ENVIRONMENTAL IMPACT STATEMENT GUIDELINES
for the
ELMTREE PROPERTY GOLD MINE

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Prepared by:

Canadian Environmental Assessment Agency

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APPENDIX A: Data and Information Sources

List of Acronyms

Acronym	Meaning
ACCDC	Atlantic Canada Conservation Data Centre
ARD	Acid Rock Drainage
Agency	Canadian Environmental Assessment Agency
CEA Act	*Canadian Environmental Assessment Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EC	Environment Canada
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
GHG	Greenhouse Gas
HADD	Harmful Alteration Disruption or Destruction
HC	Health Canada
AAND	Aboriginal Affairs and Northern Development
MBCA	*Migratory Birds Convention Act*
ML	Metal Leaching
NBDOE	New Brunswick Department of Environment
NPAG	Non-Potentially Acid Generating
NRCan	Natural Resources Canada
Provincial Act	*Clean Environment Act* (New Brunswick)
PNA	Protected Natural Area
PSGs	Project-Specific Guidelines
ROW	Right-of-Way
SARA	*Species at Risk Act*
PAG	Potentially Acid Generating
Proponent	Castle Resources Inc.
VEC	Valued Ecosystem Component

1.0 INTRODUCTION

Castle Resources Inc. (the proponent) submitted a project description for the development of an open pit gold mine located approximately 20 km to the northwest of Bathurst, New Brunswick. The mine would have a lifespan of 18 to 24 months and extract up to 559,000 tonnes per year (1,500 tonnes per day) of gold-containing ore for off-site processing.

The project includes all activities and physical works associated with the construction, operation and decommissioning of the proposed Elmtree Property Gold Mine as described in the proponent's project description dated September 28, 2010, and associated addendum dated November 15, 2010.

The proposed project will be subject to environmental assessment (EA) under both the provincial *Clean Environment Act* (Provincial Act) and the federal *Canadian Environmental Assessment Act* (CEA Act). The project is subject to a comprehensive study under the CEA Act. The Province of New Brunswick is currently undertaking a Determination Review for the project.

1.1 Purpose of the Environmental Impact Statement Guidelines

These guidelines have been prepared to guide the proponent in the preparation of the environmental impact statement (EIS) and identify the minimum information requirements. The guidelines have been developed with input from the federal responsible authority, federal expert authorities and the Province of New Brunswick.

These guidelines shall not be regarded as either restrictive or exhaustive, as concerns other than those identified in the document could arise during the investigations associated with the EIS. Reference to the Canadian Environmental Assessment Agency's (Agency) website guidance materials for the conduct of EAs, *Basics of Environmental Assessment,* is recommended. The Agency is prepared to provide advice and assistance throughout the preparation of the EIS with regard to the identification of environmental concerns and appropriate assessment methodology.

1.2 Guiding Principles

Environmental Assessment as a Planning Tool

Environmental assessment 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 development on the environment and to encourage decision makers to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy.

The EA of this project shall, in a manner consistent with the purposes above:

- consider and evaluate alternatives;
- document consultation activities;
- identify the Project's environmental effects (including natural, social and economic)
- propose measures to mitigate adverse effects[1]; and
- predict whether there will be likely significant adverse environmental effects after mitigation measures are implemented.

Traditional and Local Knowledge

Traditional and local knowledge refers to the broad base of knowledge held by individuals and collectively by communities that may be based on spiritual teachings, personal observation and experience or passed on from one generation to another through oral and/or written traditions. This tradition is dynamic, substantive and distinct living knowledge.

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

Traditional knowledge, which is rooted in the traditional life of Aboriginal people, has an important contribution to make to an EA. Certain issues relevant to the review process are firmly grounded in traditional knowledge such as harvesting, use of lands and resources for traditional purposes, cultural well-being, land use and heritage resources. Although the basis for traditional and local knowledge and science-based knowledge can differ, they may on their own or together, contribute to the understanding of these issues.

The proponent shall incorporate into the EIS the traditional and local knowledge to which it has access or that it may reasonably be expected to acquire through appropriate due diligence, in keeping with appropriate ethical standards and without breaching obligations of confidentiality.

Sustainable Development

Sustainable development, as defined in the CEA Act, means development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.

Environmental assessment provides a systematic approach for identifying, predicting and evaluating the potential environmental effects of projects before decisions are made. In

[1] The EIS Guidelines make reference to mitigation measures. In interpreting this phrase, the proponent shall consider any actions necessary or that may reasonably be expected to be necessary to prevent, change, mitigate or remedy the effects upon, or the effects that might be reasonably be expected upon, the environment.

addition, EA provides the means to identify mitigation measures for adverse effects. Environmental assessment provides an effective means of integrating environmental factors into the planning and decision-making process in a manner that promotes sustainable development and contributes to decision making that can ultimately provide net ecological, economic and social benefits to society.

A project that is supportive of sustainable development shall strive to integrate the objective of net ecological, economic and social benefits to society in the planning and decision-making process and shall incorporate citizen participation. The project, including its alternative means, shall take into account the relations and interactions among the various components of the ecosystems and meeting the needs of Canadians. The proponent shall include in the EIS consideration of the extent to which the project contributes to sustainable development. In doing so, the proponent shall consider, in particular:

- the extent to which biological diversity may be affected by the project; and
- the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and future generations.

Precautionary Approach

Under the CEA Act, one of the purposes of federal EA is to ensure that projects are considered in a careful and precautionary manner before authorities take action in connection with them, to ensure that such projects do not cause significant adverse environmental effects. The precautionary principle encourages federal decision-makers to take a cautionary approach, or to err on the side of caution, especially where there is a large degree of uncertainty or high risk.

The Government of Canada document, *A Framework for the Application of Precaution in Science-based Decision Making About Risk* (GOC 2003), sets out guiding principles for the application of precaution to science-based decision making in areas of federal regulatory activity for the protection of health and safety, the environment and the conservation of natural resources.

The proponent shall indicate how the precautionary principle was considered in the design of the Project in at least the following ways:

- 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, considering 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;
- evaluate alternative means of carrying out the project and compare in light of risk avoidance and adaptive management capacity;
- in designing and operating the project, demonstrate that priority has been given to strategies that avoid the creation of adverse effects;

- develop contingency plans that explicitly address accidents and malfunctions;
- identify any proposed follow-up and monitoring activities, particularly in areas where scientific uncertainty exists in the prediction of effects or effectiveness of proposed mitigation measures; and
- present public views on the acceptability of all of the above.

2.0 THE ENVIRONMENTAL ASSESSMENT PROCESS

2.1 Contact for the Federal Environmental Assessment

Information on the federal environmental assessment may be obtained from:

Vanessa Rodrigues, Project Manager
Canadian Environmental Assessment Agency – Atlantic Office
1801 Hollis Street, Suite 200
Halifax, NS B3J 3N4
Tel: 902-426-0564 Fax: 902-426-6550
E-mail: ElmtreeGoldMine@ceaa-acee.gc.ca

2.2 Requirement for Environmental Assessment under the *Canadian Environmental Assessment Act*

The proposed mine project is an undertaking in relation to a physical work and, as such, is defined as a project under subsection 2(1) of the CEA Act.

Fisheries and Oceans Canada (DFO) will be required to issue one or more authorizations under Section 32 and subsection 35(2) of the *Fisheries Act* with respect to the project, specifically the relocation of 750 m of the South Branch Elmtree River. These authorizations are described in the *Law List Regulations* of the CEA Act. Therefore, DFO is a responsible authority under the CEA Act and must ensure that an EA of the project is carried out before any *Fisheries Act* authorizations are issued. As more information is provided, other elements of the project could also require authorization under the *Fisheries Act*.

Environment Canada (EC), Natural Resources Canada (NRCan), and Health Canada (HC) have identified themselves as expert federal authorities, and they will provide advice in relation to the EA.

The project is subject to a comprehensive study under the CEA Act, pursuant to paragraph 16(c) of the *Comprehensive Study List Regulations* given that it is a gold mine, other than a placer mine, with an ore production capacity of 600 tonnes per day or more. Because the project will be assessed as a comprehensive study under the CEA Act, the Agency will exercise the powers and perform the duties and functions of the responsible authority until the comprehensive study report is submitted to the Minister of Environment. After this point, DFO will take on the role of lead responsible authority in relation to the project.

This document includes a description of the scope of the project, the factors to be considered in the comprehensive study and the scope of those factors.

Pursuant to subsection 17(1) of the CEA Act, the Agency delegates the preparation of the EIS to the proponent. The EIS should be prepared according to these guidelines. Once completed, the proponent shall submit five hard copies and one electronic copy of the EIS to the Agency and electronic and paper copies to the federal authorities and province of New Brunswick in the quantities detailed below. In addition, the proponent shall make hard copies (French and English) of the EIS available at designated public viewing centers in the project vicinity.

Specific numbers of copies are as follows:

Organization	**Electronic copy**	**No. of paper copies**
Agency	1	5
DFO	1	2
NRCan	1	2
EC	1	2
HC	1	1
NBDOE	1	8
Public Viewing Locations	None required	1 French and 1 English copy at each location

2.3 Federal and Provincial Cooperation in the Environmental Assessment

The Government of New Brunswick is currently assessing the project through a Determination Review under Environmental Impact Assessment regulation 87-83 of the *Clean Environment Act.*

The Government of Canada and the Province of New Brunswick are undertaking different types of EAs and therefore opportunities to coordinate will be somewhat limited. However, Canada and New Brunswick intend to coordinate the EA processes to the extent possible, including a joint review of the EIS. For further information on the New Brunswick process contact:

New Brunswick Department of Environment
Ph: (506) 444-5382
Email: env-info@gnb.ca

2.4 Public Consultation by the Agency during the Environmental Assessment Process

As is required for comprehensive studies, the Agency will provide the public with the opportunity to participate at three stages during the EA of the Elmtree project. Specifically, the public will be invited to provide their comments on:

1) the project, the conduct of the comprehensive study and the draft EIS Guidelines;
2) the EIS; and
3) the Comprehensive Study Report.

Each consultation period will be a minimum of 30 days in length. Information on consultation periods as well as other information in relation to the EA can also be found on the Agency's Canadian Environmental Assessment Registry website at http://www.ceaa.gc.ca/050/index-eng.cfm. The Agency will contact individuals or organizations who would like to be notified of public comment periods if a written request is sent to: ElmtreeGoldMine@ceaa-acee.gc.ca.

3.0 SCOPE OF PROJECT, FACTORS TO BE CONSIDERED AND SCOPE OF THE FACTORS

3.1 Scope of Project

Pursuant to section 15 of the CEA Act, the scope of the project for the purpose of the federal EA will include all activities and physical works associated with the construction, operation and decommissioning of the proposed Elmtree Property Gold Mine as described in Castle Resources Inc.'s project description dated September 28, 2010, and associated addendum dated November 15, 2010, including, but not limited to, the following activities and components:

- site clearing and preparation;
- open pit mining activities, including blasting;
- overburden and waste rock management;
- organics and overburden stockpile;
- waste rock stockpile and settling pond;
- ore stockpile and sedimentation pond and effluent management/treatment;
- South Branch Elmtree River relocation/diversion;
- mine site infrastructure including onsite buildings (office, equipment storage, onsite fuel storage);
- dewatering equipment;
- onsite access road upgrades including modifications of existing and creation of new waterbody crossings (including bridges, culverts and pipelines);
- water requirements, supply facilities and drainage works (including all site water management facilities and their operations);
- water supply systems for the residents of Dauversière Road or surrounding area;
- onsite power supply and power infrastructure (including temporary diesel generation);
- explosives, manufacturing, handling and storage;

- domestic sewage treatment and disposal;
- short- and long-term waste management;
- management of solid and hazardous wastes;
- transportation of ore from the mine to site to ore processing location and any modifications required to infrastructure;
- any modifications required to infrastructure of the existing third party-owned and operated ore processing facility that could result in exceedance of current regulatory approvals[2];
- mine decommissioning and site reclamation, including long-term management needs;
- all physical works and undertakings associated with any required fish habitat compensation plan;
- segregation/storage of potentially acid generating and non-acid generating waste rock; and
- acid rock drainage/metal leaching management.

The EIS shall include a description of all components of the project and any associated physical works and activities.

3.2 Factors to be Considered

In accordance with Subsections 16(1) and (2) of the CEA Act, the EIS shall include a consideration of the following factors:

(a) the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;

(b) the significance of the effects referred to in paragraph (a);

(c) comments from the public that are received in accordance with the CEA Act and the regulations;

[2] It is understood that the proponent is seeking to process ore from the existing and approved Brunswick Mine ore processing facility owned by Xstrata Canada Corporation. This facility is subject to applicable federal and provincial legislation, including the federal Metal Mining Effluent Regulations. The facility is under the responsibility of Xstrata Canada Corporation and as such, ore processing is not included in the scope of this project. Should the proponent choose to construct a new processing facility, the environmental assessment will have to be re-visited.

(d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;

(e) the need for the project and alternatives to the project;

(f) the purpose of the project;

(g) alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;

(h) the need for, and the requirements of, any follow-up program in respect of the project; and

(i) the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

As stated in the CEA Act: "environment" means the components of the Earth, and includes:

(a) land, water and air, including all layers of the atmosphere,

(b) all organic and inorganic matter and living organisms, and

(c) the interacting natural systems that include components referred to in paragraphs (a) and (b).

As stated in the CEA Act, “environmental effect” means, with respect to a project:

(a) any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act*,

(b) any effect of any change referred to in paragraph (a) on

(i) health and socio-economic conditions,

(ii) physical and cultural heritage,

(iii) the current use of lands and resources for traditional purposes by aboriginal persons, or

(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or

(c) any change to the project that may be caused by the environment.

3.3 Scope of the Factors to be Considered

Further to subsection 16(1) and (2) of the CEA Act, the EIS will consider the factors listed above. In addition, the EIS shall document any additional issues or concerns that may be identified through regulatory, stakeholder, Aboriginal and public consultation.

The assessment of environmental effects will focus on valued ecosystem components (VECs). For this EA, the term VEC refers to components or attributes that are particularly important for

ecological, legal, scientific, cultural, economic or aesthetic values. VECs for the project should be selected based on defined criteria and their selection should be justified. The assessment shall consider potential environmental effects that the project may have on these VECs.

The consideration of the environmental effects in the EA needs to be conceptually bound in both time and space. This is more commonly known as defining the study areas and time frames, or spatial and temporal boundaries of the EA. It is expected that the spatial and temporal boundaries will vary between VECs, depending on the nature of the predicted effects. The spatial boundaries must reflect the geographic range over which the project's environmental effects may occur, recognizing that some effects will extend beyond the project area. Specific spatial and temporal boundaries must be defined in the EIS.

Impacts with respect to spatial and temporal boundaries may vary depending on the VEC, and the assessment of these impacts shall consider:

- timing/scheduling of project activities;
- natural variations of each VEC;
- the time required for recovery from an impact; and
- cumulative effects.

Environmental components/matters to be considered in the EA of the project must include but should not necessarily be limited to the following:

- atmospheric environment (e.g., air quality, ambient noise, vibrations);
- geological resources, soils, and landscape features and processes;
- surface water quality and quantity of the watershed and receiving waters downstream of the mine site;
- groundwater quality and quantity of the watershed and receiving waters downstream of the mine site;
- groundwater and surface water resources that are or may be used for drinking water;
- fish (including the presence of any fish listed on the *Species at Risk Act*) and fish habitat in the South Branch Elmtree River and surrounding watershed including spawning, nursery, rearing, feeding, and migratory habitat;
- wetlands, forests and other ecological communities;
- wildlife and wildlife habitat, including:
    - mammals and fur-bearers;
    - amphibian and reptile populations;

  - migratory birds and raptors;
  - all species that are listed in the Provincial Regulation 96-26 of the *Endangered Species Act* and those ranked extremely rare (S1) or rare (S2) in the Atlantic Canada Conservation Data Centre (ACCDC);
  - all *Species at Risk Act* and Committee on the Status of Endangered Wildlife in Canada (COSEWIC) -listed species;
- vegetation;
- traditional lifestyles in the area, including hunting, trapping, and traditional plant gathering activities and country foods harvested as food or for medicinal or ceremonial purposes (including but not restricted to Aboriginal uses);
- archaeological sites on or near the project site;
- commercial, food and recreational fisheries on nearby waterbodies;
- other commercial or recreational uses affected by the project (e.g., forestry); and
- human health.

Detailed requirements for consideration of these components and other components in the EA are provided in Section 4.

4.0 PREPARATION OF THE EIS

The EIS is a statement of the proponent's environmental conclusions and commitments related to the proposed project and, as such, must be explicitly endorsed by the proponent. It will be made available for Aboriginal consultation and public review and to the extent possible, must be written in a manner that can be understood by non-specialists. Acronyms and a glossary of technical terms must be provided. A Plain Language Summary, described in Section 4.2, must be prepared and will serve to facilitate Aboriginal consultation and aid public review of the conclusions of the EIS.

The following sections describe the different topics to be addressed in the EIS. Sufficient information needs to be provided for each so that informed conclusions can be reached regarding the potential for impacts on the various components of the environment. However, the greatest time and effort are to be applied to data collection and interpretation related to the most significant impacts as identified by the proponent and through these guidelines. The proponent must provide a rationale if issues identified in the guidelines are not fully addressed in the EIS and highlight key impacts that are identified for more intensive investigation.

Where external sources of information or data are used, the proponent shall reference this information within the text of the EIS in addition to providing a complete reference list at the end of the document. Where conclusions that are critical to the assessment of environmental

impacts are cited from other reports, the proponent shall provide sufficient detail of the originating data and analysis so as to enable a critical review of that material. Such detailed reference material could be submitted as an appendix to the EIS. The EIS shall be a stand-alone document upon which a critical review can be undertaken.

Section 4 is organized into two parts. PART I: CONTENT OF THE EIS describes the layout and required content of the EIS. PART II: DETAILED GUIDANCE ON SELECT ENVIRONMENTAL COMPONENTS provides specific direction to the proponent on studies to be undertaken and information to be obtained in preparation of the EIS in relation to specific environmental components. Guidance on the presentation and evaluation of this information in the EIS is also included. Please note that the information included in this document is not intended to be exhaustive and additional detail, studies and components may require examination.

PART I: CONTENT OF THE EIS

4.1 Executive Summary

The EIS should begin with a clear and concise Executive Summary of the document. It should include a concordance table which describes where in the EIS the information requirements described in the EIS Guidelines have been addressed.

4.2 Plain Language Summary

In order to enhance understanding of the EIS and facilitate consultation activities, a Plain Language Summary of the EIS, which summarizes the project and major findings and conclusions of associated EA process must be prepared and should be included as a separate chapter of the EIS. The Plain Language Summary (maximum 50 pages) should briefly describe the proponent, the proposed project (including decommissioning and reclamation activities), and the environmental impacts of the project. Maps indicating project location and project components should be included. The report should be organized as follows:

Introduction

- Project Overview
- Environmental Assessment Process

Project Description

- Purpose of the Project
- Need for the Project
- Project Description
  - Location
  - Components
  - Activities
  - Schedule

Scope of the Assessment

- Scope of the Project
- Factors to be Considered
- Scope of the Factors
  - Identification of VECs
  - Spatial and Temporal Boundaries

Project Alternatives

- Alternatives to the Project
- Alternative Means of Carrying out the Project
  - Description of Alternative Means
  - Environmental Effects of Technically and Economically Feasible Alternative Means
  - Selection of a Preferred Alternative Means

Consultation

- Public Participation
- Summary of Comments
- Aboriginal Consultation
  - Summary of Comments
  - Consultation Efforts and Issues Identified
  - Mitigation, Monitoring, Follow-up and Other Forms of Accommodation

Description of the Existing Environment

- Biophysical
- Ecosystem Components
- Socio-Economic Environment
- Current Use of Lands and Resources by Aboriginal Peoples

Environmental Effects Analysis

- Analysis of Impacts on VECs (*impact Matrix should be provided)*
  - Baseline Conditions of the VEC
  - Key issues in relation to the VEC
  - Public Comments/Concerns
  - Aboriginal Comments/Concerns
  - Potential Environmental Effects on the VEC, including Effects of Accidents and Malfunctions, of the Project
  - Mitigation Measures
  - Residual Environmental Effects on the VEC
  - Cumulative Environmental Effects on the VEC
  - Follow-Up
  - Conclusions/Commitments of Proponent with respect to the VEC

- Effects of the Environment on the Project
- Additional Effects of Possible Accidents and Malfunctions
- Sustainability of Renewable Resources

Summary of Mitigation

Description of Follow-Up Program

- Objectives
- Elements
- Implementation
- Reporting
- Summary of Commitments

Benefits to Canadians

Overall Conclusions of the Proponent

4.3 Project Introduction

4.3.1 The Proponent

The EIS shall:

- identify the proponent and the name of the legal entity that would develop, manage and operate the project;
- provide contact information for the proponent (e.g., name, address, phone, fax, email);
- explain corporate and management structures, as well as insurance and liability management related to the project;
- specify the mechanism that would be used to ensure that corporate policies will be implemented and respected for the project;
- summarize key elements of its environmental management system and discuss how the system would be integrated into the project; and
- identify key personnel, contractors, and/or sub-contractors responsible for preparing the EIS. The qualifications of biologists conducting surveys for migratory birds, species at risk and species of conservation concern, and wetland delineations should be provided in an appendix to the EIS.

4.3.2 Project Overview

The EIS shall briefly summarize the development proposal. If the project is part of a larger sequence of projects, the proponent shall outline the larger context and present the relevant references, if available. The project location should be described in conjunction with surrounding land uses and infrastructure. The intent of this overview is to provide the key components and the location of the project, rather than a detailed description, which will follow as described in Section 4.4.5 of this document.

4.3.3 Regulatory Framework and the Role of Government

To understand the context of the EA, the EIS should identify, for each jurisdiction, the government bodies involved in the assessment as well as the EA processes. More specifically, it shall:

- identify the environmental regulatory approvals and legislation that are applicable to the project at the federal, provincial, and municipal levels;
- identify environmental government policies, resource management, planning or study initiatives pertinent to the project and discuss their implications;
- identify policies and guidelines of potentially affected Aboriginal groups that are pertinent to the project and discuss their implications;
- identify any relevant Land Use Plans, Land Zoning, and/or Community Plans;
- identify and delineate major components of the project and identify those being applied for and constructed within the duration of approvals under provincial and federal legislation; and
- provide 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.

4.3.4 Other Participants in the Environmental Assessment

The EIS shall clearly identify the main participants in the EA including Aboriginal groups, community groups, and environmental organizations.

4.4 Project Description

4.4.1 Purpose of the Project

The ‘purpose of’ and ‘need for’ the project should be established from the perspective of the proponent and provide a context for the consideration of alternatives to the project. The proposed project will be designed to achieve specific objectives and these should be described.

If the objectives of the project are related to or contribute to broader private or public sector policies, plans or programs, this information should also be included.

4.4.2 Need for the Project

The EIS must clearly describe the need for the proposed project (i.e., the problem or opportunity the project is intended to solve or satisfy). The 'need for' will establish the fundamental rationale of the project.

4.4.3 Alternatives to the Project

The EIS must include an analysis of alternatives to the project; describing functionally different ways to achieve the project's purpose.

The EIS will:

- identify the alternatives to the project that were considered;
- develop criteria to identify the major environmental, economic and technical costs and benefits of the alternatives; and
- identify the preferred alternatives to the project based on the relative consideration of the environmental, economic and technical costs and benefits.

4.4.4 Project Location

The EIS shall provide a concise description of the geographical setting in which the project will take place. The description shall be focused on those aspects of the environment important for understanding the potential environmental effects of the project. This description shall include the following information:

- any existing designated environmentally sensitive or significant areas; national, provincial and regional parks; protected natural areas (PNA); ecological reserves; wetlands; estuaries; mature and interior forest habitat for migratory birds; and habitats of provincially- or federally-listed species at risk, including critical habitat for species at risk; areas of concentration of migratory birds or other wildlife; and other sensitive areas and habitat;
- the current land use in the area and the relationship of the project facilities and components with any existing land use including traditional, private and crown lands; and
- a description of local communities.

The description of the site location will include maps of appropriate scale. The location map should include the boundaries of the proposed site, 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 should be included.

4.4.5 Project Description

Facilities and Components

The EIS shall describe in detail all of the project's facilities and components. As appropriate to convey the information, the EIS shall present descriptions, locations, plans, figures and/or drawings for each of the facilities.

Activities

The EIS shall include descriptions of the construction, operation, maintenance, foreseeable modifications, including the expansion and lengthening of the operation and, where relevant, closure, decommissioning and reclamation of sites and facilities associated with the proposed project. Detailed descriptions of the activities to be carried out during each phase of the project should include 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 should be on activities with the greatest potential to have environmental effects. Sufficient information should be included to predict environmental effects and address public concerns about them. If activities involve periods of increased environmental disturbance or the release of materials into the environment, these should be highlighted.

Schedule

A detailed schedule including time of year, frequency, and duration for all project activities should be provided.

4.4.6 Alternative Means of Carrying out the Project

The EIS must identify and describe alternative means of carrying out the project that are technically and economically feasible. The analysis will include:

- a description of the alternative means considered, whether they are technically and economically feasible, and the rationale for rejecting alternatives;
- the identification of the environmental effects of the technically and economically feasible alternatives; and
- the criteria and rationale for selecting the preferred alternative means of carrying out the project.

At a minimum, the discussion of alternative means of carrying out the project will include a consideration of the following:

- alternatives to open pit mining;

- alternative mining technologies;
- alternative locations of the mine on the project site (e.g., avoiding all wetlands, avoiding the South Branch Elmtree River);
- alternatives for mine closure and decommissioning; and
- alternative storage, transportation and processing options.

4.5 Description of the Existing Environment

The EIS will provide a baseline description of the environment in the vicinity of the project and all other areas that could be impacted by the project. This description shall include 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 effects analysis. The proponent's description of the existing environment shall be in sufficient detail to permit the identification, assessment and determination of the significance of potentially adverse environmental effects that may be caused by the project. The level of detail shall also enable the adequate identification and characterization of the beneficial effects of the project, and provide the data necessary to enable effective testing of impact predictions during project follow-up.

The baseline description should include results from studies conducted prior to any physical disruption of the environment (e.g., site clearing planned as part of the site preparation phase). The baseline description shall include characterization of environmental conditions resulting from historical and present activities in the local and regional study area. In describing the physical and biological environment, the proponent must take an ecosystem approach that considers both scientific and traditional knowledge and perspectives regarding ecosystem health. The EIS must identify and justify the selected indicators and measures of ecosystem health. These indicators should be transferable to future project monitoring and other follow-up.

In assessing impacts to the biological environment, the EIS shall consider the resilience of relevant species populations, communities and their habitats. It shall summarize all pertinent historical information on the size and geographic extent of relevant animal or floral populations as well as density, based on best available information. Where little or no information is available and when appropriate, specific studies shall be designed to further information on species populations and densities that could be adversely affected by the project. Habitat at regional and local scales should be defined in mapping of aquatic and terrestrial vegetation types and/or communities.

Habitat use should be characterized by type of use (e.g., spawning, breeding, migration, feeding, nursery, rearing, wintering), frequency and duration. Emphasis must be on those species, communities and processes most sensitive to project impacts. However, the interrelations of these components to the greater ecosystem and communities of which they are a part must be indicated. The EIS must address issues such as habitat, nutrient and chemical cycles, food chains, and productivity, to the extent that they are appropriate to understanding

the effects of the project. Range and probability of natural variation over time must also be considered.

A description of the rural and urban communities likely to be affected by the project should be included in the EIS as well as the proximity of the project to sensitive features including the Jacquet River Protected Natural Area and the Nigadoo River Watershed.

If the baseline data used to describe environmental conditions in the study area have been extrapolated or otherwise manipulated, the assumptions and/or extrapolations used must be described.

4.6 Effects Assessment

The EIS shall describe the project's effects on the environment, including but not limited to the effect of any environmental change on health, socio-economic conditions, and heritage values and on the current use of land and resources by Aboriginal people. Potential effects from all components of the project at the site and within local and regional study areas shall be discussed. The EIS shall predict the project's effects during all project phases (e.g., construction, operation, maintenance, foreseeable modifications, closure, decommissioning and reclamation), and describe these effects using appropriate criteria.

In undertaking the environmental effects assessment, the EIS will be based on best available information and methods. All conclusions must be substantiated. Predictions shall be based on clearly stated assumptions. With respect to quantitative models and predictions, the EIS shall discuss the assumptions that underlie the model, the quality of the data and the degree of certainty of the predictions obtained. Modelling methods and equations presented must include information on margins of error and other relevant statistical information (e.g., confidence intervals, possible sources of error).

The assessment of the project impacts shall be based on a comparison of the environment between the predicted future conditions with the project and the predicted future conditions without the project.

Views of the public and Aboriginal groups relative to the EA, including any perceived changes in the environment from the project, must be recognized and addressed as part of the impact analysis. The Proponent shall demonstrate how relevant issues raised by the public or Aboriginal groups were addressed in the EA.

4.6.1 Accidents and Malfunctions

The EIS should identify and describe the accidents and malfunctions that may occur as a result of project activities and assess the significance of associated environmental effects on VECs. It should identify potential accidents, malfunctions, unplanned events (e.g., premature or permanent shutdown), or emergency situations that could be associated with all phases of the project and the probabilities and hazards associated with them; the safeguards that have been established to protect against such occurrences such as security measures for the mine site; and

the contingency/emergency response procedures in place if an accident/malfunction were to occur. Factors which contribute to the uncertainty of detecting and mitigating impacts associated with accidents and malfunctions should be assessed.

4.7 Mitigation Measures

Under the CEA Act, mitigation is defined as the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

The EIS shall specify the actions, works, minimal disturbance footprint techniques, best available technologies, corrective measures and/or additions proposed to eliminate or reduce adverse 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 shall describe the standard mitigation practices, policies and commitments that constitute mitigation measures that will be applied as part of standard practice. It shall then describe the proponent's environmental protection plan and the environmental management system, through which it will deliver the plan. It should be clear how potentially adverse effects would be minimized and managed over time. The EIS shall discuss the mechanisms that will be used to require contractors and sub-contractors to comply with the proponent's commitments and policies and with auditing and enforcement programs.

The EIS shall also present an assessment of the effectiveness of the proposed mitigation measures. The reasons for determining if the mitigation measures reduce the significance of an adverse effect shall be made explicit. 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 should be described clearly and concisely. The EIS shall indicate what other mitigation measures were considered, and explain why they were rejected. It must identify who is responsible for the implementation of mitigation and the system of accountability. Contingency plans and environmental management plans should be presented for review.

4.8 Cumulative Impact Assessment

Cumulative effects are residual effects of a project on the environment (i.e., impacts that occur after mitigation measures have been put in place) combined with the environmental effects of past, present, and future projects and/or activities. Cumulative effects can also result from the combination of different individual environmental effects of the project acting on the same environmental component. Environmental components that would not be affected by the project can, therefore, be omitted from the cumulative effects assessment. However, a cumulative effect on an environmental component may be important even if the assessment of the project's effects on this component reveals that the effects of the project are minor.

The EIS must assess the effects of the project, including impacts on asserted and established Aboriginal Treaty rights, in tandem with the effects of other projects[3] and activities that have been or will be carried out, and for which the effects are expected to overlap with those of the project. It must consider different types of effects (e.g., synergistic, additive, induced, spatial or temporal) and identify impact pathways and trends. Generally speaking, the information available to assess the environmental effects from other projects and activities can be expected to be more conceptual and less detailed as those effects become more remote in distance and time to the project, or where information about another project or activity is not available. It is important to note that the objective is *not* to identify two classes of environmental effects (project-specific and cumulative). Instead, the EIS should identify a *single* set of environmental effects that take into account the aggregate effect of the project in the context of other foreseeable developments and activities acting upon the environment. It should determine the significance of the residual cumulative environmental effects that remain after mitigation has been implemented.

The Agency guidance documents, *Operational Policy Statement - Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act* (CEAA 2007) and *Cumulative Effects Assessment Practitioners Guide* (CEAA 1999) should also be consulted regarding the assessment of cumulative impacts in the EIS.

4.9 Effects of the Environment on the Project

The definition of an "environmental effect" under the CEA Act includes any change to the project that may be caused by the environment. The EIS must predict how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events (e.g., flooding, ice jams, rock slides, landslides, 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). Potential impacts should be mitigated, as appropriate and/or feasible.

4.10 Environmental Management

Planning

The EIS shall describe the proposed Environmental Management Plans (EMPs) for all stages of the project and include a commitment by the proponent to implement the EMPs should the project proceed. The finalization of detailed EMPs will occur through consultation with federal and provincial government agencies, Aboriginal groups, the public and other stakeholders. This may occur after the EA but must be consistent with the information presented in the EIS.

Pertinent legislation, regulations, industry standards, documents and legislative guides shall be used in the development of the EMPs.

[3] Projects should include, but not be limited to, Keymet and Madran mines, clearcutting activities, ore processing at Brunswick Mine, those listed on the Canadian Environmental Assessment Registry and the New Brunswick Department of Environment website.

Decommissioning and Reclamation Plan

Given the short lifespan of the proposed project, the proponent is required to detail methods for decommissioning and reclamation in the EIS.

With input from Aboriginal groups and stakeholders, the proponent will develop a comprehensive, conceptual Closure and Reclamation Plan that includes reclamation concepts and objectives, the impacts of these objectives on the Valued Ecosystem Components of the project, timelines for the complete reclamation of the land, proposed end land use objectives, consultation processes, estimates of long term maintenance, monitoring and implementation costs. This plan will also include how the proponent will ensure the reclamation and monitoring will occur for the project site, regardless of conditions, and ownership, transfer and control of the different project components as well as responsibility for monitoring and maintaining integrity of any related infrastructure.

The full preparation and submission of the plan to appropriate authorities will occur prior to the decommissioning of the temporary components of the project. 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 reclamation, and to clearly define the proponent's ongoing environmental commitments.

Follow-Up Program

The EIS must include a framework upon which follow-up, including effects monitoring, would be based throughout the life of the project should the project proceed, including the post-closure phase. A follow-up program must be designed to verify the accuracy of the EA and to determine the effectiveness of the measures implemented to mitigate the adverse environmental effects of the project.

The follow-up program must be designed to incorporate pre-project baseline information as well as compliance data (e.g., established benchmarks, regulatory documents, standards or guidelines) and real time data (e.g., observed data gathered in the field). Environmental assessment effects predictions, assumptions and mitigation actions that are to be tested as part of the follow-up program must be converted into field-testable monitoring objectives. The monitoring design should 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. A schedule for follow-up frequency and duration 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 should include;

- a discussion on the need for and requirements of a follow-up program and its objectives;

- a description of the main components of the program and each monitoring activity under that component;
- a discussion of the objectives the monitoring activity is fulfilling (i.e., confirmation of mitigation, confirmation of assumptions, and verification of predicted effects);
- the structure of the program;
- a schedule for the finalization and implementation of the follow-up program;
- a description of the roles and responsibilities for the program and its review process, by government, Aboriginal groups and the public;
- possible involvement of independent researchers;
- the sources of funding for the program; and
- information management and reporting.

The description of the follow-up program must 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 with or to conform to commitments in the EA and with benchmarks, regulatory standards or guidelines.

The follow-up program plan must be described in the EIS in sufficient detail to allow for 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 thereof), confirm EA assumptions, and confirm the effectiveness of mitigation.

The *Species at Risk Act* (SARA) also establishes obligations to ensure that measures are taken to monitor the adverse effects of a project on listed wildlife species and their critical habitat. A follow-up program may be undertaken to verify the accuracy of the EA, and determine the effectiveness of mitigation. If potential adverse effects on a listed wildlife species or its critical habitat are identified, a monitoring plan should be developed, which identifies the circumstances under which corrective measures may be needed to address any issue or problem identified through the monitoring (i.e., if unanticipated effects occur or the importance of effects is greater than anticipated). The monitoring plan should clearly describe how government departments responsible for the listed species at risk would be engaged in reviewing proposed adaptive management measures, in the event that mitigation measures are not effective.

4.11 Significance of Residual Adverse Environmental Effects

The criteria for evaluating and describing the significance of the residual (post-mitigation) effects (including cumulative effects) may include: magnitude; duration and frequency; ecological context; geographic extent; and degree of reversibility. In some cases, existing federal and provincial regulatory and industry standards and guidelines will be relevant in identifying points of reference for evaluating significance. Professional expertise and judgment may also be applied in evaluating the significance of an environmental effect.

To satisfy the CEA Act requirements, the EIS must include conclusions specifically on whether the project is likely to cause significant adverse effects on each component of the environment. The analysis must be documented in a manner that readily enables conclusions to be drawn on the significance of the environmental effects.

4.12 Consultation

Aboriginal Consultation

Under the CEA Act, an objective of the EA is to involve potentially affected Aboriginal people in order that the EA can identify any changes that the project may cause in the environment and the resulting effects of any such changes on the current use of lands and resources for traditional purposes by Aboriginal persons. The proponent must ensure that it engages with Aboriginal people that may be affected by the Project and that have asserted or have established Aboriginal rights, Aboriginal title or treaty rights. In preparing the EIS, the proponent must ensure that Aboriginal people have access to the information that they require in respect of the project and of how the project may impact them. The proponent is required to provide up-to-date information describing the project to the relevant Aboriginal groups, and especially to the communities likely to be most affected by the project The proponent shall also involve Aboriginal groups in determining how best to deliver that information (e.g. the types of information required, formats, and the number of community meetings required).
When the Government of Canada contemplates conduct that may have potential adverse impacts on established or potential Aboriginal and treaty rights, it has a legal duty to consult with Aboriginal groups before making a decision to proceed with the proposed conduct. To assist the federal Crown in its consultation process, the proponent is required to describe in the EIS how the concerns respecting Aboriginal people will be addressed. That description should include a summary of discussions, the issues or concerns raised, and should consider and describe any asserted or established Aboriginal rights, Aboriginal title and treaty rights. This information will be used by government to assess the potential impact of the project on asserted or established Aboriginal rights, Aboriginal title and treaty rights, and the measures to prevent, mitigate, compensate or accommodate those potential effects.

The EIS should consider areas of cultural importance to Aboriginal people within the study area, and analyze the effect of any change that a project may cause in the environment on current use of lands and resources for traditional purposes by Aboriginal people and cultural heritage. The proponent should work with the Chief and Council of the identified Aboriginal groups and the Assembly of First Nation Chiefs in New Brunswick, to develop protocols for gathering this information. The EIS should reflect that Aboriginal groups may contribute, among other things, knowledge of the existing environment to the effects analysis.

The EIS must document the views expressed by Aboriginal groups about the project and its effects. To do this, it should describe consultation activities undertaken prior to the commencement of the EA as well as those undertaken as part of the EA. It should document the results of the consultation and describe how the proponent plans to respond to any concerns raised.

The EIS should describe where and how Aboriginal traditional knowledge is incorporated into the assessment, including its effects on predicting impacts and determining mitigation measures. Where traditional knowledge is not available or not provided in a timely manner, the EA documentation should describe efforts taken to obtain it.

A section summarizing aspects relevant to potentially-affected Aboriginal people should be provided, including:

- description of Aboriginal groups potentially affected by the project;
- traditional territories;
- consultations with Aboriginal groups;
- the use of traditional knowledge to help define the VECs;
- current use activities potentially affected by the project;
- archaeology and cultural heritage potentially affected by the project;
- socio-economic and socio-community/cultural context;
- the effects of potential project induced changes in the environment on Aboriginal interests, including current use of land for traditional purposes, physical and cultural heritage and proposed mitigation of these effects;
- potential cumulative effects on current activities;
- environmental management plans related to Aboriginal issues; and
- commitments to Aboriginal groups.

Aboriginal groups will be consulted by the Agency on the draft EIS Guidelines, the EIS and the comprehensive study report.

Public Consultation by the Proponent

The EIS should describe public consultation activities undertaken by the proponent prior to the commencement of the EA and those conducted/planned during the course of the EA. It should include key stakeholder groups, summarize comments made, identify key issues of concern raised by the public, and describe how the proponent intends to address these issues.

4.13 Economic and Social Benefits of the Project

Information on the predicted economic and social benefits of the project should be presented. This information will be considered by the Agency and technical and regulatory agencies in assessing the justifiability of any significant adverse environmental effects, if necessary.

4.14 Benefits to Canadians

The proponent should describe how the EA process for the proposed project is expected to provide a benefit to Canadians. Factors to be considered include:

- Maximized environmental benefits: will there be any expected environmental benefits created as a result of the project going through the EA process? e.g., will the project reduce habitat fragmentation of a species-at-risk?

- Contribution of the EA to support sustainable development: Describe how the EA process for the project is expected to contribute to the concept of sustainable development for a healthy environment and economy.

- Public participation: How is public participation in the EA expected to influence the project design and the environmental effects analysis?

- Technological innovations: Are new technologies expected to be developed to address environmental impacts that could be used for other projects?

- Increases in scientific knowledge: Is any new scientific information expected to be collected through the EA that could benefit the assessment of other projects?

- Community and social benefits: Describe any expected changes in project design that will result in indirect benefits to communities and/or social benefits e.g., enhanced access to wilderness areas for recreation.

4.15 Assessment Summary and Conclusions

The EIS must summarize the overall findings of the EA with emphasis on the main environmental issues identified. It should make predictions on the likely significance of adverse environmental effects from the proposed project.

For all key VECs that were assessed, the EIS should contain a table summarizing the following key information:

- Concise summary of potential adverse environmental effects;
- Summary of proposed mitigation and compensation measures;
- A brief description of potential residual effects;
- A brief description of potential cumulative effects;
- Any applicable standards or guidelines;
- Comments from the public and responses;
- Comments from Aboriginal groups and individuals and responses;
- Relationship of the VEC to an Aboriginal group’s potential or established Aboriginal and Treaty right;
- A list of proposed commitments, summarizing the timing and responsibility of each of the actions for which a commitment (including special management practices or design features) has been made by the proponent.

PART II: DETAILTED GUIDANCE ON SELECT ENVIRONMENTAL COMPONENTS

4.16 Physical Environment

4.16.1 Climatic Conditions

Existing Environment

The EIS should describe the climatic conditions at the project site and in local and regional study areas and provide a description of seasonal variations and trends in climatic conditions, to allow the assessment of effects on the project. Any use of off-site data must be thoroughly discussed, including an analysis of the degree of representativeness of the data of conditions at the project site. The use of the data should be qualified with an understanding of local and regional variability and the geographic locations of any onsite and offsite meteorological stations.

Climate data should be provided to inform the impact assessment including impacts of the project on air quality, hydrology and water management. The influence of regional topography or other features that could affect conditions in the study area should also be considered, as appropriate.

Effects Assessment and Mitigation

The EIS should include a thorough analysis of the effects of the environment on the project including a description of how these effects may result in additional environmental impacts (e.g., potential for extreme precipitation to result in unforeseen events). The EIS should discuss the sensitivity of the project to changes in specific climate and related environmental parameters, including total annual rainfall, total annual snowfall, frequency and/or severity of precipitation extremes, watercourse levels and stream flow.

The sensitivity of the project to long-term climate variability and effects must be identified and discussed. The Agency Procedural Guide, *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (CEAA 2003) provides guidance for incorporating climate change considerations in an EA. Consideration should be given to the effects of climate change on project designs, and closure and reclamation of the site.

The EIS should provide details of measures and strategies to mitigate the potential effects of the environment on the project. In conducting the analysis, the EIS should consider pertinent acts, policies, guidelines and directives relating to climatic conditions.

4.16.2 Atmospheric Environment

Existing Environment

A description of the ambient air quality in the study area must be provided as required to support the assessment of emissions from the project on air quality. Depending on predicted emissions from project activities, baseline monitoring at, or in, the vicinity of the project site may be required (e.g., inhalable particulate data (PM 2.5 and PM 10)).

The EIS should also describe current ambient noise levels at the site and within local and regional study areas, and include information on source, geographic extent and temporal variations. The description must provide ambient noise levels for other areas which could be affected by the project, such as along the ore transportation route and at the ore processing facility[4].

Effects Assessment and Mitigation

Criteria Air Contaminants, Air Pollutants, Heavy Metals and Toxics

The EIS should identify potential effects of the project on air quality at the site and within local and regional study areas. The analysis should be informed by a full accounting of emissions from all project phases and activities including those from point and mobile sources. Emissions and air pollutants that should be considered as applicable include, but should not necessarily be limited to:

- Total Suspended Particulate, PM 2.5 and PM 10;
- criteria air contaminants - sulphur oxides (SO_x), nitrogen oxides (NO_x), particulate matter (PM) including total PM, PM_{10}, and $PM_{2.5}$, volatile organic compounds (VOCs), carbon monoxide (CO), ammonia (NH_3); ground-level ozone (O_3), secondary particulate matter (secondary PM)];
- air pollutants on the *List of Toxic Substances* in *Schedule 1* of the *Canadian Environmental Protection Act* (CEPA Registry 1999);
- heavy metals (e.g., mercury); and
- other toxics (e.g., benzene).

A source inventory table for the project should be prepared which describes emission sources, operating periods, pollution control equipment (if any), and predicted concentrations.

All potential emissions applicable to the project should be estimated, even those that are transient on-site, or of a short term/intermittent nature. The emissions inventory should be used to identify emissions of greatest concern from the proposed project to determine whether

[4] See Section 3.1 on Scope of Project as it relates to the third party ore processing facility.

further analysis, discussion and/or modelling[5] is required, commensurate with potential effects. The proponent may contact Environment Canada for guidance on recommended analysis based on inventory results. The analysis should take into account prevailing meteorological conditions in relation to the mine site and be informed by consideration of pertinent acts, policies, guidelines and directives relating to the atmospheric environment (e.g., National Ambient Air Quality Objectives, Canada Wide Standards, applicable provincial ambient air quality criteria).

The EIS shall provide a description of measures to reduce emissions and predict potential residual effects and their significance. The analysis should include consideration of the impacts of emissions on biological receptors (e.g., vegetation, fish, wildlife, human health).

Acoustic Environment

The EIS should assess the potential for noise impacts at the site and within local and regional study areas. Please refer to the Health Canada guidance document: *Useful Information for Environmental Assessments* (Health Canada 2010), for information needs with respect to noise effects. The EIS should also:

- identify and quantify potential noise sources during construction and operational phases including increased road traffic;
- identify potential receptors and describe the proximity of identified receptors to the project area including identifying and describing whether particular receptors may have a heightened sensitivity to noise exposure (e.g., schools, child care centres, hospitals) or expectation of peace and quiet (e.g., quiet rural areas, worker camps);
- include a map illustrating estimated noise levels from the project at key receptors; and
- describe mitigation and noise management measures including the conditions for mitigation, and evaluate project compliance with appropriate noise guidelines (e.g., for blasting use blast mats to reduce noise levels and only blast during daylight hours, providing the nearby public with advanced notice of when blasting is to occur).

Greenhouse Gases and Climate Change Considerations

With respect to greenhouse gas emissions (GHGs) the EIS should:

- list and predict GHG emissions for all relevant project sources and compare to provincial and national totals;
- discuss the analytical techniques and relevant policies considered in the assessment; and
- discuss mitigation measures considered to control project GHG emissions.

[5] The results of any atmospheric dispersion modelling conducted in support of the effects analysis should include presentation of worst-case modeling results and note the location of key and sensitive receptors if any.

In conducting the analysis, the EIS shall consider the Agency guidance document entitled *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (CEAA 2003).

4.16.3 Ground Water Quality and Quantity

Existing Environment

The EIS should describe hydrogeology at the site and, where appropriate, for the local and regional study areas. The EIS should examine all available existing hydrogeological information required to assess impacts of the project in addition to collecting baseline information, as appropriate, where there are gaps. A complete baseline study of existing groundwater quality and quantity is required on the project site and should include:

- a review of the physical geography and the geology of the area as it pertains to local and regional groundwater flow systems and aquifer/aquitard systems in the mine area;
- the physical and geochemical properties of hydrogeological units, such as aquitards and aquifers;
- bedrock fracture sizes and orientations in relation to groundwater flow and determine if there are any preferential flowpaths for groundwater;
- hydrogeologic maps and cross-sections for the mine area to outline the extent of aquifers, including fracture zones of bedrock, locations of wells, springs, potentiometric contours, and flow direction;
- groundwater flow patterns, identifying recharge and discharge areas, and identifying groundwater interaction with surface waters; and
- a description of any local and regional potable groundwater resource in the area, including:
    - its current use and potential for future use;
    - the location and proximity of nearby drinking water wells to the project site and associated Parcel Identifiers;
    - well record data; and
    - quality assurance/quality control (QA/QC) procedures.

In collecting baseline information, the proponent shall include local drinking water sources with focus on residential water wells on Dauversière Road and surrounding area and on the Nigadoo River Watershed. Careful attention should be given to the Jacquet River Natural Protected Area as well as any sensitive areas where drainage patterns may be at risk to alteration as a result of project-related events.

The EIS shall also specify what groundwater supply wells are proposed on site as part of the project, how potential water wells will be constructed and where they would be located in relation to the various mining activities in order to minimize impacts on groundwater quality. Proposed abstraction rates from these wells should also be specified.

Effects Assessment and Mitigation

The EIS shall assess the potential impacts of the proposed project on groundwater at the site and within local and regional study areas. The effects assessment should:

- provide a quantitative ground water assessment to determine how project related facilities and activities will impact groundwater flows, quality and quantity, including impacts to private drinking water wells, during open pit development, operations, abandonment and decommissioning. The assessment will describe the duration, frequency, magnitude and spatial extent of any effects and outline the need for mitigation and/or monitoring measures, and assist with Acid Rock Drainage/Metal Leaching prediction work;
- provide results of a hydrogeological study that determines seepage rates, quality, and direction into or from the pit, overburden/waste rock/ore stockpiles, waste rock settling pond, ore pad sedimentation pond and any impacts on groundwater stream flows and groundwater quality within the local study area;
- include a determination of the expected location and rates of seepage from the waste rock and ore stockpiles and settling ponds, characterize the seepage quality, and define any proposed mitigation strategies. Potential seepage to creeks and rivers will be emphasized and assessed for potential impacts to fish and fish habitat. Detailed drawings and/or figures showing equipotential contours to determine/illustrate projected seepage rates for overburden/waste rock/ore stockpiles, waste rock settling pond and ore pad sedimentation pond, as applicable, will be provided;
- include the lithology for all wells from which data was collected;
- make available all relevant base map files and calibration data sets that have been used in support of the effects assessment;
- include analysis of potential sulphide oxidation as a result of groundwater drawdown; and
- discuss the environmental considerations, including impacts to groundwater resources, that have influenced the location and management of new groundwater monitor and water supply wells that are being proposed, in relation to the various mining activities. Preliminary plans for monitoring of groundwater quantity and quality during the various phases including pre-construction, construction, operation and decommissioning should also be discussed.

In conducting the analysis, the proponent shall consider pertinent acts, policies, guidelines and directives relating to groundwater quality and quantity. The EIS shall provide a description of measures to mitigate effects to groundwater quality and quantity, and predict potential residual effects and their significance.

4.16.4 Surface Water Quality and Quantity

Existing Environment

This EIS should describe surface water quality, hydrology and sediment quality at the site and within local and regional study areas. It should provide details of surface water and sediment quality monitoring programs conducted by the proponent, and achieve the following:

- characterize the range and measure of water and sediment quality and aquatic ecology characteristics;
- provide the basis for the prediction, modeling and assessment of potential effects prior to the potential project proceeding;
- form the basis for monitoring and assessing change during construction, operation, closure and post-closure;
- provide the basis for the formulation of site-specific water quality objectives (if any) for the aquatic environment;
- provide the basis for the determination of allowable maximum waste water discharge and seepage rates based on specific water quality objectives;
- provide a graphical presentation of key variables and stream flows over time for key sites to illustrate patterns and variability; and
- provide power and confidence calculations, where applicable, for key variables at key sites once the impacts have been predicted, to guide and support future monitoring. Key variables are those that the impact assessment indicate may contribute to degraded water quality, and key sites are those sites where the discharge of key variables might take place.

The entire range of data sets must be considered in addition to mean values, because extreme events that have serious environmental consequences can be lost when using only mean values. For example, high levels of metals or acidity may occur briefly during the first flush of spring freshet, but could affect large numbers of sensitive aquatic organisms present in the receiving waters at that time of the year. Data should be provided in an appendix, where applicable, including summaries of the maximum, minimum, mean or median, standard deviation and coefficient of variation for each site.

The EIS should provide a description of sampling protocols and analytical methods, and maps and figures to show sampling locations relative to proposed project components and environmentally sensitive areas. Furthermore the EIS should:

- include delineation of drainage basins at the appropriate scales;
- provide a description of hydrological data such as water levels and flow rates;
- include a description of hydrological regimes, including monthly, seasonal and year-to-year variability of all surface waters and assess normal flow, flooding, and drought properties of water bodies;

- detail the interactions between surface water and groundwater flow systems; and
- state whether any nearby surface water is used for recreational purposes, such as swimming, boating or recreational fishing.

Effects Assessment and Mitigation

The EIS shall assess the potential impacts of the proposed project on surface waters at the site and within local and regional study areas. The analysis shall include the impacts on water quality and quantity in relation to:

- site facilities and infrastructure;
- in-filling and blasting;
- collecting and treating wastewater and surface runoff;
- mine water;
- groundwater seepage;
- water management (inputs, outputs, re-use);
- contaminant loading and dispersion (including surface runoff and airborne contaminants);
- acid rock drainage (ARD)[6], metal leaching, and geochemistry;
- sedimentation (plumes and dispersion);
- changes in water flow caused by stream diversions or otherwise;
- processed ore containment area operation, discharge, and de-watering;
- the release of contaminants, including ores, that could affect water quality;
- the contamination of waste rock drainage by residual nitrogen in the form of nitrates or nitrites from ammonium-nitrate-based explosives; and
- the Nigadoo River Watershed and contingency plans should the drinking water supply be impacted.

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

[6] Guidance on assessing the impacts of ARD is provided in Section 4.14.5: Terrestrial Abiotic Environment – Geology, Terrain and Soil

The EIS shall identify water and sediment quality objectives including the receiving water criteria of the Canadian Council of Ministers of the Environment and the *Canadian Environmental Quality Guidelines* for fresh water and aquatic life for comparative purposes, as applicable.

A comparison of predicted waste water discharge against the requirements of the *Metal Mining Effluent Regulations* is required. The assessment should detail how any effluent is predicted to mix in the receiving environment for any effluents discharged from the project.

Water Balance

The EIS should include:

- a detailed water balance for the open pit and any other associated infrastructure, during operation, closure and post-closure phases of the project, for wet case, dry case, and expected case scenarios; and
- a spreadsheet showing the predicted water balance for each year, or stage, of the mine life and all inflows and outflows. Appropriate return periods are to be defined and methodologies for the evaluation of wet, dry and expected scenarios are to be discussed.

The water balance model should evaluate the monthly average precipitation scenario as well as a range of possible wet and dry scenarios. The possible effects of each different precipitation sequence on mine water management activities should be assessed, and the results presented in terms of probabilities of occurrence.

In conducting the analysis, the proponent shall consider pertinent acts, policies, guidelines and directives relating to surface water quality and quantity. The EIS shall provide a description of measures to mitigate effects to surface water quality and quantity and list potential residual effects and their significance.

4.16.5 Terrestrial Abiotic Environment – Geology, Terrain and Soil

Existing Environment

The EIS should provide a discussion of the soils, surficial and bedrock geology of the mine site area and the deposit which includes geological maps and cross-sections. Where appropriate, the following geologic, terrain and soil parameters will be included:

- spatial distribution and thickness of bedrock and surficial units with links to vegetation and landform types;
- alteration styles in bedrock including distribution, mineralogy, and intensity;
- structural fabric in bedrock (e.g. fractures, faults, foliation and lineations) and relationships to landform;

- regional geologic framework including tectonic belt, terrain, regional metamorphism and structure (including fractures and faults);
- mineralogy of ore and waste rock, to include description of sulphide minerals, type, abundance, mode of occurrence, extent of previous oxidation and an estimate of relative sulphide mineral reactivity;
- baseline landform stability and geohazards;
- baseline mapping of the corridors for any proposed roads to support the effects assessment;
- baseline data on the concentration of trace elements in site soils prior to project development; and
- representative soil profiles, including thickness of organic and mineral horizons and buffering capacities.

The EIS will include an investigation for Acid Rock Drainage/Metal Leaching (ARD/ML) potential from overburden, mine waste rock, ore, and tailings (e.g., at the processing facilities)[7]. This investigation should include:

- population assessments for each lithological/alteration/waste management unit. Populations should be assessed in terms of vertical and horizontal distribution and sampling biases to ensure that a waste management unit is properly characterized over its range of variability;
- a description of the chronology of ARD/ML investigations and the design of an ARD/ML characterization program, including a description of all the static and kinetic test work conducted to date. The rationale, advantages and disadvantages of, detailed description, sample selections and methodology for all test work;
- predictions of the ARD/ML potential of all materials (bedrock and surficial) to be disturbed or created during all phases (construction, operation, decommissioning, reclamation and post-closure) of the proposed project. This will include a discussion of the estimation of risk for the onset of ARD for each lithological/alteration/waste management unit and mine component, metal leaching and the predicted drainage chemistry for each mine component, including the types and concentrations of major trace elements; and
- clear, concise cross-sections which relate the ARD/ML assessment (static/kinetic sample locations and results), geology and development plans.

[7] See Section 3.1 on Scope of Project as it relates to the third party ore processing facility.

Effects Assessment and Mitigation

In conducting the analysis, the EIS shall consider pertinent acts, policies, guidelines and directives. The EIS shall provide a description of measures to mitigate effects and list potential residual effects and their significance. The discussion should include a list of:

- rehabilitation measures for borrow sources;
- an erosion and sediment control plan; and
- measures to mitigate changes to local drainage patterns.

Terrain and Soils

The EIS should identify potential effects on terrain and soils during all project phases. Terrain and soils information within the EIS should be used to:

- assess the potential effects of the project and project related activities on terrain stability and geohazards, and the effects of terrain stability and geohazards on the project;
- provide a commitment to preserve, store and reuse soil (including humus layers and organic soils), as applicable for site rehabilitation; and
- outline a conceptual soil erosion and sedimentation plan for the mine site and mine site area access roads.

Typical soil profiles should be used to determine soil salvage opportunities available to support site rehabilitation at closure.

Acid Rock Drainage and Metal Leaching

The ARD/ML prediction information and historical site databases and experience will be used to assess the potential leachate risks and determine mitigation requirements for the project. Additional information should be provided on the following:

- mine waste rock, tailings (e.g., at the processing facilities)[8], ore characterization, volumes, segregation/disposal methods, mitigation/management plans, contingency plans, operational and post-closure monitoring and maintenance plans;
- 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;

[8] See Section 3.1 on Scope of Project as it relates to the third party ore processing facility.

- estimates of potential lag time to ARD/ML onset for PAG materials (including various waste rock, tailings, ore) and ability to fully saturate appropriate PAG materials during operation and post-closure based on regional experience, if any;
- pit water chemistry - existing, during operation, post-closure and pit closure management measures (e.g., flooding). This should include geochemical modeling of pit water quality in the post-closure period;
- surface and seepage water quality from the mine waste rock stockpiles, other stockpiles and other infrastructure during operation and post-closure; and
- ARD/ML prevention/management strategies under a temporary or early closure scenario, including ore.

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 ARD/ML prediction.

4.17 Biophysical and Biological Environment

4.17.1 Aquatic Biology

Existing Environment

The EIS should include a description of the limnology, freshwater biota, presence of fish and other fresh water species (with emphasis on species that perform particularly significant ecological functions), associated habitats and habitat distribution in the regional and local study areas. This description should be based on the results of baseline information collected from studies, available published information and/or information resulting from community consultation.

The baseline data collected and reported in the EIS should:

- contribute to the development of mitigation measures and compensation plans for the proposed project;
- contribute to the development of a conceptual reclamation and closure plan for the proposed project;
- provide the necessary baseline data in support of on-going monitoring programs to assess the effectiveness of mitigation measures and the compensation plans; and
- provide the necessary baseline data in support of the assessment of effects on the recreational, commercial and Aboriginal fisheries and their habitats.

Furthermore, the EIS should include the following:

- baseline data that characterizes and quantifies at a detailed level the fish habitat and fish populations within the local drainage areas. This includes a quantification of habitat by reach and/or type within the local drainage, including measures such as

length of stream, square meters, depths, and velocities. For affected waterbodies, details on total area, maximum and mean depths and water quality parameters should be included;

- distribution and abundance of fish by species and life stage;
- assessment of the existing productive capacity of the watershed within the scope of the project;
- characterization of existing metal levels in fish muscle in areas that may be impacted by effluent release or seepage from the mine;
- the results of fish and fish habitat assessments in the South Branch Elmtree River; and
- description of the biological composition of freshwater aquatic environments in the local study area, including: trophic state, periphyton, phytoplankton, zooplankton, fish, and the interactions and relative significance of each species within identified food chains.

The proponent shall consider pertinent acts, policies, guidelines, and directives relating to fish protection and management in developing the project and conducting the EA in relation to fish and fish habitat.

Effects Assessment and Mitigation

In conducting the analysis, the proponent will consider pertinent acts, policies, guidelines and directives relating to aquatic biology. The EIS will provide a description of measures to mitigate effects to aquatic biology and list potential residual effects and their significance including:

- development and implementation of Best Management Practices to reduce or eliminate impacts to fish and fish habitat, such as construction (erosion and sediment control) practices, that apply to all phases of the project;
- description and quantification of all harmful alteration, disruption or destruction of fish and fish habitat and provision of a compensation plan, to offset such alterations or losses, that demonstrates that the proposed works will not result in a loss of the productive capacity of fish habitat;
- measures to mitigate impacts to fish species that may occur in the project area and are rare as defined in section 4.17.4, including separate measures to mitigate impacts to all SARA-listed species and those recognized as ‘at risk’ by COSEWIC, their critical habitat, and residences of individuals of those species;
- measures to prevent negative impacts to fish, fish habitat and water quality resulting from water runoff, soil erosion, soil disturbance, or mass wasting; and

- stream crossing requirements[9]: bridge and culvert design and installation details, including related cross-sections and other stream channel characteristics.

Fish and Fish Habitat

The EIS should identify potential effects on all life stages (including rearing, nursing, spawning, feeding, migration, etc.) of fish and fish habitat during all phases of the project, including the 750 m relocation of the South Branch Elmtree River. Mitigation strategies for avoiding the Harmful Alteration, Disruption or Destruction (HADD) of fish and fish habitat and a conceptual plan for compensating any unavoidable HADDs, based on DFO's *Policy of the Management of Fish Habitat* and the related guiding principle of no net loss of the productive capacity of fish habitat will be included.

The potential effects and planned mitigation strategies for avoiding HADDs will be identified for the following:

- footprint of development;
- infrastructure development;
- dewatering activities;
- flow changes from water management, dewatering activities, stockpiling and waste material management and diversions; and
- compensation activities.

The analysis of potential effects should consider:

- productive capacity of aquatic systems. This will include consideration of a comparison with other similar habitat or ecosystems in the region and the province, information gathered during past mining activities and subsequent site reclamation, and a variety of other parameters such as fish density, biomass or productivity, invertebrate density and diversity; and water quality parameters such as nutrients, alkalinity, or temperature;
- all creeks and rivers that may experience changes to fisheries resources;
- habitat loss or alteration, including aquatic vegetation and sensitive areas such as spawning grounds, nursery areas, winter/summer refuges and migration corridors;
- species of cultural, spiritual or traditional use importance to Aboriginal people;
- potential for changes in migratory fish behaviour as a result of changes in water quality, temperature and quantity;
- mortality of fish; and

[9] Bridge structures that completely span a watercourse without altering the stream bed or bank or result in channel infilling are preferred over structures that alter the stream bed/bank or result in infilling of the channel.

- an assessment of changes in metal levels in fish muscle in areas that may be impacted by effluent or seepage from the mine, and an evaluation of changes in metal levels due to project development.

Sediment Quality

The EIS should use baseline data on sediment quality outlined in Section 4.16.4 to assess how potential changes during construction, operation, closure and post-closure may affect toxicity and physical habitat requirements (e.g., particle size) for benthos, fish eggs and any young of the year. In addition, it should provide baseline data that can be used to support the biological monitoring programs.

Phytoplankton and Invertebrate Communities

The EIS should use the baseline data on the characterization of the community diversity and abundance collected prior to project development to:

- evaluate changes to the community due to project development, operation and closure;
- assess variation relative to historic data; and
- provide supporting information for the fisheries assessment.

4.17.2 Vegetation Species/Communities

Existing Environment

The EIS should characterize the baseline vegetation species/communities within the area potentially affected by the proposed project. A description of plant communities at the site should be provided, including species lists and dominant species. In particular, the EIS should include information on key indicator communities, species groups or ecosystems that have ecological, cultural or social value. This discussion should include the following:

- forests, including mature and interior forest habitat for migratory birds;
- wetlands;
- riparian habitat;
- plant species at risk and of conservation concern; and
- other ecological communities of conservation concern.

In addition to habitats in the project footprint, the EIS should also consider habitats "downstream" from the project (e.g., wetlands) that may be affected by the project.

Vegetation that is harvested or grown for subsistence, social, cultural, ceremonial or medicinal purposes should also be included, for example:

- plant tissues e.g., roots, barks, leaves and seeds that are traditionally harvested for social, cultural (e.g., black ash) or ceremonial (e.g., white cedar) purposes;
- produce harvested from naturally occurring sources (e.g., berries, seeds, leaves, roots and lichen);
- plant tissues that are ingested for medicinal use (e.g., roots, bark, leaves and seeds); and
- any of the above foods from the project area that are offered for sale, barter or trade and that are not captured under (traditional) systems of licensing and/or inspection (e.g., through market gardeners).

Effects Assessment and Mitigation

The EIS shall identify potential effects on vegetation species/communities during all phases of the project. In conducting the analysis, pertinent acts, policies, guidelines and directives relating to vegetation/ecological communities should be considered. The EIS shall provide a description of measures to mitigate effects to vegetation species/communities and list potential residual effects and their significance.

For the proposed mine site area, the total area of each vegetation community (e.g., forests, wetlands) potentially affected by project (e.g., habitat loss, habitat disturbance) should be calculated. The assessment should consider impacts to rare or threatened habitat and facilitate inventories of species at risk (i.e., species listed in Section 1 of SARA, species listed under the New Brunswick *Endangered Species Act*, and species listed as Endangered, Threatened, and Special Concern by COSEWIC) and species of conservation concern (e.g. species listed as S1 and S2 by the ACCDC and species given rarity ranks by the New Brunswick Department of Natural Resources).

The EIS shall:

- describe measures to mitigate impacts to plants, mosses, lichens, and fungi species of interest or concern;
- present measures to prevent the spread of non-native vegetation;
- describe measures to reclaim and re-vegetate disturbed areas; and
- describe measures to mitigate impacts to current Aboriginal traditional use for food, social, cultural and ceremonial purposes.

<u>Wetlands</u>

The EIS shall assess direct and indirect impacts on wetlands and describe how proposed mitigation measures will adhere to the “Federal Policy on Wetland Conservation” and related implementation guidance, as well as the provincial wetland policy. Measures to ensure the no net loss of wetland function should be detailed. In the event that avoidance of wetlands is not possible, the reasons why elimination of adverse effects on wetland function was not possible should be clearly demonstrated in the EIS. Additional guidance related to the assessment of

impacts to wetlands can be found in the Environment Canada publication *Wetland Ecological Functions Assessment: An Overview of Approaches* (Hanson *et al*., 2008).

4.17.3 Wildlife and Wildlife Habitat

Existing Environment

The EIS shall include:

- a description of terrestrial fauna (e.g., ungulates, furbearers, amphibians and raptors) and their habitat potentially at the project site and within local and regional study areas, including the results of any surveys conducted; and
- a description of any wildlife corridors and physical barriers to movement that exist within the project area.

Migratory Birds

Migratory birds are protected under the *Migratory Birds Convention Act* (MBCA) and associated regulations. Migratory birds protected by the MBCA generally include all seabirds except cormorants and pelicans, all waterfowl, all shorebirds, and most landbirds (birds with principally terrestrial life cycles). Most of these birds are specifically named in the Environment Canada publication, *Birds Protected in Canada under the Migratory Birds Convention Act* (Environment Canada 1991).

Preliminary data from existing sources should first be gathered on migratory bird use of the area for all four seasons (e.g., winter, spring migration, breeding season, fall migration). In addition to information obtained from the ACCDC and naturalists, other datasets should also be consulted (see below). Datasets are downloadable through Bird Studies Canada's web portal, Nature Counts, at: http://www.birdscanada.org/birdmon/default/datasets.jsp.

In particular, data from the Maritime Breeding Bird Atlas (1st and 2nd atlas) (MBBA) should be considered. Data from the 2nd atlas is not yet fully available through the ACCDC. Special requests for species at risk information from the MBBA can be made directly via the Nature Counts website but will require special approval before the data are released. In addition to the MBBA, other datasets of relevance to this project include: Bird Studies Canada's High Elevation Landbird Survey (contact Greg Campbell, gcampbell@bsc-eoc.org), Atlantic Canada Nocturnal Owl Survey, Christmas Bird Count, and the Breeding Bird Survey.

This data should then be supplemented by surveys. In designing required surveys, the proponent should refer to the Canadian Wildlife Service's Technical Report No. 508, "A Framework for the Scientific Assessment of Potential Project Impacts on Birds" (Hanson *et al*. 2010). Appendix 3 of this Framework provides examples of project types and recommended techniques for assessing impacts on migratory birds.

The EIS should give particular, but not exclusive, consideration to birds or habitat that meets one of the following criteria:

- species listed under the *Species at Risk Act* (SARA) or provincial endangered species legislation; listed or under review by COSEWIC; or with rarity ranks assigned by the ACCDC or the province;
- areas of concentration of migratory birds, such as breeding areas, colonies, spring and fall staging areas, and wintering areas;
- breeding and nesting areas of species low in number and high in the food chain (e.g., eagles, osprey); and
- species that are identified by priority ranking systems (e.g., Partners-In-Flight).

Effects Assessment and Mitigation

The EIS shall provide an analysis of the project impacts, both direct and indirect, on wildlife and wildlife habitats, giving consideration to, and demonstrating linkages between, predicted physical and biological changes resulting from the proposed development. Management tools (i.e., federal and provincial acts and policies, guidance, and provincial or regional strategies and plans) relevant to the protection of wildlife and/or wildlife habitat should be considered in the EIS. As a starting point, the analysis in the EIS shall include:

- a quantitative and qualitative determination of overall loss or alteration of terrestrial habitat that could result from the project and the impact of this on key species. Where possible, this will include a ranking of habitat quality for each VEC species so that the relative loss of high quality versus low quality habitat can be assessed in relation to the regional availability of habitat. Regional boundaries for assessment of relative habitat loss should be based on major watershed boundaries and eco-sections;

- an assessment of possible physical hazards and attractants for wildlife (e.g., assessment of the potential impacts of roads, pits, and other structural features on wildlife feeding, migration and movement, denning and refuge, reproductive behaviour and success, nesting and chick-rearing, and direct mortality);

- an assessment of possible chemical hazards and attractants for wildlife (e.g., assessment of the potential impacts of identified contaminants of potential concern on wildlife feeding, migration and movement, denning and refuge, reproductive behaviour and success, and direct mortality);

- an assessment of possible sensory disturbance causing wildlife attraction or deterrence (e.g., assessment of the potential impacts of noise, light, odours, and human presence on wildlife feeding, migration and movement, denning and refuge, reproductive behaviour and success, and direct mortality);

- an assessment of the potential effects on species known to be important to Aboriginal people; and

- an assessment of the potential for local population level impacts to VEC species resulting from the impacts of:
    - habitat loss or alteration;
    - physical hazards;
    - chemical hazards; and/or
    - sensory disturbances.

The EIS shall describe measures to mitigate effects to wildlife and wildlife habitat and list potential residual effects and their significance.

Mature and Interior Forest Habitat for Migratory Birds

The EIS shall include:

- mapping that identifies mature and interior forest habitat for migratory birds in both the study area and footprint area, along with a rationale as to why this habitat cannot be avoided;
- an analysis of project impacts on mature and interior forest habitat for migratory birds on a local scale taking into account cumulative losses (and taking into account the species of migratory birds that use these habitats, as demonstrated by bird surveys); and
- proposed mitigation for the predicted loss of mature and interior forest habitat for migratory birds.

If habitat fragmentation already occurs in the project area, this should not be used to dismiss potential effects of further loss or fragmentation of habitat, as this would ignore the potential for cumulative effects.

4.17.4 Species at Risk and Species of Conservation Concern

Existing Environment

Species at risk are those that meet the following criteria:

- are listed in Schedules 1, 2, and 3 of SARA;
- are recognized as being at risk by COSEWIC; and/or
- are listed in the provincial *Endangered Species Act*.

Species of conservation concern are those that:

- are listed by the ACCDC as S1 or S2; and/or
- are given rarity ranks by the New Brunswick Department of Natural Resources.

Under the *Endangered Species Act* (New Brunswick), 'endangered species' means any indigenous species of fauna or flora threatened with imminent extinction or imminent extirpation throughout all or a significant portion of its range and designated by regulation as endangered.

Under SARA, 'wildlife species' refers to a native species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organisms, other than a bacterium or virus; and 'species at risk' refers to wildlife species that are extirpated, endangered, threatened, or of special concern.

SARA establishes obligations to address potential effects on species listed on Schedule 1 in a federal EA. Federal EAs are required to address the potential effects of a proposed project on these listed species, their critical habitat, and residences of individuals of those species, and to consider any cumulative environmental effects. In addition, the EIS shall also assess project impacts on species listed on Schedules 2 and 3 of SARA, those recommended for legal listing by COSEWIC, provincially-listed species and those ranked by the ACCDC as S1 or S2.

The following information should be provided as background for the analysis of species at risk and species of conservation concern. The EIS should:

- identify all species at risk and species of conservation concern that may be impacted by the project using existing data and literature as well as survey protocols to provide current field data, as appropriate;
- provide assessments of regional importance, abundance and distribution that optimize detectability of all species at risk and species of conservation concern and sufficient survey effort to obtain comprehensive coverage; and
- identify residences, seasonal movements, movement corridors, habitat requirements, key habitat areas, critical habitat and general life history of species at risk and species of conservation concern that may occur in the project area.

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

- ACCDC (www.accdc.com);
- SARA (www.sararegistry.gc.ca);
- COSEWIC (www.cosewic.gc.ca);
- New Brunswick Museum;
- New Brunswick *Endangered Species Act*;
- Local naturalist and interest groups; and
- Aboriginal groups and First Nations.

Effects Assessment and Mitigation

The EIS shall identify the adverse effects of the project on the species at risk and species of conservation concern (both floral and faunal) and as well as impacts on the critical habitat and residences of SARA-listed species. The EIS must describe specific measures that will be taken to avoid or lessen adverse effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans for SARA-listed species. As with any environmental component, the effects analysis should include not only project-specific impacts but cumulative effects on species at risk and species of conservation concern and their critical habitat and/or residences. The likely significance of adverse environmental impacts from the project on species at risk and species of conservation concern should be predicted. In conducting the analysis, the EIS shall consider pertinent acts, policies, guidelines and directives relating to species at risk and species of conservation concern.

The following documents should be used as reference in conducting the required analysis:

- *Addressing Species at Risk Act Considerations Under the Canadian Environmental Assessment Act for Species Under the Responsibility of the Minister responsible for Environment Canada and Parks Canada* (SARA-CEAA 2010).
- *The Species at Risk Act Environmental Assessment Checklists for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada – Support Tool for the Required Information Elements Under the Species at Risk Act for Environmental Assessments Conducted Under the Canadian Environmental Assessment Act* (Environment Canada –Parks Canada 2010).
- *Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada* (Environment Canada 2004).

4.18 Human Health

The analysis of human health should synthesize information documented within all potential environmental interactions that may directly or indirectly affect health parameters, where such interactions derive from a change in the environment.

Existing Environment

The EIS should include:

- information regarding the distance of the project to all potential human receptors for different uses (e.g., residential, recreational) within the area affected by the project; and
- a description of the current health profiles of the communities likely to be affected by the project, considering such aspects as proximity to the mine site, and downstream flow direction of site area surface waters.

A discussion of any potential people's health-related traditional activities, including the accessibility to spiritual sites within the study area, should also be included where available.

Health-related traditional activities could include gathering of country foods for consumption (e.g., hunting, fishing, trapping, planting and harvesting of plants for medicinal purposes) and activities of spiritual significance. Information on current consumption of country foods and its quality by food type by Aboriginal people must be provided where available.

Effects Assessment and Mitigation

The EIS should examine the potential effects of any change in the environment caused by the project on human health, including those related to potential chemical releases to the environment. The assessment should involve generally-accepted risk assessment methods, including consideration of the following:

- water supply and watersheds, including the effect on water supply and quality for local residents, communities and the mine site, as well as potential health risks from discharges (if any). Any water designated for drinking, in particular drinking water supply to the residents of Dauversière Road and the settlement of Alcida and impacts to the Nigadoo River Designated Drinking Water Watershed, must be addressed and contingency plans developed in the event there is any impact to water supply;
- use of drinking water treatment systems or drinking water alternatives as appropriate;
- the effect of the project on air quality around the mine site and in the broader study area, including predicted air emissions and health risks from emissions from point and mobile sources (e.g., dust generated at the mine including from blasting activities, traffic related to the mine). This would include a comparison of predicted project-related changes in ambient air quality to applicable air quality benchmarks relevant to human health (e.g., Canada Wide Standards, National Ambient Air Quality Objectives, provincial regulations);
- risk to human health from physical hazards associated with the site, such as flyrock from blasting operations and injuries to any on-site trespassers; and
- risks to human health from the consumption by Aboriginal people, hunters/trappers, the community, and others of traditional wild foods should be assessed, including those exposed to the following should they be included as part of the project:
    - pesticides used at the mine site;
    - metal contaminated dust;
    - seepage;
    - runoff or effluent discharges from the mine site (if any);
    - impounded water at the mine site;
    - metal-contaminated vegetation growing within the projected dust fall area surrounding project operations;
    - soils contaminated by metals; and

- any other effluents and emissions from the project.

The assessment of impacts to human health should take into consideration the following scenarios: baseline alone (i.e., before the project); project plus baseline; and cumulative (i.e., project plus baseline plus all other projects and activities).

In conducting the analysis, the proponent will consider pertinent acts, policies, guidelines and directives relating to human health. The EIS will provide a description of measures to mitigate effects to human health and list potential residual effects and their significance.

In conducting the analysis the proponent should refer to the Health Canada guidance document, *Useful Information for Environmental Assessments* (Health Canada 2010) on expected information needs with respect to air quality, noise effects, country foods and human health.

4.19 Socio-Economic & Aboriginal Land and Resource Use

Existing Environment

The EIS should describe land use at the site and within local and regional study areas. It should identify past, current and any known planned land use(s) of the project area and beyond, that may be impacted by any environmental impacts of the project.

Community involvement is required to gain a good understanding of the socio-economic conditions that could be affected by any environmental impacts of the project. In particular, the Chaleur Bay Watershed Group is a community-based watershed group partnering with the New Brunswick government and stakeholders in the Jacquet, Big and Little Elmtree, Nigadoo and Millstream watersheds. The group has completed a provisional plan for water quality management and should be consulted on the proposed project. Other key stakeholder groups include Bathurst Sustainable Development and the Elmtree Gold Mine Intervention Committee.

<u>Aboriginal Interests</u>

The EIS should include:

- an identification of the lands, waters and resources of specific social, economic, archaeological, cultural or spiritual value to Aboriginal people that may be affected by the project's environmental effects; and

- where available, information concerning traditional activities, including activities for food, social, ceremonial and other cultural purposes, in relation to such lands, waters and resources with a focus on the current use of lands, waters and resources for traditional purposes.

Residential Property

The EIS should include the effect of environmental changes caused by the project on property values.

Fishing

A description of commercial, recreational and subsistence fisheries that may be affected by the project's environmental effects must be provided, including water body use and the importance of the water body in a regional and provincial context.

Outdoor Recreation and Tourism

General estimates of the current access and demand for the recreational and tourist industry (e.g., fishing, hiking, parks, kayaking, and cottages) within the study areas must be provided. Commercial recreation tenures and activities located in the project and surrounding areas potentially impacted by a change in the environment caused by the project should be identified.

Hunting, Trapping and Guiding

Estimates of the current and projected value of the hunting, trapping and guiding industry for the project and surrounding areas potentially impacted by a change in the environment caused by the project should be identified.

Forestry

The current forest resources and activities in the area potentially affected by a change in the environment caused by the project should be identified.

Agriculture

The EIS should identify current agricultural resources and activities, if any that could be affected by a change in the environment caused by the project.

Effects Assessment and Mitigation

The EIS should assess the effects of any change in the environment as a result of the project on the use of surrounding lands and resources by the public and private sectors. In conducting the analysis, pertinent acts, policies, guidelines and directives relating to Aboriginal interest and land and resource use should be considered. The EIS will provide a description of measures to mitigate effects to Aboriginal interest and land and resource use and list potential residual effects and their significance.

Aboriginal Interests

Aboriginal peoples have a unique world view in the understanding of the relationship between people and the environment. In order to seek the meaningful participation of Aboriginal

persons in the EA process and to recognise this difference in world views, the proponent shall describe the process it has used to reconcile these differences and therefore capture and record the issues and concerns being brought forward by Aboriginal persons.

The EIS will assess the impact of the project's environmental effects on the current use of lands and resources for traditional purposes by Aboriginal persons. This includes impacts on traditional hunting, fishing, gathering or ceremonial activities. The analysis should focus on the identification of potential adverse effects of the project on the ability of future generations of Aboriginal people to pursue traditional activities.

Traditional activities carried out by Aboriginal people must be described. Based on information provided by Aboriginal groups or, if Aboriginal groups do not provide this information, on available information from other sources, the EIS will identify:

- potential social and/or economic effects to Aboriginal groups that may arise as a result of any change in the environment due to the project;
- effects of any change in the environment due to the project on current and proposed uses of land and resources by Aboriginal groups for traditional purposes;
- effects of any change in the environment due to the project on hunting, fishing, trapping and cultural uses of the land (e.g., collection of medicinal plants, use of sacred sites), as well as related effects on lifestyle, culture and quality of life of Aboriginal groups and measures to avoid, mitigate, compensate or accommodate effects;
- effects on Aboriginal groups of area access, including deactivation or reclamation of access roads; and
- effects of any change in the environment as a result of the project on heritage and archaeological resources in the project area that are of importance or concern to Aboriginal groups.

4.20 Physical and Cultural Heritage Resources & Historical, Archaeological and Paleontological Matters

Existing Environment

According to the Agency Reference Guide: *Assessing Environmental Effects on Physical and Cultural Heritage Resources* (CEAA 1996), a cultural heritage resource is a human work or a place that gives evidence of human activity or has spiritual or cultural meaning, and that has historic value. Cultural heritage resources are distinguished from other resources by virtue of the historic value placed on them through their association with an aspect(s) of human history. This interpretation of cultural resources can be applied to a wide range of resources, including cultural landscapes and landscape features, archaeological sites, structures, engineering works, artifacts and associated records.

The EIS should identify any terrestrial and aquatic areas known to contain features of historical, archaeological, paleontological, architectural or cultural importance. A description of the nature of the features located in those areas must be provided. Particular attention must

be given to Aboriginal cultural, archaeological and historical resources in consultation with Aboriginal people.

Effects Assessment and Mitigation

The EIS shall assess the potential effects of any change in the environment as a result of the project on physical and cultural heritage resources and on structures, sites or things of historical, archaeological, or paleontological significance. In conducting this analysis, it should consider pertinent acts, policies, guidelines and directives. It will provide a description of measures to mitigate effects and list potential residual effects and their significance. The analysis should include an archaeological impact assessment of the proposed mine site development area, including consideration of any new infrastructure e.g., roads or upgrades to existing infrastructure.

Appendix A: Data and Information Sources

Canadian Environmental Assessment Agency. 2007. *Operational Policy Statement: Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act.* (http://www.ceaa.gc.ca/default.asp?lang=En&n=1F77F3C2-1 or by following link – Canadian Environmental Assessment Agency/Policy & Guidance/Guidance Materials/Operational Policy Statements/Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*)

Canadian Environmental Assessment Agency. 2003. *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners.* (http://ceaa.gc.ca/default.asp?lang=En&n=DACB19EE-1).

Canadian Environmental Assessment Agency. 1999. *Cumulative Effects Assessment Practitioners Guide*. Prepared by the Cumulative Effects Assessment Working Group and AXYS Environmental Consulting Ltd. 134 Pages. (http://www.ceaa.gc.ca/default.asp?lang=En&n=1F77F3C2-1, or by following link - Canadian Environmental Assessment Agency/Policy & Guidance/Guidance Materials/Procedural Guides/Cumulative Effects Assessment Practitioners Guide)

Canadian Environmental Assessment Agency. 1996. *Reference Guide on Physical and Cultural Heritage Resources*. (http://www.ceaa.gc.ca/default.asp?lang=En&n=1BE75513-1).

Canadian Environmental Assessment Agency. *Basics of Environmental Assessment.* (*http://www.ceaa.gc.ca/default.asp?lang=En&n=B053F859-1* or follow link – Canadian Environmental Assessment Agency/Environmental Assessments/Basics of Environmental Assessment)

Environment Canada –Parks Canada. 2010. *The Species at Risk Act Environmental Assessment Checklists for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada – Support Tool for the Required Information Elements Under the Species at Risk Act for Environmental Assessments Conducted Under the Canadian Environmental Assessment Act* (Environment Canada –Parks Canada 2010) (http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=DA30C3BC-F7ED-45F2-868B-17A0B33B6FDF).

Environment Canada, 1991. Birds Protected in Canada under the *Migratory Birds Convention Act"*, Canadian Wildlife Service Occasional Paper No. 1. (http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=97AC4B68-69E6-4E12-A85D-509F5B571564).

Environment Canada. 2008. *Environment Canada Guidance Related to the Environmental Assessment of Aggregate Pit Mines and Quarries in the Atlantic Provinces*. 13 Pages.

Environment Canada. 2004. *Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada.* First Edition, Canadian Wildlife Service, Environment Canada. 68 Pages.

Environment of Canada. 1991. *The Federal Policy on Wetland Conservation.* Canadian Wildlife Services, Environment Canada, Ottawa, Ontario. 15 pages. (http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=BBAAE735-EF0D-4F0B-87B7-768745600AE8, or follow link –Environment Canada/Reports and Publications/Find a Publication/)

Fisheries and Oceans Canada. 1986. *Policy of the Management of Fish Habitat* (http://www.dfo-mpo.gc.ca/habitat/role/141/1415/14155/fhm-policy/index-eng.asp)

Government of Canada. 2003. *A Framework for the Application of Precaution in Science-based Decision Making About Risk.*

Hanson, A., I. Goudie, A. Lang, C. Gjerdrum, R. Cotter and G. Donaldson. 2009. *A Framework for the Scientific Assessment of Potential Project Impacts on Birds*. Canadian Wildlife Service's Technical Report Series No. 508. Atlantic Region. 61 pp.

Hanson, A., L. Swanson, D. Ewing, G. Grabas, S. Meye, L. Ross, M. Watmough, and J, Kirby. 2008. *Wetland Ecological Functions Assessment: An Overview of Approaches*. Canadian Wildlife Service Technical Report Series No. 497. Atlantic Region. 59 pp.

Health Canada. 2010. *Useful Information for Environmental Assessments*. Ottawa, Ontario. 17 pages. (http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/environ_assess-eval/index-eng.php)

Mine Environment Neutral Drainage (MEND) Program. 2009. *MEND Report 1.20.1, "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials", Version 0 – December.*

SARA-CEAA Guidance Working Group (Canada). 2010. *Addressing Species at Risk Act considerations under the Canadian Environmental Assessment Act for SpeciesUnder the Responsibility of the Minister Responsible for Environment Canada and Parks Canada.* (http://www.registrelep-sararegistry.gc.ca/document/dspDocument_e.cfm?documentID=2100).