's conclusions were reached. The assessment must provide a clear, traceable path of information from the baseline conditions through the identification of potential impacts, mitigation, residual impacts and determination of

significance. The proponent should where appropriate address issues on a regional basis to reflect differences in communities. As appropriate, consider how natural processes or events (e.g., Climate Change, see section 16.1) could affect the characteristics of Project impacts.

In the analysis, identify and take into account the particular needs and interests of various segments of the local populations (e.g., youth, elders, women, harvesters), and consider how the Project may affect each of them. The Proponent shall, to the best of its ability and within knowledge, indicate how the direct and indirect impacts of the Project would enhance and/or impair both the current social, cultural, and economic ways of life in the communities, and community aspirations for the future, including other economic opportunities. Changes to the human, physical and biological environment induced by the Project, how people, communities, institutions and governments could adapt to these changes. The potential consequences of those strategies for adaptation are important considerations for the impact analysis.

In considering the local impacts, the Proponents shall have due regard for the attitudes and perceptions of local residents, and how these are grounded in their culture, social organization, and historical experience. To the best of the Proponents' knowledge, include a consideration of people's possible reactions to Project-related effects and the capacity of the people, communities and institutions to respond to the Project. Discuss the range of changes that may be induced.

Subject to confidentiality, where mitigation relies or is dependent in part or in whole on actions to be taken by parties other than the Proponent (e.g., where local access to certain jobs requires that a training program be offered by an outside agency), provide information about these required actions and about any agreements reached, and a prediction of the effectiveness of these mitigation measures.

In assessing the effects of the Project on people's way of life, give particular attention to the comparative adverse and beneficial effects for workers, their spouses and families, and other residents, of a major employment base away from the communities, rotational work schedules and the presence of large numbers of transient employees and contractors in the region. Describe plans to mitigate the identified adverse effects.

In assessing the effects of the Project on harvesting activities, give particular attention to the comparative adverse and beneficial effects on social, economic and cultural systems and determinants of human health, particularly at the household and community levels for all phases of the Project.

With respect to mitigation measures to reduce or offset adverse effects on the way of life and well-being of individuals, families and communities most directly affected by the Project, indicate how mitigation would address impacts experienced by residents by age group, gender and ethnicity where appropriate and describe how aboriginal and community organizations will be involved in the development, application and ongoing evaluation of these measures.

### **15.1. Regional and Community Demographics and Mobility**

Describe and evaluate the potential impacts of the Project on demographics and mobility, including a consideration of:

- age, gender and ethnicity
- residence patterns
- In/out migration, by community and region

### **15.2. Local, Regional, Provincial, Territorial and National Economies**

Describe and evaluate the potential impacts of the Project (by Project phase and by year) on local, regional (e.g., ISR, Gwich'in Settlement Area, etc.), provincial and territorial economies, including consideration of:

- the contribution of the proposed Project to the gross domestic product (GDP) provided separately for direct, indirect and induced economic activities for the regional (to the extent possible), provincial, territorial and national economies
- Provide an estimate of direct taxes for business and persons including royalties, corporate income taxes, and personal income taxes, employer and employee contributions to EI and CPP and other indirect taxes for business (e.g. NWT fuel and payroll taxes) and persons including property taxes. Please provide separate estimates for the federal, territorial, aboriginal, and provincial governments
- employment and income for every year of construction and operation, with particular reference to wage and salary employment by length of employment, form of employment (full time, part-time, seasonal), skills category, gender and age. Include estimates of the following:
  - territorial, regional, local, aboriginal participation by gender
  - opportunities for participation in wage and salary employment, considering such factors as:
    - disincentives and constraints for local participation in employment (e.g., social assistance, housing assistance and related policies)
    - the extent to which the skills of the available workers match the job requirements
    - the level of interest in Project-related work
    - commuting arrangements to allow these workers to reach the work site
- how any unionized labour used by the Proponents could impact employment and income, including a consideration of
  - hiring opportunities, priority hiring practices
  - skill or certification requirements
  - the equitable distribution of benefits to people in the Project area
- competition for labour between the Project and existing businesses, government institutions and traditional activities and related wage and salary impacts

- community income and household economics, including subsistence activities and the sustainability of traditional economies
- local consumer prices, inflation and costs of living, particularly with regard to food, shelter, utilities and transportation
- how Project-related impacts on harvested resources or harvest activities (both positive or negative) affect community income and household economics, and sustainability of traditional economies (see also sections 14, 15.4, 15.5 and 15.6)
- activities such as tourism, outfitting, trapping, commercial harvesting and recreation, including foregone or precluded opportunities that are lost or deferred as a result of the Project
- local and regional spin-off economic activity from wages and purchases related to the proposed Project.
- opportunities for local, regional, provincial and territorial businesses to supply goods and services both directly to the Project and to meet the demand created by the expenditure of new income by employees of, and suppliers to, the Project
- distribution of costs and benefits of Project activities at local, regional, provincial/territorial and national levels
- poverty levels
- competition between land users as a result of modifications to or displacement from the land resulting from the Project
- opportunities to diversify the local, regional and territorial economic base to produce and to supply new goods and services
- constraints that could affect economic benefits or opportunities
- consistency and compliance with local and regional land use plans
- consistency with goals and objectives identified in territorial, regional and community economic development plans and strategies

Discuss potential leakage of economic benefits into or out of the Project area after the construction phase.

Include with your submission, any hiring practices and policies and any preliminary arrangements already made for labour. Also indicate if these provisions will apply to any sub-contractors.

### **15.3. Education, Training and Skills**

Describe and evaluate the potential impacts of the Project on education, training and skills, including a consideration of:

- participation in education and training, by age, gender and ethnicity
- educational achievement and attainment, including school drop-out as well as potential for school drop-out as a result of employment opportunities with the Project
- literacy levels (English, Aboriginal languages)

Discuss the education and training programs required for Project-related employment for each phase (see section 9.5 Cost and Workforce), including:

- local and regional training opportunities available to local people
- timing and duration of programs, in relation to the Project schedule
- which skills and experience gained in the Project workforce that could be applied to other available projects or sectors

Describe any programs that would be provided by, or sponsored by, the Proponents.

In particular, discuss which types of programs could be completed in time to qualify for Project-related employment (in both the construction and operation phases) and which could not. Identify when training would have to start in order to be complete when jobs would be available.

### **15.4. Subsistence, Sport and Commercial Harvesting**

Describe and evaluate the potential impacts of the Project on harvesting (see also sections 14, 15.2, 15.5 and 15.6), including a consideration of:

- changes in harvester travel patterns resulting from construction and Project use of seasonal and all-weather roads; temporary and permanent air strips, and by barging, road and air transport activities
- changes in access
- disturbance of harvest patterns; or loss or alteration of high-value harvest areas; including changes in response to changes in visual aesthetics (including light)
- changes in harvest level
- changes in the abundance and distribution of harvested resources, including wildlife, bird, fish and vegetation, that would adversely affect harvesting (see also sections 14.2 through 14.6)
- changes to harvesting costs created by the Project
- changes to harvest effort as perceived by harvesters

- competition between harvesters within and between communities as a result of loss or alteration to the land or displacement from the land resulting from the Project
- changes in the quality of harvested species, including contamination, that would adversely affect their consumption or sale
- measures to avoid or minimize changes in the abundance, distribution, or quality of harvested species, or mitigate the consequences of such changes
- control of Project workforce-related hunting, fishing, or harassment of animals

Identify the quantity of commercial and non-commercial forest products that would be harvested as a result of the Project.

### **15.5. Human Health and Community Wellness**

Describe and evaluate the potential impacts of the Project on human health and community wellness<sup>6</sup>, including a consideration of:

- local perceptions of physical, mental and social health and changes in the quality of life
- local and regional differences, or similarities
- measures of mortality and morbidity, and of social pathology and dysfunction such as teen pregnancies, sexually transmitted infections, communicable diseases, substance abuse, family, physical and sexual violence, and other crime)
- the presence or absence of support systems and programs, regionally and locally and their capacity to address human health and community wellness
- poverty and homelessness
- literacy skills and education levels (see section 15.3)
- changes in the diet and use of country food
- how Project-related changes in the quality of country food affect health, including possible sources of contaminants, exposure pathways and consumption patterns (i.e., age group, sex)
- how Project-related impacts on harvested resources or harvest activities affect health and wellness (see also sections 14, 15.2, 15.4 and 15.6)
- describe and evaluate potential impacts that may arise from changes in water quality and air quality

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<sup>6</sup> Additional health-related discussions are located in sections 13.3 (Air Quality) and 13.4 (Noise).



## **15.6. Social and Cultural Patterns and Cohesion**

Describe and evaluate the potential impacts of the Project on social and cultural patterns and cohesion, including a consideration of:

- cultural and spiritual life of the communities, including language loss or retention
- traditional lifestyles, values and culture
- patterns of social organization at the household and community level, including the organization of work, mutual aid and sharing
- family dynamics or structure, including child and elder care
- social relations between residents and non-residents, between men and women, among generations, and between aboriginal and non-aboriginal persons and among those that are employed and unemployed
- how transient workers could impact communities
- how Project-related impacts on harvested resources or harvest activities affect social and cultural patterns and cohesion (see also sections 14, 15.2, 15.4 and 15.5)
- programs that could support cultural patterns and cohesion (e.g. language programs)

## **15.7. Land Use**

Describe and evaluate the potential impacts of the Project on land use, including a consideration of:

- patterns of use
- impacts on particular sites or features

Discuss conformity of proposed Project-related land uses with designated land use management areas as described in approved and draft land use plans, community conservation plans and proposed land use designations. Identify areas of non-conformity.

### **15.7.1. Protected Areas and Special Management Areas**

Evaluate the potential impacts of the Project on protected areas and special management areas, including a consideration of the following:

- existing and proposed protected areas
- community conservation plans
- regional land use plans
- special management areas
- other proposed special management areas such as parks, sanctuaries or preserves

- implementation of plans, action plans, strategies and guidelines

Describe and evaluate how the Project could impact (either positively or negatively) upon the establishment and long term functioning of a planned network of protected areas in the Mackenzie Valley, as set out in the NWT Protected Areas Strategy Mackenzie Valley Five Year Action Plan, including a consideration of the following:

- safeguarding culturally important areas
- adequate representation of the diversity of habitats, landscapes and waterscapes
- maintenance of ecological integrity of Northwest Territories ecoregions
- viability of wide ranging species such as caribou, wolves, bears, wolverine, fish, marine mammals and migratory birds
- maintenance of a well-connected natural landscape or waterscape

### **15.8. Cultural and Heritage Resources**

Describe and evaluate the potential impacts of the Project on cultural heritage and special management areas, including a consideration of the following:

- historic, archaeological, paleontological, cultural and heritage resources/ sites/ trails;
- resource potential
- encounter of resources during Project activities
- valued visual and aesthetic locations and their attributes

### **15.9. Infrastructure and Institutional Capacity**

Describe and evaluate the potential impacts of the Project on infrastructure and institutional capacity, including a consideration of:

- changes in the availability, quality and affordability of housing in communities over the lifespan of the Project
- factors that influence accessibility to housing (e.g. age, gender)
- temporary and permanent changes to infrastructure and services and the capacity of institutions and organizations to deliver those services identified in the baseline description (see sections 11.5.8 and 11.5.10). Special consideration shall be given to
  - education
  - medical care
  - social and community support services, including drug and alcohol centres and counselling, child care, elder care
  - local law enforcement
  - recreation
  - water, sewage and waste disposal

- quarries and quarry materials available to local and territorial governments
- management of renewable resources
- navigability, public navigation or safety of navigators, including location, timing and duration, by Project phase
- transportation (roads, airports, barges)
- changes in the capacity of the service industries to provide local goods and services.

Describe measures to reduce the financial burden caused by the Project on infrastructure and institutional capacity. Include an estimate of incremental costs to municipal, territorial, and federal governments resulting from the Project.

## **16. CHANGES TO THE PROJECT CAUSED BY THE ENVIRONMENT**

Describe and evaluate changes to the Project that may be caused by the environment, including a specific consideration of climate change (section 16.1).

Identify those elements of the physical, biological and human environment that may cause a change to the Project during its lifespan and how they could change the Project. Discuss how those elements were considered in the Project design, siting, selection of mitigation, scheduling, and surveillance and monitoring.

Specially, include a consideration of the following:

- extreme weather events including storm surges
- flooding regimes and channel migration
- erosion (including shorelines, ice and water scour)
- debris flows
- subsidence related to thaw of ground ice and hydrocarbon extraction
- seismicity
- unstable slopes
- permafrost, including thermal regime, thaw sensitivity and frost susceptibility and associated ground movements (also see section 16.1 Climate Change)
- how forest and tundra fires could affect facility operation and monitoring
- ecologically or culturally important flora and fauna (e.g., Kendall Island Bird Sanctuary, Species of Concern)
- human use and value of the Project area.

## **16.1. Climate Change**

Climate change is defined by the *United Nations Framework Convention on Climate Change* as, “a change of climate which is attributed directly or indirectly to human activity that alters the composition of global atmosphere and which is in addition to natural climate variability observed over comparable time periods”. Climate change, as opposed to climate variability, is considered to be changes over relatively long periods of time (e.g., 30 years) that do not represent variability around average values for year-to-year or decade-to-decade.

Describe how any changes to the climate in the Project area could affect the Project over its lifespan.

### **Future conditions:**

To assist in the evaluation of how climate change could affect the Project over its lifespan, provide a scenario of possible future climate conditions. For certain portions of the Project area, it may be necessary to identify potential changes in water levels and storm surges, fire, permafrost conditions and changes to other landscape and waterscape processes that could occur because of climate change (e.g. fire).

More than one scenario may be required to cover the Project lifespan, to address regional differences or uncertainties, or to clarify potential responses of specific climate variables. For any scenario provided, the methodology, resolution, validity, unknowns, assumptions, and level of uncertainty with respect to its development must be provided.

In particular, the description of future conditions should:

- estimate and discuss the extent to which the key weather and climate parameters are projected to be affected by climate change over the Project lifespan. Discuss trends or changes in climate anticipated to occur
- identify associated hazards or limitations presented to the Project
- identify the climate parameters that may change and to which the Project, or Project components, would be sensitive

### **Changes to the Project caused by Climate Change:**

Identify the sensitivity of the Project, or Project components, to specific climate parameters.

Describe how changes in these parameters may change the Project over its lifespan. Provide this description in general, by Project phase (design, construction, operation decommissioning, abandonment, etc), by facility type, location, time of year, etc, as appropriate.

Identify any Project-related risk(s) to the public that may be sensitive to changes in climate parameters and describe how any risk(s) may change through the Project lifespan.

**Mitigation and Monitoring:**

Describe any specific ways in which the Project would be designed, constructed, operated or abandoned / decommissioned, etc. to reduce the Project's vulnerability to changes in specific climate parameters. Discuss the economic and technical feasibility of each option and, for each feasible option, describe the broad impacts on the environment impacts, including any social, cultural or economic considerations.

Describe ways in which the Project could be designed, constructed, or operated to address any potential risk to the public from the Project that could result from changes in climate parameters, including adaptive management.

Identify any planned monitoring of climate parameters or of the Project with respect to climate change (see also sections 23.1 Facility Monitoring and section 25 Compliance Inspection, Monitoring and Follow Up).

**17. CUMULATIVE IMPACTS**

Cumulative impacts may occur when the impacts of one project or activity combine with the impacts of other past, present and future projects and activities. The IFA processes, MVRMA and CEAA each require the consideration of potential cumulative impacts as part of the impact assessment of projects.

The planning and conduct of an evaluation of cumulative impacts that may occur as a result of the Project should be guided by the following questions:

- Which are the most appropriate VECs on which to focus the cumulative effects assessment?
- For the selected VECs, will the residual impacts caused by the Project act in a cumulative manner with those of other Projects, activities or land/water use pressures? Which ones?
- Will the impacts of the Project, in combination with these other impacts, measurably change the state, health or sustainability of the VEC? If so, how?
- How can the Project's contribution to cumulative impacts be avoided or mitigated?
- What is the significance of the potential cumulative impacts?
- How can and should potential cumulative impacts be managed and monitored? What are the opportunities to manage cumulative impacts?

The cumulative impacts assessment must include the following five components:

- 1) Scoping
- 2) Analysis
- 3) Mitigation
- 4) Significance
- 5) Follow-up

**Scoping:** Identify the VECs, or their indicators, on which the cumulative impacts assessment is focused, including the rationale for their selection. The spatial and temporal boundaries for the cumulative impact assessment must be presented for each VEC selected. The sources of potential cumulative impacts must be identified. Accordingly, identify other projects or activities that have been or will be carried out that could produce impacts a) on the selected VEC; and b) within the boundaries defined; and c) whose impacts would act in combination with the residual impacts of the Project.

The assessment of cumulative impacts should be limited to cumulative impacts on the physical, biological, and human environment that are likely and for which measurable or detectable residual impacts are predicted.

With respect to defining future projects and activities a degree of certainty that the project or activity will proceed is necessary for it to be included in this analysis. For clarity, the identification of future projects or activities should include those that are reasonably foreseen to be carried out. Projects that are conceptual in nature or otherwise limited with respect to information on specifications, timing or location may not be sufficiently developed to contribute to the assessment of cumulative impacts in a meaningful manner. A rationale for the inclusion of projects and activities, or the exclusion of certain others, should be provided.

**Analysis:** The analysis of the cumulative effect must enable an understanding of the incremental contribution of all projects or activities, and of the Project alone, to the total cumulative effect on the VEC over the life of the Project. Different types of potential impacts should be discussed, such as synergistic, additive, induced and spatial or temporal overlap. Impact pathways and trends should be included.

Many factors that impact, or could impact, a VEC are not solely the result of a particular project. While a project-specific assessment of cumulative impacts is not responsible for assessing all external impacts, the assessment of impact must consider how a project-specific effect, or suite of Project-specific impacts, would interact with these external factors. Ensure that the assessment makes clear the Proponents' view of the contribution of the Project to a total potential cumulative effect.

The potential cumulative impacts of the Project must be placed in a relevant and appropriate regional context, or contexts. Regional plans, community conservation plans, recovery plans,

management plans, thresholds, objectives and/or guidelines etc may be helpful in conveying an integrated sense of the aspirations of people and communities in the Project area with respect to the sustainability of the land, wildlife, culture, social structure and economy.

**Mitigation:** Identify tools and approaches to mitigating cumulative impacts, including economic and technical considerations, as well as community involvement. Identify proposed mitigation, including a discussion on goals and effectiveness. Discuss any proposed application of adaptive management.

If Project-related cumulative impacts remain following mitigation, discuss the need to pursue regional and/or non-Project specific mitigative measures. In this case, discuss how the Proponent would contribute to, influence or control the implementation of mitigation that extends beyond its Project (e.g., possible approaches, policies, coordination, partnerships).

Discuss any other proposed actions or initiatives that the Proponents would carry out to strengthen or improve aspects of the physical, biological or human environments vulnerable to cumulative impacts.

**Significance:** For each VEC or indicator assessed, evaluate the significance of residual cumulative impacts and discuss the relative contribution of the Project to those impacts. Identify how significance was determined (see Sections 12.5 and 12.6 for additional guidance).

The analysis must indicate the Proponents' view as to whether the Project would be responsible for adversely affecting a VEC or indicator beyond an acceptable point and how that VEC relates to the state and trends in the broader physical, biological or human environments. Any link made between significance and the regional context (see above) should be clear.

Should the Proponents identify potential significant adverse cumulative impacts, discuss likelihood of occurrence, based on probability of occurrence and scientific certainty.

**Follow-up:** Follow-up refers to proposed monitoring that would be undertaken following Project approval, specifically to verify the accuracy of cumulative impacts predictions and the effectiveness of mitigation (see also section 25 Compliance Inspection, Monitoring and Follow-up).

Discuss how any proposed programs could be integrated or coordinated with programs such as the Cumulative Impact Monitoring Program or the Cumulative Environmental Assessment Management Framework, or with programs associated with other current or future projects.

## **18. CAPACITY OF RENEWABLE RESOURCES**

Consider the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future would be affected.

Identify those resources likely to be significantly impacted by the Project, and describe how the Project could affect their sustainable use. Identify and describe any criteria used in considering sustainable use.

## **19. ACCIDENTS AND MALFUNCTIONS**

Identify and discuss, for each Project phase, the potential accidents or malfunctions that may occur as a result of the Project, including a consideration of:

- spills of a hazardous material (on land, ice and in water - freshwater and marine)
- explosion and/or fire
- use of explosives
- transportation accidents (air, land, water)
- rupture or failure of a pipeline (on land, beneath a watercourse)
- failure of components at a well, compression or processing facility
- harvesting
- social and cultural elements, or systems

Describe and evaluate the potential impacts of Project-related accidents and malfunctions on the environment, including impacts on harvesting and social or cultural elements of the environment and human health.

Particular attention should be focused on sensitive components of the environment that could be affected in the event of an accident or malfunction and that could make the consequences major or worse (e.g., proximity of communities, natural sites of particular value). Where potentially significant impacts could occur as a result of an accident or malfunction, assess the probability of such an occurrence, taking into account weather or external events that present contributing factors. Identify the contingency and/or response measures that would be in place should an accident occur (also see section 23 Emergency Response and Environmental Management).



## **20. OBLIGATIONS UNDER THE INUVIALUIT FINAL AGREEMENT**

In accordance with the Memorandum of Understanding between the Inuvialuit and the Minister of the Environment (MOU), the Joint Review Panel has been charged with the mandate to carry out certain responsibilities described in the Inuvialuit Final Agreement (IFA) in respect of the Inuvialuit Settlement Region. Specifically, as described in Schedule 2 of the Joint Review Panel Agreement (and in Appendix 2 of this document), the Panel must recommend:

- a) Terms and conditions relating to mitigation measures that would be necessary to minimize any negative impact on wildlife harvesting, as referred to in paragraph 13(11)(a) of the IFA, including, as far as is practicable, measures to restore wildlife and its habitat to its original state and to compensate Inuvialuit hunters, trappers and fishermen for the loss of their subsistence or commercial harvesting opportunities;
- b) An estimate of the potential liability of the Proponent, determined on a worst case scenario, taking into consideration the balance between economic factors, including the ability of the Proponent to pay, and environmental factors, as referred to in paragraph 13(11)(b) of the IFA.

It must be recognized that these specific IFA responsibilities are not part of the factors 1 through 10 in Schedule 2 of the Joint Review Panel Agreement with respect to considering the potential impacts of the Project on the environment.

Although some of the information related to these IFA responsibilities may also be helpful in the consideration of factors 1 through 10, fulfillment of the IFA responsibilities is not necessary for, or part of, the consideration of environmental impacts of the Project on the environment.

### **20.1. Worst Case Scenario**

The worst-case scenario will be the basis for the Panel to estimate the potential liability of the Proponent with respect to harvest compensation and habitat remediation, as per paragraph 13(11)(b) of the IFA.

Jointly develop, with the Inuvialuit, a worst-case scenario for the Project (paragraph 13(11)(b) of the IFA). Document the process used to develop the scenario, including the dates that consultation took place with the Inuvialuit.

Provide the worst-case scenario(s) and identify the ownership of Project components related to each.

### **20.2. Wildlife Compensation**

Describe mitigative or remedial measures necessary to minimize any negative impact on wildlife harvesting, as referred to in paragraph 13(11)(a) and (b) of the IFA.

Describe plans to prevent damage to wildlife and its habitat and to avoid disruption of harvesting activities as a result of the Project, and, if damage occurs, to restore wildlife and its habitat as far as is practicable to its original state and to compensate hunters, trappers and fishermen for:

- loss or damage to property or equipment used in wildlife harvesting or to wildlife harvested
- present and future loss of income from wildlife harvesting
- present and future loss of wildlife harvested for personal use or which is provided by participants to other participants for their personal use

## **21. COMPENSATION**

Describe any plans for compensation that would be part of proposed mitigation as informed by land claim agreements, governmental policies, legislation, corporate agreements, etc.

Specifically, discuss compensation terms and conditions relating to mitigation measures that would be necessary to minimize any negative impact on wildlife harvesting, as referred to in the Gwich'in and Sahtu Dene-Metis Land Claim Agreements.

Describe any plans for compensation that would be part of any proposed mitigation for impacts on wildlife harvesting in areas without land claim agreements.

## **22. GREENHOUSE GAS EMISSIONS**

Greenhouse gases (GHG) are made up of natural and man-made sources. Greenhouse gases include, collectively, water vapour, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and halocarbons. For the purposes of this EIR, identify the sources, quantities, and frequency of Project-related emissions of GHG, including:

- anticipated during construction, including the drilling of wells
- anticipated during operation of Project components and during Project activities such as maintenance and repair (e.g. as a result of blowdowns)
- that could result from accidents or malfunctions
- that could result from fugitive emissions

Identify the various ways that reductions in GHG emissions could be realized, including a discussion on the technical and economic feasibility of options. As appropriate, provide an estimate of emissions volume and frequency for each option considered.

Identify any required permits with respect to the emission of greenhouse gasses from the operation of the Project facilities, including maintenance and repair. Indicate whether permits

would be issued for each source of emissions or combination of sources.

Describe any relevant federal, territorial or provincial actions and/or initiatives, including policies or accords that currently exist to identify, track, report or manage GHG.

Describe the means by which GHG emissions would be managed. Describe any proposed verification, monitoring and/or reporting of GHG emissions that would be carried out during operation, including the identification of facilities, frequency and methods.

## **23. EMERGENCY RESPONSE AND ENVIRONMENTAL MANAGEMENT**

Describe company programs regarding facility monitoring, emergency preparedness and environmental management over the lifespan of the Project, by phase. The descriptions should be in sufficient detail in order to understand the scope of the programs, how they work, how they are developed, the link to any regulatory requirements and the expected components of these programs.

### **23.1. Facility Monitoring**

The programs to monitor the physical condition of Project facilities and their operation are relevant to understanding how Proponent design and management reduces the risk of an accident or malfunction occurring and is able to detect one, if it occurs.

Describe the safety and detection measures that would be incorporated at Project facilities, including such things as: access restrictions, monitoring and surveillance systems, pipeline integrity programs, malfunction detection devices, emergency shutdown systems, fire fighting systems, emergency power units and communications systems.

### **23.2. Emergency Preparedness**

Provide a general description of the Proponent's Emergency Response Procedures, including the company level of preparedness, safety, response capability and procedures in the case of an emergency. Include the types of Emergency Response Procedures that would be developed, the purpose of the programs and what the programs are intended to achieve. Identify the facilities and activities for which procedures would be developed.

The descriptions should provide adequate detail to understand how the Emergency Response Programs would work, including the identification of emergency conditions, response procedures and the steps that would be taken to notify or inform all persons who may be affected. Describe the process by which the programs would be developed, timing, and the communities, agencies, boards and regulators that would be consulted during their preparation.

Identify any applicable regulatory requirements to have emergency procedures in place, including relevant standards and the expected components of these programs. Discuss consistency with municipal requirements, where present.

### **23.3. Environmental Management and Protection Programs**

Describe any plans, programs and policies relevant to the design and implementation of standard mitigation practices or monitoring programs that would be followed during the lifespan of the Project.

The description should allow understanding of the purpose of the programs, the scope of the programs, how the programs would function, who would be responsible for their implementation and how reporting would take place. Describe how the results of the programs would be used to refine or modify the design and implementation of management plans, mitigation measures and Project operations. Include: the process by which the programs would be developed, approved and enforced; timing of development and updating; and the method(s) by which adequacy and effectiveness of the programs would be evaluated and tracked.

Identify any regulatory requirements relevant to monitoring as well as corporate management plans, programs, policies and quality assurance/quality control measures.

Identify the communities, organizations, agencies, boards and regulators that would be involved during the preparation of the programs and any opportunities for partnerships, coordination and participation.

## **24. SOCIO-ECONOMIC AND CULTURAL POLICIES AND COMMITMENTS**

Describe any commitments, policies, and arrangements directed at promoting beneficial, or mitigating adverse impacts to social or economic conditions where they have been presented as a form of mitigation. Discuss any requirements for contractors and sub-contractors to comply with these policies. Include information on:

- occupational health and safety and related training, committees and communications, and emergency response plans for workplace accidents
- plain language policies
- commuting and work rotation of workers and contractors
- recruitment, training, hiring, employment counselling, pay equity and employment, including those policies specifically for Aboriginal and local candidates, and those promoting Aboriginal participation
- orientation to the workplace, cross-cultural, anti-racism and anti-sexism policies and programs, and personal counselling, for both Aboriginal and non-Aboriginal employees
- control of movements to and from the construction areas, camps and Project facilities by employees, contractors and others reducing the potential for social problems on the job-

site or in the home communities resulting from the Project, including policies on sexual and gender harassment, alcohol and drugs on the job site, work and pay schedules, and access to communities by workers

- ensuring public safety on site with respect to firearms, while respecting the rights and needs of harvesters from adjacent communities
- firearms policy
- managing hunting, fishing and gathering on, or from, the site by non-Aboriginal employees, while respecting the harvest rights of Aboriginal employees
- accommodating Aboriginal personnel wishing to pursue harvesting and traditional activities, for example with respect to work scheduling
- use of committees and liaison arrangements to respond to issues raised by employees;
- promoting activities and programs that increase community stability and wellness
- contracting and procurement, including those which promote local sourcing, and participation of local businesses and how this will be accomplished
- any policies or programs encouraging advancement in education or encouraging youth to seek higher education
- any programs encouraging the development of financial management and skills training

## 25. COMPLIANCE INSPECTION, MONITORING AND FOLLOW-UP

Identify and describe proposed environmental and socio-economic monitoring programs in terms of:

**Compliance Inspection:** the activities, procedures and programs undertaken to confirm the implementation of approved design standards, mitigation, conditions of approval and company commitments, including proposed mitigation.

**Monitoring:** monitoring to track conditions or issues during the Project lifespan or at certain times; and

**Follow-up:** a program to verify the accuracy of impact predictions and determine the effectiveness of mitigative measures.

Detail should be adequate to allow an understanding of the purpose of the programs, how issues, subjects or indicators would be selected, how the programs would function, who would be responsible for their implementation and how reporting would take place. Identify any regulatory requirements relevant to monitoring as well as corporate management plans, programs, policies and quality assurance/quality control measures.

Specifically, describe how the follow-up programs would verify any predictions of significant adverse impact on the physical, biological, and human environment and the effectiveness of related mitigation. Discuss how the programs could identify or measure how the Project

advances the objectives of sustainability and maximizes beneficial impacts in the Project area, in relation to impact predictions.

Describe how the results of the programs would be used to refine or modify the design and implementation of management plans, mitigation measures and Project operations. Include the process by which the programs would be developed, the timing of program development and updating and the method(s) by which adequacy and effectiveness of the programs would be evaluated and tracked. Discuss how programs would be managed, including adaptive management, over the lifespan of the Project.

With respect to proposed monitoring programs related to social and cultural impacts indicate the level (i.e. community or regional) and the duration of the program.

Additionally, identify the communities, agencies, boards and regulators that would be involved during the preparation of the programs and any opportunities for partnerships, coordination and participation. Discuss the ways in which holders of traditional knowledge and area residents would be involved in the design and implementation of the programs.

Discuss how monitoring results would be communicated back to the communities and their involvement in program refinement, if required.

Specifically discuss the need for, and requirements of, a follow-up program, including consideration of:

- the need for such a program and its objectives
- the main components of the program
- how it would be structured
- the roles to be played by the Proponent, regulatory agencies, Aboriginal people and others in such a program
- possible involvement of independent researchers
- the sources of funding for the program
- information management and reporting

## Appendix 1 – Project Description

For the purposes of the Joint Review Panel process the Project includes the construction, operation, maintenance, decommissioning and abandonment of:

### Production Facilities at the Taglu, Parsons Lake and Niglintgak natural gas fields

- approximately 15 production wells at Taglu
- approximately 15 production wells at Parsons Lake
- approximately 10 production wells at Niglintgak
- connection facilities
- drilling waste disposal facilities including sumps and/or injection wells
- natural gas production top side facilities e.g. conditioning, dehydration and compression facilities, including temperature control, flare system, separators, control valves and piping, communications systems.

### Gathering System

The gathering system consists of a network of pipelines and facilities to collect natural gas and Natural Gas Liquids (NGL) from the three fields and move them to the Inuvik Area Facility, including:

- approximately 15 kilometres (km) of pipeline to transport natural gas and associated liquids from the Niglintgak field to the Taglu junction
- approximately 82 km of pipeline to deliver natural gas and associated liquids from the Niglintgak and Taglu fields to the Parsons Lake junction
- approximately 28 km of pipeline to deliver natural gas from the Parsons Lake field to the Parsons Lake junction
- approximately 51 km of pipeline from the Parsons Lake junction to the Inuvik Area Facility
- valves, compression, connection and custody transfer meter facilities

### Inuvik Area Facility

- a NGL facility to process and separate natural gas and NGLs from the gas stream, recover NGLs and process the natural gas and NGLs to the specifications of the transmission and NGL pipelines.
- Associated facilities including inlet slug catcher, pumps, liquids handling equipment, meters, flare systems, natural gas handling equipment, control room, storage, maintenance areas, buildings

### Natural Gas Liquids Pipeline

- approximately 480 km of single phase pipeline to transport natural gas liquids from the Inuvik Area Facility to the existing Enbridge Pipelines (NW) Inc. facilities at Norman Wells
- up to 4 pumping stations and associated facilities
- connection, custody transfer and metering facilities

### Natural Gas Transmission Pipeline

- approximately 1300 km of natural gas transmission pipeline from the outlet of the NGL facility near Inuvik to a connection with Nova Gas Transmission Limited (NGTL) pipeline facilities approximately 15 metres south of the Northwest Territories-Alberta border
- up to 15 compressor stations and associated facilities
- interconnect facilities, including temperature and pressure control, metering, custody-transfer, system isolation and in-line inspection

### Nova Gas Transmission Limited Facilities

- Dickins Lake Section - approximately 65 km of pipeline from the existing Bootis Hill junction on the NGTL Northwest Mainline to interconnection facilities with the natural gas transmission pipeline
- Northwest Mainline (Vardie River Section) - a loop of a portion of the existing Northwest Mainline. This loop will occur between the Bootis Hill junction and the existing Thunder Creek Compressor Station (a distance of approximately 35 km)

### General

- construction camps
- line heaters and block valves
- compression, connection and custody transfer meter facilities
- pipeline inline inspection facilities including receivers and launchers
- cathodic protection
- safety equipment, safety control systems, isolation and shutdown systems, and flare systems
- power generation facilities
- utilities, such as fuel gas, electrical power and instrument air
- service and accommodation buildings
- transportation infrastructure including access roads, barge landing sites, helicopter pads and airstrips
- various temporary construction workspace, construction lay down areas and access roads



The Project also includes any other undertakings in relation to the physical works identified above that are proposed by the Proponents or that are likely to be carried out, including:

- transport of material and personnel
- storage of material at locations in the vicinity of the Project
- construction and operation of various temporary construction work spaces, storage and work areas, borrow pits and quarries
- operation of various existing access roads and trails
- testing of the facilities prior to their being authorized for use
- inspection, maintenance and repair activities associated with the proposed facilities
- maintenance and use of existing access roads for the proposed facilities

## **Appendix 2 – Factors to be considered during the Environmental Impact Review**

The Environmental Impact Review will have regard to the protection of the existing and future social, cultural, and economic well-being of residents and communities and will include a consideration of the following factors:

1. The impact of the Project on the environment, including the impact of malfunctions or accidents that may occur in connection with the Project and any cumulative impact that is likely to result from the Project in combination with other projects or activities that have been or will be carried out;
2. The significance of any such impact;
3. Any comments from the public that are received during the Environmental Impact Review;
4. Measures that are technically and economically feasible and that would mitigate any significant adverse impact of the Project on the environment;
5. The purpose of the Project;
6. The need for the Project;
7. Alternatives to the Project;
8. Alternative means of carrying out the Project that are technically and economically feasible and the impact on the environment of any such alternative means;
9. The need for any follow-up program in respect of the Project, and the requirements of such a program;
10. The capacity of renewable resources that are likely to be significantly affected by the Project to meet existing and future needs;

In respect of the Inuvialuit Settlement Region the Joint Review Panel will recommend:

- a) Terms and conditions relating to mitigation measures that would be necessary to minimize any negative impact on wildlife harvesting, as referred to in paragraph 13(11)(a) of the IFA, including, as far as is practicable, measures to restore wildlife and its habitat to its original state and to compensate Inuvialuit hunters, trappers and fishermen for the loss of their subsistence or commercial harvesting opportunities; and
- b) An estimate of the potential liability of the Proponent, determined on a worst case scenario, taking into consideration the balance between economic factors, including the ability of the Proponent to pay, and environmental factors, as referred to in paragraph 13(11)(b) of the IFA.

## APPENDIX 3 - Definitions

**Abandonment:** the permanent removal from service of Project facilities with, in the case of pipeline facilities, the discontinuation of service to end users.

**Cumulative Impacts:** changes to the environment that are caused by an action in combination with other past, present and future human actions. A cumulative impact assessment is an assessment of those impacts. Actions include both facilities and activities.

**Environment** means the components of the Earth and includes:

- (a) land, water and all layers of the atmosphere;
- (b) all organic and inorganic matter and living organisms; and
- (c) the interacting natural systems that include components referred to in (a) and (b).

**Environmental Impact Assessment** means the process of evaluating the physical, biological, cultural, social and economic impacts of a proposed project.

**Environmental Impact Statement** means a report prepared by the Proponent according to the direction in the terms of reference.

**Follow-up** means a program to verify the accuracy of impact predictions and determine the effectiveness of mitigative measures.

**Harvesting** means gathering, hunting, trapping or fishing or the reduction of wildlife into possession by any lawful means.

**Impact on the environment** means, in respect of a project

- a) any change that the project may cause on the environment, and includes
  - (i) any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance;
  - (ii) any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species as those terms are defined in subsection 2(1) of the *Species of Risk Act*;
  - (iii) any change to present or future wildlife harvesting;
  - (iv) any change to the social and cultural environment or to heritage resources; and
- b) any change to the project that may be caused by the environment.

**Mitigation** means action for the control, reduction, or elimination of an adverse impact of the Project on the environment and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation, remedial measures or other means.

**Permafrost** means ground (soil or rock and included ice and organic material) that remains at or below 0° C for at least two consecutive years. It is defined on the basis of temperature, and, because the freezing point of water may be depressed, permafrost may not necessarily be frozen or completely frozen). Permafrost includes ground ice, but does not include glacier ice or icings.

**Project** means the proposed development described in Appendix 1 of this document.

**Proponents** include, in respect of the Project or any part of it, Imperial Oil Resources Ventures Limited, the Aboriginal Pipeline Group, ConocoPhillips Canada (North) Limited, ExxonMobil Canada Properties, Shell Canada Limited and any other entity proposing to carry out a portion of the Project.

**Talik** means a layer or body of unfrozen ground occurring in a permafrost area due to a local anomaly in thermal, hydrological, hydrogeological, or hydrochemical conditions.

**closed talik:** one which occupies a depression in the permafrost table (the top of permafrost) below a lake or river

**open talik:** one that penetrates permafrost completely, also called through talik

**isolated talik:** one that is entirely surrounded by perennially frozen ground

**hydrochemical talik:** one in which freezing is prevented by mineralized ground water

**Valued Environmental Components** means valued components of the physical, biological and human environments selected on which to focus the assessment of impacts of a project.

#### **APPENDIX 4 – List of Abbreviations**

CEAA	Canadian Environmental Assessment Act
EIR	Environmental Impact Review
EIS	Environmental Impact Statement
GDP	Gross Domestic Product
JRP	Joint Review Panel
IFA	the Western Arctic (Inuvialuit) Claims Settlement Act - Inuvialuit Final Agreement
IPCC	Intergovernmental Panel on Climate Change
ISR	Inuvialuit Settlement Region
MVRMA	Mackenzie Valley Resource Management Act
NEB	National Energy Board
NWT	Northwest Territories
TOR	Terms of Reference
VEC	Valued Environmental Component