



DRAFT ENVIRONMENTAL IMPACT STATEMENT GUIDELINES

**Guidelines for the preparation
of an Environmental Impact Statement
for an environmental assessment conducted pursuant to the
*Canadian Environmental Assessment Act, 2012.***

Victor Mine Extension Project

De Beers Canada Inc.

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DISCLAIMER

This document is not a legal authority, nor does it provide legal advice or direction; it provides information only, and must not be used as a substitute for the *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) or its regulations. In the event of a discrepancy, the CEAA, 2012 and its regulations prevail. Portions of CEAA, 2012 have been paraphrased in this document, but will not be relied upon for legal purposes.

Part 1 - Background

1 INTRODUCTION

The purpose of this document is to identify for the proponent the information requirements for the preparation of an Environmental Impact Statement (EIS) for a designated project¹ to be assessed pursuant to the *Canadian Environmental Assessment Act, 2012* (CEAA, 2012). This document specifies the nature, scope and extent of the information required.

It is the responsibility of the proponent to provide sufficient data and analysis on any potential changes to the environment to permit a thorough evaluation of the environmental effects of the project by the Canadian Environmental Assessment Agency (the Agency). The EIS Guidelines set out minimum information requirements. It is the proponent's responsibility to provide any additional information required to assess the environmental effects of the project. Except where specified by the Agency, the proponent has the discretion to select the most appropriate methods to compile and present data, information and analysis in the EIS.

2 GUIDING PRINCIPLES

2.1 Environmental assessment as a planning tool

Environmental Assessment (EA) is a planning tool used to ensure that projects are considered in a careful and precautionary manner in order to avoid or mitigate the possible adverse effects of projects on the environment and to encourage decision makers to take actions that promote sustainable development.

2.2 Public participation

One of the purposes identified in CEAA, 2012 is to ensure opportunities for meaningful public participation during an EA. The Act requires that the Agency provide the public with an opportunity to participate in the EA and an opportunity to comment on the draft EA report.

The overall objective of meaningful public participation is best achieved when all parties have a clear understanding of the proposed project as early as possible in the review process. The proponent is required to provide current information about the project to the public and especially to the communities likely to be most affected by the project.

2.3 Aboriginal consultation

One of the purposes of CEAA, 2012 is to promote communication and cooperation with Aboriginal peoples, including First Nations, Inuit and Métis. To work toward this goal, the proponent will ensure that it engages with Aboriginal people and groups that may be affected by the project, or that have potential or established Aboriginal and Treaty rights and related interests in the project area, as early as possible in the project planning process. The proponent is strongly encouraged to work with Aboriginal groups in establishing an engagement approach. In addition,

1 In this document, "project" has the same meaning as "designated project" as defined in the *CEAA, 2012*.

the Aboriginal persons involved will have access to relevant information that allows them to understand the proposed project and to determine its impacts on their rights and interests. The proponent will make reasonable efforts to integrate “traditional Aboriginal knowledge” that will contribute to the assessment of environmental impacts.

All information gathered through the EA process and associated engagement by the proponent and consultation by government with Aboriginal peoples will be used to inform decisions under CEAA, 2012. This information will also inform the Crown’s understanding of the potential adverse impacts of the project on potential or established Aboriginal or Treaty rights and related interests, and the effectiveness of measures proposed to avoid or minimise those impacts.

3 PREPARATION AND PRESENTATION OF THE EIS

3.1 Agency guidance

The proponent is encouraged to consult relevant Agency Policy and Guidance² on topics to be addressed in the EIS. The proponent is further encouraged to consult with the Agency and federal authorities (see section 3.4.1) during the planning and development of the EIS materials.

3.2 Study strategy and methodology

The proponent is expected to respect the intent of the EIS Guidelines and to consider the effects that are likely to arise from the project (including situations not explicitly identified in these guidelines), the technically and economically feasible mitigation measures that will be applied, and the significance of any residual effects. It is possible that the EIS Guidelines may include matters that, in the judgement of the proponent, are not relevant or significant to the project. If such matters are omitted from the EIS, the proponent will clearly indicate it and the justification for their conclusion provided so that the Agency, federal authorities, Aboriginal groups, the public and any other interested party have an opportunity to comment on this decision. Where the Agency disagrees with the proponent's decision, it may require the proponent to provide the specified information.

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

All significant gaps in knowledge and understanding related to key conclusions presented in the EIS must be identified. The steps to be taken by the proponent to address these gaps will also be identified. Where the conclusions drawn from scientific and technical knowledge are inconsistent with the conclusions drawn from traditional knowledge, the EIS will contain a balanced presentation of the issues and a statement of the proponent's conclusions.

Visit the Canadian Environmental Assessment Agency website: ² www.ceaa-acee.gc.ca/default.asp?lang=En&n=F1F30EEF-1

3.3 Integration of EA, Aboriginal and public consultation information

In preparing the EIS, the proponent is encouraged to integrate Aboriginal and public consultation outcomes into the consideration and mitigation of environmental effects at the appropriate EA analytical steps shown on the next page (Figure 1). The proponent will ensure that public and Aboriginal concerns are well documented in the EIS. The proponent will identify and explain all unresolved questions or concerns as part of its analysis of the impacts of the project.

This information will help the Crown assess adequacy of consultation with Aboriginal groups, as set out in the Updated Guidelines for Federal Officials to Fulfill the Duty to Consult (2011)³.

³ Visit the Aboriginal Affairs and Northern Development Canada website at: www.aadnc-aandc.gc.ca/eng/1100100014680/1100100014681

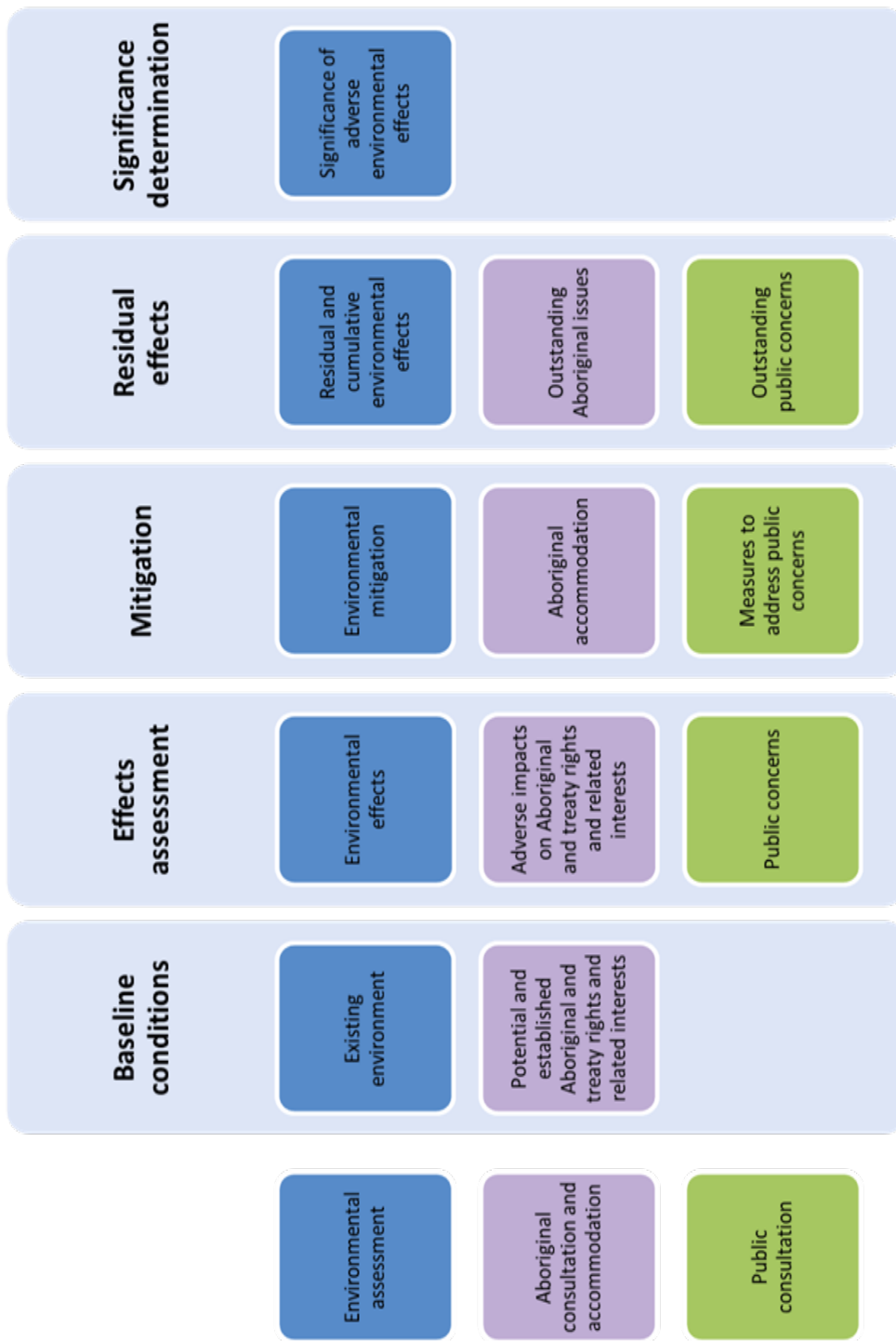


Figure 1. Integration of environmental assessment, Aboriginal and public consultation information into the Environmental Impact Statement.

3.4 Use of information

3.4.1 Scientific advice

Section 20 of CEAA, 2012 requires that every federal authority with specialist or expert information or knowledge with respect to a project subject to an EA make that information or knowledge available to the Agency. The Agency will advise the proponent of the availability of any pertinent information or knowledge so that it can be incorporated into the EIS, along with, as appropriate, expert and specialist knowledge provided by other levels of government.

3.4.2 Community knowledge and Aboriginal traditional knowledge

Sub-section 19(3) of CEAA, 2012 states that “the environmental assessment of a designated project may take into account community knowledge and Aboriginal traditional knowledge”. For the purposes of these guidelines, community knowledge and Aboriginal traditional knowledge refers to knowledge acquired and accumulated by a community or an Aboriginal community, through generations of living in close contact with nature.

The proponent will incorporate into the EIS the community and Aboriginal traditional knowledge to which it has access or that is acquired through Aboriginal engagement activities, in keeping with appropriate ethical standards and without breaking obligations of confidentiality, if any. Agreement should be obtained from Aboriginal groups regarding the use, management and protection of their existing traditional knowledge information during and after the EA.

3.4.3 Existing information

In preparing the EIS, the proponent is encouraged to make use of existing information relevant to the project. However, when relying on existing information to meet requirements of the EIS Guidelines, the proponent will either include the information directly in the EIS or clearly direct the reader to where it may obtain the information (i.e., through cross-referencing). When relying on existing information, the proponent will also comment on how the data have been applied to the project, clearly separate factual lines of evidence from inference, and state any limitations on the inferences or conclusions that can be drawn from the existing information.

3.4.4 Confidential information

In implementing CEAA, 2012, the Government of Canada is committed to promoting public participation in the environmental assessment of projects and providing access to the information on which environmental assessments are based. All documents prepared or submitted by the proponent or any other stakeholder in relation to the environmental assessment are included in the Canadian Environmental Assessment Registry (CEAR) and made available to the public on request. For this reason, the EIS will not contain:

- Information that is sensitive or confidential (i.e., financial, commercial, scientific, technical, personal, cultural or other nature), that is treated consistently as confidential, and the person affected has not consented to the disclosure; or,
- Information that may cause harm to a person or harm to the environment through its disclosure.

The proponent will consult with the Agency regarding whether specific information requested by these guidelines will be treated as confidential.

3.5 Presentation and organization of the EIS

To facilitate the identification of the documents submitted and their placement in the Canadian Environmental Assessment Registry, the title page of the EIS and its related documents will contain the following information:

- project name and location;
- title of the document, including the term “environmental impact statement”;
- subtitle of the document;
- name of the proponent; and
- the date.

The EIS will be written in clear, precise language. A glossary defining technical words, acronyms and abbreviations will be included. The proponent will provide charts, diagrams, tables, maps and photographs, where appropriate, to clarify the text. Perspective drawings that clearly convey the various components of the project will also be provided. Wherever possible, maps will be presented in common scales and datum to allow for comparison and overlay of mapped features.

For purposes of brevity and to avoid repetition, cross-referencing is preferred. The EIS may make reference to the information that has already been presented in other sections of the document, rather than repeating it. The exception to this preference is the cumulative effects assessment, which should be provided in a stand-alone section as described in section 12.1.2. Detailed studies (including all relevant and supporting data and methodologies) will be provided in separate appendices and will be referenced by appendix, section and page in the text of the main document of the EIS. The EIS will explain how information is organized in the document. This will include a list of all tables, figures, and photographs referenced in the text of the EIS. A complete list of supporting literature and references will also be provided. A Table of Concordance, which cross references the information presented in the EIS with the information requirements identified in the EIS Guidelines, will be provided. The proponent will provide copies of the EIS and its summary for distribution, including paper and electronic version in an unlocked, searchable PDF format, as directed by the Agency.

Part 2 – Content and Structure of the EIS

4 SUMMARY OF ENVIRONMENTAL IMPACT STATEMENT

The proponent will prepare a summary of the EIS in both of Canada's official languages (French and English) to be provided to the Agency at the same time as the EIS and which will include the following:

- A concise description of all key components of the project and related activities;
- A summary of the consultation conducted with Aboriginal groups, the public, and government agencies, including a summary of the issues raised and the proponent's responses;
- An overview of the key environmental effects of the project and proposed technically and economically feasible mitigation measures; and
- The proponent's conclusions on the residual environmental effects of the project and the significance of adverse environmental effects after taking mitigation measures into account.

The summary is to be provided as a separate document and should follow the outline provided below:

1. Introduction and environmental assessment context
2. Project overview
3. Scope of project and assessment
4. Alternative means of carrying out the project
5. Public and Aboriginal engagement
6. Summary of environmental effects assessment
7. Mitigation measures
8. Proposed significance determination

The summary will have a sufficient level of detail for the reader to learn and understand the entire project, potential impacts, mitigation measures proposed by the proponent, the residual effects and the conclusions regarding significance.

It is strongly recommended that the proponent translates the summary into the appropriate Aboriginal language(s) in order to facilitate consultation activities during the environmental assessment.

5 INTRODUCTION AND PROJECT OVERVIEW

5.1 Geographical setting

The EIS will contain a concise description of the geographical setting in which the project will take place. This description will focus on those aspects of the project and its setting that are important in order to understand the potential environmental effects of the project. The description will address the natural and human elements of the environment as well as explain the

interrelationships between the biophysical environment and people and communities. The following information will be included:

- the UTM coordinates of the main project site;
- current land use in the area and the relationship of the project facilities and components with any federal lands;
- the environmental significance and value of the geographical setting in which the project will take place and the surrounding area;
- environmentally sensitive areas, such as national, provincial and regional parks, ecological reserves, wetlands, estuaries, and habitats of federally or provincially listed species at risk and other sensitive areas;
- local and Aboriginal communities; and,
- traditional Aboriginal territories, treaty lands, Indian reserve lands.

The EIS will provide expanded description and mapping of the project location, including each of the project components as outlined in section 5.6 of this document.

Maps of the project's location at an appropriate scale will accompany the text. The location map should include the boundaries of the proposed site including UTM coordinates, the major existing infrastructure, adjacent land uses and any important environmental features. In addition, site plans/sketches and photographs showing project location, site features and the intended location of project components will be included.

5.2 Regulatory framework and the role of government

To understand the context of the EA, this section will identify, for each jurisdiction, the government bodies involved in the EA as well as the EA processes. More specifically identify:

- any federal power duty or function to be exercised that may permit the carrying out (in whole or in part) of the project or associated activities
- the environmental and other specific regulatory approvals and legislation that are applicable to the project at the federal, provincial, regional and municipal levels;
- government policies, resource management, planning or study initiatives pertinent to the project and/or EA and discuss their implications
- any treaty or self government agreements with Aboriginal groups that are pertinent to the project and/or EA;
- any relevant Land Use Plans, Land Zoning, or Community Plans; and
- a summary of the regional, provincial and/or national objectives, standards or guidelines that have been used by the proponent to assist in the evaluation of any predicted environmental effects.

In planning for a mine proposal and in developing the EIS and technical support documentation, the Proponent is advised to consider the "Environmental Code of Practice for Metal Mines"⁴, published by Environment Canada in 2009. The recommended practices in the Code include the development and implementation of environmental management tools, the management of

Visit Environment Canada's website at: ⁴ www.ec.gc.ca/lcpe-epa/default.asp?lang=En&n=CBE3CD59-1

wastewater and mining wastes, and the prevention and control of environmental releases to air, water and land. In addition, the parameters and approach of the Environmental Effects Monitoring program under the Metal Mining Effluent Regulations should be considered when developing a baseline monitoring program for the aquatic environment.

Submission of regulatory and technical information necessary for federal authorities to make their regulatory decisions during the conduct of the environmental assessment is at the discretion of the Proponent. Although that information is not necessary for the EA decision, the Proponent is strongly encouraged to submit it concurrent with the EIS.

5.3 Participants in the environmental assessment

Clearly identify the main participants in the EA including jurisdictions other than the federal government, Aboriginal groups, community groups, and environmental organizations.

5.4 The proponent

The proponent will:

- provide contact information (e.g. name, address, phone, fax, email);
- identify itself and the name of the legal entity that would develop, manage and operate the project;
- explain corporate and management structures, as well as insurance and liability management related to the project;
- specify the mechanism used to ensure that corporate policies will be implemented and respected for the project;
- summarize key elements of its environment, health and safety management system and discuss how the system will be integrated into the project; and,
- identify key personnel, contractors, and/or sub-contractors responsible for preparing the EIS.

5.5 Purpose of the project

The proponent will describe the purpose of the project by providing the rationale for the project, explaining the background, the problems or opportunities that project is intended to satisfy and the stated objectives from the perspective of the proponent. If the objectives of the project are related to, or contribute to broader private or public sector policies, plans or programs, this information will also be included.

5.6 Project components

The proponent will describe the project, by presenting the project components, associated and ancillary works, activities, scheduling details, the timing of each phase of the project and other characteristics that will assist in understanding the environmental effects. This will include:

- A characterization of geochemical properties of pit mine materials, waste rock, foundation materials and tailings pond foundation materials;
- A description of the geology, based on results from drilling, test pits and sampling programs;

- A description of the tailings management facility (geotechnical properties and foundation conditions for tailings management facility/dams, hazard classification, location, preliminary designs, tailings properties, and tailings water seepage);
- A description of the waste rock and overburden storage and stock piles (locations, volumes and development plans; geotechnical conditions, seismicity and design criteria and a description of waste water management components of the project);
- A description of open pit mine (development plans including pit phases, phase designs, pit design including slopes, design standards, geotechnical and hydrogeological considerations (e.g. pit wall management));
- A description of water management (e.g. pit water); and
- A description of permanent and temporary access infrastructure, as well as the pipelines, identifying the route of each access road, the location and types of structure used for stream crossings.
- In cases where the geotechnical design is based on the observational method, the general nature and geotechnical properties of geological materials will be provided.

If the project is part of a larger sequence of projects, the proponent will outline the larger context and present the relevant references, if available.

5.7 Project activities

The EIS will include expanded descriptions of the construction, operation, maintenance, foreseeable modifications, and where relevant, closure, decommissioning and restoration of sites and facilities associated with the proposed project.

This would include detailed descriptions of the activities to be carried out during each phase, the location of each activity, expected outputs and an indication of the activity's magnitude and scale.

Although a complete list of project activities is required, the emphasis will be on activities with the greatest potential to have environmental effects. Sufficient information will be included to predict environmental effects and address public concerns identified. Highlight activities that involve periods of increased environmental disturbance or the release of materials into the environment.

The EIS will include a detailed schedule including time of year, frequency, and duration for all project activities.

The EIS will provide the preliminary outline of a decommissioning and reclamation plan for any components associated with the project. This will include ownership, transfer and control of the different project components as well as the responsibility for monitoring and maintaining the integrity of some of the structures. The plan would serve to provide guidance on specific actions and activities to be implemented to decrease the potential for environmental degradation in the long-term during decommissioning and abandonment activities for temporary facilities, and to clearly define the proponent's ongoing environmental commitments. A conceptual discussion on how decommissioning could occur will be provided for permanent facilities.

6 SCOPE OF PROJECT

The scope of project for the purposes of the EA includes the components (section 5.6), physical activities (section 5.7) and federal decisions (section 5.2). The proponent will consider all the

components, activities and decisions identified in these sections as part of the effects assessment.

Based on information received in the project description from the proponent, the Agency defines the scope of project to be assessed as the construction, operation and decommissioning of the following project components:

- Open pit;
- Stockpiles (peat, overburden and mine rock as well as low grade kimberlite ore);
- Access roads, pipelines, ore conveyor,
- Power infrastructure (generator and local distribution line) and fuel storage facilities, connecting the VMEP and Victor Mine sites;
- Water management facilities and general site drainage works;
- Domestic waste storage/handling;
- Aggregate extraction ;
- Storage of Fine Particulate Kimberlite (FPK)
- Storage of particulate kimberlite

7 SCOPE OF ASSESSMENT

7.1 Factors to be considered

7.1.1 Valued components

Valued Components (VCs) refer to attributes associated with the project that have been identified to be of concern by the proponent, government agencies, Aboriginal peoples and/or the public. The value of a component not only relates to its role in the ecosystem, but also to the value placed on it by humans.

The proponent will identify the VCs deemed appropriate to ensure the full consideration of the factors listed in subsection 19(1) of CEAA, 2012 as well as the 2012 amendment to section 79 of the *Species at Risk Act*. As a minimum, the proponent must consider the list of environmental components provided in section 9.1 of this document. The final list of VC to be presented in the EIS will be completed according to the evolution and design of the project and reflect the knowledge acquired on the environment through public and Aboriginal consultations. The proponent will describe how the VCs were selected and what methods were used to predict and assess the adverse environmental effects of the project on these components.

The VCs will be described in sufficient detail to allow the reviewer to understand their importance and assess the potential for environmental effects arising from the project activities. The rationale for selecting these components as VCs and for excluding others will be stated. Challenges may arise regarding particular exclusions, so it is important to document the information and the criteria used to make each determination. Examples of justification include primary data collection, computer modelling, literature references, public consultation, expert input or

professional judgement. If comments are received on a component that has not been included as a VC, these comments will be summarised and addressed in this section.

For consultations associated with the identification of VCs, the proponent will identify those VCs, processes, and interactions that either were identified to be of concern during any workshops or meetings held by the proponent or that the proponent considers likely to be affected by the project. In doing so, the proponent will indicate to whom these concerns are important and the reasons why, including Aboriginal, social, economic, recreational, and aesthetic considerations. The proponent will describe any issues raised or comments noted regarding the nature and sensitivity of the area within and surrounding the project and any planned or existing land and water use in the area. The proponent will also indicate the specific geographical areas or ecosystems that are of particular concern to interested parties, and their relation to the broader regional environment and economy.

7.1.2 Effects of potential accidents or malfunctions

The proponent will identify the probability of potential accidents and malfunctions related to the project, including an explanation of how those events were identified, potential consequences (including the environmental effects), the plausible worst case scenarios and the effects of these scenarios.

The geographical and temporal boundaries for the assessment of malfunctions and accidents may be different than those in the scope of factors for each VC. This will include an identification of the magnitude of an accident and/or malfunction, including the quantity, mechanism, rate, form and characteristics of the contaminants and other materials likely to be released into the environment during the accident and malfunction events.

The EIS will also describe the safeguards that have been established to protect against such occurrences and the contingency/emergency response procedures in place if accidents and/or malfunctions do occur. Detailed contingency and response plans will be presented.

7.1.3 Effects of the environment on the project

The EIS will take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events (e.g. flooding, drought, ice jams, landslides, avalanches, erosion, subsidence, fire, outflow conditions and seismic events) could adversely affect the project and how this in turn could result in impacts to the environment (e.g., extreme environmental conditions result in malfunctions and accidental events). These events will be considered in different probability patterns (i.e. 5-year flood vs. 100-year flood). Longer-term effects of climate change will also be discussed up to the projected post-closure phase of the project. This discussion will include a description of climate data used.

The EIS will provide details of a number of planning, design and construction strategies intended to minimize the potential environmental effects of the environment on the project.

7.2 Scope of the factors

Scoping establishes the boundaries of the EA and focuses the assessment on relevant issues and concerns. The spatial and temporal boundaries used in the EA may vary depending on the VC.

7.2.1 Spatial boundaries

The EIS will clearly indicate the spatial boundaries to be used in assessing the potential adverse environmental effects of the proposed project and provide a rationale for each boundary. It is recognized that the spatial boundaries for each VC may not be the same.

Spatial boundaries will be defined taking into account as applicable the appropriate scale and spatial extent of potential environmental effects, community and Aboriginal traditional knowledge, current land and resource use by Aboriginal groups, ecological, technical and social and cultural considerations. The description of the project setting will be presented in sufficient detail to address the relevant environmental effects of the project.

The proponent is advised to consult with the Agency, federal and provincial government departments and agencies, local government and Aboriginal groups, and take into account public comment when defining the spatial boundaries used in the EIS.

7.2.2 Temporal boundaries

The temporal boundaries of the EA will span all phases of the project: construction, operation, maintenance, foreseeable modifications, and where relevant, closure, decommissioning and restoration of the sites affected by the project. Temporal boundaries will also consider variations related to VCs for all phases of the project, where appropriate. Community and Aboriginal traditional knowledge should factor into decisions around appropriate temporal boundaries.

If the temporal boundaries do not span all phases of the project, the EIS will identify the boundaries used and provide a rationale.

8 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

The EIS will identify and consider the effects of alternative means of carrying out the project that are technically and economically feasible. The proponent will complete the following procedural steps for addressing alternative means:

Identify the alternative means to carry out the project.

- Develop criteria to determine the technical and economic feasibility of the alternative means; and,
- Identify those alternative means that are technically and economically feasible, describing each alternative means in sufficient detail.

Identify the effects of each alternative means.

- Identify those elements of each alternative means that could produce effects in sufficient detail to allow a comparison with the effects of the project; and
- The effects referred to above include both environmental effects and potential adverse impacts on potential or established Aboriginal and Treaty rights and related interests.

Identify the preferred means.

- Identify the preferred means based on the relative consideration of effects; and of technical and economic feasibility; and

- Determine criteria to examine the effects of each remaining alternative means to identify the preferred means.

In its alternative means analysis, the proponent will address, as a minimum, the following project components:

- Stockpiles (peat, overburden and mine rock as well as low grade kimberlite ore);
- Access roads pipelines, ore conveyor,
- Power infrastructure (generator and local distribution line) and fuel storage facilities, connecting the VMEP and Victor Mine sites;
- Water management facilities and general site drainage works;
- Domestic waste storage/handling;
- Aggregate extraction;
- Storage of Fine Particulate Kimberlite (FPK)
- Storage of particulate kimberlite

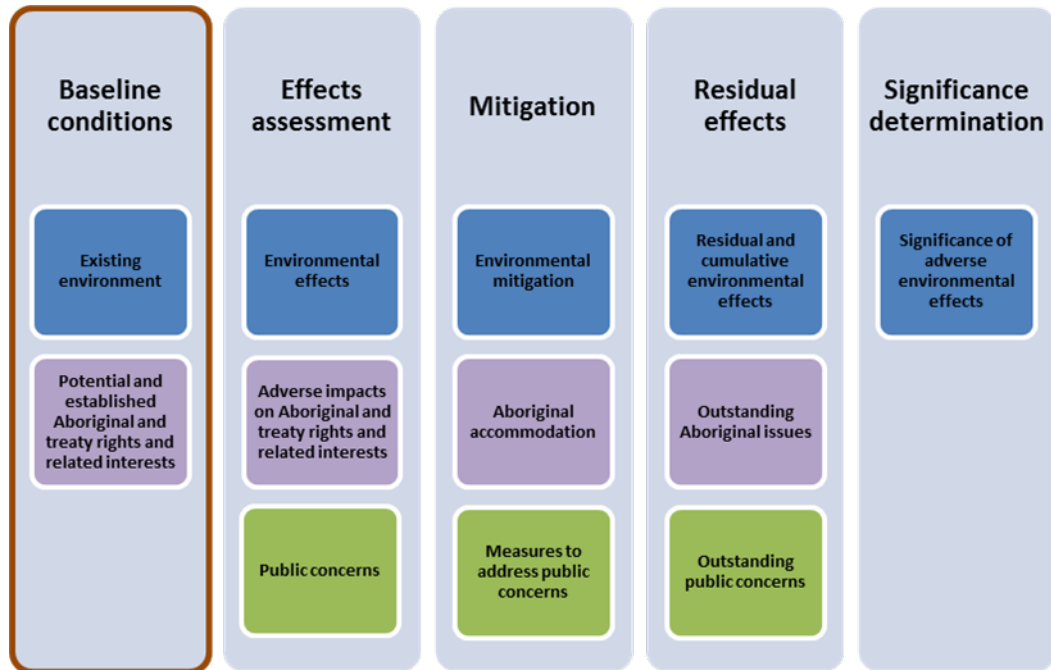
8.1 Assessment of alternatives for mine waste disposal

The proponent has identified the potential need to use the former Victor Mine open pit for the disposal of mine waste, including Fine Processed Kimberlite (FPK) and mine rock, and for the management of process water. Diamond mining is subject to the requirements of the *Fisheries Act*. Before mine waste is disposed of, a determination must be made by Fisheries and Oceans Canada (DFO) to identify whether the mine waste is a deleterious substance, as defined by the *Fisheries Act*, Subsection 36(3) of the *Fisheries Act* states “no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any conditions where the deleterious substance may enter any such water...” unless authorized by regulations. There are currently no federal regulations specific to diamond mining

The potential for deleterious effects of Total Suspended Solids (TSS) is an issue of importance. The technical assessment in the DFO report entitled “[Effect of Suspended Sediment on Freshwater Fish and Fish Habitat](#)”⁵ very clearly sets out the impacts that are associated with high TSS levels. As such, a detailed assessment of alternatives for mine waste disposal must be undertaken by the proponent.

⁵ View the report entitled “Effect of Suspended Sediment on Freshwater Fish and Fish Habitat” at <http://www.dfo-mpo.gc.ca/Library/321450.pdf>

9 BASELINE CONDITIONS



9.1 Existing environment

9.1.1 Methodology

The EIS will include a description of the environment, including the components of the existing environment and environmental processes, their interrelations and interactions as well as the variability in these components, processes and interactions over time scales appropriate to the project. The description will be sufficiently detailed to characterize the environment before any disturbance to the environment due to the project and to identify, assess and determine the significance of the potential adverse environmental effects of the project. This data should include results from studies done prior to any physical disruption of the environment due to initial site clearing activities. The information describing the existing environment may be provided in a stand-alone chapter of the EIS or may be integrated into clearly defined sections within the effects assessment of each VC. This analysis will include environmental conditions resulting from historical and present activities in the local and regional study area.

In describing the physical and biological environment, the proponent will take an ecosystem approach that considers both scientific and traditional knowledge and perspectives regarding ecosystem health and integrity. The proponent will identify and justify the indicators and measures of ecosystem health and integrity used for analysis and relate these to the identified VCs and proposed monitoring and follow-up measures.

For the biophysical environment, baseline data in the form of inventories alone are not sufficient to assess effects. The proponent will consider the resilience of relevant species populations, communities and their habitats. The proponent will summarize all pertinent historical information on the size and geographic extent of relevant animal populations as well as density, based on best available information. Where little or no information is available, specific studies will be

designed to gather further information on species populations, densities and the interrelations of these species to the ecosystem.

Habitat at regional and local scales should be defined in ecological mapping of aquatic and terrestrial vegetation types and species (e.g. ecological land classification mapping). Habitat use will be characterized by type of use (e.g. spawning, breeding, migration, feeding, nursery, rearing, wintering), frequency and duration. This assessment will consider all relevant variations for all VCs as appropriate. Emphasis will be on those species, communities and processes identified as VCs. However, the interrelations of these components and their relation to the entire ecosystem and communities of which they are a part will be indicated (e.g. population-level risk assessment). The proponent will address issues such as habitat, nutrient and chemical cycles, food chains, productivity, to the extent that they are appropriate to understanding the effect of the project on ecosystem health and integrity. Range and probability of natural variation over time will also be considered. The proponent will also examine changes in the distribution, populations, behaviour, and availability of wildlife, fish, and flora in the important context of implications to current use of lands and resources by Aboriginal peoples.

If the baseline data have been extrapolated or otherwise manipulated to depict environmental conditions in the study areas, modelling methods and equations will be described and will include calculations of margins of error and other relevant statistical information, such as confidence intervals and possible sources of error.

9.1.2 Biophysical environment

Based on the scope of project described in section 6, the proponent will present the following baseline information to facilitate the identification of valued components (VC) for the purposes of the environmental assessment. Should other VCs be identified during the conduct of the EA, these components will also be described in the EIS.

Atmospheric Environment and Climate

The EIS will describe the following:

- Ambient air quality in the project areas and, for the mine site, the results of a baseline survey of ambient air quality, including the following contaminants: Total Suspended Particulates, PM2.5, PM10, SOx, VOCs and NOx;
- Current ambient noise levels at both sites and within the local area, including the results of a baseline ambient noise survey. Information on typical sound sources, geographic extent and temporal variations will be included;
- Existing ambient light levels at the project site and at any other areas where project activities could have an effect on light levels. The EIS will describe night-time illumination levels during different weather conditions and seasons; and
- Historical records of total precipitation (rain and snow), mean, max and min temperatures;

Terrestrial Environment-Geology and Geochemistry

The EIS will describe the following:

- A discussion of the bedrock and host rock geology of the deposit which includes a table of geologic descriptions, geological maps and cross-sections of appropriate scale. Where appropriate, the following geologic parameters will be included:
 - Maps of surficial and bedrock geology showing the distribution of geologic units;
 - Representative lithologic and sediment descriptions including: age, colour, grain size, porosity, moisture conditions, permeability, mineralogy, physical strength, hardness, weathering characteristics, depositional setting and correlations of surficial and bedrock units;
 - A geological stratigraphic framework for the surficial sediments and bedrock as appropriate in support of hydrogeological assessments. In particular, delineation of key stratigraphic and hydrogeologic boundaries, the spatial distribution and thickness of lithologic units shown in plan and cross-section;
 - Alteration styles, mineralogy, bulk chemistry, trace metal chemistry occurrence and intensity of bedrock units;
 - Structural fabric (e.g., joints and fractures, faults, foliation and lineation) and structural relationships, structural characterization of the rock formations impacted by the project;
 - Ore mineralogy, including sulphide types, abundance, mode of occurrence, extent of previous oxidation and an estimate of relative sulphide reactivity;
 - Type and grade of metamorphism; and
 - Regional geologic framework including tectonic belt, terrane, regional metamorphism and structure.
- A delineation of the regional and local geological structures in the project area that may affect the proposed infrastructure. This includes major structural features as well as lesser local structures, their ecological functions and distribution in the local study area.
- Geomorphology and topography of areas proposed for construction of major project components,
- Bedrock lithology, morphology, geomorphology and soils where earthworks are proposed;
- A description of geological hazards that exist in the areas planned for the project facilities and infrastructure, including:
 - History of seismic activity in the area;
 - Isostatic rise or subsidence;
 - Landslides, slope erosion and the potential for ground and rock instability, and subsidence following project activities; and
 - History of landslide-generated tsunamis if near a shoreline.
- Sites of paleontological or palaeobotanical significance; and,
- A characterization of the geochemical composition of expected mine materials such as waste rock, ore, low grade ore, tailings, overburden and potential construction material, which will include:
 - Mineralogy;
 - Elemental composition of host lithologies and ore in study area (major and trace elements); and,
 - Potential for acid generation, neutralization and contaminated neutral drainage.

Acid Rock Drainage/Metal Leaching

The manual produced by the Mine Environment Neutral Drainage (MEND) Program, entitled, *MEND Report 1.20.1, "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials", Version 0 - December 2009* is a recommended reference for use in Acid Rock Drainage/Metal Leaching (ARD/ML) prediction.

The ARD/ML prediction information will be used to predict water quality for effects assessment and to determine mitigation requirements for the Project. Additional information will be provided on the following:

- the type and method used for the ARD/ML prediction and possible mitigation measures;
- waste rock, tailings and low grade ore characterization, volumes, segregation/disposal method mitigation/management plans, contingency plans, operational and post-closure monitoring and maintenance plans;
- assessment of short term metal leaching properties;
- longer term kinetic testing to evaluate rates of acid generation (if any) and metal leaching;
- assessment of the feasibility to successfully segregate potentially-acid generating (PAG) and non-potentially acid generating (NPAG) waste materials during operations, proposed geochemical segregation criteria and identification of operational methods that will be required to achieve geochemical characterization during operations (i.e. geochemical surrogates, on site lab, procedures needed, etc);
- sensitivity analysis to assess the effects of imperfect segregation of waste rock;
- estimates of the potential for mined materials (including waste rock, tailings and low grade ore) to be sources of ARD or ML; estimates of potential time to the onset of ARD or ML; and the ability to prevent or control ARD and ML during operation and post-closure;
- pit water chemistry during operation and post-closure, and pit closure management measures (e.g. flooding). This will include geochemical modeling of pit water quality in the post-closure period;
- surface and seepage water quality from the waste rock dumps, tailings/waste rock impoundment facility, stockpiles and other infrastructure during operation and post-closure;
- ARD/ML prevention/management strategies under a temporary or early closure scenario, including low grade ore.
- quantity and quality of leachate from samples of tailings, waste rock, and ore,
- quantity and quality of effluent to be released from the site into the receiving waters, and
- quality of humidity cell or column test liquid from acid rock testing;

Surficial Geology (i.e. Terrain and Soil)

The EIS will describe the following:

- Baseline mapping and description of landforms and landform processes and soils within the local and regional project area,
- Description of surface sediments at proposed borrow and quarry sites, and other areas where earthworks are proposed. If the sedimentary deposits are identified as a potential source of granular material a description should be included;
- Maps depicting soil depth by horizon and soil order within the mine site area to support soil salvage and reclamation efforts, and to outline potential for soil erosion;
- Sedimentological and geochemical characteristics of surficial sedimentary units and soils;

- A description/details of soil sample analysis completed and the quality assurance/quality control program followed;
- Suitability of topsoil and overburden for use in the re-vegetation of surface-disturbed areas; and
- A summary of the baseline data on the concentration of trace elements in site soils prior to project development.

If there is permafrost in the study area the EIS will including the following information:

- Discussion of the geomorphologic and topographic features at areas proposed for construction of major project components, including the type, thickness, and distribution of soils as applicable;
- Discussion of permafrost conditions including distribution of frozen and unfrozen ground, thermal conditions (ground temperatures), ground ice, thaw sensitivity and active layer thickness;
- Discussion of the potential for thaw settlement and terrain instability associated with ground thawing;
- Description of the morphology, geomorphology and soils (including sediments and the thermal and ground ice conditions) at proposed borrow and quarry sites, and other areas where earthworks are proposed. If the sedimentary deposits are identified as a potential source of granular material then a description of granular material properties, including thermal condition and ice content, will also be described;
- Discussion of the relationship between permafrost conditions and associated processes and active layer, topography, drainage conditions and surface hydrology;
- Details regarding the suitability of topsoil and overburden for use in the re-vegetation of surface-disturbed areas;
- Description of permafrost distribution (i.e., distribution of frozen and unfrozen ground) in the local project area, high ice-content soils, ice lenses, thaw-sensitive slopes, and talik zones; and,
- Description of permafrost temperatures at areas planned for project facilities and infrastructure, including discussion of sensitivity to warming induced by project activities (construction and operation of facilities) or climate change, and implications for integrity, performance and safety of infrastructures.

Water Resources

The EIS will describe the following:

- An appropriate hydrogeologic model will be presented for the project area, which discusses the hydrostratigraphy and groundwater flow systems. Include the rationale for the selected model;
- A detailed conceptual model will be provided. Model input parameters and boundary conditions will be clearly defined. Model inputs will be based on a sufficiently large data set and be conservative in nature. The model will be calibrated against baseline conditions and should be tested using site groundwater monitoring data to confirm the generated model;

- A sensitivity analysis will be performed to test model sensitivity to climatic variations (e.g., recharge) and hydrogeologic parameters (e.g., hydraulic conductivity);
- A description of the hydrogeology at the site and at local and regional study areas. The description will:
 - Characterize the hydrogeological context (e.g., hydrostratigraphy with aquifers and aquitards, major faults etc.) including the delineation of key stratigraphic and hydrogeologic boundaries;
 - Characterize the physical properties of the hydrogeological units (e.g., hydraulic conductivity, transmissivity, saturated thickness, storativity, porosity, specific yield);
 - Delineate regional and local and site groundwater flow patterns and rates; discuss the hydrogeologic, hydrologic, geomorphic, climatic and anthropogenic controls on groundwater flow;
 - Include a detailed groundwater budget;
 - Discuss temporal changes in groundwater flow (e.g., seasonal and long term changes in water levels);
 - Identify recharge and discharge areas;
 - Delineate and characterize groundwater and surface water interactions including the locations of groundwater discharge to surface water and surface water recharge to groundwater, and characterize perennial surface water flow (e.g., spatial extent and magnitude of baseflow);
 - Describe baseline groundwater and baseflow quality and the water type with their spatial distribution (zones);
 - Describe and locate the groundwater sources used as drinking water in the study area, their current use and potential for future use; and,
 - In permafrost regions, describe configuration of frozen ground and taliks and the influence on groundwater flow.
- An inventory and analysis of existing information on the hydrogeological conditions/groundwater resources in the project area, including published reports, geological maps well record data (from water wells, monitoring wells and production wells) and Quality Assurance/Quality Control (QA/QC) procedures followed;
- Hydrogeologic maps and cross-sections for the mine area to outline the extent of aquifers and aquitards, including bedrock fracture and fault zones, locations and depths of wells, groundwater types springs, surface waters, and project facilities. Groundwater levels, potentiometric contours and flow directions should be included;
- A review of the physical geography (e.g., topography and physiographic units) and the geology of the area as it pertains to local and regional groundwater flow systems and aquifer/aquitard systems;
- Maps showing groundwater divides and areas of recharge and discharge, with project components overlain
- Location and description of all groundwater monitoring wells in respect to the project area, including geologic, hydrostratigraphic, piezometric and construction data (e.g., depths of surficial and bedrock units, water level, hydraulic conductivity, diameter and screen depth and intercepted aquifer unit);

- A description of baseline groundwater level data for regional and local flows in all aquifer units (overburden and bedrock units);
- A description of monitoring protocol for collection of existing groundwater data;
- Measurements of hydraulic conductivity (or transmissivity) for all hydrogeological units in the project area;
- Results of the modeling of baseline hydrogeological conditions (refer to hydrogeological modeling section);
- Graphs or tables indicating the seasonal variations in groundwater levels, flow regime, and quality;
- Tables of baseflow measurements or estimates;
- A description of local and regional potable groundwater supplies, including their current use and potential for future use, as appropriate;
- Baseline analysis of groundwater and baseflow quality at the site and within the regional and local study area, including methods of sampling and analysis and details of QA/QC. This includes determining natural groundwater types and measuring concentrations of major constituents as well as minor and trace components. Ensure that particular attention is given to the components that would be, from an environmental point of view, potentially of interest in the course of mining operations. This analysis should be performed on sediment and bedrock aquifers.
- Bedrock fracture sizes and orientations in relation to groundwater flow; and
- Evaluation of discharge rates.

The EIS will describe surface water quality, hydrology and sediment quality within the area of influence of the project. The baseline will provide the basis for the assessment of potential effects to surface water, presenting the range of water and sediment quality and surface water hydrology.

Furthermore, the EIS will describe:

- The delineation of drainage basins, at appropriate scales;
- The assessment of hydrological regimes,
- Flows or design peak flows for selected periods for the project area;
- Any local and regional potable surface water resource;
- Seasonal water quality field and lab analytical results and interpretation at several representative local stream and lake monitoring stations established at the project site.

Wetlands

Wetlands that may be affected by project activities will be characterized according to their location, size, type (wetland class and form), species composition and ecological function (Canadian Wetland Classification System, National Wetlands Working Group [NWWG] 1997). Efforts should focus on describing the wetlands with the greatest potential to be affected, including those within the project footprint. An overview of the key plant communities and animals that rely on wetlands will be presented. An overview of the key plant communities and animals that rely on wetlands will be presented.

Fish and Fish Habitat

The EIS will describe the limnology, hydrology, freshwater biota, presence of fish and other freshwater species, associated habitats and habitat distribution and fisheries in potentially affected surface waters, based on available published information, information resulting from community consultation, and/or results of on-site baseline surveys.

Furthermore, the EIS will describe the following:

- Characterize fish populations on the basis of species and life stage for affected water bodies (i.e., project footprint, upstream and downstream);
- List any rare fish or invertebrate species that are known to be present; and
- Identify any potential waterbodies and fish habitat sites that could be rehabilitated, restored or created for possible habitat gains to offset losses from the project.

In order to allow analysis of the project's effects, the EIS will document the physical and biological characteristics of the fish and fish habitat likely to be directly or indirectly affected by the project.

Note that certain intermittent streams or wetlands may constitute fish habitat or contribute indirectly to fish habitat. The absence of fish at the time of the survey does not irrefutably indicate an absence of fish habitat.

The EIS will illustrate, on a topographic scale map, the hydrographic network (water bodies and watercourses), including intermittent streams, flood risk areas and wetlands. It will also indicate the boundaries of the watershed and subwatersheds of the study area.

Emphasis will be placed on the watercourses and water bodies likely to be affected by the project and their physical characteristics, water quality and hydrological regime.

Hence, for all the watercourses and water bodies on which effects are anticipated, the EIS will describe the biophysical characteristics, including:

- For each watercourse, indicate the name of the watercourse and provide a description of the habitat by homogeneous section. The parameters that must be determined are length of the section, width of the channel from the high water mark (bankful width), water depths, type of substrate (sediments), aquatic and riparian vegetation, including bank slopes. It is recommended that photos be attached to the description;
- For each lake or water body affected, indicate the name of the water body and provide a description. The parameters that must be determined are total surface area, bathymetry, maximum and mean depths, water level fluctuations, type of substrate (sediments), and location of submerged, floating and emergent aquatic vegetation, and water quality parameters (e.g. water temperature, turbidity, pH, dissolved oxygen profiles);
- Monthly/seasonal/annual water flow (discharge) data, including minimum and maximum flows;
- Natural obstacles (e.g. falls, beaver dams) or existing structures (e.g. water crossings) that hinder the free passage of fish.
- Preparation of habitat maps at a suitable scale indicating the surface area of habitat for spawning, nursery, feeding, migration routes etc. This information should be linked to water depths (bathymetry) to identify the extent of a lake's littoral zone.

Fish sampling survey methods used will be described in order to allow experts to ensure the quality of the information provided. If studies on fish and fish habitat were carried out previously, they are to be submitted with the EIS.

For all watercourses or water bodies on which the project is likely to have effects, the EIS will:

- Describe the fish species present on the basis of the surveys carried out and the data available (e.g. electric and experimental fishing, government and historical databases, sport fishing data). Identify the sources of the data and provide the information concerning the fishing carried out (e.g. location of sampling stations, catch methods, date of catches, species);
- Specify the location and surface area of potential or confirmed fish habitats and describe how they are used by fish (spawning, rearing, growth, feeding, migration, overwintering)
- Locate and describe suitable habitats for species at risk that appear on federal and provincial lists and that are found or are likely to be found in the study area.
- Document any blasting activity near water where vibrations may affect fish behaviour, such as spawning or migrations.
- Indicate how fish passage will be maintained for sites where stream crossings are to be installed, constructed or modified.

Birds, Wildlife and their Habitat

The EIS will describe migratory and non-migratory birds (including waterfowl, raptors, shorebirds, marsh birds and other landbirds), ungulates, furbearers, amphibians, small mammals, and their habitat at the project site and within the local and regional areas. The results of any baseline surveys and a description of the methodology will be included.

Migratory birds are protected under the *Migratory Birds Convention Act* (MBCA) and associated regulations. Preliminary data from existing sources will be gathered on year-round migratory bird use of the area (e.g., winter, spring migration, breeding season, fall migration). In addition to information obtained from naturalists, other relevant datasets should be consulted.

Existing data will be supplemented by surveys, where necessary. Surveys should be designed with reference to the Canadian Wildlife Service's guidance such as Technical Report No. 508, *A Framework for the Scientific Assessment of Potential Project Impacts on Birds* (Hanson *et al.* 2009). Appendix 3 of the Framework provides examples of project types and recommended techniques for assessing impacts on migratory birds.

Other wildlife and their habitat that could be impacted by project activities will be characterized using existing data, supplemented by surveys as appropriate. The EIS will give particular consideration to areas of concentration of migratory animals, such as breeding, denning and/or wintering areas, as well as breeding areas of species low in number and high in the food chain (e.g. furbearers such as black bear and wolf).

The description of the existing environment will include consideration of existing or proposed protected areas, special management areas, and conservation areas in the regional study area,

Species at Risk and Species of Conservation Concern

As background for the analysis of the project's effects on Species at Risk (SAR), the EIS will:

- Identify all SARs that may be affected by the project, using existing data and literature as well as surveys to provide current field data, as appropriate;

- Incorporate any published studies that describe the regional importance, abundance and distribution of SARs; and
- Identify residences, seasonal movements, movement corridors, habitat requirements, key habitat areas, identified critical habitat and/or recovery habitat (where applicable) and general life history of SARs that may occur in the project area, or be affected by the project.

The following information sources on species at risk and species of conservation concern should be consulted:

- SARA (www.sararegistry.gc.ca);
- COSEWIC;
- Relevant Government agencies;
- Local naturalist and interest groups; and
- Aboriginal groups and First Nations.

Ecosystems (grassland, temperate forest, etc.)

The EIS will describe the various ecosystems found in the project area which are likely to be affected by the project.

Flora

The EIS will describe potential or known plant species in the project area, which are listed under the *Species at Risk Act* or other provincial or territorial endangered species legislation, and critical habitat that are likely to be affected by the project;

In order to complete the description of the baseline information regarding the biophysical environment, the proponent may consider the inclusion of other VCs in the EIS.

The species selected within each biotic VC should include those of importance to health and socio-economic conditions, cultural heritage and the current use of land and resources for traditional purposes by Aboriginal persons.

9.1.3 Human environment

The definition of the human environment will be interpreted broadly. Based on the scope of project described in section 6, the following VCs will be identified and described in the relevant sections of the EIS:

- Land use context (e.g., hunting, fishing, outdoor recreation, use of seasonal cabins, existing land development)
- Health and socio-economic conditions
- Physical and cultural heritage, including structures, sites or things of historical, archaeological, paleontological or architectural significance;
- Current use of land and resources for traditional purposes by Aboriginal persons; and
- In describing how the project may impede navigation, the EIS will:
 - identify any Project components and a description of any activities (e.g., dredging, alteration of water bed and/or water banks) that may affect waterways and water bodies, ;

- describe any recreational uses of natural waters (i.e., swimming, canoeing, fishing); and
- provide information on current and/or historic usage of all waterways and water bodies that will be directly affected by the project, including current Aboriginal uses, where available.

This is a minimum list that is not meant to be exhaustive. The proponent may consider the inclusion of other human environment VCs in the EIS.

The Proponent will include all baseline information relevant to human health in one section of the EIS. The Proponent should refer to Health Canada's Useful Information for Environmental Assessments document⁶ in order to include the appropriate baseline information relevant to human health.

In describing the socio-economic environment, the proponent will provide information on the functioning and health of the socio-economic environment, encompassing a broad range of matters that affect communities and Aboriginal peoples in the study area in a way that recognizes interrelationships, system functions and vulnerabilities. A description of the rural and urban settings likely to be affected by the project will be provided.

In describing physical and cultural heritage, the proponent will provide information on heritage resources, including structures, sites or things of historical, archaeological, paleontological or architectural significance.

In describing current uses of land and resources by Aboriginal groups for traditional purposes, the proponent will include activities related, but not limited, to hunting, fishing, trapping, cultural and other traditional uses of the land (e.g. collection of medicinal plants, use of sacred sites). Potential effects on current uses include access to areas that are of importance or concern to Aboriginal groups.

9.2 Potential or established Aboriginal and Treaty rights and Related Interests

For the purposes of developing the EIS, the proponent will engage with Aboriginal groups whose potential or established Aboriginal rights and Treaty rights and related interests may be affected by the project.

The proponent will hold meetings and facilitate these by making key EA summary documents (baseline studies, EIS and key findings) accessible and making plain language summaries of these documents available to the Attawapiskat First Nation.

The proponent will ensure that the Attawapiskat First Nation's views are heard and recorded.

There are additional Aboriginal groups whose interests may be affected but who are further removed from the project and its related effects. These Aboriginal groups include, but are not limited to:

- Fort Albany First Nation;
- Kashechewan First Nation;
- Moose Cree First Nation; and

⁶ This document can be obtained at http://www.hc-sc.gc.ca/ewh-semtpubs/eval/envIRON_assess-eval/index-eng.php."

- Taykwa Tagamou First Nation.

For these groups, the Proponent must make key EA summary documents (Draft/Final EIS and key findings) accessible and make plain language summaries of these documents available and ensure these groups' views are heard and recorded.

In preparing the EIS, the proponent will ensure that Aboriginal groups, especially those most likely to be affected by the project, have access to timely and relevant information that they require in respect of the project and how the project may adversely impact them.

For the Aboriginal groups previously identified by the Agency, the proponent will hold meetings and facilitate these by making key EA summary documents (baseline studies, EIS and key findings) accessible and making plain language summaries of these documents.

At a minimum, the EIS will summarize available information on the potential or established Aboriginal and Treaty rights and related interests of the named Aboriginal groups that have the potential to be adversely impacted by the project. As part of this summary, the EIS will include for each Aboriginal group:

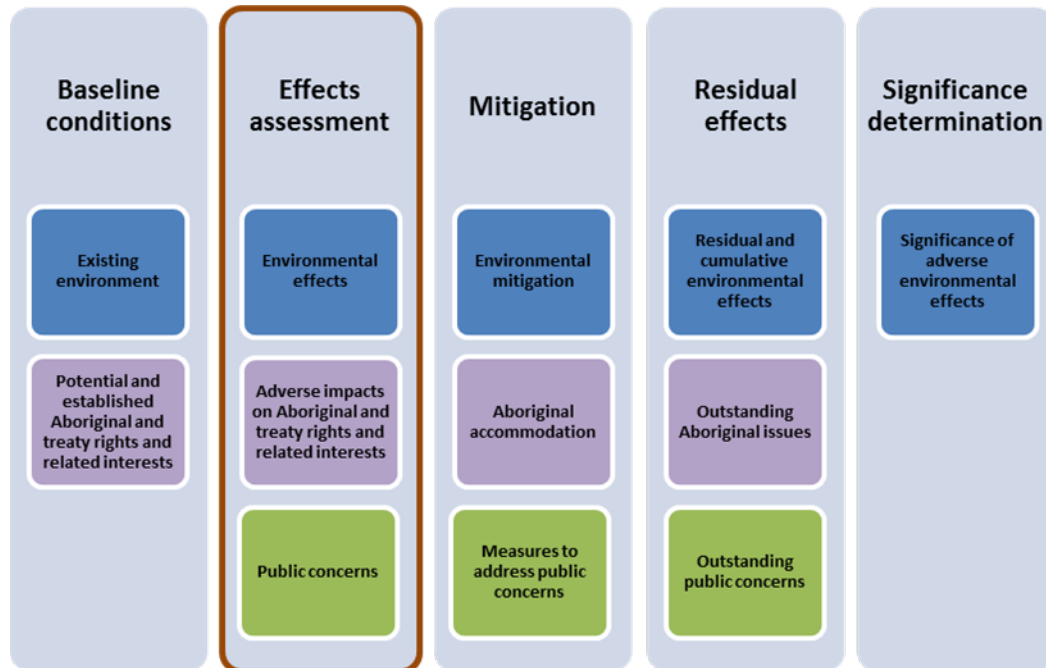
- Background information and a map of the group's traditional territory;
- A summary of engagement activities conducted prior to the submission of the EIS, including the date and means of engagement (e.g., meeting, mail, telephone);
- Information on each group's potential or established rights (including geographical extent, nature, frequency, timing), including maps and data sets (e.g. fish catch numbers) when this information is provided by a group to the proponent;
- An overview of key comments and concerns provided by each group to the proponent;
- Responses provided by government and/or the proponent, as appropriate;
- Future planned engagement activities; and
- Efforts undertaken to engage with Aboriginal groups as part of developing the information identified above.

The proponent will describe all efforts, successful or not, taken to solicit the information required to prepare the EIS.

The Agency will provide additional instructions to the proponent in cases where further research and/or engagement effort by the proponent is required to support Canada's ability to fulfil the duty to consult with one or more Aboriginal groups that may be adversely affected by the project.

Should the proponent have knowledge of potential adverse impacts to an Aboriginal group not appearing on the above list, the proponent will bring this to the attention of the Agency at the earliest opportunity.

10 EFFECTS ASSESSMENT



10.1 Environmental effects

10.1.1 Methodology

The proponent will indicate the project's effects during construction, operation, maintenance, foreseeable modifications, and where relevant, closure, decommissioning and restoration of sites and facilities associated with the project, and describe these effects using appropriate criteria. To the maximum extent possible, this documentation will include, for each potential project-related environmental effect, an indication of the nature of the effect, mechanism, magnitude, duration, frequency, geographic extent, and the degree to which it may be reversible. The proponent will consider both the direct and indirect, reversible and irreversible, short- and long-term environmental effects of the project. In predicting and assessing the project's effects, the proponent will indicate important details and clearly state the elements and functions of the environment that may be affected, specifying the location, extent and duration of these effects and their overall impact.

The assessment of the effects of each of the project components and physical activities, in all phases, will be based on a comparison of the biophysical and human environments between the predicted future conditions with the project and the predicted future conditions without the project. In undertaking the environmental effects assessment, the proponent will use best available information and methods. All conclusions will be substantiated. Predictions will be based on clearly stated assumptions. The proponent will describe how it has tested each assumption. With respect to quantitative models and predictions, the proponent will discuss the assumptions that underlie the model, the quality of the data and the degree of certainty of the predictions obtained.

Risk assessment framework

The proponent is expected to employ, where appropriate, standard ecological risk assessment frameworks that categorize the levels of detail and quality of the data required for the assessment. These tiers are as follows:

- Tier 1: Qualitative (expert opinion, including traditional and local knowledge, literature review, and existing site information);
- Tier 2: Semi-quantitative (measured site-specific data and existing site information); and,
- Tier 3: Quantitative (recent field surveys and detailed quantitative methods).

Thus, if the Tier 2 assessment still indicates a potential for effects to VCs, a Tier 3 assessment may need to be conducted to reduce the level of uncertainty. If the risk characterization component is uncertain this may necessitate the probabilistic modelling of the population-level consequences of the proposed project.

Biophysical changes to the environment that may impact human health include changes to: air quality, water quality, noise levels, contaminants in country food sources, and radiation levels. Such changes in the biophysical environment, as described in Section 9 (Baseline Environment), can impact human health. When risks to human health due to changes in one or more of these components are predicted, a complete Human Health Risk Assessment (HHRA) examining all exposure pathways for pollutants of concern may be necessary to adequately characterize potential risks the human health.

Impact matrix

An impact matrix methodology in combination with identification of VCs should be used to evaluate environmental effects of the proposed project, including those related to Aboriginal peoples. The assessment will include the following general steps:

- identification of the activities and components of the project;
- predicting/evaluating the likely effects on identified valued components;
- identification of technically and economically feasible mitigation measures for any significant adverse environmental effects;
- determination of any residual environmental effects;
- ranking of each residual adverse environmental effect based on various criteria; and,
- determination of the potential significance of any residual environmental effect following the implementation of mitigation.

Application of precautionary approach

In documenting the analyses included in the EIS, the proponent will:

- Demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner in order to ensure that they would not cause serious or irreversible damage to the environment, especially with respect to environmental functions and integrity, system tolerance and resilience, and/or the human health of current or future generations;
- Outline and justify the assumptions made about the effects of all aspects of the project and the approaches to minimize these effects;

- Ensure that in designing and operating the project, priority has been and would be given to strategies that avoid the creation of adverse effects;
- Develop contingency plans that explicitly address accidents and malfunctions; and
- Identify any proposed follow-up and monitoring activities, particularly in areas where scientific uncertainty exists in the prediction of effects.

10.1.2 Changes to the environment

Section 5 of CEAA, 2012 describes specific categories of direct and indirect environmental effects that will be considered in the EA (see Figure 2). However, to be able to assess these categories of environmental effects, a complete understanding of the changes the project will cause to the environment is required, including changes that are directly linked or necessarily incidental to any federal decisions that would permit the project to be carried out.

The EIS will describe any change that may be caused by the project (as scoped in section 6 of this document) on the environment, which is defined as the components of the Earth, including:

- Land, water and air, including all layers of the atmosphere;
- All organic and inorganic matter and living organisms; and
- The interacting natural systems that include the components described above.

These descriptions will be integrated into the effects assessment sections of each VC included in the EIS.

Changes to components of the environment within federal jurisdiction

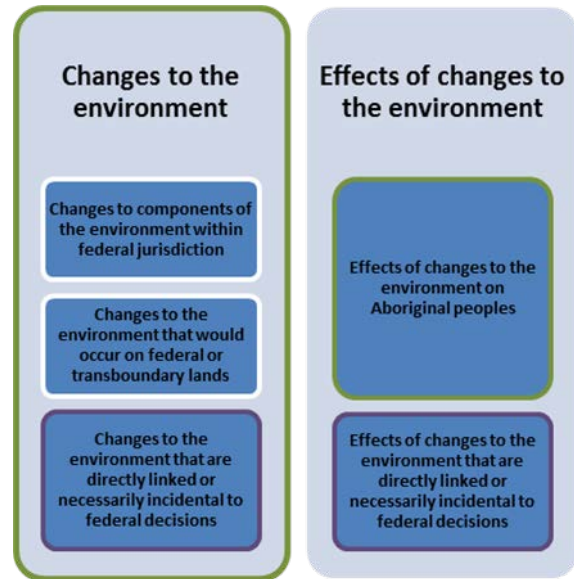
The EIS will include a stand-alone section that summarises those changes that may be caused by the project on the components of the environment listed in paragraph 5(1)(a) of CEAA, 2012, namely fish and fish habitat, aquatic species and migratory birds.

Changes to the environment that would occur on federal or transboundary lands

The EIS will include a stand-alone section that summarises any change the project may cause to the environment that may occur on federal lands or lands outside the province in which the project is to be located (including outside of Canada).

Changes to the environment that are directly linked or necessarily incidental to federal decisions

In situations where the project requires one or more federal decisions identified in section 5.2, the EIS will also include a stand-alone section that describes any change that may be caused by the project on the environment that is directly linked or necessarily incidental to these decisions.



10.1.3 Effects of changes to the environment

Effects of changes to the environment on Aboriginal peoples

The EIS will describe the effects of any changes the project may cause to the environment, with respect to Aboriginal peoples, on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions

In situations where the EIS has identified changes to the environment that are directly linked or necessarily incidental to federal decisions identified in section 5.2, the EIS will also include a stand-alone section that describes the effects of these changes on health and socio-economic conditions, physical and cultural heritage, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, other than as they pertain to Aboriginal peoples (who are considered in the previous section).

10.2 Adverse Impacts on Aboriginal and Treaty Rights and Related Interests

The EIS will describe, from the perspective of the proponent, the potential adverse impacts of the project on the ability of Aboriginal peoples to exercise the potential or established Aboriginal and Treaty rights and related interests identified in section 9.2. As part of this description, this section will summarise:

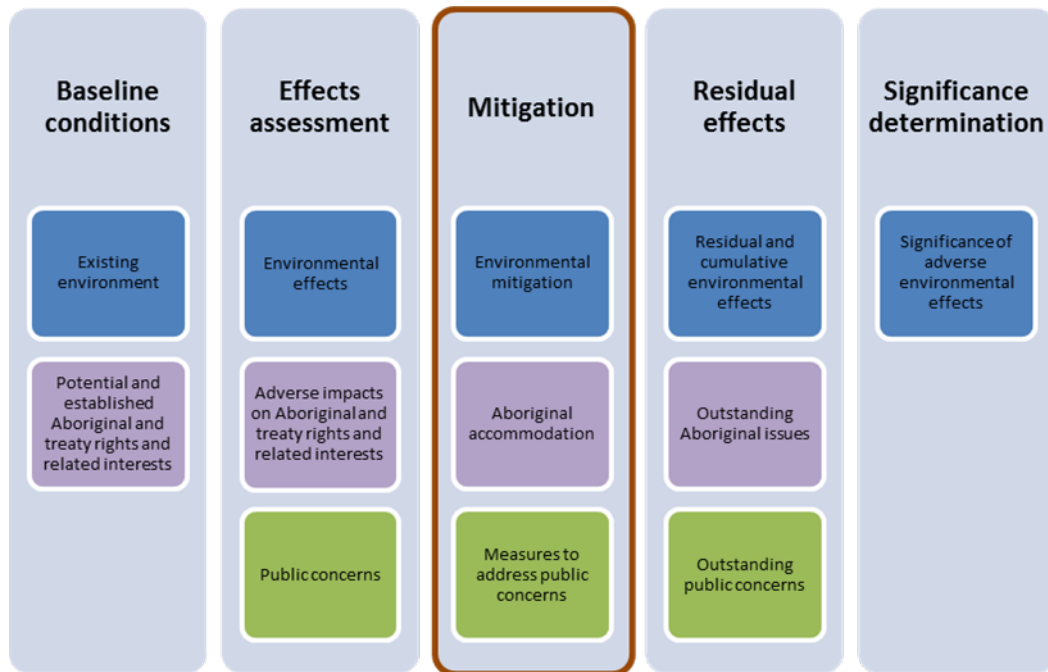
- Potential adverse impacts (on potential or established Aboriginal and Treaty rights and related interests) that were identified through the environmental effects described in sections 10.1.2 and 10.1.3
- Specific issues and concerns raised by Aboriginal groups in relation to the potential adverse impacts of the project on potential or established Aboriginal and Treaty rights and related interests;
- VCs suggested for inclusion in the EIS, whether or not those factors were included, and the rationale for any exclusions;
- Where and how Aboriginal traditional knowledge or other Aboriginal views were incorporated into the consideration of environmental effects and potential adverse impacts on potential or established Aboriginal and Treaty rights and related interests; and
- Efforts undertaken to engage with Aboriginal groups as part of collecting the information identified above.

The assessment of the potential adverse impacts of each of the project components and physical activities, in all phases, will be based on a comparison of the exercise of the identified rights between the predicted future conditions with the project and the predicted future conditions without the project. It is recommended that the impact matrix methodology described in section 10.1.1 be adapted for this purpose.

10.3 Public concerns

This section will detail public concerns raised in relation to the project, including through public consultation conducted prior to the preparation of the EIS, and/or community knowledge that may have been provided.

11 MITIGATION



11.1 Environmental mitigation

11.1.1 Methodology

Every EA conducted under CEEA, 2012 will consider clear, enforceable measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project. As a first step, the proponent is encouraged to use an approach based on the avoidance and reduction of the effects at the source. Such an approach may include the modification of the design of the project or relocation of project components.

The EIS will describe the standard mitigation practices, policies and commitments that constitute technically and economically feasible mitigation measures and that will be applied as part of standard practice regardless of location. The proponent will then describe its environmental protection plan and its environmental management system, through which it will deliver this plan. The plan will provide an overall perspective on how potentially adverse effects would be minimized and managed over time.

The EIS will then describe mitigation measures that are specific to each environmental effect identified in section 10.1. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them. Where mitigation measures have been identified

in relation to species and/or critical habitat listed under the *Species at Risk Act*, the mitigation measures will be consistent with any applicable recovery strategy and action plans.

The EIS will describe proponent commitments, policies and arrangements directed at promoting beneficial or mitigating adverse socio-economic effects. The EIS will further discuss the mechanisms the proponent would use to require its contractors and sub-contractors to comply with these commitments and policies and with auditing and enforcement programs.

The EIS will specify the actions, works, minimal disturbance footprint techniques, best available technology, corrective measures or additions planned during the project's various phases (construction, operation, modification, decommissioning, abandonment or other undertaking related to the project) to eliminate or reduce the significance of adverse effects. The impact statement will also present an assessment of the effectiveness of the proposed technically and economically feasible mitigation measures. The reasons for determining if the mitigation measure reduces the significance of an adverse effect will be made explicit.

The EIS will indicate what other technically and economically feasible mitigation measures were considered, including the various components of mitigation, and explain why they were rejected. Trade-offs between cost savings and effectiveness of the various forms of mitigation will be justified. The EIS will identify who is responsible for the implementation of these measures and the system of accountability.

Where mitigation measures are proposed to be implemented for which there is little experience or for which there is some question as to their effectiveness, the potential risks and effects to the environment should those measures not be effective will be clearly and concisely described. In addition, the EIS will identify the extent to which technology innovations will help mitigate environmental effects. Where possible, it will provide detailed information on the nature of these measures, their implementation, management and the development of the Follow-up Program as described in section 11.4.

Adaptive management is not considered a valid mitigation measure, but if the Follow-up Program indicates that corrective action is required, the proposed approach for managing the response should be identified.

11.1.2 Summary of environmental mitigation

In addition, the EIS will summarise the mitigation measures, follow-up and related commitments identified to address the categories of environmental effects specified in section 10:

- Changes to components of the environment within federal jurisdiction;
- Changes to the environment that would occur on federal or transboundary lands;
- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

11.2 Measures to address impacts on Aboriginal rights

This section will describe, from the perspective of the proponent, the measures identified to mitigate the potential adverse impacts of the project described in section 10.2 on the potential or established Aboriginal and Treaty rights and related interests identified in section 9.2. These measures will be written as specific commitments that clearly describe how the proponent intends to implement them. This description will include a summary of:

- Specific suggestions raised by Aboriginal groups for mitigating the potential adverse impacts of the project on potential or established Aboriginal and Treaty rights and related interests in relation to environmental effects specified in sections 10.1.2 and 10.1.3;
- Environmental mitigation measures identified in section 11.1 that also serve to address potential adverse impacts on potential or established Aboriginal and Treaty rights and related interests;
- Any potential cultural, social and/or economic impacts or benefits to Aboriginal groups that may arise as a result of the project;
- Where and how Aboriginal traditional knowledge or other Aboriginal views were incorporated into the mitigation of environmental effects of potential adverse impacts on potential or established Aboriginal and Treaty rights and related interests; and
- Efforts undertaken to engage with Aboriginal groups as part of developing the information identified above.

In preparing the EIS, the proponent will ensure that Aboriginal people and groups have access to the information that they require in respect of the project and of how it may impact them. The proponent will describe all efforts, successful or not, taken to solicit the information required to prepare the EIS.

The proponent will structure its Aboriginal engagement activities to provide adequate time for Aboriginal groups to have reviewed the relevant information in advance and to ensure there are sufficient opportunities for individuals and groups to provide oral input in the language of their choosing. Consultation activities must be appropriate to the groups' needs and should be arranged through discussions with the groups.

11.3 Measures to address public concerns

This section will describe measures identified for addressing public concerns in relation to the project identified in section 10.3. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them.

For any consultations undertaken with the general public, the EIS will describe the ongoing and proposed consultations and information sessions with respect to the project at the local, regional and provincial levels, where applicable. The EIS will provide a summary of discussions, indicate the methods used and their relevance, locations, the persons and organizations consulted, the concerns raised, the extent to which this information was incorporated in the design of the project as well as in the EIS, and the resultant changes. The proponent will also provide a description of efforts made to distribute project information and provide a description of information and materials that were distributed during the consultation process.

11.4 Follow-Up Program

A Follow-up Program is designed to verify the accuracy of the effects assessment and to determine the effectiveness of the measures implemented to mitigate the adverse effects of the project. The EIS will describe the proposed Follow-up Program in sufficient detail to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them), and to confirm both the assumptions and the effectiveness of mitigation. The Follow-up Program will include specific commitments that clearly describe how the proponent intends to implement them.

The Follow-up Program will be designed to incorporate baseline data, compliance data (such as established benchmarks, regulatory documents, standards or guidelines) and real time data (such as observed data gathered in the field). The proponent will describe the reporting methods to be used, including frequency, methods and format.

The effects predictions, assumptions and mitigation actions that are to be tested in the follow-up program must be converted into field-testable monitoring objectives. The monitoring design must include a statistical evaluation of the adequacy of existing baseline data to provide a benchmark against which to test for project effects, and the need for any additional pre-construction or pre-operational monitoring to establish a firmer project baseline.

The Follow-up Program will include a schedule indicating the frequency and duration of effects monitoring. This schedule is to be developed after an evaluation of the length of time needed to detect effects given estimated baseline variability, likely magnitude of environmental effect and desired level of statistical confidence in the results (Type 1 and Type 2 errors).

The description of the Follow-up Program will include any contingency procedures/plans or other adaptive management provisions as a means of addressing unforeseen effects or for correcting exceedances as required to comply or to conform to benchmarks, regulatory standards or guidelines.

The Follow up Program will also be designed to monitor the implementation of mitigation measures resulting from Aboriginal consultation, including:

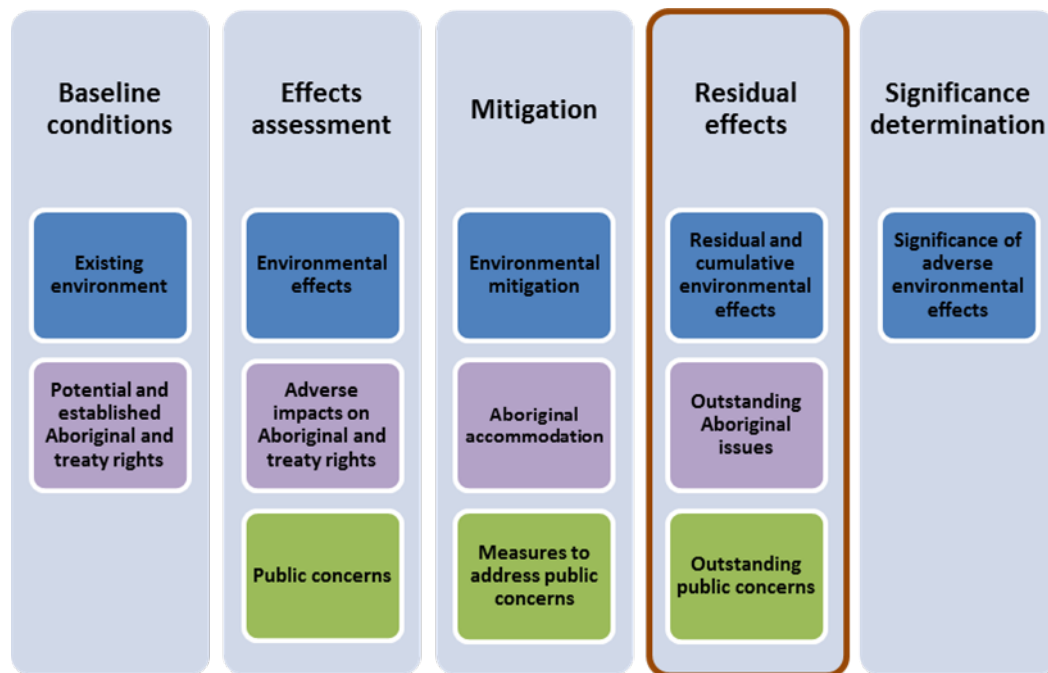
- Verifying predictions of environmental effects with respect to Aboriginal peoples, as well as residual impacts that could not be addressed within the context of the EA;
- Determining the effectiveness of mitigation measures as they relate to environmental effects with respect to Aboriginal peoples in order to modify or implement new measures where required;
- Supporting the implementation of adaptive management measures to address previously unanticipated adverse environmental effects with respect to Aboriginal peoples or unanticipated adverse impacts to Aboriginal rights;
- Verifying measures identified to prevent and mitigate potential adverse effects of the project on potential or established Aboriginal and Treaty rights; and,
- Providing information that can be used to improve and/or support future EAs and Aboriginal consultation processes.

Where appropriate, the Follow-up Program can also encompass measures identified to address public concerns identified in section 11.3.

11.5 Proponent commitments

Proponent commitments identified in the EIS, including environmental mitigation measures to address public and Aboriginal peoples concern, and Follow-up Program elements, may be considered for inclusion as conditions in the EA decision statement and/or as part of other compliance and enforcement mechanisms. Each commitment will be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation and implementation.

12 RESIDUAL EFFECTS



12.1 Residual and cumulative environmental effects

12.1.1 Residual environmental effects

After having established the technically and economically feasible mitigation measures, the EIS will present any residual environmental effects of the project on the biophysical and human environments after these mitigation measures have been taken into account. The residual effects, even if very small or deemed insignificant will be described.

12.1.2 Cumulative environmental effects

The proponent will identify and assess the project's cumulative effects using the approach described in the Agency's Operational Policy Statement Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act ⁷.

⁷ Visit the Canadian Environmental Assessment Agency's website at: www.ceaa-acee.gc.ca/default.asp?lang=En&n=1F77F3C2-1

Cumulative effects are defined as changes to the environment due to the project combined with the existence of other works or other past, present and reasonably foreseeable physical activities. Cumulative effects may result if:

- Implementation of the project being studied may cause direct residual adverse effects on the environmental components, taking into account the application of technically and economically feasible mitigation measures; and/or,
- The same environmental components may be affected by other past, present or reasonably foreseeable physical activities.

The EIS will describe the analysis of the total cumulative effect on a VC over the life of the project, including the incremental contribution of all current and proposed physical activities, in addition to that of the project. The EIS will include different forms of effects (e.g. synergistic, additive, induced, spatial or temporal) and identify impact pathways and trends.

The EIS will include a narrative discussion of existing projects in the vicinity of the proposed project. The narrative will include the description of any existing studies of changes to the environment resulting from those projects that are similar to potential changes resulting from the project, including any mitigation measures that were implemented, and any long term monitoring or follow up program that were conducted. The effectiveness of those mitigation measures and key results of monitoring or follow-up programs will be described. This narrative discussion should include historical data, where available and applicable, to assist interested parties to understand the potential effects of the project and how they may be addressed.

The cumulative effects assessment may consider the results of any relevant study conducted by a committee established under section 73 or 74 of CEEA, 2012.

12.1.3 Summary of residual environmental effects

In addition, the EIS will summarise the residual environmental effects (including cumulative environmental effects) identified in relation to the categories of environmental effects specified in sections 10.1.2 and 10.1.3:

- Changes to components of the environment within federal jurisdiction;
- Changes to the environment that would occur on federal or transboundary lands;
- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

12.2 Outstanding Aboriginal issues

This section will describe, from the perspective of the proponent, the potential adverse impacts on potential or established Aboriginal and Treaty rights and related interests that have not been fully mitigated as part of the environmental assessment and associated consultations with Aboriginal groups. This includes potential adverse impacts (on potential or established Aboriginal and Treaty rights and related interests) that may result from the residual and cumulative environmental effects described in section 10.2.

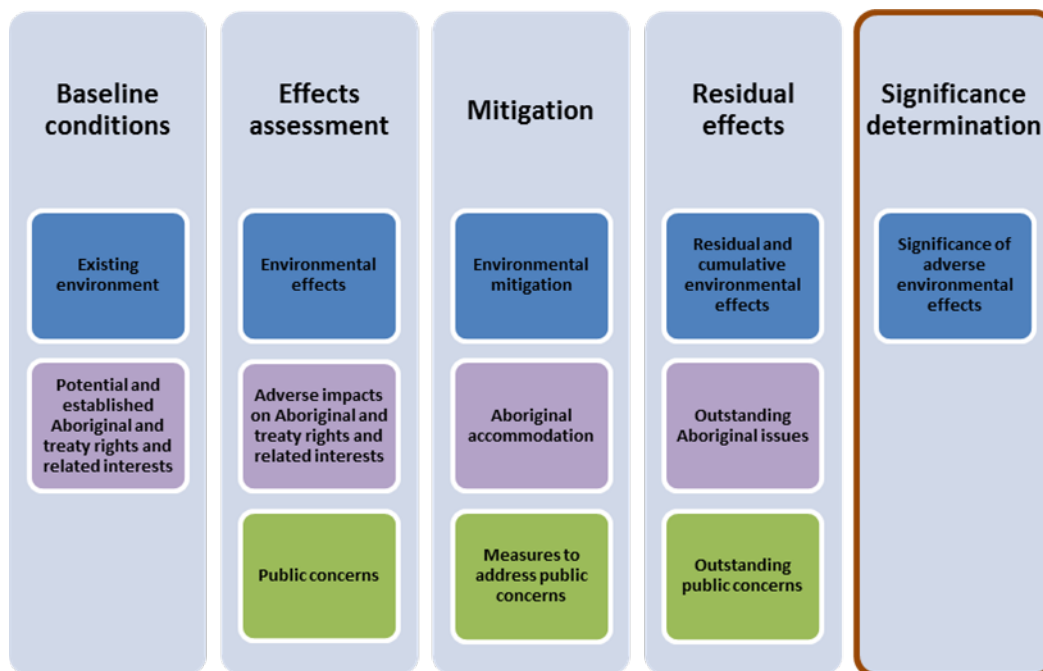
The information in this section will assist the Crown in assessing the adequacy of consultation and accommodation as set out in the Updated Guidelines for Federal Officials to Fulfill the Duty to Consult (2011)⁸.

12.3 Outstanding public concerns

This section will describe the outstanding public concerns in relation to the project that have not been resolved as a result of changes to the project, mitigation measures, or public consultation.

⁸ Visit the Aboriginal Affairs and Northern Development Canada website at: www.aadnc-aandc.gc.ca/eng/1100100014680/1100100014681

13 SIGNIFICANCE DETERMINATION



13.1 Significance of adverse environmental effects

13.1.1 Methodology

This section will provide a detailed analysis of the significance of the residual environmental effects (including cumulative environmental effects) that are considered adverse, using the approach described in the Agency's Reference Guide Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects⁹.

The EIS will identify the criteria used to assign significance ratings to any predicted adverse effects. It will contain clear and sufficient information to enable the Agency, technical and regulatory agencies, Aboriginal groups and the public to review the proponent's analysis of the significance of effects. The proponent will define the terms used to describe the level of significance.

The following elements should be used in determining the significance of residual effects:

- Magnitude;
- Geographic extent;
- Duration and frequency;
- Reversibility;
- Ecological and social context; and
- Existence of environmental standards, guidelines or objectives for assessing the impact.

⁹ Visit the Canadian Environmental Assessment Agency's website at: www.ceaa-acee.gc.ca/default.asp?lang=En&n=D213D286-1&offset=&toc=hide

In assessing significance against these criteria the EIS will, where possible, employ relevant existing regulatory documents, environmental standards, guidelines, or objectives such as prescribed maximum levels of emissions or discharges of specific hazardous agents into the environment. The EIS will contain a section which explains the assumptions, definitions and limits to the criteria mentioned above in order to maintain consistency between the effects on each VC.

Where significant adverse effects are identified, the EIS will set out the probability (likelihood) that they will occur, and describe the degree of scientific uncertainty related to the data and methods used within the framework of its environmental analysis.

13.1.2 Summary of significant adverse environmental effects

In addition, the EIS will summarise the significant adverse environmental effects identified in relation to the categories of environmental effects specified in sections 10.1.2 and 10.1.3:

- Changes to components of the environment within federal jurisdiction;
- Changes to the environment that would occur on federal or transboundary lands;
- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

14 SUMMARY TABLES

The EIS will contain a series of tables summarising the following key information:

- Potential environmental effects (section 10.1), adverse impacts on potential or established Aboriginal and Treaty rights and related interests (section 10.2) and public concerns (section 10.3);
- Proposed mitigation measures and commitments (section 11.5) by proponent to address potential impacts on environment, (section 11.1), Aboriginal rights (section 11.2) and public concerns (section 11.3), and Follow-up Program (section 11.4);
- Potential residual and cumulative environmental effects (section 12.1) and the significance of the residual environmental effects (section 13.1) ; outstanding Aboriginal issues (section 12.2) and outstanding public concerns (section 12.3);
- Comments from the public and responses;
- Comments from Aboriginal groups and individuals and responses; and
- Relationship of the identified Valued Components (section 7.1.1) to Aboriginal groups' potential or established Aboriginal and Treaty rights and related interests (section 9.2).

The summary tables will be used in the EA Report prepared by the Agency. Proponent commitments may be considered for inclusion as conditions in the EA decision statement and/or as part of other compliance and enforcement mechanisms.

15 BENEFITS TO CANADIANS

15.1 Changes to the project since initially proposed

The EIS will include a summary of the changes that have been made to the project since originally proposed, including the benefits of these changes to the environment, Aboriginal peoples, and the public.

15.2 Benefits of the project

The EIS will include a section describing the predicted environmental, economic and social benefits of the project. This information will be considered in assessing the justifiability of the significant adverse environmental effects, if necessary.

16 MONITORING PROGRAM AND ENVIRONMENTAL MANAGEMENT PLANS

The goal of a monitoring program is to ensure that proper measures and controls are in place in order to decrease the potential for environmental degradation during all phases of project development, and to provide clearly defined action plans and emergency response procedures to account for human and environmental health and safety. In the EIS, the proponent will describe the monitoring activities at all stages of the project, the proponent's proposed commitment to implementing these activities and the resources provided for this purpose. The program will need to provide the key information such as contacts, protocols, measured parameters, deadlines, intervention in case of non-compliance of legal requirements and production of monitoring reports.

The finalization of a detailed monitoring program will occur through consultation with federal and provincial government agencies, Aboriginal groups, the public and other stakeholders. This may occur after the environmental assessment but will be consistent with the information presented in the EIS. Pertinent legislation, regulations, industry standards, documents and legislative guides will be used in the development of the monitoring program.

Environmental management plans (EMPs) are an example of a tool that can be used to ensure that proper measures and controls are in place in order to decrease the potential for environmental degradation during all phases of project development, and to provide clearly defined action plans and emergency response procedures to account for human and environmental health and safety. The EMPs will serve to provide guidance on specific actions and activities that will be implemented to decrease the potential for environmental degradation during construction and operation, and to clearly define the proponent's ongoing environmental commitment.