

**Final Terms of Reference for an  
Environmental Impact Assessment**

**FOR:**

Sisson Project  
Northcliff Resources Ltd.

**PURSUANT TO:**

Section 10(1) of the New Brunswick  
*Environmental Impact Assessment  
Regulation – Clean Environment Act*  
and Sections 15(1) and 16(3) of the  
*Canadian Environmental Assessment  
Act*

April 16, 2012  
(Supersedes August 18, 2011 draft)



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## List of Acronyms and Units

Acronym / Unit	Definition
AADT	average annual daily traffic
AC CDC	Atlantic Canada Conservation Data Centre
AFNCNB	Assembly of First Nations Chiefs in New Brunswick
AP	acid potential
ARD	acid rock drainage
AS	Archaeological Services (of the New Brunswick Department of Wellness, Culture and Sport)
ATV	all-terrain vehicle
CAC	criteria air contaminant(s)
CCME	Canadian Council of Ministers of the Environment
CEA Agency	Canadian Environmental Assessment Agency
<i>CEAA</i>	<i>Canadian Environmental Assessment Act</i>
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSR	comprehensive study report
DEM	digital elevation model
DFO	Department of Fisheries and Oceans Canada
EA	environmental assessment
EIA	environmental impact assessment
EIA Regulation	New Brunswick <i>Environmental Impact Assessment Regulation - Clean Environment Act</i>
ERA	ecological risk assessment
<i>ESA</i>	<i>Endangered Species Act</i>
FA	federal authority
FCR	“Federal Coordination Regulations” under <i>CEAA</i>
FPWC	Federal Policy on Wetland Conservation

FINAL TERMS OF REFERENCE FOR AN ENVIRONMENTAL IMPACT ASSESSMENT: SISSON PROJECT

Acronym / Unit	Definition
GDP	gross domestic product
GHG	greenhouse gases
GIS	geographic information system
GNB	Government of New Brunswick
GPS	global positioning system
HADD	harmful alteration, disruption or destruction (of fish habitat)
HHERA	human health and ecological risk assessment
HHRA	human health risk assessment
LAA	local assessment area
$L_{DN}$	equivalent sound pressure level, day-night
$L_{eq}$	equivalent sound pressure level
LiDAR	light detection and ranging
LOS	level of service
MARI	Maritime Archaeological Resource Inventory
ML	metal leaching
<i>MMER</i>	<i>Metal Mining Effluent Regulations of the Fisheries Act</i>
MPMO	Major Projects Management Office of Natural Resources Canada
NB	New Brunswick
NBDOT	New Brunswick Department of Transportation
NBDNR	New Brunswick Department of Natural Resources
NBENV	New Brunswick Department of Environment
NP	neutralization potential
NPR	neutralization potential ratio
NRCan	Natural Resources Canada
NSA	noise sensitive area

**FINAL TERMS OF REFERENCE FOR AN ENVIRONMENTAL IMPACT ASSESSMENT: SISSON PROJECT**

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<b>Acronym / Unit</b>	<b>Definition</b>
NWPA	<i>Navigable Waters Protection Act</i>
PAG	potentially acid generating
PDA	Project development area
PID	parcel identifier
PSW	provincially significant wetland
RA	responsible authority (Government of Canada)
RAA	regional assessment area
SARA	<i>Species at Risk Act</i>
SGPP	standard good practices and procedures
SNB	Service New Brunswick
t/d	tonnes (metric) per day
TIA	tailings impoundment area (synonymous with TSF below)
TRC	Technical Review Committee
TOR	Terms of Reference
TSF	tailings storage facility
USEPA	United States Environmental Protection Agency
VEC	valued environmental component
WAWA	watercourse and wetland alteration (permit, regulation)



## 1.0 INTRODUCTION

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This document is the final Terms of Reference (TOR) for preparing the provincial Environmental Impact Assessment (EIA) and federal Environmental Assessment (EA) of the Sisson Project (the Project), proposed by Northcliff Resources Ltd. (Northcliff) approximately 60 km directly northwest of Fredericton, New Brunswick. This final Terms of Reference supersedes the draft Terms of Reference released for public comment by the Canadian Environmental Assessment Agency (CEA Agency) on August 18, 2011.

The TOR describes the approach to and methods for carrying out the EIA of the Project, and how Northcliff and both governments will engage with the public, stakeholders, and Aboriginal peoples during the course of the EIA process. The TOR outlines the contents of the EIA Report to meet the requirements of the provincial EIA process and to support the preparation of a comprehensive study report by the CEA Agency. The anticipated structure and contents of the EIA Report as it will ultimately be prepared and submitted to the regulatory agencies is also conceptually described.

The initial draft TOR was prepared by Stantec for Northcliff and was submitted to a multi-agency provincial/federal Technical Review Committee (TRC) jointly chaired by the Project Assessment Section, NBENV, and the CEA Agency, Atlantic Region. The TRC then reviewed the initial draft TOR, provided comments to Northcliff, and the draft TOR was revised for use as a public consultation document. It was made available for comment by the public, stakeholders and Aboriginal peoples on August 18, 2011, and the public comment period closed on October 2, 2011. Revisions were made to the draft TOR to address the changes and requirements of the federal and provincial regulatory agencies. The CEA Agency accepted the final TOR on February 13, 2012. Following some minor revisions, the New Brunswick Department of Environment (NBENV) accepted the final TOR on April 16, 2012.

This final TOR addresses, as appropriate, comments made by the public, stakeholders, the Aboriginal community, and regulatory agencies in respect of the draft TOR. This final TOR is being adopted as the Scope of the federal EA under Section 15(1) and Section 16(3) of the *Canadian Environmental Assessment Act (CEAA)* and as the final Terms of Reference for the provincial EIA under Section 10(1) the New Brunswick *Environmental Impact Assessment Regulation (87-83)*. Northcliff will prepare the EIA Report that will fulfill the requirements of the TOR.

Concurrently with preparation of the EIA report, Northcliff is carrying out a feasibility study of the Sisson Project. The information gathered, and analyses conducted, during the EIA, and during public, stakeholder and Aboriginal engagement activities by Northcliff, will inform the planning and design of the Sisson Project. The EIA will assess the Sisson Project as it was generally described in the Project Description (Stantec 2011), and as it will be defined in more detail in the EIA Report based on the feasibility study and the preferred options provided therein. Thus, the

project description included in the EIA Report will be more detailed than the one submitted by Northcliff to initiate the EA of the Project under *CEAA*.

## **1.1 BACKGROUND**

### **1.1.1 About the Sisson Project**

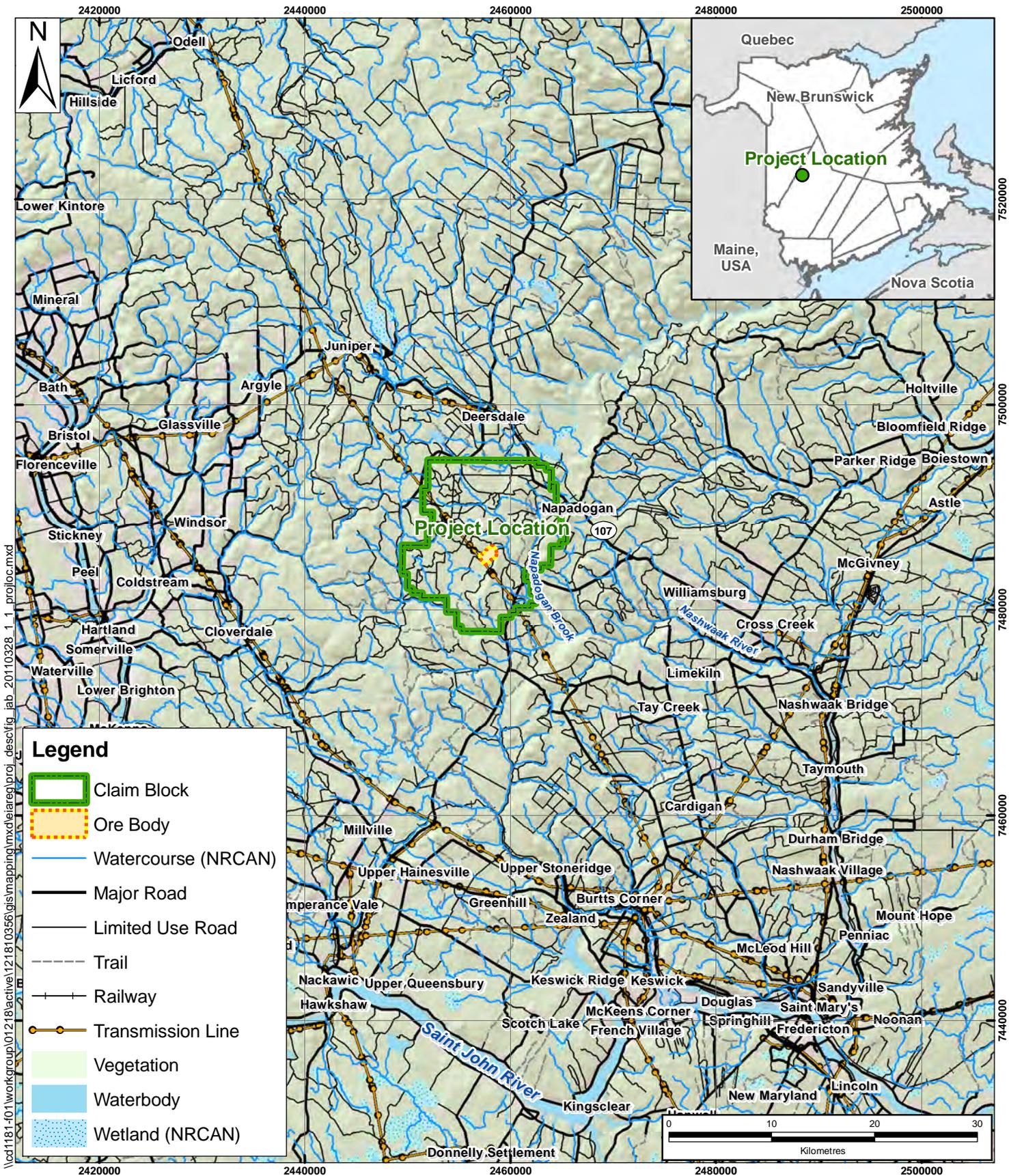
As described in the Project Description (Stantec 2011), the Sisson Project will consist of the development, construction, and operation of a conventional open pit tungsten and molybdenum mine and associated facilities by Northcliff. The Project site is on provincial Crown land at approximately N 46° 22' by W 67° 03', approximately 10 km southwest of the community of Napadogan, New Brunswick, and approximately 60 km directly northwest of the city of Fredericton (Figure 1.1).

The Project was initially proposed by Geodex Minerals Ltd. in 2008. In October 2010, Northcliff acquired a controlling interest in the Project, with Geodex Minerals retaining a 30% equity share. Northcliff now holds the Sisson mineral claims and is managing the development of the Project. A feasibility study, an environmental study and assessment program, an engagement program for stakeholders, the public and Aboriginal peoples, and other planning and development activities are underway in parallel to the EIA.

Tungsten is a steel-grey metal that is an important alloy in tool and construction steel as it enhances hardness, cutting efficiency, and speed with a similar hardness to diamonds. Tungsten components are used in lighting technology, electronic industry, transportation, the chemical industries, glass melting industry, medical technology, power engineering, and in jewelry.

Molybdenum is an important alloy in stainless steel and steel. It is also an important material for the chemical and lubricant industries. Molybdenum is used in automotive parts, construction equipment, and gas transmission pipes and turbine parts.

The Project will involve an open pit mine and associated processing, storage, and waste management facilities. The mine will operate for about 20 years and perhaps up to 30 years and extract between 20,000 and 40,000 tonnes per day (t/d) of tungsten and molybdenum containing ore (depending on the rate of mining as determined by the feasibility study). Though the rate of mining may change, the total amount of mineral product produced, and of waste managed, would not change. The tungsten and molybdenum containing ore would be extracted, crushed and processed on-site. The bulk of the wastes from the processing operation will be placed in a tailings storage facility (TSF, also sometimes referred to as a tailings impoundment area or TIA); a small amount of waste may be placed in a separate storage facility. The mineral products will be trucked off-site to buyers.



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<h2 style="text-align: center;">Project Location</h2> <p style="text-align: center;">Sisson Project</p> <p style="text-align: center;">Napadogan, N.B.</p>		Scale:	Project No.:	Data Sources:	Fig. No.:	 <p style="text-align: center;"><b>Stantec</b></p>
		1:500,000	121810356	SNB NRCAN, ESRI	1.1	
Client:	Northcliff Resources Ltd.	Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:		
		11/5/2011	JAB	DLM		



Organics and overburden material, and ore and non-potentially acid generating (NPAG) waste rock, will be stockpiled on-site. Engineered diversion channels will keep clean surface runoff water away from mining, processing and waste storage areas. Precipitation falling on the Project site, and dewatering from the open pit, will be collected and used in project operations; any surplus water will be treated, if necessary, and discharged to natural drainages.

The specific locations of the various Project facilities within the claim block have not yet been finalized, and will be confirmed during the feasibility study that will be conducted in parallel with the EIA. The current preferred layout of the facilities and some possible alternatives have been identified and are described in the Project Description (Stantec 2011).

At the end of mining, decommissioning, reclamation, and closure will occur. At closure, the water management system will be reconfigured to ensure that all water discharged from the site is monitored and, as needed, treated to meet applicable water quality standards for as long as is required.

The Project is expected to generate employment and positive economic activity in the area during its life span. The capital cost of the Project is anticipated to be in the \$300 to \$500 million USD range. In terms of employment, it is estimated that the Project will create some 200 to 300 direct full-time jobs over its operating life span and some 500 to 800 direct jobs during the construction phase. Local contractors will be given preference for site contract work where qualified companies and suppliers can be identified.

### **1.1.2 Purpose/Rationale/Need for the Project**

The purpose of the Project is to extract tungsten and molybdenum from the Sisson deposit to meet market demands. The Project will benefit the Government of Canada and the Province of New Brunswick through the generation of tax revenues. The Project will generate direct employment (mine construction and operation) and indirect employment (*e.g.*, services, materials and equipment supply, transportation) in New Brunswick and elsewhere, and contribute to New Brunswick's gross domestic product. It will also likely attract businesses and development to the local region, adding to the economic benefits, local developments, and the standard of living.

## **1.2 REGULATORY FRAMEWORK APPLICABLE TO THE PROJECT**

The Project requires a provincial EIA under the EIA Regulation as well as a federal EA under *CEAA*, due to a number of potential "triggers". The Project is also subject to the federal Major Projects Management Office initiative, administered by Natural Resources Canada. A brief summary of the regulatory framework applicable to the EIA of the Project is provided below. It is important to note that only the EIA regulatory processes applicable to the EIA of the Project are described in the TOR. Other regulatory processes (*e.g.*, under the New Brunswick *Mining Act*) will proceed independently of the EIA.

### 1.2.1 New Brunswick Environmental Impact Assessment Regulation

The EIA Regulation was enacted in 1987 under the *Clean Environment Act*. The EIA Regulation requires that the proposed construction, operation, modification, extension, abandonment, demolition or rehabilitation of certain projects or activities, described in Schedule A of the Regulation, must be registered. Schedule A of the EIA Regulation identifies 24 categories of projects or activities (referred to as undertakings) which must be registered, one of which is “(a) all commercial extraction or processing of a mineral as defined in the *Mining Act*”.

The Project Registration (Rescan 2008) was submitted to the New Brunswick Department of Environment (NBENV) on September 5, 2008, in accordance with Section “a” of Schedule A of the Regulation (“all commercial extraction or processing of a mineral as defined in the *Mining Act*”). The Minister of Environment determined on October 24, 2008 that an EIA (Comprehensive Review) of the Project is required. Final Guidelines for the EIA (referred to herein as the “NBENV Final Guidelines”) were issued on March 1, 2009 (NBENV 2009).

Section 10(1) of the EIA Regulation requires that the proponent “...prepare terms of reference for an environmental impact assessment, setting out his proposals for the carrying out of an assessment in accordance with the final guidelines”. The specific requirements for the Terms of Reference are outlined in Section 2.8 of the NBENV Final Guidelines issued on March 1, 2009.

### 1.2.2 Canadian Environmental Assessment Act

The requirements for federal EA are defined by *CEAA*. For *CEAA* to apply there must first be a project as defined under the *Act*. There must also be a “trigger” for EA. The requirement for an EA is triggered under Section 5(1) of *CEAA* when a federal authority (responsible authority or RA):

- proposes a project;
- provides financial assistance to a proponent to enable a project to be carried out;
- sells, leases, or otherwise transfers control or administration of federal land to enable a project to be carried out; and/or
- provides a licence, permit or an approval that is listed in the *Law List Regulations* that enables a project to be carried out.

The Project requires an EA under Section 5(1) of *CEAA* as it is a “project” as defined in the *Act*, and it is expected that there are at least three triggers under the *Law List Regulations* of *CEAA*. The Project is expected to require approvals, permits, licences, or other forms of authorization under the *Fisheries Act* and the *Explosives Act* – which are triggers under the *Law List Regulations* of *CEAA*. Fisheries and Oceans Canada (DFO) and Natural Resources Canada (NRCan) will thus be responsible authorities (RAs). An EA under Section 5(2) of *CEAA* is also

required, as elements of the Project (e.g., the tailings storage facility) will require the Governor in Council to amend Schedule 2 of the *Metal Mining Effluent Regulations* under the *Fisheries Act* to enable the Project to be carried out—as such, an EA is required prior to the Government of Canada exercising this power, duty, or function. In accordance with recent amendments to *CEAA*, the Canadian Environmental Assessment Agency (the CEA Agency) will manage the EA process as the decision-making authority for all comprehensive studies under *CEAA*.

The anticipated daily production rate for the mine exceeds the threshold for metal mines (3,000 t/d) and for metal mills (4,000 t/d) under the *Comprehensive Study List Regulations* under *CEAA*. Therefore, the EA under *CEAA* will be a comprehensive study unless the Minister of Environment refers the Project to a mediator or review panel.

Under Section 15(1) of *CEAA*, the RAs must define the scope of project to be assessed. Section 16(1) establishes the mandatory factors to be considered in any EA under *CEAA*, and Section 16(2) establishes additional mandatory factors to be considered for comprehensive studies. Section 16(3) provides the RAs the authority to determine the scope of the factors to be considered in an EA to meet the applicable requirements of Sections 16(1) and 16(2). The RAs normally define those requirements in guidelines issued to the proponent which document the scope of project to be assessed, the factors to be considered, and the scope of those factors. This TOR defines those requirements to meet the regulatory obligations of the CEA Agency and the RAs under Sections 15 and 16 of *CEAA*.

### **Sustainable Development**

Sustainable development, as defined in *CEAA*, means development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. In addition, environmental assessment provides an effective means of integrating environmental factors into the planning and decision-making process in a manner that promotes sustainable development.

In planning the Project and compiling information for the EIA Report, the Proponent should demonstrate how the proposed Project, including the alternative means of carrying out the Project, takes into account the relations and interactions among the various components of the ecosystems, including the extent to which biological diversity may be affected by the Project, and how it meets the needs of the present as well as future populations.

### **Precautionary Approach**

One of the purposes of federal EA under *CEAA* 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.

Principle 15 of the 1992 *Rio Declaration on Environment and Development* states that “Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”

In describing the Project, its alternatives, and associated implementation plans, and in documenting the assessment of residual environmental effects, the Proponent shall:

- 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 them in light of risk avoidance and adaptive management capacity;
- ensure that in designing and operating the Project, priority has been and would be given to strategies that avoid the creation of adverse environmental effects;
- develop contingency plans that explicitly address accidents and malfunctions; and
- identify any proposed follow-up and monitoring activities, particularly in areas where scientific uncertainty exists in the prediction of environmental effects.

In doing so, the Proponent shall consider the guiding principles set out in the Government of Canada “Framework for the Application of Precaution in Science-based Decision Making About Risk” (Government of Canada 2003).

### **1.2.3 Harmonization of the EIA Processes and Conduct of the EIA**

The Governments of New Brunswick and Canada have decided to implement a harmonized environmental assessment process for the Sisson Project, beginning with one TOR and then one EIA Report prepared by the proponent to meet the requirements of the TOR. The CEA Agency will then prepare its comprehensive study report (CSR) based primarily on the EIA Report.

To meet the New Brunswick environmental assessment requirements, the TOR has been prepared in accordance with Section 2.8 of the NBENV Final Guidelines for the Project to describe the methods Northcliff will use to conduct the EIA of the Project, and the means by which Northcliff will consult with the public during the course of the EIA, to meet the requirements of Sections 10(1) and 10(2) of the EIA Regulation.

To initiate the federal EA process under *CEAA*, the Sisson Project Description (Stantec 2011) was submitted on April 15, 2011 to the CEA Agency, and was accepted as complete on April 26, 2011. Fisheries and Oceans Canada and Natural Resources Canada will be responsible authorities (RAs) for the EA under *CEAA*. The TOR has also been prepared to meet the requirements of Sections 15 and 16 of *CEAA*. The TOR will be issued by the CEA Agency on behalf of the federal government as the guidelines for the environmental assessment under *CEAA*, thereby defining the scope of the environmental assessment, including scope of project, factors to be considered and scope of factors to be considered for the EA under Sections 15 and 16 of *CEAA*. The CEA Agency will exercise the powers and perform the duties and functions of the RAs until such time as the federal Minister of Environment is provided with the comprehensive study report that will be based primarily on the EIA Report being prepared by Northcliff in accordance with this TOR.

### **1.3 ORGANIZATION OF THE TERMS OF REFERENCE**

The TOR is organized in six sections, as follows.

- Introductory information regarding the Project, its scope, its purpose, and regulatory processes, is provided in Chapter 1.
- The scope of the EIA that was determined by the provincial and federal regulatory authorities, including the scope of the project and the factors to be considered to meet the EIA Regulation and *CEAA*, are described in Chapter 2. In addition, the methodological approach that will be followed to conduct the EIA is also described.
- Information regarding the public, stakeholder, and Aboriginal engagement program being implemented for the Project by Northcliff and government agencies is provided in Chapter 3.
- Details on the scope of factors to be considered in the EIA of the Project are presented in Chapter 4. This includes a definition of the Valued Environmental Components (VECs), a discussion of Project-VEC interactions, boundaries for the EIA, significance criteria for the VECs, and the methods by which the EIA of the Project will be carried out including work plans for the studies to be conducted.
- The key members of the Project Team are identified in Chapter 5.
- Chapter 6 contains a list of references consulted in the preparation of this TOR.

The NBENV Final Guidelines are provided in Appendix A, for convenience. In accordance with the requirements of the NBENV Final Guidelines, a general table of concordance is provided in Appendix B to identify the location in the TOR where each of the detailed requirements of the NBENV Final Guidelines is addressed. The proposed structure and content of the EIA Report, as currently conceived and subject to change, is outlined in Appendix C.

**FINAL TERMS OF REFERENCE FOR AN ENVIRONMENTAL IMPACT ASSESSMENT: SISSON PROJECT**

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Please note that the information provided in this document is not exhaustive and additional detail, studies, or examination of additional components by the Proponent beyond what is included in this TOR may be required.

## 2.0 SCOPE OF THE ENVIRONMENTAL ASSESSMENT, AND ENVIRONMENTAL ASSESSMENT METHODS

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The scope of the EIA as determined by the NBENV Final Guidelines, and the scope of assessment for the EA under CEAA, are described in this section. In addition, the methods that will be used to conduct the EIA of the Project are described. The EIA Report will include a Table of Concordance that cross-references the information presented in the EIA Report (including appendices and reference material) with the information requirements identified in the Terms of Reference. A second Table of Concordance, which cross-references the information presented in the EIA Report with the NBENV Final Guidelines, will also be included.

### 2.1 DEFINITION OF TERMS

For the purpose of this EIA, the term “environment” refers broadly to the combined biophysical and human environment, and encompasses the more limited definition of environment in CEAA where:

*“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).*

The term “environmental effect” used in the EIA is as defined in CEAA and broadly refers to a change in the environment in response to a Project activity. Specifically:

*“environmental effect” means, in respect of 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, whether any such change or effect occurs within or outside Canada.*

Taken together, the definition of “environment” and “environmental effect” in *CEAA* include the biophysical and human environments. As such, socio-economic components that are part of the human environment are encompassed in the definition of “environmental effect” as defined in *CEAA*, insofar as they may be indirectly affected by changes in the biophysical environment. For the purposes of these TOR, the definition of environment includes both biophysical and human environments, as they are required by both the federal and provincial governments.

For convenience, in this TOR, the term “environmental effect” as defined in *CEAA* will be taken to be synonymous to the term “impact” as referred to in the New Brunswick EIA Regulation. As such, the EIA Report will assess environmental effects and impacts as defined by the respective federal and provincial legislation.

The EIA will focus on specific environmental components (called Valued Environmental Components or VECs) that are of particular value or interest to regulatory agencies, the public, Aboriginal peoples, and other stakeholders. VECs are typically selected for assessment on the basis of regulatory issues, guidelines, and requirements; consultation with regulatory agencies, the public, and stakeholders; field reconnaissance; and the professional judgment of the study team.

Finally, to assist in establishing spatial boundaries for the assessment, the terms Project development area (PDA), local assessment area (LAA), and regional assessment area (RAA) are defined as follows.

- The PDA is the most basic and immediate area of the Project. The PDA typically is limited to the area of physical disturbance associated with the construction and operation of the Project. In the case of this EIA, the PDA consists of an area of approximately 12 km<sup>2</sup> that includes the area of physical disturbance associated with the open pit, processing facility, storage areas, and TSF. The PDA also includes access roads and a transmission line, the specific area of which will be determined and assessed in the EIA Report. The location and footprint of the various Project facilities will be determined as part of the feasibility study, and all selected components will be assessed in the EIA Report.
- The LAA is the maximum area within which Project-related environmental effects can be predicted or measured with a reasonable degree of accuracy and confidence. The LAA

is defined for each VEC and includes the PDA and any adjacent areas where Project-related environmental effects may reasonably be expected to occur; for example, the zone of influence for changes in surface water flows from the presence of the open pit.

- The RAA is the area within which the Project's environmental effects may overlap or accumulate with the environmental effects of other Projects or activities that have been or will be carried out. The RAA will be defined for each VEC depending on physical and biological conditions, and the type and location of other past, present or reasonably foreseeable projects or activities that have been or will be carried out.

The specific spatial boundaries for these terms are defined on a VEC by VEC basis, in consideration of the nature and geographic extent of potential Project-VEC interactions and resulting environmental effects. In some instances, the PDA, LAA and/or RAA can be the same geographical area. The boundaries for these will be refined in the EIA Report based on the final configuration of the Project arising from the feasibility study.

## **2.2 SCOPE OF THE ENVIRONMENTAL ASSESSMENT**

The scope of the EIA of the Project is defined in this section to meet the requirements of both the NBENV Final Guidelines for the EIA under the New Brunswick *Environmental Impact Assessment Regulation*, and Sections 15 and 16 of *CEAA*.

### **2.2.1 Scope of the Project**

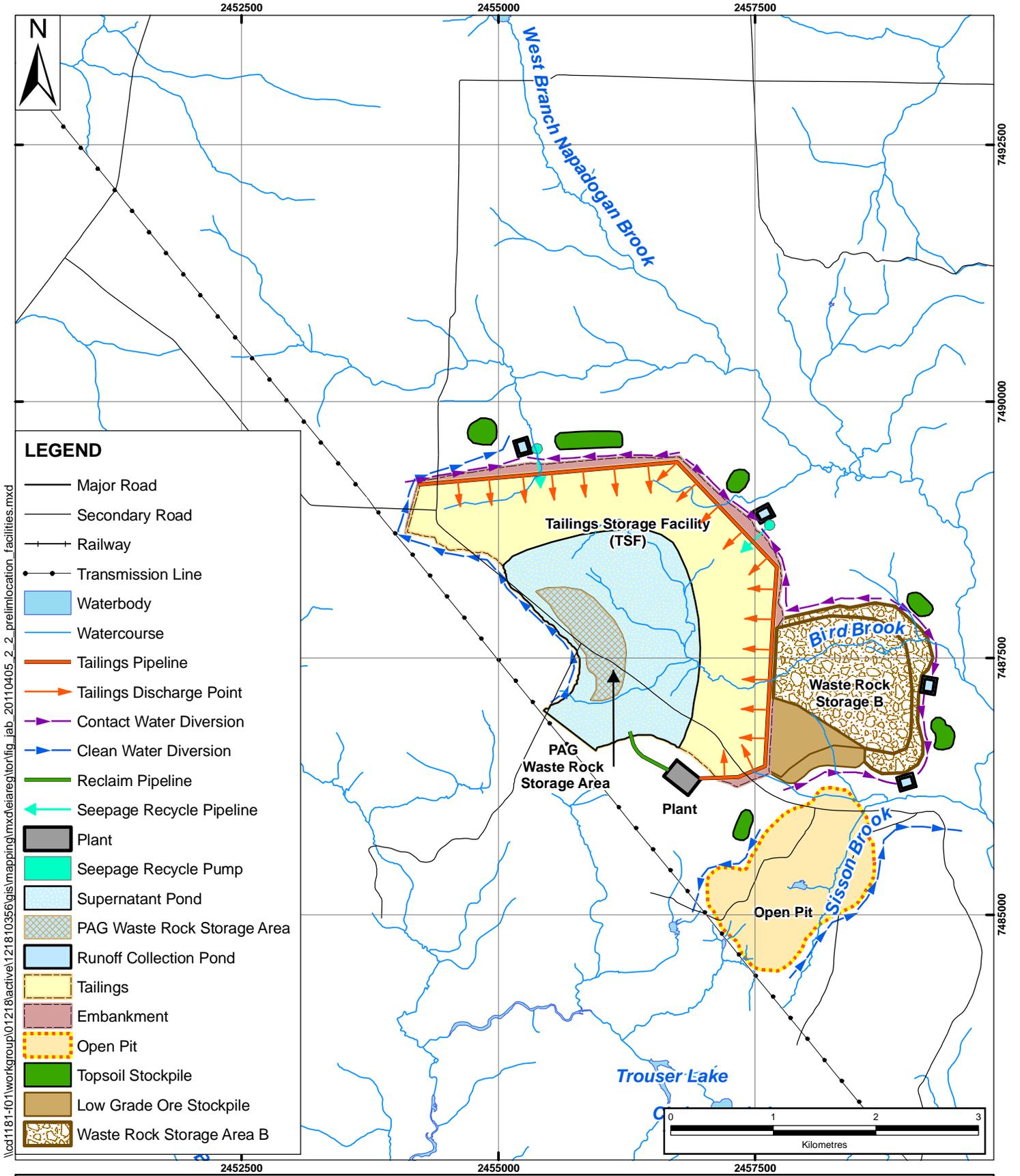
The scope of the Project to be assessed under the EIA Regulation and under Section 15(1) of *CEAA* includes the construction, operation, and decommissioning, reclamation and closure phases (including post-closure activities as appropriate) of the open pit mine; ore processing facility; tailings, ore and waste rock storage areas; and all associated infrastructure. The specific processes, components and activities that form the scope of Project, as defined by the Project Description submitted to the CEA Agency (Stantec 2011) to initiate the EA under *CEAA*, are outlined below. This list of Project elements encompasses those elements identified in Section 3.1 of the NBENV Final Guidelines (NBENV 2009). The Project Description (Stantec 2011) provides more detail on the proposed Project and should be considered in conjunction with this TOR.

The Project will be a conventional, open pit tungsten and molybdenum mining operation located near Napadogan, New Brunswick. The mine will operate for about 20 years and perhaps up to 30 years and extract between 20,000 and 40,000 tonnes per day (t/d) of tungsten and molybdenum containing ore (depending on the results of the feasibility study), for on-site processing in a new mill and processing facility. The scope of the Project, and its main elements and activities, is comprised of:

- a conventional open pit mine including blasting of rock, and rock and ore movement;

- storage areas for ore and waste rock, and storage of ore and waste rock;
- stockpiling of organics and overburden for future reclamation use;
- ore processing facilities (crushing, grinding, flotation), and on-site processing of ore to mineral concentrates and waste tailings, and perhaps to a higher-value crystalline tungsten product and solid precipitate waste products;
- a tailings storage facility (TSF) for storage of tailings from the process, and the operation of the TSF and perhaps a small storage facility for some solid waste products;
- diversion of clean surface water away from project facilities (e.g., open pit, TSF), and associated management of surface water on the project site;
- collection of precipitation on the Project site, and groundwater flows into the pit, for use in operations, and discharge of surplus water, with treatment as needed to meet permitting conditions;
- ancillary facilities, including on-site buildings, an explosives magazine and/or explosives manufacturing facility for on-site storage or manufacture of explosives (as needed ), aggregate and concrete batch plants, fuel storage and distribution systems, water supply systems, sanitary facilities, and a temporary construction camp;
- linear facilities to the project site comprised of a new 138 kV electrical transmission line and use of existing roads, upgraded as needed to accommodate Project needs;
- transportation of the mineral products to off-site buyers; and
- decommissioning of facilities, and reclamation and closure of the site at the end of the mine life.

The current preferred locations and approximate configurations of the Project facilities are shown in Figure 2.1. Alternatives for locating Project facilities, including low grade ore, waste rock and tailings storage, are under consideration through the feasibility study. Project facilities will be located within the existing 18,880 ha claim block, at approximately N 46° 22' by W 67° 03'. Project elements will be located on provincial Crown land within a parcel of land identified by Service New Brunswick (SNB) as Parcel Identifier (PID) Number 75140541 administered by the Department of Natural Resources. The specific location of Project facilities will be finalized during the feasibility study and reflected in the EIA Report.



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NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<b>Preliminary Locations and General Arrangement of Project Facilities (Employing Preferred Alternatives)</b> Sisson Project Napadogan, N.B.		Scale:	Project No.:	Data Sources:	Fig. No.:
		1:50,000	121810356	NBDNR SNB	2.1
Client:	Northcliff Resources Ltd.	Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:	
		11/5/2011	JAB	DLM	



The EIA Report will include a description of the explosives manufacturing facility and explosives magazines, as appropriate. The specified location of the various components of the facilities, with distances to vulnerable features including but not limited to dwellings, roads, camps, railways, and bodies of water, will be identified. It will be demonstrated that safety distances required by the Explosives Regulatory Division of Natural Resources Canada (NRCan) have been considered and met. Infrastructures for manufacturing or storing explosives will be identified, including but not limited to: explosives and magazines; fuel storage; ammonium nitrate storage; maintenance / wash area; process vehicles and their parking area; offices; warehouses; and buildings. Additional information provided will include: explosives at each facility, and fuel and ammonium nitrate storage plans. Storage of ammonium nitrate is to be in conformance with Explosives Regulatory Division guidelines. Liquid effluent disposal plans, evaluation of worst case scenario (*i.e.*, accidental explosion), spill contingency plans, and details on any temporary explosive facilities to be used during the Project start-up will be provided, giving the same information requirements above.

#### **2.2.1.1 Environmental Management System**

The EIA Report will describe a proposed Environmental Management System (EMS), and suite of Environmental Management Plans (EMPs), for the Project during all applicable phases. The EIA Report will include a commitment by the Proponent to implement the EMS and EMPs should the Project proceed. The EMPs will take into consideration input from Aboriginal groups, the public and other stakeholders and their finalization will occur through consultation with federal and provincial government agencies.

While it is expected that the EMS/EMPs will be finalized after the EIA is completed, it will be consistent with the information presented in the EIA Report. The EMS should include a proposed procedure for auditing the monitoring, reporting and regulatory requirements for the Project.

#### **2.2.1.2 Decommissioning and Reclamation Plan**

The EIA will provide a preliminary outline of a draft decommissioning, reclamation and closure plan for the Project. This will include ownership, transfer and control of the different Project components as well as the responsibility for monitoring and maintaining the integrity of any remaining structures or components of the Project that could result in future environmental effects. For permanent facilities, a conceptual discussion of how decommissioning might be carried out will be provided.

#### **2.2.2 Factors to be Considered in the EIA**

The factors to be considered in the EIA are described in this section. The scope of those factors (*i.e.*, the means by which each factor is to be addressed in the EIA) is described herein and in Chapter 4 of this TOR.

### 2.2.2.1 Provincial Environmental Impact Assessment

The factors to be considered in the EIA, as detailed in the NBENV Final Guidelines, include potential environmental effects of the Project on several VECs during all phases of the Project, including potential accidents, malfunctions, and unplanned events. These VECs are encompassed in the scope of factors to be considered in the EIA described in Chapter 4 of this TOR. General and specific mitigation, contingency and compensation measures that are technically and economically feasible will be described, as applicable and appropriate to avoid or minimize potentially significant adverse environmental effects. A follow-up program will be described in the EIA Report to verify the predictions of the EIA and/or the effectiveness of mitigation.

The EIA Report will describe existing conditions for each applicable VEC in detail. This will assist in the assessment of Project-related environmental effects as well as the assessment of cumulative environmental effects of the Project. The selection of other past, present and future projects that have been or will be carried out will be conducted in conjunction with the provincial TRC and the federal RAs.

An essential component of the EIA will be the implementation of an extensive consultation and engagement program to meet the requirements of the NBENV Final Guidelines. The planned program to be implemented as part of the EIA to meet the requirements of the NBENV Final Guidelines is described in Chapter 3 of this TOR.

The reader is referred to the full text of the NBENV Final Guidelines (NBENV 2009) for further specific details on the requirements for the EIA of the Project under the *Environmental Impact Assessment Regulation*. They are included as Appendix A to this TOR for convenience.

### 2.2.2.2 Federal Environmental Assessment

All environmental assessments conducted under *CEAA* require specific factors to be considered. Sections 16(1)(a) to 16(1)(d) of *CEAA* detail the mandatory factors to be considered within the scope of an EA conducted under *CEAA*, as follows:

- (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 this Act and the regulations;*

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

In addition, Section 16(1)(e) of *CEAA* establishes that additional factors can be considered if determined to be relevant by the federal RAs:

*(e) “any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to the project, that the responsible authority or, except in the case of a screening, the Minister after consulting with the responsible authority, may require to be considered.”*

As an additional factor to be considered under Section 16(1)(e) of *CEAA*, the EIA will consider the need for and alternatives to the Project, in accordance with the CEA Agency's Operational Policy Statement entitled “Addressing “Need for”, “Purpose of”, “Alternatives to” and “Alternative Means” under the *Canadian Environmental Assessment Act*” (CEA Agency 2007a).

It is noted that in addressing the NBENV Final Guidelines, the TOR includes several additional factors involving changes in the socio-economic environment that may arise as a result of a change in the environment as outlined in the definition of environmental effect provided in Section 2.1. The environmental effects of the Project on these VECs, particularly Labour and Economy, Community Services and Infrastructure, Land and Resource Use, and Transportation, and their related overlapping cumulative environmental effects, though described in this TOR to meet the requirements of the NBENV Final Guidelines, are additional to the requirements of an EA under *CEAA*.

Section 16(2) of *CEAA* requires consideration of the following additional mandatory factors as part of the EA of the scoped Project for a comprehensive study:

- (a) “the purpose of the project;*
- (b) alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;*
- (c) the need for, and the requirements of, any follow-up program in respect of the project; and*
- (d) 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.”*

Further details on the EIA approach to address the mandatory factors under Section 16(1) and 16(2) of *CEAA* are provided in Chapter 4 where the scope of these factors is outlined pursuant to Section 16(3).

### 2.2.2.3 Assessment of Project and Cumulative Environmental Effects

In accordance with the requirements of Section 16(1)(a) to (d) of *CEAA* and the NBENV Final Guidelines, the EIA Report will assess the environmental effects of the Project, including cumulative environmental effects, for each VEC for all phases of the Project, including the construction, operation, and decommissioning, reclamation and closure phases of the Project. The potential environmental effects of credible accidents, malfunctions, and unplanned events will also be assessed.

The significance of the residual Project environmental effects and residual cumulative environmental effects within defined boundaries for the assessment will be determined, in consideration of planned mitigation.

Comments from the public, stakeholders, and Aboriginal persons obtained through engagement activities described in Chapter 3 will be considered and addressed, where appropriate, in the assessment.

Section 16(1)(d) of *CEAA* requires that the EIA must consider “measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project”. In this light, general and specific mitigation, contingency and compensation measures that are technically and economically feasible will be described, as applicable and appropriate, to minimize the potential for significant adverse environmental effects. The precautionary principle as described in Section 4(2) of *CEAA* will be applied when developing mitigation, as applicable and appropriate, to avoid significant adverse environmental effects from the Project. Where applicable, a program of monitoring and follow-up initiatives regarding the environmental effects potentially resulting from the Project will be outlined in the EIA Report as applicable, to verify the predictions of the EIA and/or the effectiveness of mitigation.

It is important to note that the focus of the assessment will be based on potential residual environmental effects (*i.e.*, after taking into account well-known, commonly-applied effects avoidance, mitigation, compensation and management practices).

### 2.2.2.4 Consideration of Cumulative Environmental Effects

Section 16(1)(a) of *CEAA* requires that the “...*cumulative environmental effects of the Project in combination with other projects or activities that have been or will be carried out...*” must be assessed. To accomplish this, the Project Team will select other projects or activities that, when combined with the Project, may result in overlapping or cumulative environmental effects.

Pursuant to Section 16(3) of *CEAA*, the selection of other projects or activities, as cumulative environmental effects contributing projects or activities, will be based on the NBENV and Canadian Environmental Assessment Registry databases, and in consideration of other activities that are and will be carried out in the future (*e.g.*, forest resource harvesting, recreational land use). The selection of other projects or activities that have been or will be

carried out will be confirmed with the TRC. Future projects or activities will include those that are reasonably foreseeable as described in the CEA Agency's Operational Policy Statement entitled "Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*" (CEA Agency 2007b). Factors such as the proximity of another project to the Sisson Project, and the possibility of substantive overlapping environmental effects with the Sisson Project, will be considered. The selection of these projects will be based on:

- proximity to the Sisson Project (York or Carleton County);
- the possibility of overlapping environmental effects; and
- the likelihood of future projects being carried out (*i.e.*, they are reasonably foreseeable).

The activities that will be considered in the cumulative effects assessment will consist of:

- forest resource harvesting and processing;
- agriculture;
- mineral exploration and development;
- residential development (both rural and within incorporated areas like villages);
- recreational land use including campsites, angling, snowmobiling, and ATV riding;
- hunting, fishing, and trapping;
- current use of land and resources for traditional purposes by Aboriginal persons; and
- other land uses that may be identified through public, stakeholder and Aboriginal engagement, and a Traditional Use Study, if available.

#### **2.2.2.5 Need for the Project**

In accordance with the CEA Agency's Operational Policy Statement entitled "Addressing "Need for", "Purpose of", "Alternatives to" and "Alternative Means" under the *Canadian Environmental Assessment Act*" (CEA Agency 2007a), the EIA shall clearly describe the rationale or need for the Project. This description shall define the problem or opportunity the Project is intending to solve or satisfy. The EIA shall identify the main function of the Project. In this context, the EIA shall present the fundamental rationale for proceeding with the development at this time within the context of regional, provincial and national economies, as well as global implications of supply and demand on metal prices and markets. The "need for" the Project shall be established from the perspective of the Proponent and provide the context for the consideration of alternatives.

### 2.2.2.6 Alternatives to the Project

In accordance with the CEA Agency's Operational Policy Statement entitled "Addressing "Need for", "Purpose of", "Alternatives to" and "Alternative Means" under the *Canadian Environmental Assessment Act*" (CEA Agency 2007a), the EIA must include an analysis of alternatives to the Project; describing functionally different ways to achieve the Project's purpose.

The EIA 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.

This analysis must be done to a level of detail which is sufficient to allow the Agency, technical and regulatory agencies, the public and Aboriginal groups to compare the Project as proposed with its alternatives.

When assessing alternatives to the Project, the Proponent is encouraged to take into account the relations and interactions among various components of the ecosystem, including affected Aboriginal and other communities, and any adverse environmental effects on potential or established Aboriginal and treaty rights. Further, the Proponent is encouraged to demonstrate how the preferred alternative contributes to sustainable development.

### 2.2.2.7 Alternative Means of Carrying Out the Project

Alternative means of carrying out the Project, as required under Section 16(2)(b) of *CEAA* and in Section 3.3 of the NBENV Final Guidelines, were identified in the Project Description (Stantec 2011). In accordance with the CEA Agency's Operational Policy Statement entitled "Addressing "Need for", "Purpose of", "Alternatives to" and "Alternative Means" under the *Canadian Environmental Assessment Act*" (CEA Agency 2007a), the EIA Report will describe those alternative means of carrying out the Project that are technically and economically feasible, and will assess the environmental effects of those feasible alternatives. At a minimum, the discussion of alternative means of carrying out the Project shall include a consideration of the following:

- alternative locations for low grade ore stockpiling and waste rock storage;
- alternative locations for the tailings storage facility (TSF);
- alternative tailings management technologies that are proven and could be technically and economically implemented;

- alternative means and routes for transporting equipment, supplies and materials to the Project site, and for transporting mineral products to market;
- alternative routes for the electrical transmission line for the Project; and
- alternative options for reclamation and closure.

It is important to note that the Project location is fixed by the location of the ore body. Moreover, the ore body at the Project site is near surface, with only 8 to 10 m of overburden, so that underground mining is not a technically or economically feasible alternative. As noted in the Project Description (Stantec 2011), the only technically and economically feasible means of mining this ore body is with an open pit. Thus, in terms of location and method of mining, there are no technically or economically feasible alternative means of carrying out the Project, therefore alternative Project locations or mining methods will not be assessed in the EIA beyond the recognition of this fact.

With respect to the electrical transmission line, the New Brunswick System Operator (NBSO) will conduct a feasibility review and potentially a system impact study to determine the best means of supplying electrical power to the Project. Once this is completed, a route selection process will be conducted to identify the preferred route (and at least one feasible alternative route) for the electrical transmission line between the Project and existing tie-in points to the electrical grid, which will have been determined by NBSO through the feasibility review and/or system impact study. These processes and the associated route selection study will identify environmental, engineering and socio-economic constraints that must be considered in selecting the transmission line route, and will select a preferred route and at least one technically and economically feasible alternative. A broad 1 km-wide corridor will be selected, within which the preferred and one alternative route (approximately 100 m wide) will be sited based on a GIS-based constraint analysis and as confirmed by reconnaissance-level information as necessary. Environmental effects on key environmental constraints like rare plants and other environmentally sensitive features can be prevented by the avoidance and careful design. Reconnaissance-level field surveys will be conducted in the preferred route identified by the route selection study to ground-truth the GIS data used to select the preferred route, with detailed field work like archaeology and wetland delineation carried out in the process of finalizing the tower locations and in support of permitting. The information will be processed using geographic information systems (GIS) allow for integration of multiple spatially referenced datasets. The preferred route, and technically and economically feasible alternative route(s), will be assessed in the EIA.

#### **2.2.2.8 Follow-Up Programs**

Section 16(2)(c) of *CEAA* requires that a comprehensive study consider “*the need for, and the requirements of, any follow-up program in respect of the Project*”, and Section 38 of *CEAA* provides further direction and authority to RAs in the development and implementation of follow-up programs. Similarly, Section 2.6 of the NBENV Final Guidelines requires that the EIA Report

outline “a well-defined program of monitoring and follow-up initiatives regarding environmental effects resulting or potentially resulting from the proposed project”. It is noted that “follow-up program” is defined in *CEAA* as “a program for (a) verifying the accuracy of the environmental assessment of a project, or (b) determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project”. Though additional requirements may apply through the life of the Project to verify compliance with environmental legislation (e.g., compliance monitoring) or achieve other goals, these measures are not considered to be part of a formal follow-up program as defined *CEAA* and as required to be implemented by Section 38 of *CEAA*.

Irrespective of any compliance monitoring or operational requirements that are likely to arise as a result of federal or provincial regulatory requirements (e.g., *MMER*, provincial approval to operate), pursuant to Section 16(3), a follow-up program to meet Section 38 of *CEAA*, and Section 79 of the *Species at Risk Act*, as applicable, will be developed in the EIA report for each applicable VEC to verify the accuracy of the environmental effects predictions or to verify the effectiveness of mitigation. The follow-up program will follow the CEA Agency’s Operational Policy Statement entitled “Follow-Up Programs under the *Canadian Environmental Assessment Act*” (CEA Agency 2007c). The follow-up program will be described in sufficient detail to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted environmental effects (or absence of them), and to confirm both the EIA predictions and/or the effectiveness of mitigation. In addition, various other monitoring programs (e.g., EEM, compliance monitoring) will be developed by Northcliff to monitor environmental performance of the Project and to demonstrate compliance with legislation or authorizations/approvals/permits/licences issued thereunder. The follow-up program will be designed to incorporate baseline data, compliance data (such as established benchmarks, regulatory documents, standards or guidelines), and real time data (such as observed data gathered in the field). The reporting methods to be used, including reporting frequency, methods and format, will be described as they are applicable to achieve the objectives of follow-up as defined in *CEAA*.

The EIA Report will describe the basic elements and requirements for a follow-up and monitoring program during applicable phases of the Project, including post-closure, as well as for potential accidents, malfunctions, or unplanned events. The EIA Report will not necessarily provide a detailed design of these follow-up programs, but rather will describe Northcliff’s proposed approach to the management of follow-up programs, basic principles, and the process that it will employ for developing the specific details of the programs following EIA approval, to the greatest level of detail that is reasonable at the time of preparing the EIA Report. Where specific details are not known at the time of preparing the EIA Report, the process for developing those details progressively in parallel to or following the EIA will be described. This will include how the program will be implemented during the pre-construction, construction, operation, and decommissioning, reclamation and closure phases of the Project, and in consultation with the CEA Agency, the federal RAs, and NBENV.

The need for and objectives of the follow-up program, the specific components of the program and each activity under that component, and the spatial boundaries and temporal boundaries of the follow-up measures including the monitoring schedule, will be described to an appropriate level of detail for the EIA Report and with the specific details to be developed progressively in parallel to the various phases of the Project. The follow-up schedule, including duration and frequency, will be developed in consideration of the length of time needed to detect environmental effects given estimated baseline variability, likely magnitude of environmental effect, and desired level of confidence in the results. Follow-up measures will build upon existing conditions information prior to Project development (e.g., baseline conditions) and will be tailored in extent, duration, and frequency to monitor the environmental effects of the Project, including how they may change existing conditions over time and space. Statistical variation and evaluation of the follow-up program results will be considered as appropriate in the design of follow-up measures.

Follow-up programs provide an opportunity to monitor the implementation of commitments made as part of the public, stakeholder, and Aboriginal engagement process. Agencies may include conditions in authorizations, permits, contracts, leases or other binding documents regarding specific mitigation and follow-up measures for adverse environmental effects, and to accommodate for such effects on Aboriginal use of land or resources for traditional purposes.

Public, stakeholder and Aboriginal input can be incorporated into the EIA follow-up program and can be used to:

- verify predictions of environmental effects identified in the EIA;
- determine the effectiveness of mitigation and follow-up measures in order to modify or implement new measures where required;
- support the implementation of adaptive management measures to address previously unanticipated adverse environmental effects; and
- provide information on environmental effects, and mitigation and follow-up measures that can be used to improve and/or support future EAs and consultation processes, including cumulative effects assessments.

#### **2.2.2.9 Capacity of Renewable Resources That Are Likely to be Significantly Affected by the Project**

Section 16(2)(d) of *CEAA* requires that a comprehensive study consider “*the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future*”. A similar requirement is listed in Section 3.0 of the NBENV Final Guidelines.

If the environmental effects assessment determines that the Project will result in significant residual environmental effects that are likely to occur, the EIA Report will assess 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. In such a case, the EIA Report will identify those resources likely to be significantly affected by the Project, and describe how the Project could affect their sustainable use. The EIA Report will also identify any criteria used in considering sustainable use.

For the purpose of the EIA and pursuant to Section 16(3) of *CEAA*, sustainable use will be defined as the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of populations in the Central Uplands Ecoregion and the Valley Lowlands Ecoregion, thereby maintaining its potential to meet the needs of present and future generations. Renewable resources will be defined as those resources that are replenished through biogeochemical and physical cycles. Examples include organic renewable resources like plant and animal species, or inorganic renewable resources like water and certain gases like oxygen.

#### **2.2.2.10 Benefits to Canadians**

The Proponent should describe how Canadians benefit from the project planning and information gathering process undertaken by the Proponent as part of the environmental assessment. Factors to be considered may include the following.

- **Maximized environmental benefits:** Describe the environmental benefits created as a result of the project going through the EA process.
- **Contribution of the EA to support sustainable development:** Describe how the EA process for the Project contributed to the concept of sustainable development for a healthy environment and economy.
- **Public Participation:** Describe how public participation in the EA influenced the Project design and the environmental effects analysis.
- **Technological innovations:** Identify any new technologies that were developed to address environmental effects that could be used for other projects.
- **Increases in scientific knowledge:** Describe any new scientific information collected through the EA that could benefit the assessment of other projects.
- **Community and social benefits:** Describe any changes in Project design that resulted in indirect benefits to communities and/or social benefits (e.g., enhanced access to wilderness areas for recreation).

## 2.3 ENVIRONMENTAL ASSESSMENT METHODOLOGY

The methods that will be used to conduct the EIA of the Project are outlined in this section. The EIA will be completed following generally the methodological framework described by Barnes *et al.* (2000) to meet the requirements the *Canadian Environmental Assessment Act*. This approach is consistent with the requirements of the provincial EIA process. These methods are based on a structured approach that:

- considers the mandatory and discretionary factors under Section 16 of *CEAA*, following an integrated approach to the assessment of Project-related and cumulative environmental effects;
- focuses on issues of greatest concern;
- considers applicable federal and provincial regulatory requirements for the assessment of environmental effects as defined by the EIA Regulation and *CEAA*, with specific consideration of the requirements of the NBENV Final Guidelines for the EIA and the scope of the EA as defined by the CEA Agency;
- considers issues raised by the public, Aboriginal persons, and other stakeholders during consultation and engagement activities conducted; and
- integrates engineering design and programs for mitigation and monitoring into a comprehensive environmental planning and management process.

### 2.3.1 Overview of Approach

The environmental assessment methods address both Project-related and cumulative environmental effects. Project-related environmental effects are changes to the biophysical or human environment that will be caused by a project or activity arising solely as a result of the proposed principal works and activities associated with the Project. Cumulative environmental effects are changes to the biophysical or human environment that are caused by an action associated with the Project, in combination with other projects or activities that have been or will be carried out, including those that are reasonably foreseeable in accordance with the Operational Policy Statement (CEA Agency 2007b). The assessment of cumulative environmental effects will include the establishment of temporal and spatial boundaries following the guidance of the CEA Agency (“Cumulative Effects Assessment Practitioner’s Guide”, CEA Agency 1999). The environmental effects of past and present projects will be assessed through the establishment of current baseline conditions that reflect those cumulative environmental effects.

The environmental effects of the Project will be assessed for a range of valued environmental components (VECs) that are elements of the biophysical, social, cultural, and economic environments. The benefits of the Project will also be identified and considered in this process.

Project-related environmental effects and cumulative environmental effects are assessed using a standardized methodological framework for each VEC, with standard tables and matrices used to facilitate and document details of the evaluation. The residual Project-related environmental effects (*i.e.*, after mitigation has been applied) are characterized using specific criteria (*e.g.*, direction, magnitude, geographic extent, duration, frequency, and reversibility) that are specifically defined for each VEC. The significance of the Project-related environmental effects is then determined based on pre-defined criteria or thresholds (also called significance criteria).

If there is overlap between the Project environmental effects and the environmental effects of other projects or activities that have been or will be carried out, cumulative environmental effects of the Project in combination with those other projects or activities are assessed to determine if the cumulative environmental effects could be significant, and to consider the contribution of the Project to them.

The environmental effects assessment approach used in this EIA is shown graphically in Figure 2.2. The environmental assessment methodology involves the following generalized steps.

- **Scoping of the Assessment** – Scoping of the assessment includes the selection of VEC and the rationale for its selection; influence of consultation and engagement on the scoping of the VEC; selection of the environmental effect(s); description of measurable parameters; description of temporal, spatial (assessment area), administrative, and technical boundaries; and identification of the standards or thresholds proposed to determine the significance of environmental effects. This step relies upon the scoping undertaken by regulatory authorities; consideration of the input of the public, stakeholders, and Aboriginal peoples (as applicable); and the professional judgment of the Study Team.
- **Existing Conditions** – Existing (baseline) environmental conditions are established for the VEC. In many cases, existing conditions expressly or implicitly include those environmental effects that may be or may have been caused by other past or present projects or activities that have been or are being carried out.
- **Assessment** – An assessment of Project-related environmental effects, and any overlapping cumulative environmental effects, is made. A determination of significance is then made in consideration of the identified significance criteria. These are further described as follows.
  - **Assessment of Project-Related Environmental Effects** – Project-related environmental effects are assessed. The assessment includes descriptions how the Project will interact with the environment; the standard good practices and procedures (SGPP), and planned mitigation and environmental protection measures to reduce or eliminate the environmental effect; and the characterization of the

residual environmental effects of the Project. The focus is on residual environmental effects, *i.e.*, the environmental effects that remain after SGPP and planned protection and mitigation measures have been applied. All mandatory and additional factors under Section 16(1) and 16(2) of *CEAA* are assessed for all phases of the Project (*i.e.*, the construction, operation, and decommissioning, reclamation and closure phases of the Project) as scoped in this TOR, as well as for accidents, malfunctions, and unplanned events. The assessment also considers the effects of the environment on the Project.

- **Assessment of Cumulative Environmental Effects** – Cumulative environmental effects of the Project are identified in consideration of other projects or activities that have been or will be carried out (as reflected in baseline conditions and for reasonably foreseeable projects or activities), for all phases of the Project (*i.e.*, construction, operation, and decommissioning, reclamation and closure). An assessment of potential interactions is completed to determine if an assessment of cumulative environmental effects is required (*i.e.*, there is potential for interaction) for that specific Project-related environmental effect that overlaps with those of other projects or activities that have been or will be carried out. The residual cumulative environmental effects of the Project in combination with other projects or activities that have been or will be carried out are then evaluated, including the contribution of the Project to those cumulative environmental effects.
- **Determination of Significance** – The significance of residual Project-related environmental effects and residual cumulative environmental effects is then determined, based on significance criteria defined for each VEC in this TOR.
- **Follow-up** – Follow-up measures that are required to verify the environmental effects predictions or to assess the effectiveness of the planned mitigation are described, where applicable. Other monitoring (*e.g.*, compliance monitoring) may also be described, as applicable and appropriate.

Further details on these environmental assessment methods will be provided in the EIA Report.

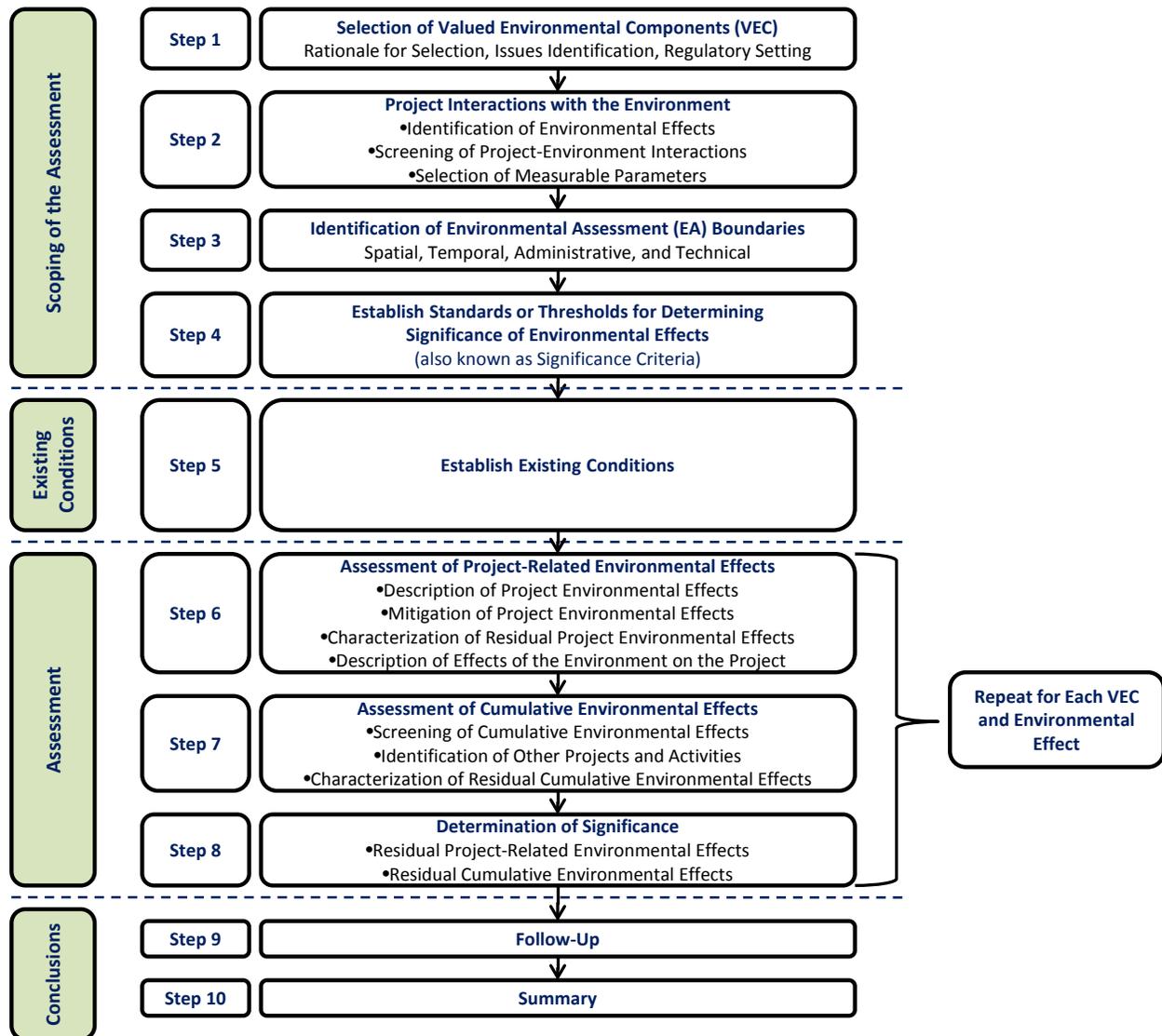


Figure 2.2 Summary of EIA Methodology

### 3.0 PUBLIC, STAKEHOLDER, AND ABORIGINAL ENGAGEMENT

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A key requirement of any EIA process is to conduct comprehensive public, stakeholder, and Aboriginal engagement. The goals of such engagement are to inform such parties about the Project, to assist in the identification of key issues and concerns in respect of the Project, to obtain information that may assist in carrying out baseline or predictive studies for the EIA, to collect information in respect of the current use of land and resources for traditional purposes by Aboriginal persons, and to ensure that sufficient information in respect of the Project is available to neighbours, stakeholders, and the general public. There are additional objectives around the development of support for the Project in the community and with governments.

The NBENV Final Guidelines for the EIA of the Project specifically require that Geodex, now Northcliff:

*“...must consult with persons and organizations potentially affected by the proposed project and associated infrastructure, and must inform and engage any interested individuals, groups, stakeholders, local hunters and trappers, recreational users, affected communities, and Aboriginal communities in this assessment. This will include local governments and specific groups with mandates/initiatives in this area. The stakeholder consultation program is to be reviewed and accepted in the early stages of the study (e.g., at the TOR stage).”*

Additionally, Section 16(1)(c) *CEAA* requires that the EA must consider comments from the public received in relation to EA, and Section 21.2 of *CEAA* requires that the public is provided with an opportunity to participate in the comprehensive study. The Program described here outlines how the public, stakeholders and Aboriginal peoples will be consulted and engaged. The scope of the assessment pursuant to Section 16(3) respecting consultation and engagement is as described in this section. Northcliff will consider the input of the public, stakeholders and Aboriginal peoples in the EA, and evidence of how such input was considered will be provided in the EIA Report.

#### 3.1 OVERALL OBJECTIVES

The objectives of the engagement program implemented as part of the EIA for the Project are to:

- provide information and seek input from members of the general public, Aboriginal peoples, stakeholders and interested parties on the Project;
- identify, document, and monitor issues and concerns arising from the engagement process;

- request information on the current use of lands and resources for traditional purposes by Aboriginal persons and how those activities might be affected by the Project; and
- identify the need for planning, design and management measures that will mitigate or resolve the issues raised through the public, stakeholder and Aboriginal engagement process.

### **3.2 PUBLIC, STAKEHOLDER, AND ABORIGINAL ENGAGEMENT BY NORTHCLIFF**

#### **3.2.1 Public and Stakeholder Engagement by Northcliff**

The public and stakeholder engagement to be implemented by Northcliff throughout the Project will contribute, through constructive dialogue, to the development and implementation of a Project, meet regulatory public consultation requirements, and inform the Crown's duty to consult process. The public and stakeholder engagement to be implemented by Northcliff throughout the Project does not exclude Aboriginal peoples. However they will also have a focused engagement program described below. Northcliff is committed to:

- consider the input and interests of the public and stakeholders in the planning phase of the Project, particularly with communities and stakeholders whose interests may be affected;
- communicate openly, and act with honesty and integrity;
- listen closely to public / stakeholder concerns and perspectives;
- build trust, respect and constructive relationships through responsible performance from the outset and with a long-term orientation;
- share information early and often, to a level of detail and completeness that will assist all interests to prepare and to act knowledgeably;
- provide early and adequate notice of opportunities for involvement;
- provide opportunities for information exchange and mutual education about interests, objectives and values in an open, transparent, and responsive manner;
- satisfy all regulatory expectations and requirements for public engagement and consultation; and
- positively affect the Project timeline through the development of good relationships with stakeholders.

### 3.2.1.1 Key Stakeholders Identification

A list of stakeholders has been developed to identify persons and organizations potentially affected by the Project. The stakeholder list includes interested members of the public (e.g., residents of the surrounding communities, local hunters and trappers, recreational users), individuals holding tenure such as Crown land leases within the Project development area, interest groups including the Canadian Rivers Institute (CRI), Nashwaak Watershed Association Inc. (NWA), Atlantic Salmon Federation, the New Brunswick Trappers and Fur Harvester's Federation, the Professional Guide Outfitter Association, the Conservation Council of New Brunswick, local service district representatives, and elected members and officials at all levels of government. First Nations and those representing Aboriginal interests are discussed in the next section. The stakeholder list is considered a 'living document' and will be updated on an ongoing basis as interested parties are identified.

Contact with some key organizations has already been made to gather stakeholder information and organizational profiles, as well as to inform key stakeholders of the Project and ask about their level of interest to engage in the consultation process. Identified stakeholders will be invited to become involved through a spectrum of engagement opportunities including public open houses and/or technical workshops, and some may be asked to participate in one-on-one interviews. Early indications are that there is a high level of interest in being informed and involved in ongoing engagement opportunities. Stakeholders have been, and will be, asked in which way they would prefer to be engaged, and requests will be accommodated to a reasonable extent (e.g., having individual meetings with concerned groups, accepting written submissions). Northcliff will canvass known stakeholders about other interested parties who should be similarly contacted. A stakeholder and engagement database will be maintained to keep a record of individual stakeholders, affiliations, and contact information, preferred method of contact, and dates and methods of all communications.

### 3.2.1.2 Planned Engagement Methods

Northcliff is committed to carrying out a comprehensive consultation program as the Project moves forward. Consultation initiatives being considered for the Project include, but are not limited to:

- presentations to and meetings with stakeholder groups;
- meetings with local residents;
- public open house(s);
- technical workshops;
- information office in Stanley; and

- development and distribution of Project information through newsletters and via a Project website.

Comments received from the public and from stakeholders will be considered in the final Project design and in EA. The consultation program will continue throughout the course of the EA and will continue through the life of the Project.

The primary means by which Northcliff may consult with the public as part of the EIA are described below.

#### **3.2.1.2.1 Open Houses and Public Information Sessions**

As a minimum, open houses or public information sessions will be held to share information and gather public input about the Project.

The open house and/or public information session will provide a venue for the public, stakeholders and Aboriginal peoples, to learn more about the Project, and ask questions or raise concerns with the Project team in one-on-one or casual small group conversations in an open and unstructured multi-hour setting. Display boards will feature Project information, including design and layout of Project components (where available), summaries of scoping and methodology being used for the Project, summaries of issues raised to date, key findings of the technical studies being undertaken to support the EIA Report, as well as diagrams and maps to guide the discussion. Handouts (brochures, leaflets, technical summaries) with relevant information will be available at each session.

The open houses or public information sessions will be advertised on the Project website, in local media, and at public areas (e.g., local municipal offices, corner stores).

#### **3.2.1.2.2 Formal Meetings**

The New Brunswick *Environmental Impact Assessment Regulation* requires that at least one public meeting be held at the completion of a Comprehensive Review. The purpose of this meeting, which occurs following the public release of the EIA Report, is to provide all interested parties with an opportunity to make comments, raise concerns, or ask questions for clarification about any matter covered in the EIA Report. Such meetings are often chaired by an independent panel appointed by the New Brunswick Minister of Environment. This independent panel administers the meeting and coordinates the public input process.

Northcliff would welcome the opportunity to attend the public meeting and will make its EIA team available to participate in any manner deemed appropriate by the regulatory authorities and independent panel.

### **3.2.1.2.3 Stakeholder Workshops and Targeted Discussions**

In order to discuss some specific aspects of the Project which are of particular interest to stakeholders, it may be more meaningful to meet one-on-one with some stakeholder groups. One-on-one discussions, including conference calls, may also be planned with environmental non-governmental organizations, municipal councils, local service district organizations and special interest groups at their request. To the extent possible and reasonable, Northcliff will endeavour to make Project team members available to discuss the Project upon requests by stakeholders. These meetings will continue throughout the life of the Project to gather relevant information and to share available Project information.

Technical workshops may be scheduled on specific topics on an as required basis, should there be a demand from the public or other stakeholders. These are envisioned to be smaller group gatherings in order to facilitate meaningful dialogue, and understanding, on specific issues of interest to stakeholders. Where possible, these additional workshops will be scheduled in concert with other planned public events (e.g., planned open houses) to take advantage of synergies and economics that would result from combining events.

### **3.2.1.2.4 Information (“Store Front”) Office in Stanley**

A store front, or community office, will be open in Stanley, as a minimum, throughout the planning and assessment phase of the Project. This office will be equipped with information about the project as well as general information about the mine development process. The office will be operated on a part-time basis at times when the local public can access a company representative to discuss the project and seek responses to questions.

### **3.2.1.2.5 Information Materials and Sources**

The flow of information from Northcliff to the public will continue through face-to-face and telephone conversations, email, media releases, print advertisements, information brochures, and website announcements and postings. When important Project developments come to light, the public will receive notification and additional information as required. Lines of communication, including normal mail and email addresses of key Northcliff representatives, will remain open to receive comments, questions and concerns, and to provide responses.

Print media, including information sheets, brochures and newspaper announcements will be distributed within the local communities and to key stakeholders at various stages of the Project. These media will contain information about upcoming events, information about the Project and contact information.

A website dedicated to the Sisson Project will be developed to provide up-to-date information concerning the Project. Visitors can access among other resources, media releases made to date, a schedule of upcoming events, information about the Project, a copy of the supporting

documents prepared to date and contact information. This site will be updated as new information becomes available. This TOR will be added to the website at the appropriate time.

Audio media, such as radio announcements and television advertisements are being considered to inform stakeholders, the public and Aboriginal peoples of the Project and upcoming events. These advertisements will be carried on local stations.

#### **3.2.1.2.6 Tracking and Responding to Issues of Concern**

The Project Team will be careful to ensure that all issues, communications, conversations and concerns are documented during consultation and engagement activities. Concerns and issues will be discussed within the Project team to ensure they are fully considered in the Project planning, design and assessment. Issues and discussions with stakeholders will be recorded and tracked in a stakeholder engagement database.

#### **3.2.1.2.7 Key Milestones for Engagement**

It is not possible to accurately identify the precise timing of the consultation and engagement activities at this stage of the Project because they are contingent upon key milestones in the preparation of Project assessment materials and the timing of government review and permitting and licensing activities. Therefore, engagement activities will be held in coordination with key milestones and other aspects of the EIA and permitting processes. The type of engagement activity applied during each stage will depend on the level of information collected at each stage and whether the objective of the engagement is to seek input or merely to share information. The key milestones at which engagement activities are likely to take place may include:

- following the filing of the Project Description for the purpose of initiating the EIA under *CEAA*, as well as following the public release of this TOR;
- following the completion of the baseline environmental studies;
- during the preparation of the EIA Report for the Project;
- during the public review period for the draft EIA Report; and
- prior to the formal public meeting that will be held by the New Brunswick Minister of Environment in compliance with Section 13 of the EIA Regulation.

### **3.2.2 Aboriginal Engagement by Northcliff**

#### **3.2.2.1 Approach to Aboriginal Engagement**

As part of an EA under *CEAA*, potentially affected Aboriginal peoples should be afforded the opportunity to participate in the EIA so that any changes that the Project may cause in the environment can be identified and the resulting environmental effects of such changes on the

current use of land and resources for traditional purposes by Aboriginal persons can be assessed. Northcliff will engage with Aboriginal peoples that may be affected by the Project to determine current use, and to document any asserted or established Aboriginal or treaty rights as conveyed to it by Aboriginal peoples for the purposes of the EIA so that the provincial and federal governments can be informed of such use and assertions in fulfilling its duty to consult (and accommodate, as required) with Aboriginal peoples. It is expected that such engagement will continue through the Project life.

In conducting the EIA, Northcliff will provide Aboriginal peoples with access to the information that they require in respect of the Project and seek to obtain any comments, questions or concerns regarding the Project from Aboriginal peoples so that such comments, questions, or concerns can be considered and dealt with as appropriate. Northcliff will provide up-to-date information describing the Project to the potentially affected Aboriginal peoples, and especially to First Nations, particularly those proximal to the Project. Northcliff will also involve First Nations and 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), as applicable.

To meet these requirements, a key objective of Northcliff's Aboriginal engagement strategy is to seek opportunities to provide Project information to, and seek input from, potentially affected First Nations, particularly those proximal to the Project, throughout the planning and assessment process. Discussions with the First Nations and Aboriginal umbrella organizations (i.e., Assembly of First Nations Chiefs in New Brunswick, Aboriginal Workforce Development Initiative, Maliseet Nation Conservation Council, and St. John River Valley Tribal Council) have begun and will continue throughout the EIA process under the advisement of and in consideration of the wishes of the Chiefs, their councils and communities. Initial meetings with representatives of the Assembly of First Nations Chiefs in New Brunswick (AFNCNB) identified AFNCNB as the key point of contact for consultation with some First Nations in New Brunswick. Preliminary meetings with Woodstock and St. Mary's communities have established that they will represent their own interests in discussions about the Project with Northcliff.

Northcliff is particularly interested in, and committed to, engaging First Nations proximal to the Project directly as well as through AFNCNB or other representative assemblies delegated by Chiefs and councils of communities with interests in the Project area.

Engagement activities contemplated for First Nations include face to face meetings with Chiefs and councils, community open houses, community newsletters and other means deemed appropriate by council and community employees.

The information collected during this engagement provides valuable insight about Aboriginal traditional uses, knowledge, community interests and concerns about the Project.

### **3.2.2.2 Traditional and Local Knowledge**

Section 16.1 of *CEAA* states that “*community knowledge and aboriginal traditional knowledge may be considered in conducting an EA*”, and the definition of an environmental effect in *CEAA* addresses the current use of land and resources for traditional purposes by Aboriginal persons. Traditional and local knowledge refers to the broad base of knowledge held by individuals and by communities that may be based on 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 can be a useful and important contributor to an EIA, and in combination with other information sources, is valuable in achieving a better understanding of potential environmental 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 environmental effects and their significance, the effectiveness of proposed mitigation and/or compensation, cumulative environmental effects, and the consideration of follow-up programs.

Certain issues relevant to the review process are grounded in traditional and local knowledge, such as harvesting, land use, physical and cultural 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 EIA will facilitate, where relevant, the contribution of traditional and local knowledge to the review process, where appropriate. It is recognized that approaches to traditional and local knowledge, customs and protocols may differ among communities and persons with respect to the use, management and protection of this knowledge. Where applicable and available, Northcliff will incorporate into the EIA 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. Agreement from Aboriginal groups regarding the use, management and protection of their existing traditional knowledge information during the EIA and post-EIA will be obtained as required.

It is expected that the CEA Agency and NBENV will consider the views of First Nations, Aboriginal groups and traditional and local knowledge holders during the comprehensive study review process.

### **3.2.3 Engagement Initiatives Conducted To date**

#### **3.2.3.1 Issues Raised by Stakeholders**

Prior to registration of the Project, public information sessions were held by Geodex in April 2008. These were preliminary meetings only held with the objective of introducing the

proposed project to the public in surrounding communities. The public sessions were held in the nearby surrounding communities of Juniper, Stanley, Boiestown, Burtts Corner, and Fredericton North. Most recently, Northcliff conducted open houses in September 2011 in the communities of Juniper, Millville and Stanley, to provide an update on the Project to the public and introduce them to the TOR and proposed studies to be carried out in support of the EIA.

Northcliff has also held meetings with various stakeholders and community members to share information about the Project and to collect comments, questions and concerns, for future reference and consideration. Stakeholder and community groups consulted to date include, but are not limited to: Canadian Rivers Institute, Conservation Council of New Brunswick, Atlantic Salmon Council, Nashwaak Watershed Association Inc., Taymouth Community Association, New Brunswick Guide Outfitter Association, and New Brunswick Trappers and Fur Harvesters Federation. Engagement of these and other groups will continue throughout the EIA.

A summary of the principal comments that have been raised as part of the public communication and engagement efforts conducted to date is provided in Table 3.1. Importantly, it is noted that this listing is not all-inclusive.

**Table 3.1 Summary of Principal Comments Received**

Valued Environmental Component (VEC) / Topic	Comments
Atmospheric Environment	<ul style="list-style-type: none"> <li>• Will there be dust produced, and what is the quality of the dust?</li> <li>• How will blasting change air quality?</li> </ul>
Acoustic Environment	<ul style="list-style-type: none"> <li>• How far from the site will we hear the blasting?</li> </ul>
Water Resources	<ul style="list-style-type: none"> <li>• How will water quality in the area be affected?</li> <li>• How will groundwater be affected by the Project?</li> <li>• How much water is required to operate the facility?</li> </ul>
Public Health and Safety	<ul style="list-style-type: none"> <li>• What are the risks to local communities and the public?</li> <li>• What chemicals will be used and stored on site?</li> <li>• Will the dust generated by blasting be toxic?</li> <li>• What are the human health risks of mining tungsten and molybdenum?</li> </ul>
Aquatic Environment	<ul style="list-style-type: none"> <li>• Will there be acid rock drainage that will contaminate local streams?</li> <li>• How will the lakes in the area be affected by discharges from Project facilities?</li> <li>• Will waterways be re-routed?</li> <li>• How will Atlantic salmon and other fish species and their habitats be affected by the project?</li> </ul>
Terrestrial Environment	<ul style="list-style-type: none"> <li>• How big an area will be disturbed by the Project?</li> <li>• How deep will the pit be?</li> <li>• How will wildlife, specifically those species that are important for hunting and trapping, be affected?</li> </ul>
Environmental Incidents and Mine Closure	<ul style="list-style-type: none"> <li>• How will the company handle any catastrophic incidents?</li> <li>• What happens after mining? Who will fund closure and post-closure monitoring?</li> <li>• How long will Northcliff be responsible for wastes generated at the mine?</li> </ul>
Labour and Economy	<ul style="list-style-type: none"> <li>• Will there be local employment or contracting opportunities?</li> <li>• What is the value of the mine, e.g., market value?</li> </ul>

**Table 3.1 Summary of Principal Comments Received**

Valued Environmental Component (VEC) / Topic	Comments
Land and Resource Use	<ul style="list-style-type: none"> <li>• Will there be a “camp” onsite?</li> <li>• How close will the mine be to residential dwellings?</li> <li>• Will campsite leases be withdrawn by the province to accommodate the Project?</li> <li>• How much waste rock will be generated?</li> <li>• Where will waste rock be stored?</li> </ul>
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	<ul style="list-style-type: none"> <li>• The Project is in Maliseet traditional territory and the area is important for traditional hunting, fishing, trapping, and gathering activities by Aboriginal persons. How will those uses be affected?</li> </ul>
Heritage Resources	<ul style="list-style-type: none"> <li>• What will happen if you find Aboriginal or other historic artifacts?</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• What transport routes will use to and from the mine?</li> <li>• Will concentrate be shipped by rail or road?</li> <li>• Who will maintain the existing road infrastructure?</li> </ul>
Effects of the Environment on the Project	<ul style="list-style-type: none"> <li>• Will there be an emergency plan prepared for natural disasters such as earthquakes?</li> </ul>

It is noted that the issues described above were raised at both Geodex’s and Northcliff’s meetings with stakeholders. Meetings between Northcliff and stakeholders have confirmed that these remain issues of interest to stakeholders. These issues and others raised during the public engagement process will be considered in the Project design and the EIA.

**3.2.3.2 Issues Raised by Aboriginal Peoples**

Geodex initiated communication with New Brunswick First Nations and their representatives as part of the provincial EIA process, starting in 2008. Early discussions with the Chiefs of the Maliseet communities and the Natural Resources Committee of the Union of New Brunswick Indians (UNBI) were held by Geodex in the spring of 2008 following the EIA Registration and the issuance of the NBENV Final Guidelines on March 1, 2009.

Aboriginal engagement by Northcliff will build upon this initial communication and will continue throughout the course of the EA. Initial engagement of the Maliseet Nations by Northcliff at Oromocto, St. Mary’s, Kingsclear, Woodstock and Tobique, began in 2010 with a letter being sent to each of the Chiefs and Councils. The letters informed the Chiefs and Councils about the Project, and introduced Northcliff as the proponent of the Project.

More recently, Northcliff initiated discussions about the Project with the Assembly of First Nations Chiefs in New Brunswick (AFNCNB), Woodstock and St. Mary’s First Nations, and the Maliseet Nation Conservation Council. Northcliff has also made efforts to contact other Maliseet First Nations and the Chiefs of Kingsclear, Tobique, and Oromocto. Meetings have been held with the AFNCNB and its technical committee, the Maliseet Nation Conservation Council, the

St. John River Valley Tribal Council Chiefs and the Chief and Council of the Woodstock and St. Mary's First Nation to introduce Northcliff and the Project. Interests and concerns raised at these meetings have focused on potential environmental impacts and management, employment and economic opportunities, and effects on Aboriginal traditional uses of the area, such as hunting and fishing. Northcliff will seek details and clarification of interests and concerns through ongoing engagement and Aboriginal Traditional Use Studies.

Northcliff will follow the guidance of the Chiefs and their Councils with respect to how to best engage their communities. The information collected as part of such engagement will be reflected in the EIA. Northcliff will seek Aboriginal support in conducting an Aboriginal Traditional Use Study that will contribute to understanding potential effects on current use of land and resources for traditional purposes by Aboriginal persons. Northcliff will work with the Province of New Brunswick and the Government of Canada to improve understanding of Aboriginal interests regarding the Project, to assist the Crown in fulfilling its duty to consult requirements.

### **3.3 PUBLIC, STAKEHOLDER, AND ABORIGINAL ENGAGEMENT BY THE PROVINCIAL AND FEDERAL GOVERNMENTS**

In concert with the public, stakeholder and Aboriginal engagement activities to be undertaken by Northcliff, both the provincial and federal governments will engage the public, stakeholders, and consult with Aboriginal peoples in the course of exercising their respective regulatory mandates regarding the Project. A brief description of those consultation and engagement activities planned by governments is provided in this section.

#### **3.3.1 Public Participation**

##### **3.3.1.1 Provincial**

The New Brunswick EIA process affords various opportunities for the public to participate in the EIA of a development project. Generally speaking, as outlined in the NBENV Final Guidelines issued for the EIA, the proponent of a project is delegated the responsibility for sharing Project and assessment information and engage in meaningful discussion with the public, stakeholders, and Aboriginal communities to understand interests and concerns and in order to consider them in the assessment. In addition to the proponent-led consultation described above and required as part of the NBENV Final Guidelines, the NBENV is required to provide the following opportunities for public, stakeholder and Aboriginal input into an EIA:

- the proponent is required through the provincial EIA guide to notify the public that the project has been registered, and to make available copies of the registration documentation for public viewing and comment;
- the NBENV maintains a public register of all EIA registrations (required under Section 7(1) of the EIA Regulation) and makes this register available on its website;

- if a comprehensive review is required, the NBENV issues a news release to this effect and invites the public and stakeholders to participate in the EIA;
- Draft Guidelines are provided to the public for a minimum 30-day public comment period (required under Section 9(1) of the EIA Regulation), after which Final Guidelines are issued to the proponent that consider the public input received;
- the proponent is required to prepare TOR for the EIA to meet the requirements of the NBENV Final Guidelines and, after the TOR have been evaluated by government, to provide the public, stakeholders and the Aboriginal community with a meaningful opportunity to review and comment on the TOR;
- following acceptance of the EIA Report, a summary of the report is prepared and released to the public along with an announcement of a public meeting to be held and inviting the public to comment on the report (required under Sections 12(2) and 13 of the EIA Regulation);
- a formal public meeting, chaired by NBENV, is held to gather public input in respect of the EIA Report (required under Section 14 of the EIA Regulation); and
- a final 15 day public comment period is provided following the public meeting, and a summary of public participation is prepared and released to the public (required under Section 15 of the EIA Regulation).

In addition, the NBENV and/or members of the TRC may participate in public events held by the Proponent.

### **3.3.1.2 Federal**

Public participation in a comprehensive study is mandatory under *CEAA*. The EA is officially commenced by a “Notice of Commencement”, published by the CEA Agency within 90 days following acceptance of a Project Description submitted by a proponent, thereby initiating the “scoping” phase of the EA. For the Sisson Project, the Project Description was accepted on April 26, 2011. The comprehensive study process for the Project will include at least three distinct opportunities for the public to participate in the EA:

- within 10 days following the Notice of Commencement, the terms of reference for the EA are released to the public for comment (required under Section 21.1(1) of *CEAA*) and public comment period is initiated on the terms of reference, the Project itself, and the conduct of the comprehensive study;
- the public is given the opportunity to comment on the environmental assessment following the public release of the EIA Report (required under Section 21.2 of *CEAA*); and

- during the comment period upon completion of the comprehensive study report (CSR), which is prepared by the CEA Agency with support from the RAs and FAs based on the EIA Report (required under Sections 22(1) and 22(2) of *CEAA*).

In addition, the CEA Agency and/or the RAs may participate in public events held by the Proponent.

As required by *CEAA*, once the Notice of Commencement is issued, the Sisson Project will be listed on the Canadian Environmental Assessment Registry (CEAR) Internet Site. Key EA documents will be available on this internet site.

To facilitate and encourage public participation in the EA, the Government of Canada will also make funds available under its Participant Funding Program, administered by the CEA Agency.

### **3.3.2 Aboriginal Consultation**

#### **3.3.2.1 Duty to Consult**

When the Government of Canada or the Province of New Brunswick contemplates conduct that may potentially adversely affect established or potential Aboriginal and treaty rights, it has a legal duty to consult Aboriginal peoples before making a decision to proceed with the proposed conduct. The Supreme Court of Canada has held in several decisions that the Crown has a duty to consult with, and if applicable, accommodate Aboriginal peoples if the Crown has knowledge of real or asserted Aboriginal or treaty rights and it exercises a power, duty or function that may adversely affect such rights. The Government of Canada's policy and procedures with respect to this obligation are set forth in its publication entitled "Aboriginal Consultation and Accommodation - Updated Guidelines for Federal Officials to Fulfill the Duty to Consult, March 2011 (INAC 2011). These guidelines form the basis for the Government's actions in the evaluation of the existence of asserted rights, current traditional use, and the strength of any claim in relation to the Project.

In addition to the Crown's broader obligations, *CEAA* requires that all federal EAs consider the effect of any change in the environment caused by the Project, as well the effect of that change on current use of land and resources for traditional purposes by Aboriginal persons. The Act also requires consideration of the effect of any Project-induced change in the environment on physical and cultural heritage, as well as any structure, site or thing that is of historical or archaeological significance, such as sites historically occupied by Aboriginal peoples.

To assist the federal and provincial governments in their consultation processes, the EIA Report must describe the concerns raised by Aboriginal peoples in respect of the Project, and where applicable, how they have been or will be considered and where appropriate addressed. That description should include a summary of discussions, the issues or concerns raised, and should identify any asserted or established Aboriginal and treaty rights as conveyed to Northcliff by Aboriginal peoples or the Crown. Where applicable, the EIA Report must document any

significant adverse environmental effects of the Project on the current use of land and resources for traditional purposes by Aboriginal persons as well as any measures taken or recommended that would prevent, mitigate, or otherwise accommodate such environmental effects, as applicable. This information will be then used by governments towards fulfilling any duty to consult Aboriginal peoples regarding the Project.

### **3.3.2.2 Aboriginal Consultation Activities to be Undertaken by Governments**

In addition to proponent-involved Aboriginal engagement, the provincial and federal governments may undertake additional engagement activities directly with Aboriginal peoples regarding the Project.

The CEA Agency administers the Aboriginal Funding Envelope under the Participant Funding Program that supports Aboriginal groups engaged in consultation activities on projects that are undergoing a federal environmental assessment under *CEAA*.

## 4.0 SCOPE OF FACTORS TO BE CONSIDERED IN THE EIA

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The scope of factors to be considered in the EIA of the Project is detailed in this section as it relates to valued environmental components (VECs) to comply with the requirements of the NBENV Final Guidelines for the provincial EIA for the Project, and of a federal EA according to Sections 16(1) to 16(3) of *CEAA*.

The environmental effects assessment in the EIA will be organized around VECs and the factors they encompass. For each VEC, a work plan to meet the requirements of the NBENV Final Guidelines and Sections 16(1) and 16(2) of *CEAA*, as applicable, is provided in this section of the TOR. Specifically, key project-environment interactions are identified, assessment boundaries and significance criteria are defined, and work plans to characterize existing conditions and to carry out the environmental effects assessment are described. These work plans specify the scope and detail of baseline and predictive studies required so that a comprehensive assessment of the residual environmental effects of the Project (including cumulative environmental effects and alternative means of carrying out the Project) can be carried out, and so that the Project can be planned, designed, managed, and carried out in an environmentally responsible manner. As such, the focus of the assessment, and the work plans that will inform its conduct, will be based on potential residual environmental effects; that is, after taking into account well-known, commonly-applied effects avoidance, mitigation, compensation and management practices as described in the Project Description. In so doing, the work plans address key issues of concern, as defined in the NBENV Final Guidelines and as raised by stakeholders, according to a scope and depth appropriate to ensuring that the Project is designed, planned, permitted, constructed, operated, and closed at the end of mine life in ways that meet Northcliff's "Principles of Responsible Mineral Development" and satisfy government permitting standards.

As mentioned above, part of the EIA process requires the selection of a list of environmental components that are considered "valued" (ecologically, socially, economically, culturally and/or scientifically) and thus of interest when considering the potential environmental effects of a project. The VECs selected for this Project were based on the NBENV Final Guidelines and the requirements of *CEAA*; input from the public, stakeholders, and Aboriginal peoples; and the professional judgment of the study team. The VECs will focus on the following factors as shown in Table 4.1, and as such represent the factors to be considered pursuant to Sections 16(1) and 16(2) of *CEAA*.

**Table 4.1 Factors to be Considered for each Valued Environmental Component**

Valued Environmental Component	Factors to be Considered
Atmospheric Environment	<ul style="list-style-type: none"> <li>• Change in Climate (greenhouse gas emissions)</li> <li>• Change in Air Quality</li> </ul>
Acoustic Environment	<ul style="list-style-type: none"> <li>• Change in Sound Quality (sound and vibration)</li> </ul>
Water Resources	<ul style="list-style-type: none"> <li>• Change in Water Quality</li> <li>• Change in Water Quantity (groundwater and surface water)</li> </ul>
Public Health and Safety	<ul style="list-style-type: none"> <li>• Change in Public Health (human health and ecological risks)</li> <li>• Change in Public Safety (accidents, malfunctions, and unplanned events)</li> </ul>
Aquatic Environment	<ul style="list-style-type: none"> <li>• Change in fish populations (including fish and fish habitat area, water and sediment quality, primary production, and benthic invertebrate community productivity)</li> <li>• Change in the productivity of fisheries resources</li> <li>• Change in the useability of recreational fisheries resources</li> <li>• Change in the abundance or distribution of aquatic species of conservation concern</li> <li>• Mortality of one or more individuals of a species listed on Schedule 1 of the <i>Species at Risk Act</i> or on the <i>New Brunswick Endangered Species Act</i>.</li> </ul>
Terrestrial Environment	<ul style="list-style-type: none"> <li>• Change in wildlife populations, including migratory birds, and their habitats</li> <li>• Species of conservation concern</li> </ul>
Vegetated Environment	<ul style="list-style-type: none"> <li>• Change in vegetation, particularly with respect to species of conservation concern</li> </ul>
Wetland Environment	<ul style="list-style-type: none"> <li>• Change in wetland area and/or function</li> </ul>
Labour and Economy	<ul style="list-style-type: none"> <li>• Change in employment (direct and indirect)</li> <li>• Availability of skilled and unskilled labour</li> <li>• Change in economy (local, regional, provincial)</li> </ul>
Community Services and Infrastructure	<ul style="list-style-type: none"> <li>• Change in public services</li> <li>• Change in housing and accommodation</li> </ul>
Land and Resource Use	<ul style="list-style-type: none"> <li>• Change in Land and Resource Use (use and enjoyment of land for current purposes)</li> </ul>
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	<ul style="list-style-type: none"> <li>• Change in the current use of land and resources for traditional purposes by Aboriginal persons</li> </ul>
Heritage Resources	<ul style="list-style-type: none"> <li>• Change in heritage resources (including archaeological, historic, or paleontological resources)</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Change in Transportation (road infrastructure, railway infrastructure, traffic and traffic safety)</li> </ul>

Additionally, though not a VEC, the EIA will consider the Effects of the Environment on the Project, including changes to the Project caused by environmental forces or processes (e.g., seismic activity, fire, severe weather, climate change, sea level rise). The following sections define the scope of the factors to be considered pursuant to Section 16(3) of *CEAA*.

The proposed content and structure of the EIA Report as currently conceived at this early stage and subject to change as the EIA progresses, is outlined in Appendix C.

## 4.1 ATMOSPHERIC ENVIRONMENT

### 4.1.1 Definition of Atmospheric Environment

The Atmospheric Environment is a component of the environment that comprises the layer of air near the earth's surface to a height of approximately 10 km. The Atmospheric Environment has been divided into two key factors for consideration in the EIA, reflecting key Project-atmospheric interactions: Air Quality, and Climate.

- **Air Quality** is defined as a measure of the constituents of ambient air, and includes the presence and the quantity of these constituents including air contaminants and odour in the atmosphere. The environmental effect of concern is defined as a Change in Air Quality, reflecting potential changes resulting from emissions from the Project.
- **Climate** is defined as the composite of generally prevailing meteorological conditions of a region, including temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the seasons, averaged over a series of years. The Climate factor that will be addressed in this section is the net emissions of greenhouse gases (GHG) as a result of the Project and thus the environmental effect of concern is defined as a Change in Climate as represented by greenhouse gas emissions. The effects of Climate on the Project are addressed in Section 4.15 of this TOR as part of Effects of the Environment on the Project.

### 4.1.2 Project-VEC Interactions

Potential interactions between the Project and the Atmospheric Environment are highlighted in this section. Those aspects of the Project that may cause environmental effects, either positive or adverse, are identified. The Project may interact with the Atmospheric Environment in the following ways:

- heavy equipment movement on-site, heavy-duty trucks used to deliver equipment and/or materials to the site, and passenger vehicles will generate combustion gases and greenhouse gases during the construction and operation phases;
- earthworks and on-site earth moving activities during the construction and operation phases will generate particulate matter in the form of fugitive dust;
- equipment within the processing facility (e.g., crushers, grinding circuit) and heating systems will release criteria air contaminants (particulate matter, combustion gases, odour) and greenhouse gases during the operation phase;

- blasting and excavation activities, and wind erosion of exposed surfaces will release particulate matter in the form of fugitive dust; and
- removal of vegetation from the active areas of the Project site will reduce the availability of carbon dioxide sinks currently associated with the site.

#### **4.1.3 Boundaries**

The spatial boundaries (assessment area) for the assessment of Project environmental effects and cumulative environmental effects on the Atmospheric Environment will be made up of two different areas in the Region, specific to each of the factors to be considered within Atmospheric Environment:

- For a Change in Air Quality, the local assessment area (LAA) is a 10 km x 10 km domain centered on the Project development area (PDA). It is selected to include the nearest residential receptors to the Project and so that, at its boundary, the Project-related air contaminants would be expected to be at or near the existing background concentrations.
- For a Change in Climate (Greenhouse Gas Emissions), the assessment area includes New Brunswick and Canada.

The temporal boundaries will include the construction, operation, and decommissioning, reclamation and closure phases of the Project.

The administrative and technical boundaries for the Atmospheric Environment pertain mainly to regulatory limits with respect to the release of air contaminants to the atmosphere, where they exist, and the presence of air contaminants in the Atmospheric Environment. These standards and objectives are set by regulatory authorities to reflect environment protection objectives for human and environmental health. As such, application of standards is an inherently conservative approach on which to base environmental effects predictions. The EIA will establish appropriate administrative boundaries for various contaminants based on air quality standards and objectives of provincial jurisdictions (e.g., New Brunswick, Ontario, Newfoundland and Labrador) as well as those of federal entities (e.g., Canada-Wide Standards, CCME). Note that there are no generally accepted standards or objectives for odour, though if these were of concern, individual odourous species could be compared to standards in other jurisdictions (e.g., OMOE AAQC). Given its nature, however, odour is not expected to be an issue for the Project.

#### **4.1.4 Significance Criteria**

For a Change in Air Quality (including odour), a significant adverse residual environmental effect is one that degrades the quality of the ambient air such that the maximum Project-related ground-level concentration plus the conservative background level of the air contaminant being

assessed frequently exceeds the respective ambient air quality objective, guideline or standard. “Frequently” is defined as once per week for 1 hour objectives and once per month for 24 hour objectives.

For a Change in Climate (Greenhouse Gas Emissions), following guidance from the CEA Agency, “*the environmental assessment process cannot consider the bulk of GHG emitted from already existing developments. Furthermore, unlike most project-related environmental effects, the contribution of an individual project to climate change cannot be measured*” (CEA Agency 2003). It is, therefore, recognized that it is not possible to assess significance related to a measured environmental effect on climate change on a project-specific basis. At the same time, it is recognized that a scientific consensus is emerging in respect of global emissions of GHG and consequent changes to global climate as generally representing a significant cumulative environmental effect. Project emissions of GHG will contribute to these cumulative environmental effects, but the contribution, although measurable and potentially important in comparison to local and provincial levels, will be very small in a global context. Policies and regulations are being developed by the Government of Canada for regulating GHG emissions for specific sources or industry sectors.

Thus, instead of setting a specific significance criterion for environmental effects on climate change and determining whether and how it can be met, a Change in Climate (GHG Emissions) will be considered by conducting a preliminary scoping of GHG emissions, determining jurisdictional considerations (including GHG policies or plans), determining the industry profile (where possible) and by considering the magnitude, intensity and duration of Project emissions as directed by the CEA Agency guidance (CEA Agency 2003). Specifically for this Project, the Project-related GHG emissions are compared to similar projects, and to provincial, national, and global GHG emissions. Three categories are described in the CEA Agency guidance: low, medium and high. In this EIA, these are attributed to numerical values (on a tonnes CO<sub>2</sub>eq per annum basis) of less than 10<sup>5</sup>, greater than 10<sup>5</sup> and less than 10<sup>6</sup>, and greater than 10<sup>6</sup>, for low, medium and high categories, respectively. Where the GHG emissions are considered to be either medium or high, a GHG Management Plan must be prepared. The assessment will focus on mitigation and adaptive management strategies aimed at minimizing Project-related GHG emissions in a manner consistent with CEA Agency guidance (e.g., Operational Policy Statement “Adaptive Management Measures under the *Canadian Environmental Assessment Act*” (CEA Agency 2009)).

#### **4.1.5 Characterization of Existing Conditions**

##### **4.1.5.1 Air Quality**

Baseline conditions for air quality will be established by conducting ambient air quality monitoring, analysis of available air quality data from the provincial network of monitoring stations, and analysis of available weather and climate data at the nearest Environment Canada weather station (*i.e.*, the Fredericton Airport). Further, a meteorological station has been at the Project site since 2008 and is equipped with sensors used to measure temperature and relative

humidity, atmospheric pressure, wind speed and direction, precipitation intensity, snow depth, and solar radiation. Information at the meteorological station will continue to be collected at this station to determine reliable baseline meteorological conditions.

Ambient dustfall sampling was conducted at five locations in and around the Project site over 2008 and 2009. Total dustfall mass per unit area was determined, and the dustfall was analyzed for various metals including lead and arsenic, and for other inorganic compounds such as nitrate and sulfate. Dustfall and/or deposition sampling is not required by NBENV. This sampling will help to inform the determination of overall baseline conditions at the Project site; however, no further dustfall sampling is planned.

Baseline ambient air quality monitoring will be conducted at the location of the meteorological station (or at an alternative location with sufficient power and infrastructure to operate the monitors, to be determined) to measure ambient concentrations of:

- total suspended particulate matter (TSP);
- particulate matter having an aerodynamic diameter less than 2.5 microns (PM<sub>2.5</sub>);
- nitrogen oxides (NO<sub>x</sub>);
- sulphur dioxide (SO<sub>2</sub>); and
- selected trace metals.

Monitoring will be conducted for a period of up to six months to cover two seasons in 2011 (spring-summer and summer-fall). The TSP and PM<sub>2.5</sub> samples will be collected using mini high-volume samplers. The dust on the TSP filters will be analyzed for standard trace metals (including as a minimum, lead, arsenic, tungsten, molybdenum, zinc, copper, antimony, and aluminum). Ambient concentrations of NO<sub>x</sub> and SO<sub>2</sub> will be measured using diffusion tubes. The samples will be collected on a weekly basis (6 day cycle) over the monitoring period.

Emissions of organic compounds (e.g., VOC, PAH) or reduced sulphur compounds (e.g., H<sub>2</sub>S, TRS) from the mine and processing facility are not expected to be substantive. Similarly, there are no substantive sources of odour associated with the Project. As such, monitoring of these emissions or for odour is not required.

#### **4.1.5.2 Climate**

A review of available climate data (climate normals) from the nearest Environment Canada meteorological stations will be conducted to establish baseline climate information. The nearest Environment Canada weather station that monitors a complete suite of meteorological parameters is at the Fredericton airport, though other nearby stations (e.g., Juniper, Woodstock) measure a partial suite of parameters. The Fredericton airport data will be the focus of the analysis due to the completeness of the data set and the long history of climate data availability

at this location, and these data will be compared to the meteorological data collected at the Project site. Annual and seasonal wind rose plots will be generated for each station and compared. The measured on-site temperature and precipitation data would also be compared with the climate normals data for the Fredericton airport station.

#### **4.1.6 Environmental Effects Analyses**

In the context of this EIA, Project environmental effects on the Atmospheric Environment will be assessed through the analysis of chemical and physical attributes of the Atmospheric Environment resulting from Project-related releases of exhaust gases, and particulate matter.

##### **4.1.6.1 Change in Air Quality**

Emissions from substantive emission sources associated with the Project during the construction and operation phases will be quantified using standard emissions estimation techniques (e.g., USEPA AP-42 emission factors, USEPA MOBILE emission factors), and an inventory of Project-related emissions of criteria air contaminants (particulate matter, PM<sub>10</sub>, PM<sub>2.5</sub>, combustion gases, and greenhouse gases) will be developed. The expected emissions of PM<sub>10</sub> along with any associated monitoring or analysis will take into account guidelines published for this parameter by the Canadian Council of Ministers of Environment (CCME) along with criteria developed in other provincial jurisdictions (e.g., Newfoundland and Labrador, Ontario).

Dispersion modeling will be conducted to predict the maximum ground-level concentrations resulting from Project emissions during the construction and operation phases of the Project, though emissions during the construction phase are not expected to be substantive and will be short-term and transient. The air contaminant emissions associated with the Project as described above will serve as inputs to the model. The baseline ambient concentrations will be incorporated with the model predictions to serve as background. The assessment of air quality will be in consideration of existing conditions, standard good practice and procedures (SGPP) and planned mitigation.

##### **4.1.6.2 Change in Climate (Greenhouse Gas Emissions)**

The assessment of climate environmental effects will be based on guidance provided by the Canadian Environmental Assessment Agency (CEA Agency 2003) and will be in consideration of existing conditions, SGPP, and planned mitigation.

Estimates of GHG emissions during the construction, operation, and decommissioning, reclamation and closure phases of the Project will be developed, as will an industry profile as required by guidance of the CEA Agency. The greenhouse gases to be considered are CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O. Substantive emission sources will be identified and quantified.

For any electrical installations associated with the Project containing sulphur hexafluoride (SF<sub>6</sub>), the Proponent is expected to operate in a manner consistent with the Memorandum of Understanding on SF<sub>6</sub> emissions signed by representatives of Environment Canada and the Canadian Electricity Association in 2007 and any subsequent amendments and Annexes.

The Project's annual contribution to total provincial and national GHG emissions for various Project phases, and the intensity of GHG emission per unit of ore processed, will be determined and compared, where data are available, to other similar projects.

## **4.2 ACOUSTIC ENVIRONMENT**

### **4.2.1 Definition of Acoustic Environment**

The Acoustic Environment includes sound quality in the outdoor environment that may be adversely affected by the Project. Noise is defined as unwanted sound and is usually present through a range of frequencies. The audible frequencies for humans are in the range of 20-20 000 Hertz (Hz).

Though sound quality is sometimes assessed as part of the Atmospheric Environment, the environmental effects assessment for this Project will be conducted separately from the Atmospheric Environment.

### **4.2.2 Project-VEC Interactions**

The Project will interact with the Acoustic Environment in the following ways:

- the movement and use of heavy equipment on-site for construction activities, and for the movement of ore and waste rock during the operation phase, will generate sound emissions;
- the movement of heavy-duty trucks and passenger vehicles on-site and to and from the Project site during the construction, operation, and decommissioning, reclamation and closure phases of the Project will generate sound emissions; and
- blasting activities during the construction phase and from mining activities during the operation phase will result in short-term, intermittent releases of impulsive sound emissions and related vibration.

Sound emissions will also be released from the mill and processing facilities, in particular from the crushers and grinding equipment, though all equipment will be located indoors to reduce external noise to acceptable levels. Conveyors will be enclosed, and therefore materials being conveyed are not expected to interact substantively with sound quality.

### 4.2.3 Boundaries

The spatial boundaries for the assessment of Project environmental effects and cumulative environmental effects on the Acoustic Environment will extend from the PDA out to a distance of 1.5 km, as the LAA for the assessment of the Acoustic Environment. Additionally, the LAA for the Acoustic Environment will include the nearest residential receptors to the Project that may experience a change in sound quality as a result of Project site noise and increased traffic levels due to Project-related vehicles. These receptors will be comprised of the recreational campsite leases to the east of the open pit location.

The temporal boundaries will include the phases of construction, operation, and decommissioning, reclamation, and closure of the Project.

In terms of administrative and technical boundaries, the NBENV generally requires that sound emissions from any activity be controlled such that it does not cause substantial loss of enjoyment of the normal use of any property, or substantial interference with the normal conduct of business. In some cases, the hours of operation may be restricted with a higher limit for one period and another limit for another period during the same day. There are no noise guideline levels, regulations, or standards currently established in the Province of New Brunswick for limiting acceptable noise levels from industrial facilities. Facility noise levels in New Brunswick are typically set by the NBENV in specific industrial approvals for individual sources of sound emissions, and are consistent with the above.

Under Health Canada's "Draft Guidance on Noise Assessment for CEAA Projects" (Health Canada n.d.), noise levels are set for both construction and operation of facilities and are based on day-night average sound levels ( $L_{DN}$ ) and percent annoyance.  $L_{DN}$  is an energy-weighted average, similar to the equivalent sound pressure level,  $L_{eq}$ , for a full day, except that the night time hour (22:00 to 07:00) levels are incremented by 10  $dB_A$  to reflect increased sensitivity of the community to sound levels during those hours. For construction phases less than one year in duration, Health Canada has set an  $L_{DN}$  of 62  $dB_A$ , and for construction phases greater than one year in duration the percentage of highly annoyed is to be calculated for the baseline condition and for the baseline plus the construction condition. The difference between the sound quality of the baseline condition and the construction of a project should not increase by more than 6.5%. This is also the case during operational phases. The algorithm to calculate the percent highly annoyed is defined by ISO 1996-1:2003.

Blasting noise is also regulated in Canada at the provincial level, although some municipalities have additional provisions and blasting in or near the coastline may be subject to additional provisions to the marine environment. In New Brunswick, the *Blasting Code Approval Regulation* under the *Municipalities Act* limits peak overpressure (instantaneous blasting noise) to 128 dB. Blasting regulations also often include a provision to limit vibration. Both the noise limit and vibration limits are designed to afford protection from damage to structures (such as cracking of drywall) with a reasonable margin of safety. The regulations are applicable at the nearest designated site, typically a residence or other building. Regulations may stipulate that

pre and post-blast surveys be carried out to assess whether damage has occurred. Whether regulated or not, most blasting contractors will generally conduct such surveys on occasion to avoid nuisance claims.

#### **4.2.4 Significance Criteria**

For a Change in Sound Quality, in consideration of the accepted practice in New Brunswick for regulating project-related noise in industrial Certificates of Approval and the rural nature of the PDA, a significant adverse residual environmental effect on the Acoustic Environment is one where Project-related sound emissions cause the sound pressure levels at the nearest noise sensitive area or receptor (NSA) to frequently exceed the noise guideline levels of a 1 hour  $L_{eq}$  of 65  $dB_A$  during the day (06:00-22:00) and 55  $dB_A$  during the night (22:00-06:00). “Frequently” is defined as once (*i.e.*, one hour) per week.

For impulsive noise such as during blasting, a significant adverse residual environmental effect on the Acoustic Environment is one where peak overpressure exceeds 128 dB.

#### **4.2.5 Characterization of Existing Conditions**

Baseline sound monitoring will be conducted at three locations over a period of one week at each location. The sound monitoring will be conducted at locations that are representative of the area and of local receptors; monitoring will be conducted near the location of the meteorological station and at two additional locations to be defined, to characterize ambient baseline sound pressure levels in the area of the Project and near recreational cabins. Any important sources of baseline noise that can be identified during the monitoring (*e.g.*, drilling activity, forest resource harvesting) will be incidentally noted by the study team.

#### **4.2.6 Environmental Effects Analyses**

An inventory of Project-related sources of sound emissions will be developed for the construction and operation phases of the Project. This will be based on an expected inventory of vehicles and equipment that will be used during each phase, on expected blasting intensities and frequencies, and referring to literature sources for obtaining typical sound pressure levels and vibration levels from each type of source to complete the inventory.

The baseline sound quality information collected for the Project will be input to an accepted noise model along with expected sound pressure levels from the Project. The Roadway Noise Construction Model (RCNM) of the US Department of Transportation (or equivalent) will be used to model sound pressure levels during the construction phase, whereas Cadnaa will be used to model sound pressure during the operation phase. Noise sensitive receptor locations will be identified in the EIA Report. Predicted sound levels at noise sensitive receptors (after mitigation) will be presented in the EIA report. The modeling will be carried out in a manner to enable comparison of the model results with both the significance criteria as well as the Health

Canada guidance. The assessment of sound quality will be in consideration of existing conditions, SGPP, and planned mitigation.

### **4.3 WATER RESOURCES**

#### **4.3.1 Definition of Water Resources**

Water resources include both groundwater and surface water that can be considered as a resource for humans as defined below. Water resources are hosted by the geologic formations and valleys within the assessment area. Water as habitat for aquatic and terrestrial species is not considered in this VEC but rather in Section 4.4.

Groundwater resources include any water that may be used by humans or the Project naturally stored underground, or water that flows through and saturates soils and rock. For example, groundwater resources supply springs, streams, lakes and extraction locations such as wells. Surface water resources include streams, rivers, lakes and other bodies of fresh surface water that may be used by humans or by the Project, either as a source of fire-protection water, process water, potable water or other required water.

Potential Project-related environmental effects, in terms of Water Resources availability, would then include wells, streams and lakes. The potential environmental effects on quantity and quality of groundwater and surface water, moving towards and arriving at these receptors will be considered.

It is noted that the EIA Report could assess surface water and groundwater quality and quantity directly as part of a single Water Resources VEC, or these could be split into two separate VECs. The Study Team will determine how these issues are best presented and assessed as part of its evolving work on the EIA. Regardless of the outcome, the work plan presented below will be followed.

#### **4.3.2 Potential Project-VEC Interactions**

The potential environmental effects of the Project will be minimized by Project design and mitigation, including consideration of water conservation, diversion, and recycling techniques. The primary use of groundwater (extracted from a well) will be for the supply of potable, domestic water for human use (e.g., sanitary facilities, drinking water). Groundwater flowing into, and pumped from, the open pit during the operation phase will be used in the process along with collected precipitation on the Project site; water thus collected in excess of Project needs will be discharged to area streams, treated if necessary to meet permit requirements.

The Project may interact with Water Resources in the following ways.

- During the construction and operation phases, fresh water is required for fire protection, domestic potable water uses, vehicle washing, dust suppression, and as a minor

component of the process water requirements. Fresh water for use in the process will be obtained from site runoff and the open pit to the extent possible. The majority of the water used for ore processing will be recycled through the tailings storage facility (TSF). The primary source of potable water for the administration offices and washrooms will be from surrounding groundwater (well) once the groundwater source has been tested and approved.

- Construction of Project facilities will result in the elimination of portions of some watercourses, causing physical changes to local surface hydrology.
- During the operation phase, the presence of the mine and associated facilities will result in the reshaping of the landscape, also resulting in changes to surface hydrology. The operation of the open pit will influence both surface hydrology and the groundwater regime, as a result of surface water diversions and groundwater draining to the open pit as opposed to flowing within existing surface drainage patterns, migrating within natural groundwater flow paths and contributing to stream base flow. Subject to confirmation in the EIA, the cone of groundwater depression caused by the operation of the pit will potentially lower surface water flows and decrease base flow in surrounding watercourses.
- A substantial portion of the process water supplied from pit dewatering and surface runoff from within the mine site will be sequestered in the TSF during the operation phase. As will be determined in the EIA, this sequestration will cause a net reduction of water leaving the site and thus reduce the quantity of surface water flows and groundwater recharge. Water surplus to operational needs will be discharged to local stream(s), and treated if required to meet regulated discharge water quality standards.

Changes to the Water Resources as a result of the Project that affect current use for traditional purposes by Aboriginal persons will be considered as part of the assessment of the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VEC.

### **4.3.3 Boundaries**

The spatial boundaries for Water Resources include the Project Development Area (PDA) as well as the potential zone of influence surrounding the Project (defined as the local assessment area or LAA). The spatial boundaries for potential interactions with groundwater can be more localized, depending on the type of work being done. The distance within which the Project may affect water wells in the vicinity of the Project is dependent on the zone of influence of the Project as governed by local conditions (e.g., site design, aquifer characteristics, geology). The spatial boundaries of the LAA and zone of influence of the Project will be determined by the various hydrology and hydrogeology studies to be conducted as part of the EIA. The associated spatial boundaries will thus be confirmed in the EIA as a result of these modeling studies to be conducted. Spatial boundaries for surface water flows and hydrology will be considered for watercourses draining to and away from Project components and facilities, with a particular

emphasis on those watercourses downstream of the Project to determine the potential for flow reductions as a result of the Project. The spatial distribution of these environmental effects will be analyzed as far as is required to assess consequent environmental effects on aquatic habitats as well as for human use.

The temporal boundaries of the Water Resources include the construction, operation, and decommissioning, reclamation, and closure phases of the Project. Though the Project may affect groundwater resources during all phases of the Project, the greatest potential for environmental effects on groundwater resources will be most likely be during the operation phase. Environmental effects on surface water resources are most likely as a result of construction activities, as portions of streams will be lost, and others may be diverted as a result of Project facilities. New drainage patterns, as a result of site reclamation and closure, will be avoided. Potential environmental effects to groundwater and surface water resources due to accidental spills could occur in all phases of the Project.

Water quality is protected through federal and provincial legislation and guidelines. These include the *Water Well Regulation* under the *Clean Water Act* and the *Water Quality Regulation* under the *Clean Environment Act*. Potable water quality is generally based on Health Canada's *Guidelines for Canadian Drinking Water Quality* (Health Canada 2010), which has also been adopted by the Canadian Council of Ministers of the Environment (CCME). Federally, water quality resulting from releases from mining operations is also regulated by the *Metal Mining Effluent Regulations (MMER)* under the *Fisheries Act*.

#### 4.3.4 Significance Criteria

For Water Resources, including groundwater and surface water, a significant adverse residual environmental effect will be defined as one that:

- degrades the quality of previously unaffected surface water or groundwater by exceeding the standards of one or more parameters as specified in the *Guidelines for Canadian Drinking Water Quality* for potable domestic water supplies for a period of more than 30 days; or
- reduces the quantity of groundwater recoverable from an aquifer on a sustainable basis such that it no longer meets present and future needs of current users or land owners; or
- reduces groundwater discharge and consequently adversely affects base flow to a stream, preventing current users from meeting present and future needs on a sustainable basis; or
- reduces the quantity of surface water available for surface water supplies, preventing current users from meeting present and future needs on a sustainable basis; or

- degrades the physical and chemical characteristics of an aquifer or stream to the extent that interaction with local surface water results in stream flow or chemistry changes that adversely affect sustainable surface water flow or aquatic life.

#### 4.3.5 Characterization of Existing Conditions

An understanding of groundwater and surface water existing conditions will be determined through hydrogeology and hydrology studies.

Hydrogeological properties of bedrock and overburden units will be determined to identify hydrogeological units and primary groundwater flow paths within the assessment area. Estimated hydrogeological properties will include hydraulic conductivity, transmissivity and storage parameters. Groundwater flow components, such as local flow or regional flow, aquitards, faults, fractures, and other geological features, will be analyzed using the hydrogeological properties and horizontal and vertical hydraulic gradients to provide a description of groundwater flow paths from mine facilities to potential receptors such as springs, streams, lakes, and wells.

Geochemical conditions of the assessment area will be determined using existing information from the Preliminary Economic Assessment (Geodex 2009) and the Technical Report on December 2009 Mineral Resource Estimate (Mercator 2009) collected during the earlier exploration phase of the Project, as well as using new information gathered as part of current site studies (e.g., ML/ARD studies as described in Section 4.4.5.2). Groundwater chemistry data will be collected from monitoring wells and analyzed using piper plots to portray trends and to compare to appropriate existing Canadian Water Quality Guidelines.

In addition, prior to the construction phase, water samples will be collected according to appropriate sampling protocols (e.g., ISO Standard 5667 or equivalent) from the network of groundwater monitoring wells and from accessible residential groundwater wells located within 1 km of the Project. The samples will be used to establish potable water quality baseline levels of turbidity, coliform, *Escherichia coli*, nitrates, trace metals, and general chemistry. The analyses will be conducted by an independent accredited laboratory and quality assurance and quality control samples will be taken and analyzed to support the reliability of the results. Residential well owners will be notified of the results.

If any residential wells (including camps) are determined to be located within the zone of influence of the Project, a water survey will be conducted for the accessible wells prior to any blasting activities to provide a baseline condition so that mitigation or compensation can be implemented in the event of an unforeseen environmental effect during the operation phase.

Prior to the construction phase, baseline conditions will be determined for streams, lakes and groundwater resources within the assessment area. Since 2008, several hydrometric and water quality stations have been operated at and around the Project site, and data from these stations have been collected since that time. These stations are being maintained or redeployed to suit

the current Project configuration, and approximately six stations at key locations will allow continuous measurement of stream stage or water level. These measurements, together with manual flow measurements, will be used to develop a continuous record of stream flows at the sites. As well, a meteorological station has been operating near the open pit site since 2008 that measures and records climate parameters such as temperature, wind direction and precipitation. Stream water quality will continue to be monitored to provide information on surface water quality over time. The sampling methods, location of sampling stations, sampling frequency, and chemical elements/parameters analyzed will be selected in accordance with good practice to capture natural and seasonal variation over several years, and will be described in the EIA Report. Water quality sampling will be carried out in accordance with ISO Standard 5667, and samples will be analyzed for general chemistry and trace metals by an accredited analytical laboratory. Sampling locations will be shown graphically in the EIA Report. Groundwater and surface water chemistries will be analyzed to provide insight on potential groundwater / surface water interaction along streams and lakes. The data collected will:

- 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 environmental effects prior to the potential Project proceeding;
- form the basis for monitoring and assessing change during construction, operation, and decommissioning, reclamation and 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 information on 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 environmental effects have been predicted, to guide and support future monitoring.

The EIA Report will include a description of sampling protocols and analytical methods used, as well as one or more figures showing the sampling locations relative to Project components and environmental features, to an appropriate level of detail.

Hydrogeological information and hydrological information will be computer modeled to understand the physical aspects of water resources (groundwater and surface water) within the assessment area. The model will be used to simulate various possible future conditions with

the mine in its various phases of construction, operation, and decommissioning, reclamation, and closure. The model will assist in producing a water balance within the assessment area and in forecasting migration of fugitive contaminants from tailings or rock storage areas, of from an accidental event.

#### 4.3.6 Environmental Effects Analyses

To predict the potential environmental effects of the Project on Water Resources, a water balance study will be conducted using the developed computer model. The water balance study will include changes to groundwater recharge and discharge quantities, and potential changes to groundwater base flow to streams, as a result of the Project. Baseline data of conditions collected for the Project will be inputted to the water balance. Preliminary forecasting of environmental effects will include model simulations of:

- flow exchange between the TSF and the natural environment;
- the hydrological effects of the development of the open pit, ore and rock storages, and mine infrastructure;
- anticipated changes to water quality (e.g., from ARD/ML or explosives residues); and
- the hydrology of potentially affected watercourses.

The water balance study will estimate the extent to which the Project will alter flows in local surface water bodies and in groundwater aquifers. The water balance will aid in the identification of potential environmental effects of the Project on water resources, in the development of mitigation measures, and in Project design (e.g., when and where surplus water would be discharged). If flow levels are predicted to alter substantively (either increased or decreased), such that maintenance flow, fish habitat, or bank or bed stability are adversely affected despite mitigation, additional corrective action will be implemented.

The water balance for the Project will include water conservation or recycling measures that are technically and economically feasible for implementation as part of the Project. It is expected that groundwater will be used as a potable water supply for the Project. The water supply wells will be located and used such that the wells are sustainable. Pumping tests will be completed on any water installed supply wells to estimate safe yields. A *Water Supply Source Assessment* will be undertaken if the capacity of the water supply required for the Project is greater than 50 m<sup>3</sup> per day. A groundwater monitoring and management plan would be developed as applicable and appropriate.

The EIA report will include estimates of the quantity of:

- potable water used by the Project;
- groundwater pumped from the open pit; and

- water needed for process purposes.

Characterization of groundwater resources will include estimation of the recharge rates, assessment of conceptual groundwater flow paths and identification of groundwater discharge areas. Groundwater recharge and discharge will be assessed using a water balance approach, which generates simulated stream flows that can be calibrated to measured stream flows at key locations on and near the Project site. Potential environmental effects to groundwater resources will be assessed using the water balance approach and analytical and/or numerical modelling, where appropriate.

The EIA Report will include piezometric maps, showing the location of existing wells and boreholes; recharge and discharge maps; and a surficial (deposit) isopach map.

The potential environmental effects of the Project on Water Resources will be assessed in consideration of existing conditions, SGPP and planned mitigation measures.

#### **4.4 AQUATIC ENVIRONMENT**

##### **4.4.1 Definition of Aquatic Environment**

Environmental effects on the Aquatic Environment, focusing on fish and fish habitat, will be considered due to the potential interactions with the Project. For the purpose of the EIA, the following definitions will apply.

- Freshwater fish will refer to fish (as defined in Section 2 of the *Fisheries Act*) that live in freshwater during at least part of their life cycle. Fish include (a) parts of fish, (b) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and (c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.
- Fish habitat as defined in Section 34(1) of the *Fisheries Act* includes spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes. Fish habitat will be assumed to include the physical (e.g., substrate/sediment, temperature, flow velocity and volumes, water depth), chemical (e.g., water quality), and biological (e.g., fish, benthic macro-invertebrates, periphyton, aquatic macrophytes) attributes of the Aquatic Environment that are required by fish to carry out life cycle processes.

The Aquatic Environment includes all fish as defined in the *Fisheries Act* and also includes freshwater species at risk and species of conservation concern (*i.e.*, those species that live for large parts of their life cycle in freshwater, and that have been identified by federal or provincial agencies as being rare, threatened or otherwise endangered). Ecologically sensitive, protected areas and critical habitat features of the aquatic environment will also be included in the assessment.

#### 4.4.2 Potential Project-VEC Interactions

Key components of the Project that may interact with the Aquatic Environment include:

- freshwater use;
- wastewater systems and final effluent discharge points;
- watercourse alterations including flow diversion channels;
- the open pit, tailings, ore storage, and waste rock management areas; and
- roads, bridges, culverts, and new linear corridors such as the electrical transmission line.

The open pit, and the tailings, ore and waste rock management areas have the potential to alter water quality through:

- metal leaching;
- potentially acid generating (PAG) rock;
- explosives use; and
- wastewater treatment processes.

The natural hydrological cycle may also be modified, as may the thermal regime of water discharged from the mine operation.

The Project is expected to use existing roads for vehicle access, however, new access roads will likely be required within the Project site, and it is likely that some existing roads will require upgrading (e.g., culverts, bridges, road widening) to accommodate traffic and loads anticipated during the mine construction and operations phases. There is a requirement for an electricity supply to the site, which will require the construction of an electrical transmission line approximately 25 km in length.

During the construction phase, fish habitat alterations are likely to range:

- from outright loss of habitat (for which compensation will be required under the *Fisheries Act*) due to construction of the open pit, TSF, ore and waste rock storage areas;
- to reduced shading and cover of aquatic habitat due to clearing of riparian vegetation, changes in channel morphology due to channel alterations (e.g., surface water diversion channels), and

- to possible sedimentation of important habitat features such as gravel deposits suitable for spawning due to temporary or permanent alterations or diversions of watercourses, and site runoff.

Potential interactions that may affect the Aquatic Environment during the operation phase may include environmental effects of wastewater release on local hydrology, surface water quality and quantity, reduced or increased stream flow, and impediments to fish passage due to in-stream structures, if they are needed.

The aquatic species at risk or species of conservation concern listed in Table 4.2 have been identified within New Brunswick, and along with other secure species, will be considered in the assessment.

**Table 4.2 Aquatic Species at Risk and Species of Conservation Concern Identified Within New Brunswick**

Common Name (Scientific Name)	COSEWIC Status	SARA Schedule	SARA Status	Comments
<b>Fishes</b>				
American eel ( <i>Anguilla rostrata</i> )	Special Concern	N/A	N/A	Likely present throughout the PDA.
Atlantic Salmon – Outer Bay of Fundy ( <i>Salmo salar</i> )	Endangered	N/A	N/A	Likely present in much of the PDA, although natural barriers to fish passage may preclude its presence in Sisson Brook and some other watercourses.
Redbreast Sunfish ( <i>Lepomis auritus</i> )	Data Deficient	Schedule 3	Special Concern	Present in lakes and rivers from the lower Saint John River watershed, but not reported or likely in the Nashwaak River watershed.
Shortnose Sturgeon ( <i>Acipenser brevirostrum</i> )	Special Concern	Schedule 1	Special Concern	Present in the Saint John River, but not likely in the Nashwaak River upstream of Marysville.
<b>Molluscs</b>				
Yellow Lampmussel ( <i>Lampsilis cariosa</i> )	Special Concern	Schedule 1	Special Concern	Present in the Saint John River below Mactaquac, but not likely to be present in the Nashwaak River due to habitat constraints.
Brook Floater ( <i>Alasmidonta varicosa</i> )	Special Concern	N/A	N/A	Potentially present although not reported from the Nashwaak River watershed.
Dwarf Wedgemussel ( <i>Alasmidonta heterodon</i> )	Extirpated	Schedule 1	Extirpated	Not known from the Saint John River watershed.
<b>Insects</b>				
Skillet Clubtail ( <i>Gomphus ventricosa</i> )	Endangered	N/A	N/A	Known from New Brunswick although specific records are unclear. Potentially present in the Nashwaak River.
Pygmy Snaketail ( <i>Ophiogomphus howei</i> )	Special Concern	Schedule 1	Special Concern	Potentially present in the Nashwaak River, although not reported.

**Table 4.2 Aquatic Species at Risk and Species of Conservation Concern Identified Within New Brunswick**

Common Name (Scientific Name)	COSEWIC Status	SARA Schedule	SARA Status	Comments
<b>Plants</b>				
Prototype Quillwort ( <i>Isoetes prototypus</i> )	Special Concern	Schedule 1	Special Concern	Potentially present in headwater lakes or ponds; reported in some lakes in York and Queens Counties.

Notes:

N/A = Not applicable (*i.e.*, not on a SARA schedule or SARA status non-existent)

Accidents, malfunctions or unplanned events including hazardous materials spills or loss of containment have the potential to interact with the Aquatic Environment and affect fish and fish habitat. The potential for such events to cause adverse effects on the Aquatic Environment will be considered in the accidents, malfunctions, and unplanned events chapter in the EIA Report.

Atmospheric emissions from the Project have the potential to interact with the Aquatic Environment via deposition of air contaminants, as discussed in the Atmospheric Environment section and will be evaluated as part of the ecological risk assessment (ERA) to be conducted (discussed in Section 4.8).

Changes to the Aquatic Environment as a result of the Project that affect current use for traditional purposes by Aboriginal persons will be considered as part of the assessment of the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VEC.

#### 4.4.3 Boundaries

The spatial boundaries for the Aquatic Environment include watercourses that may be affected by the Project, either directly or indirectly. Watercourses that are likely to be directly affected by the Project, and where habitat loss is likely to occur as a result, are defined as the PDA and are comprised of:

- Sisson Brook;
- Bird Brook;
- two tributaries to McBean Brook; and
- three tributaries to Napadogan Forks (Western Branch of Napadogan Brook).

Additional unmapped watercourses may be identified during field surveys of the PDA. The Project may interact indirectly with:

- Napadogan Brook; and/or

- the lower portions of Nashwaak River (below the confluence of Napadogan Brook).

Watercourses located along the new electrical transmission line, or associated with upgrades to existing infrastructure (e.g., roads, bridges, culverts) may also be directly or indirectly affected by the Project. These areas will be defined as the LAA.

The spatial distribution of potential changes in the flow of watercourses arising as a result of the Project will be analyzed as required to assess consequent environmental effects on the use of water resources and on aquatic habitat.

The RAA will consist of the Nashwaak River watershed, within which cumulative environmental effects will be assessed.

Together, the areas described above will be referred to as the assessment area.

The temporal boundaries for the assessment include the construction, operation, and decommissioning, reclamation, and closure phases of the Project.

In terms of administrative boundaries, freshwater fish, fish habitat and water quality are protected through federal and provincial legislation. Fish habitat is protected under the federal *Fisheries Act*, and by Fisheries and Oceans Canada's (DFO's) *Policy for the Management of Fish Habitat* (DFO 1986). This policy applies to all Projects and activities in or near water that could alter, disrupt or destroy fish habitat by physical, chemical or biological means. Fish habitat is also protected by New Brunswick's *Watercourse and Wetland Alteration Regulation 90-80* of the *Clean Water Act*. Under this regulation, Watercourse and Wetland Alteration Permits are required for any vegetation clearing, soil excavation, construction or landscaping activities within 30 m of a watercourse. Water quality of watercourses is protected under Section 36 of the *Fisheries Act*; under New Brunswick's *Water Quality Regulation (82-126)* of the *Clean Environment Act*; and where applicable under the *Water Classification Regulation (2002-13)* of the *Clean Water Act*. The CCME freshwater aquatic life (FWAL) guidelines provide overall water quality objectives for freshwater in the receiving environment for the purpose of supporting aquatic life. Water quality resulting from releases from mining operations is also regulated by the *Metal Mining Effluent Regulations (MMER)* under the *Fisheries Act*.

The federal *Species at Risk Act (SARA)* prohibits the interference, disturbance or destruction of species at risk, endangered species or critical habitats for any listed species. The New Brunswick *Endangered Species Act (NB ESA)* contains similar provisions. The Committee of the Status of Endangered Species in Canada (COSEWIC) assesses and designates which wildlife species are in some danger of disappearing from Canada.

#### 4.4.4 Significance Criteria

The environmental assessment methodology for the Aquatic Environment will be based on the determination of whether significant adverse residual environmental effects are likely to occur as a result of the Project. Within the Aquatic Environment VEC, consideration is given to environmental effects on fish habitat, fish populations, and on species at risk.

With respect to fish habitat, a significant adverse residual environmental effect on the Aquatic Environment will be defined as one that results in an unmitigated or uncompensated net loss of fish habitat as defined under the *Fisheries Act* and its associated no-net-loss policy. Such an environmental effect may alter the aquatic environment physically, chemically, or biologically, in quality or extent, that could include, for example, exceeding long-term Canadian Council of Ministers of the Environment (CCME) *Water Quality Guidelines for the Protection of Aquatic Life* (CCME 1999). A significant adverse residual environmental effect on fish habitat would also result from a discharge of a deleterious substance into fish habitat that is not authorized through the *Metal Mining Effluent Regulations* and which would result in a violation of Section 36 of the *Fisheries Act*. A significant adverse residual environmental effect on fish habitat would also result from an unapproved Project-related alteration of water quality that would constitute water pollution as defined in the *Clean Environment Act*, or where applicable, violated the *Water Classification Regulation* of the *Clean Water Act*.

For fish populations, a significant adverse residual environmental effect on the Aquatic Environment would result from a Project-related destruction of fish that was not authorized under Section 32 of the *Fisheries Act*. However, it is recognized that the separation of fish and fish habitat is somewhat artificial, and that fish populations are also protected and sustained by protecting fish habitat, as explained above.

For aquatic species at risk and species of conservation concern, a significant adverse residual environmental effect on the Aquatic Environment will be defined as:

- one that alters the freshwater aquatic habitat within the assessment area physically, chemically, or biologically, in quality or extent after taking into consideration appropriate mitigation or compensation, in such a way as to cause a change or decline in the distribution or abundance of a viable population that is dependent upon that habitat such that the long-term survival of these rare, uncommon and/or non-secure population(s) within the Nashwaak River watershed is unlikely; or
- one that results in the direct mortality of individuals or communities such that the long-term survival of these rare, uncommon and/or non-secure population(s) within the Nashwaak River watershed is unlikely; or
- one that results in a non-permitted contravention of any of the prohibitions stated in Sections 32-36 of *SARA*; or

- in the case of species of special concern listed in Schedule 1 of SARA, where the Project activities are not in compliance with the objectives of management plans (developed as a result of Section 65 of SARA) that are in place at the time of relevant Project activities.

#### **4.4.5 Characterization of Existing Conditions**

As part of the preparation for evaluating the Aquatic Environment VEC, public, stakeholder and Aboriginal community knowledge will be sought from various stakeholders, including but not limited to:

- Canadian Rivers Institute;
- Nashwaak Watershed Association Inc.;
- Atlantic Salmon Federation; and
- Interested members of the public.

Additionally, knowledge and input will be sought from members of Aboriginal communities (e.g., Assembly of First Nations Chiefs in New Brunswick, Maliseet Nation Conservation Council, individual First Nations communities).

##### **4.4.5.1 Fish and Fish Habitat**

Fish and fish habitat assessments for directly affected watercourses in the assessment area have been or will be conducted in order to effectively assess the potential environmental effects to the aquatic environment by the Project, including the characterization of fish habitat quality and the identification of any freshwater species at risk and species of conservation concern that may be present. Data for each of these categories, described below, have been or will be collected for the Project.

A review of existing information combined with field surveys of the watercourse reaches that may be directly affected by the Project will be undertaken to determine the quality and quantity of fish habitat potentially affected by the Project, with particular focus on those watercourses that will be directly affected by the construction and presence of Project facilities. Specifically, this work will be carried out according to the following plan.

- A review of species of conservation concern databases (e.g., AC CDC) will be undertaken to determine the potential for aquatic species of conservation concern to be present in the assessment area. These could include rare aquatic plants, aquatic invertebrates, and/or fish species. It is important to identify rare species that could potentially be present within the assessment area, in order that their habitat requirements can be documented. This will enable the efficient identification of areas

where rare species are known or likely to be present, as well as to provide strong justification for areas where rare species are not likely to be present.

- Existing watercourses in the assessment area will be identified using Service New Brunswick (SNB) and New Brunswick Department of Natural Resources (NBDNR) map databases. These data are not reliable at the level of first-order streams that are important nursery areas of salmonid fish in New Brunswick. Therefore, a digital elevation model (DEM) to a resolution of 15 cm was developed from LiDAR surveys of the assessment area conducted for Northcliff in January 2011, and will be used to accurately locate mapped stream channels and to identify additional unmapped watercourses likely to be affected by the Project. The DEM also provides accurate elevation and grade information to aid in the desktop modeling of habitat type. Preliminary survey locations for fish and fish habitat surveys, and *in-situ* water quality sampling, will be identified using this information.
- Following the review of existing information and LiDAR data, each watercourse that may be directly affected by the Project will be surveyed by aquatic biologists (subject to access) to verify watercourse locations, and collect quantitative habitat data. The aquatic biologists will also identify and map any unmapped or previously unidentified watercourses they encounter. Survey locations will also be confirmed and adjusted as necessary in an effort to adequately and appropriately characterize fish habitat within these streams.
- Aquatic biologists will visit the confirmed survey locations once to perform qualitative electrofishing and fish habitat surveys based on 100 m reaches. Habitat surveys will be performed using the modified NBDNR/DFO habitat survey form. In-situ water quality measurements (*i.e.*, pH, dissolved oxygen, conductivity, and temperature) will be collected at these survey locations along with photos and GPS coordinates. Water and sediment samples will be collected and will be submitted for chemical analysis. Benthic invertebrate samples will be collected for taxonomic analysis. Field surveys will also include site-specific evaluation of the potential presence of rare species.
- Subsequent to the initial field survey, selected survey locations will be identified for quantitative electrofishing to provide more precise information on the abundance and biomass of fish species present. Subject to possible licensing restrictions (to be determined through consultation with DFO), the quantitative electrofishing will result in the collection of information on length, weight, and external appearance of each fish species present at each site, with more invasive or lethal sampling being recommended for brook trout (as a surrogate for Atlantic salmon), and slimy sculpin, both of which would be candidate species for long-term and environmental effects monitoring (EEM). Lethal sampling of brook trout will provide an opportunity to examine the gonads and livers (as per the national EEM technical guidance). Lethal sampling will also support the establishment of baseline metal concentrations in fish tissues subjected to laboratory analysis.

Thus, the abundance of fish will be determined in two stages. Qualitative electrofishing will be undertaken during the fish habitat survey such that the relative abundance of each fish species will be determined in relation to the electrofishing effort as a function of time. These fish will all be released unharmed. The second stage will involve quantitative electrofishing (with barrier nets and a Zippin estimate of abundance) at a more limited set of stations selected for EEM work. Therefore, all fishing will be catch and release, with the exception of some brook trout (as a surrogate for salmonid species) that will be retained (killed) as part of the EEM work following the Environment Canada EEM protocol. This protocol requires the lethal sampling of 20 male and 20 female adult fish at each EEM sampling area. For slimy sculpin, a non-lethal sampling protocol involving 100 young of year fish per site will be followed. The lethal sampling data will also inform the HHERA.

Some invasive/lethal sampling of fish is required in order to provide baseline information on fish health and to support the HHERA. This will facilitate the collection of information for the EIA that is consistent with information that will be required in the future to meet federal EEM requirements. The collection of this information as part of an enhanced baseline data collection goes beyond the basic *MMER* requirements, but will substantially strengthen the future EEM program. All fish that are lethally sampled will serve to inform both EEM and the baseline for the HHERA.

Existing conditions of watercourses that will not likely be directly affected by the Project but that may be indirectly affected (*i.e.*, watercourses upstream and downstream of Project components), will also be established. Mine activities (*e.g.*, mine effluent discharge) may affect downstream water quality, and fish will navigate through directly affected watercourses or reaches thereof to reach other habitat. The data will be used to establish a baseline for these areas that will support future follow-up and EEM requirements for the Project. Survey locations will be established at points along the Napadogan Brook, McBean Brook and the Nashwaak River. Surveys will be comprised of:

- fish habitat surveys (100 m reaches) and qualitative electrofishing;
- water quality sampling (*i.e.*, pH, dissolved oxygen, conductivity, and temperature);
- sediment quality sampling (chemical analysis); and
- benthic invertebrate sampling.

As with directly affected watercourses, information related to fish community health will be important for indirectly affected watercourses. Therefore, data will be collected to enable the calculation of fish condition factor and may also include lethal sampling of some fish species for tissue sampling. Species for lethal sampling will be brook trout and slimy sculpin.

In addition to survey sites established downstream of the Project, reference sites will be established in the Nashwaak River watershed upstream of the Project. These sites will be surveyed for the same parameters listed above.

Field surveys to characterize existing conditions along existing roads, on-site roads, and the transmission line route to be determined will be comprised of:

- an assessment of fish species present at the crossing, typically via qualitative electro-fishing;
- a fish habitat survey; and
- *in-situ* water quality monitoring (*i.e.*, pH, dissolved oxygen, conductivity, and temperature).

#### 4.4.5.2 Acid Rock Drainage / Metal Leaching

Mine site development, extraction of ore from an open pit, and metallurgical processing will result in waste facilities and structures that may affect water quality and aquatic habitats. Waste rock, pit walls, borrow sources, ore stockpiles and tailings (metallurgical waste) all interact with precipitation under atmospheric conditions. Understanding the outcome of these interactions and the measures that can be used to minimize potential environmental effects is performed by characterizing the metal leaching and acid rock drainage (ML/ARD) potential of geological materials and wastes.

The EIA Report will include predictions of the ML/ARD potential of all materials (bedrock and surficial) to be disturbed or created during all phases (construction, operation, decommissioning, reclamation, closure, and post-closure) of the 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.

Characterizing ML/ARD potential is accomplished through laboratory and field based testing that is directed by years of experience. The procedures that will be used have been documented in several manuals which include internationally-recognized Canadian Mine Environment Neutral Drainage (MEND) reports (MEND 1991; MEND 2009) and the Guide for Acid Rock Drainage (GARD) produced by the International Network for Acid Prevention (INAP 2010, <http://www.inap.com.au/>). These manuals describe two general categories of characterization tests: static laboratory tests and kinetic laboratory and field tests.

Metals can leach in both the presence and absence of ARD, and thus the potential for metal leaching at neutral pH will also be assessed. Assessment of ML potential is performed by comparing concentrations of elements present in the test sample (*i.e.*, waste rock, tailings, pit wall) to typical global concentrations indicated by Price (1997). Elements present at ten times

typical concentrations are considered to have the potential to leach under neutral pH conditions. Rates of metal leaching are then determined from laboratory and field based kinetic tests.

Under acid generating conditions, metal mobility will typically increase regardless of metal concentrations in the rock. Potential for ARD is initially determined from static tests by comparing the amount of neutralization potential (NP) versus acid potential (AP), where a neutralization potential ratio ( $NP/AP = NPR$ ) greater than 3 indicates that the rock has low potential for ARD, ratios between 1 and 3 indicate uncertainty, and ratios below 1 indicate that the rock is potentially acid generating (PAG). Timing to onset of ARD (if at all) is estimated from the kinetic tests where the rate of NP depletion can be estimated to assess whether or not active management of mine facility leachate will be required and on what time scale. The NP/AP ratios are used as an initial screening tool. Kinetic tests and mineralogy will refine this classification when more rigorous testing of the deposit is completed.

Static tests will be used to determine the elemental and mineralogical composition of selected samples and for calculating NPRs. Numerous variations on the test to determine NP exist as described by MEND (1991, 2009). The rationale for the choice of static test methods will be provided in the EIA Report. As part of the program, site-specific mineralogical-based approaches will be developed to interpret NP (see below). Acid-potential is usually more straightforward. It will be calculated from either the amount of total sulphur or sulphide sulphur described in the MEND manual. Factors, including mineralogy, will determine the final analytical procedures for calculating acid-potential.

The specific static tests that will be performed include:

- total sulphur (Leco);
- sulphate sulphur determined by hydrochloric acid and sodium carbonate methods;
- sulphide sulphur by difference;
- modified neutralization potential;
- paste pH and conductivity;
- total carbonate analysis;
- low level mercury;
- fluoride (fusion, ISE);
- total barium; and
- ICP-MS element scan following *aqua regia* digestion.

Samples will be selected from across the deposit to encompass spatial distribution (both horizontally and vertically), lithology and ore grade. Approximately 185 drill core samples (1.5 m intervals) will be used to represent waste rock, pit walls, borrow sources and low grade ore stockpiles. This additional sampling will complement the 85 samples already tested by the previous owner of the project. For tailings characterization, metallurgical process waste from each stage of testing will be used.

Following interpretation of static testing results, a subset of composited samples will be selected for mineralogical and kinetic testing (including tailings samples). The selected samples will number about 12 and will cover the range of ML/ARD potential indicated from static testing.

Mineralogical testing is required to refine the form of NP and AP. Carbonates provide the majority of acid neutralizing capacity, although not all carbonates consume acid. Heavy metal carbonates (e.g., siderite) are not consumers of acid due to the oxidation of ferrous iron and subsequent hydrolysis of ferric iron, and determining which carbonates are present is required to determine actual NP. Differentiating sulphide mineralogy is used for refinement of predicted oxidation rates (e.g., pyrite versus pyrrhotite) and acid production as not all sulphide minerals produce acid (e.g., pyrite versus sphalerite). Microprobe testing of NP and AP minerals will also help determine the potential for metal leaching as both carbonates and sulphides can contain toxic elements (e.g., cadmium and selenium). The specific mineralogical tests to determine the above information will include:

- optical mineralogy;
- microprobe testing of carbonate and sulphide grains; and
- rietveld XRD.

Kinetic tests will include laboratory humidity cells and field “barrel” tests. The goal of these tests is to assess mineral weathering rates, including oxidation, acid neutralization and metal release through analyses of leachates. A field based test is used so that the effects of laboratory conditions versus actual site conditions (i.e., temperature, precipitation, particle size) can be compared. This facilitates the development of factors that can be used to predict weathering rates from the eventual mine facility. For example, weathering rates indicated by laboratory tests are typically one to two orders of magnitude greater than barrel tests, and rates from barrel tests are typically one to two orders of magnitude greater than the actual mine facility (e.g., a full scale waste rock dump).

As indicated above, the sample source for kinetic testing will be drill core for all materials except tailings. Sample preparation for the humidity cells for all samples will follow the guidelines of MEND (1991) whereby 1 kg of -0.6 cm (-1/4”) diameter rock is placed into a cylindrical cell. For the field barrels, drill core is also used, except that approximately 300 kg of rock is crushed to -3 cm diameter and placed into barrels on site. It is impractical to source 300 kg of tailings from metallurgical testing, however, scaling factors determined from all other samples will be applied

to the results of laboratory humidity cell testing for prediction of water quality from tailings facilities.

For the humidity cells, weekly leachate analyses of the following will be performed:

- volume;
- pH; and
- conductivity.

All of the following parameters will be measured weekly for the first two weeks of the program and then every two to four weeks thereafter:

- acidity;
- alkalinity;
- pH;
- sulphate;
- chloride;
- fluoride;
- dissolved organic carbon;
- metal scan by ICP; and
- low level mercury.

For the barrel tests, monitoring of pH, conductivity, and temperature will be performed weekly, and all other parameters and volume estimates will be performed monthly. It is expected that kinetic tests will run for the duration of the permitting process and communication between regulatory agencies, Northcliff and SRK will determine when they can be stopped.

Quality assurance and quality control will be a component of all testing. Approximately 10% of all samples collected will have both duplicates and blanks, which will be in addition to routine QA/QC performed by the laboratories used for this work.

At the conclusion of static and kinetic testing, the ML/ARD characteristics and water quality sources terms of waste rock, pit walls, borrow sources, ore grade stockpiles and tailings will be

provided in the EIA Report to inform the environmental effects assessment and potential environmental effects on surface water and groundwater quality.

The discussion of ML/ARD should demonstrate that Northcliff has the necessary understanding, site capacity, technical capability and intent to identify, avoid, mitigate and/or manage ML/ARD in a manner which protects the environment through the life of the mine and after closure of the mine.

#### **4.4.6 Environmental Effects Analyses**

The environmental effects analysis for the Aquatic Environment VEC will address the potential residual environmental effects of the Project on all aspects of the Aquatic Environment. Key aspects of the aquatic environment to be considered are:

- surface water quantity and quality;
- sediment quality;
- fish habitat quantity and quality;
- fish populations;
- usability of the fisheries resource; and
- aquatic species of conservation concern.

The potential residual environmental effects of the Project on the Aquatic Environment will be assessed in the EIA Report. Project design and mitigation plans will focus on avoiding environmental effects, and otherwise minimizing them to the fullest extent possible. The assessment will include the potential residual environmental effects of the Project on fish, fish habitat, surface water quality (including ARD/ML considerations that may affect surface water and groundwater quality) and quantity, sediment quality, potential bioaccumulation of metals in fish, direct mortality, local and regional hydrology, river bank and bed stability, and other considerations during the construction and operation phases of the Project, as well as potential rehabilitation considerations during the decommissioning, reclamation and closure phases. The potential for metals uptake in fish will be determined through the ERA. The ERA is generally described along with the human health risk assessment (HHRA) in Section 4.8 of the TOR. The ERA will examine the potential Project-Environment interactions and the different ways in which ecosystems can be affected from exposure to chemicals of potential concern (COPCs). The scope of and approach to the ERA will be confirmed with regulators. Contingency and emergency response plans that will be implemented to mitigate potential environmental effects will be considered and described in the EIA Report.

The Project will likely result in the alteration, disruption and/or destruction of fish habitat (HADD), and as a result, an acceptable compensation agreement will likely be required to be agreed with DFO before authorization for the HADD can be granted under the *Fisheries Act*. Typical compensation agreements generally require replacement or enhancement of like habitat for like, within the same watershed or management unit as the affected habitat. The EIA Report will provide the conceptual approach to fish habitat compensation, with the details of the compensation program developed in parallel to the EIA. The final compensation program will be agreed with DFO prior to HADD authorization.

Environmental management measures to be developed and implemented as part of the Project, including environmental protection, contingency and emergency response plans, will be generally described in the EIA Report and further details will be developed as the Project matures through its various phases. These plans will necessarily be updated as necessary over the lifetime of the mine and mill to respond to emerging issues and address regulatory requirements, among others, and to strengthen environmental protection measures arising from the operation of the Project. Contingency plans, including emergency response plans, will provide guidance on how to respond to and mitigate any environmental effects as a result of accidents, malfunctions or unplanned events, such as spills. These plans will include measures for spill prevention and response. Effective environmental emergency response does not solely involve actions to mitigate adverse environmental effects; it should address prevention, preparedness, response, mitigation, and restoration of the affected environment.

It is likely that an extensive follow-up and monitoring program will need to be developed for the Aquatic Environment to verify the predictions of the EIA, and to assess the effectiveness of mitigation measures. Additionally, extensive monitoring will be carried out to verify compliance with permit conditions. This will be described in the EIA Report. Key considerations will include process and compliance monitoring, environmental effects monitoring, upstream and downstream monitoring for cumulative environmental effects, and other aspects. For example, the *Metal Mining Effluent Regulations (MMER)* under the *Fisheries Act* specify the EEM requirements for operating metal mines in Canada. These requirements include daily, weekly, monthly and annual monitoring of liquid effluents discharged by mines, in addition to regular rounds of biological monitoring. In addition to EEM requirements as specified by *MMER*, monitoring and follow-up requirements may arise from the EIA process (to test the predictions of the EIA and/or to evaluate the effectiveness of mitigation). Monitoring may also be required as a result of provincial approvals to operate.

Aquatic monitoring programs for mining facilities typically include process monitoring (*i.e.*, monitoring that is internal to the facility, and is intended to provide assurance that the facility is operating normally); end of pipe monitoring (*i.e.*, monitoring of liquid effluent at the point of discharge to the environment, where regulatory requirements such as non-lethality and authorized limits on total suspended solids, metals and pH must be maintained); and environmental monitoring in the receiving environment. The environmental monitoring typically includes regular (*e.g.*, weekly or monthly) sampling of water quality at reference locations as

well as points downstream of the effluent discharge location, in addition to the regular rounds of biological studies required under *MMER*.

The planned aquatic environment monitoring program for the Project will be detailed in the EIA Report in terms of the monitoring objectives, components of the environment that will be monitored, where, how often and for how long monitoring will occur, and how the results will be reported. Baseline data will be collected as part of the EIA, and prior to construction and operation of the Project. Contingency plans will be developed to respond to or mitigate any environmental effects from accidents, malfunctions or unplanned events. The aquatic environment monitoring program will provide opportunity for adaptive management of the mine operations in the event that mining activities are found to be having adverse environmental effects on the aquatic environment that were not anticipated during the EIA.

## **4.5 TERRESTRIAL ENVIRONMENT**

### **4.5.1 Definition of Terrestrial Environment**

The Terrestrial Environment includes all terrestrial wildlife, habitat and birds located within the zone of influence of the Project. Though vegetation is also part of the Terrestrial Environment, it is addressed separately in this TOR in Section 4.6 (Vegetated Environment).

Terrestrial species at risk and species of conservation concern are considered to be those terrestrial faunal species that live for large parts of their life cycle in the terrestrial environment and have been identified by federal or provincial agencies as being rare, threatened or otherwise endangered. Species listed in *SARA* and/or the *NB ESA* are considered to be species at risk, while species ranked S1, S2, or S3 by AC CDC and ranked May Be at Risk or Sensitive by NBDNR are considered to be species of conservation concern. Both secure and/or abundant terrestrial species as well as terrestrial species at risk and species of conservation concern will be considered in the assessment of the Terrestrial Environment, with particular emphasis on species at risk and species of conservation concern as the most sensitive or susceptible populations that could be affected by Project-related environmental effects.

### **4.5.2 Potential Project-VEC Interactions**

The Project may interact with the Terrestrial Environment in the following ways.

- Habitat loss will occur during the construction phase as a result of facility construction for mining activities (*e.g.*, clearing and grubbing), but habitat will be restored to some extent on closure, depending on the closure objectives and plan. The loss will occur at the location of Project components and facilities, including the open pit, waste rock storage area, and TSF, among others. The decommissioning, reclamation and closure plan may include habitat restoration, depending on the closure objectives agreed with government. Restored habitat at closure may be different in nature than pre-Project habitat.

- Migrant bird species may use the habitat temporarily or fly over or around the Project, but any breeding birds that are loyal to their nest sites will lose resources on the Project site upon construction. During the construction and operation phases of the Project, wildlife will lose habitat due to the proposed development, and habitat fragmentation may occur in certain locations where access road or transmission line construction may take place. Further investigations are being conducted to determine the importance of this habitat loss, and mitigation will be considered to minimize the loss to the extent possible.
- Clearing and grubbing during site preparation will remove vegetation and, particularly in forested areas, will change the quality of the habitat along the edge of the Project. This may enable more light-tolerant and disturbance-tolerant vegetation to be established, which may have an environmental effect on wildlife habitat through habitat alteration. The environmental effects of clearing and grubbing are most severe when these activities are conducted during the period when most migratory bird species are breeding (predominantly from May to the end of August). Clearing and grubbing during that time could result in the direct mortality of eggs and unfledged nestlings.
- Construction and operation of mine facilities and infrastructure, including the new transmission line and any on-site roads, may lead to the loss of habitat of, and disturbance to, terrestrial species.
- The Project may result in loss of habitat for, or disturbance or direct mortality to, species at risk or of conservation concern under national, provincial and/or regional classification systems, should any such species be present in the assessment area, defined below.

Changes to the Terrestrial Environment as a result of the Project that affect current use for traditional purposes by Aboriginal persons will be considered as part of the assessment of the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VEC.

#### **4.5.3 Boundaries**

The spatial boundaries for the Project with respect to the Terrestrial Environment encompass the Project development area (PDA). The affected habitat and/or populations in the PDA will be placed in the context of a local assessment area (LAA) consisting of the Central Uplands Ecoregion and Valley Lowlands Ecoregion. For assessment of potential cumulative environmental effects, a regional assessment area (RAA) consisting of the Province of New Brunswick will be considered. Together, these areas are referred to as the assessment area.

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Terrestrial Environment include the construction, operation, and decommissioning, reclamation, and closure phases of the Project.

In terms of administrative boundaries, the terrestrial environment is protected through provincial and federal legislation. SARA prohibits the interference, disturbance or destruction of endangered or threatened species or critical habitats for any listed species, and the NB *ESA* contains similar provisions. Migratory birds are protected federally under the *Migratory Birds Convention Act (MBCA)*, to protect migratory birds and active nests. The killing of migratory birds or the destruction of their nests, eggs, or young is an offence under the *MBCA*. Avoiding clearing activities during the migratory bird breeding season is expected to be a permitting condition and thus the EIA Report will include such mitigation in the Project construction plan.

#### 4.5.4 Significance Criteria

For species at risk and species of conservation concern, a significant adverse residual environmental effect on the Terrestrial Environment will be defined as:

- one that alters the terrestrial habitat within the assessment area physically, chemically, or biologically, in quality or extent, in such a way as to cause a change or decline in the distribution or abundance of a viable population that is dependent upon that habitat such that the likelihood of long-term survival of these rare, uncommon and/or non-secure population(s) within New Brunswick is substantially reduced as a result; or
- one that results in the direct mortality of individuals or communities such that the likelihood of the long-term survival of these rare, uncommon and/or non-secure population(s) within New Brunswick is substantially reduced as a result; or
- one that results in a non-permitted contravention of any of the prohibitions stated in Sections 32-36 of *SARA*, or in contravention of any of the prohibitions stated in Section 3 of the *New Brunswick Endangered Species Act*; or
- in the case of species of special concern listed in Schedule 1 of *SARA*, where the Project activities are not in compliance with the objectives of management plans (developed as a result of Section 65 of *SARA*) that are in place at the time of relevant Project activities.

For all other terrestrial fauna, a significant adverse residual environmental effect on the Terrestrial Environment will be defined as one that affects terrestrial populations in such a way as to cause a decline in abundance or change in distribution of common and secure population(s) such that the populations will not be sustainable within the Central Uplands Ecoregion and Valley Lowlands Ecoregion.

#### 4.5.5 Characterization of Existing Conditions

To date, the following work has been conducted or is in progress to characterize the existing conditions of the assessment area:

- terrestrial surveys were conducted in June of 2008 in the assessment area and included incidental amphibian, mammal, and bird observations;
- breeding bird, raptor, and waterfowl surveys/counts were completed in June 2008; and
- waterfowl surveys/counts were also completed in September 2008.

A variety of surveys will be conducted within the assessment area in order to characterize existing conditions. These studies are:

- surveys of potential bird nesting and other wildlife habitat within the PDA;
- additional breeding bird surveys determined in consultation with the Canadian Wildlife Service (CWS) of Environment Canada;
- targeted surveys for bird species at risk that may potentially be present in the PDA, including Canada Warbler, Olive-sided Flycatcher, Common Nighthawk; and for wood turtle;
- targeted surveys including wildlife transects through representative habitats, to identify the presence of wildlife, wildlife corridors, and wintering areas; and
- incidental observations of other wildlife, including ungulates (*e.g.*, moose and deer) and small fur-bearing mammals.

In addition to the surveys listed above, planned work will be comprised of:

- review of existing databases to determine the potential for presence of species at risk or species of conservation concern, such as those maintained by the Atlantic Canada Conservation Data Centre (AC CDC 2010) and Bird Studies Canada (*i.e.*, [www.naturecounts.ca](http://www.naturecounts.ca));
- consultation with regulatory agencies (including NBDNR and CWS) to determine the adequacy of existing information and potential requirements for further surveys;
- desktop research to confirm the presence or absence of important ungulate habitat within the PDA, including the presence or absence of wintering areas; and
- consultation with hunting and trapping associations known to be active in the general vicinity of the Project; and
- the results of a Traditional Use Study, if available.

Reputable sources of information and data, including but not limited to those listed in Section 4.4 of the NBENV Final Guidelines, will be consulted to supplement the field data

gathered from field reconnaissance and planned future work in order to document existing conditions.

The EIA Report will contain several figures and/or maps displaying existing conditions in the assessment area, including topography, surficial and bedrock geology and the results of field reconnaissance and surveys, as applicable.

#### **4.5.6 Environmental Effects Analyses**

To predict the environmental effects of the Project on the Terrestrial Environment, ground clearing activities to be conducted during the construction phase that eliminate wildlife habitat will be quantified and located.

Potential environmental effects of the Project on the Terrestrial Environment will be documented graphically, where possible, on appropriately scaled figures showing habitats or other relevant information, such as interior forest and habitat fragmentation. The potential environmental effects of the Project on the Terrestrial Environment will be assessed in consideration of existing conditions, SGPP and planned mitigation measures, including closure plans.

### **4.6 VEGETATED ENVIRONMENT**

#### **4.6.1 Definition of Vegetated Environment**

The Vegetated Environment is defined to include terrestrial vascular plants, including invasive species, in upland, wetland, and aquatic habitats, in particular, through consideration of SAR (Species at Risk) or SOCC (Species of Conservation Concern: defined here as species ranked S1, S2, or S3 by AC CDC, and ranked May Be at Risk or Sensitive by NBDNR). Rare plants are often an indicator of the presence of unusual and/or sensitive habitat, and their protection as umbrella species can confer protection on their associated unusual habitats and co-existing species.

#### **4.6.2 Potential Project-VEC Interactions**

The Project may interact with the Vegetated Environment in the following ways.

- Clearing and grubbing during site preparation will remove vegetation within the footprint of the Project.
- The diversion of surface water around Project components may also change the surface water hydrology locally, and down-flow, so vegetation communities within the receiving environment could experience short and longer term changes to water budgets. If plant species of conservation concern are present in these areas, this activity could result in the direct mortality to individual plants. This disturbance in combination with vehicle traffic may facilitate the establishment of more pioneering type plant species and possibly invasive species, which may have an environmental effect on terrestrial

vascular plant species of conservation concern through increased competition or habitat disturbance.

Due to the specific site requirements and conditions required by rare plants, they tend to be vulnerable to Project-related environmental effects, and potential effects on rare plants are measurable.

Given the fixed location of the ore deposit, and the large footprint required to store rock and ore, interaction with plant species of conservation concern may not be avoidable, should they be found to be present in this area.

Changes to the Vegetated Environment as a result of the Project that affect current use for traditional purposes by Aboriginal persons will be considered as part of the assessment of the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VEC.

#### **4.6.3 Boundaries**

The spatial boundaries for the Vegetated Environment will encompass the PDA. The affected populations in the PDA will be placed in the context of a local assessment area (LAA) consisting of the Central Uplands Ecoregion and Valley Lowlands Ecoregion. For assessment of potential cumulative environmental effects, the regional assessment area (RAA) will consist of the Province of New Brunswick. Together, these areas are referred to as the assessment area.

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Vegetated Environment include the phases of construction, operation, and decommissioning, reclamation, and closure of the Project.

The protection of plant species of conservation concern is regulated by the New Brunswick *Endangered Species Act* and the federal *Species at Risk Act*, the primary administrative boundaries for the Vegetated Environment in this EIA.

#### **4.6.4 Significance Criteria**

For species at risk and species of conservation concern, a significant adverse residual environmental effect on the Vegetated Environment will be defined as:

- one that alters the terrestrial habitat within the assessment area physically, chemically, or biologically, in quality or extent, in such a way as to cause a change or decline in the distribution or abundance of a viable population that is dependent upon that habitat such that the likelihood of long-term survival of rare, uncommon and/or non-secure population(s) within New Brunswick is substantially reduced as a result; or
- one that results in the direct mortality of individuals or communities such that the likelihood of the long-term survival of rare, uncommon and/or non-secure population(s) within New Brunswick is substantially reduced as a result;

- one that results in a non-permitted contravention of any of the prohibitions stated in Sections 32-36 of *SARA*, or in contravention of any of the prohibitions stated in Section 3 of the New Brunswick *Endangered Species Act*; or
- in the case of species of special concern listed in Schedule 1 of *SARA*, where the Project activities are not in compliance with the objectives of management plans (developed as a result of Section 65 of *SARA*) that are in place at the time of relevant Project activities.

For all other terrestrial flora, a significant adverse residual environmental effect on the Vegetated Environment will be defined as one that affects terrestrial populations in such a way as to cause a decline in abundance or change in distribution of common and secure population(s) such that populations will not be sustainable within the Central Uplands Ecoregion and the Valley Lowlands Ecoregion.

#### **4.6.5 Characterization of Existing Conditions**

Prior to vascular plant field surveys, habitat modeling using available data will be conducted to determine high potential areas for plant species of conservation concern. Available information on the known occurrence of rare and uncommon plant species will be reviewed from public and private sources including the *SARA* Registry, the Nature Trust of New Brunswick environmentally sensitive areas database, the AC CDC database (AC CDC 2010), NBDNR, and Hinds (2000).

Vascular plant surveys will be conducted in all areas of the PDA with focus on high potential areas, and the locations of any plants of conservation concern will be mapped.

#### **4.6.6 Environmental Effects Analyses**

The location of plants of conservation concern within the assessment area will be compared to the footprint of Project facilities and activities. The potential environmental effects of the Project on the Vegetated Environment will be assessed in consideration of existing conditions, SGPP and planned mitigation measures.

### **4.7 WETLAND ENVIRONMENT**

#### **4.7.1 Definition of Wetland Environment**

The Wetland Environment is defined to include wetland habitat including, soils, habitat values, surface hydrology, and wetland function. The Wetland Environment is selected as a VEC due to provincial and federal legislation (as applicable) and policy related to wetlands, as well as in recognition of the value placed on their preservation by regulatory agencies, the public, and stakeholders.

A wetland is defined by the New Brunswick *Clean Environment Act* as land that, either periodically or permanently, has a water table at, near or above the land's surface or that is saturated with water, and sustains aquatic process as indicated by the presence of hydric soils, hydrophytic vegetation, and biological activities adapted to wet conditions; and

Wetland function is defined by the Federal Policy on Wetland Conservation (Environment Canada 1991) which is relied upon by the Province in its consideration of how a project may affect wetlands. The Policy describes wetland function as:

*"...the natural processes and derivation of benefits and values associated with wetland ecosystems, including economic production (e.g., peat, agricultural crops, wild rice, peatland forest production), fish and wildlife habitat, organic carbon storage, water supply and purification (groundwater recharge, flood control, maintenance of flow regimes, shoreline erosion buffering), and soil and water conservation, as well as tourism, heritage, recreational, educational, scientific, and aesthetic opportunities".*

#### **4.7.2 Potential Project-VEC Interactions**

The Project may interact with the Wetland Environment in the following ways.

- Given the fixed location of the ore deposit, and the footprint required to construct the Project facilities, the complete avoidance of wetlands is likely not possible. Project activities will thus likely result in the direct loss of wetland area in the PDA, and have the potential for indirect environmental effects in wetlands in the LAA that are immediately adjacent to the PDA, such as those resulting from alteration of drainage patterns affecting wetlands.
- The diversion of surface water around project components may also change the surface water hydrology locally, and down-flow, so wetlands within the receiving environment could experience short and longer term changes to water budgets.
- The potential environmental effects on wetland function due to development will be assessed within the PDA and LAA (where applicable), and will include environmental effects on wetlands due to alteration of hydrological conditions outside of the PDA.
- Wetlands may be susceptible to environmental effects of spills and Project emissions through deposition.

Changes to the wetlands as a result of the Project that affect current use for traditional purposes by Aboriginal persons will be considered as part of the assessment of the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VEC.

### 4.7.3 Boundaries

The spatial boundaries for the assessment of the potential direct environmental effects of the Project on wetlands and wetland function are the PDA. Indirect environmental effects may also occur in wetlands adjacent to the PDA (within the local assessment area (LAA) defined by the West Branch Napadogan Brook subwatershed) as a result of alteration of drainage patterns by the Project. The affected wetlands in the PDA will be placed in the context of the LAA. For assessment of potential cumulative environmental effects, the regional assessment area (RAA) will consist of the Nashwaak River watershed. Together, these areas are referred to as the assessment area.

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Wetland Environment include the phases of construction, operation, and decommissioning, reclamation and closure of the Project.

In terms of administrative boundaries, wetlands are addressed provincially by the New Brunswick Wetlands Conservation Policy (NBDNR and NBDELG 2002). The primary objective of this policy is to prevent the loss of provincially significant wetlands and achieve no net loss of wetland function for all other wetlands (*e.g.*, wetlands greater than 1 ha in size). Implementation of this policy is the responsibility of NBENV, through existing legislation. Wetlands are also protected provincially under the *Clean Water Act* and the *Clean Environment Act*. Under the *Clean Water Act*, a permit is required for a wetland alteration. Both of these acts are administered by the NBENV. The *Clean Environment Act* includes provisions to designate a wetland or any portion of it as a protected area. Under the *Clean Water Act*, the *Watercourse and Wetland Alteration Regulation* applies to all wetlands of 1 ha or greater in size, or any wetland contiguous to a watercourse. The application process applies to all Project-related activities within 30 m of a wetland. Recently, a short-term wetland management strategy has been implemented by NBENV that defines wetland protection restrictions to all provincially significant wetlands (PSWs) as well as all GeoNB mapped, regulated wetlands and their buffers, with compensation for affected wetland loss in these areas established at a ratio of 2:1. It is intended that the short-term wetland management strategy will remain in place while a consultative exercise (initiated in 2011) is being carried out to map a long-term wetland management strategy.

In addition to the provincial short-term strategy to wetland management, the Federal Policy on Wetland Conservation (FPWC, Government of Canada 1991) applies to the Project. The FPWC applies to all federally managed lands and protected areas, or to any wetland when the federal government has decision-making authority in respect of a development that may potentially affect wetlands. As such, all wetlands potentially affected by Project activities for which a federal authorization is issued, regardless of their size or whether they appear on any mapping, are subject to the FPWC. Thus, the sequence of avoidance, minimization and compensation will be followed for these wetlands.

In light of regulatory measures described above, there are provisions in regulation and policy that generally allow development in areas of wetlands to take place on a case-by-case basis provided any net loss of wetland function is authorized and compensated for (as applicable). In order for development to proceed in a wetland, a hierarchy of protective measures must be followed. First, wetlands must be avoided if possible. If this is not possible, then some type of mitigation must be attempted to minimize adverse environmental effects to wetlands. If mitigation is not possible and wetlands must be destroyed or displaced, then compensation is required. Provincially, compensation is required on an interim basis, only for mapped wetlands as defined by the GeoNB mapped, regulated wetland layer and Provincially Significant Wetlands layer and buffers. Thus, the approach to the EIA will consider all wetlands potentially affected by the Project, whether on the NBDNR mapping layer or not. While avoidance or mitigation will be applied to all affected wetlands, compensation at the 2:1 ratio as applicable will be considered only for provincially significant wetlands or GeoNB mapped, regulated wetlands, in accordance with the provincial short-term wetland management strategy, unless superseded by the provincial long-term strategy for wetlands protection.

#### **4.7.4 Significance Criteria**

A significant adverse residual environmental effect on the Wetland Environment will be defined as one that results in an unauthorized net loss of wetland function in a wetland for which alteration would otherwise require authorization (*i.e.*, an NBDNR-mapped wetland); the unauthorized loss of wetland function in a provincially significant wetland (PSW) after consideration of planned mitigation or provincially required compensation for unavoidable wetland losses; or the loss of a significant function provided by an unregulated wetland that cannot be avoided or mitigated. An understanding of function is the basis for application of the mitigation hierarchy; therefore significance is based on the nature and magnitude of an environmental effect after the mitigation hierarchy has been applied. These significance criteria are based in part on the NBENV's short-term wetland management strategy, discussed previously.

For all wetlands that are not PSW or do not appear on the NBDNR-mapping layer, the key wetland functions of concern are the potential changes in the stream flows in the watershed or subwatershed, or potential changes to biodiversity as a result of wetland function loss. These issues will be assessed and mitigated as part of the environmental effects assessment for the Wetland Environment and other VECs as applicable.

In consideration of the currently evolving approach to provincial wetland protection at the time of preparing this TOR, these criteria may be revisited in the EIA Report to consider developments in the wetland management strategy.

#### **4.7.5 Characterization of Existing Conditions**

Some preliminary reconnaissance-level wetland surveys were conducted in the assessment area in July 2008. These data will assist in planning further field efforts to be conducted in the summer of 2011.

The location of all wetlands in the RAA and LAA will first be mapped using the NBDNR mapping layer to identify the location of all known wetlands in the RAA, with particular emphasis on those in the LAA. This will assist in the preparation of plans for field investigations, the assessment of environmental effects, and preparation of response plans should an accident, malfunction, or unplanned event occur that has environmental effects outside of the PDA (as necessary).

Within the PDA, a review of desktop information including NBDNR wetlands layers, aerial photography, depth-to-water-table mapping layers, and other GIS data will be combined with digital elevation model (DEM) data collected using light detection and ranging (LiDAR) surveys to focus the field efforts within the PDA. Field surveys will be conducted only in the PDA. Field work in the PDA will be conducted in 2011 to collect the required information to support the EIA, including full delineation and evaluation of wetland function within the PDA. Regulatory guidance will be sought from NBENV and/or Canadian Wildlife Service on the approach to delineation and the evaluation of wetland function. Wetland boundaries will be determined through field delineation using global positioning systems (GPS), and the collected wetland boundary data will be mapped using GIS.

All wetlands outside of the PDA (*i.e.*, within the LAA or RAA) will be mapped using the existing NBDNR mapping layer only. The assessment of potential indirect environmental effects that might result from alteration of surface water flows will be carried out using such mapping.

#### **4.7.6 Environmental Effects Analyses**

The location of all wetlands within the PDA will be delineated and mapped. Wetlands that are within the potential zone of influence of the Project during the construction or operation phases will be identified, delineated, and assessed for function by wetland specialists. A description of representative wetlands in each watershed will be provided in the EIA Report.

The potential residual environmental effects of the Project on the Wetland Environment (after avoidance, mitigation and compensation, as applicable, has been applied) will be assessed in consideration of existing conditions, SGPP and planned mitigation measures, including closure plans.

## **4.8 PUBLIC HEALTH AND SAFETY**

### **4.8.1 Definition of Public Health and Safety**

Public Health and Safety is characterized in the following discussion of Public Health, as well as for Public Safety associated with the Project.

Public Health is a condition of the environment that relates to the physical health and well-being of the human/public community surrounding the Project. The potential for public health concerns include those associated with chemical emissions, human health factors, potable water supplies, and several types of accidents, malfunctions, and unplanned events. Public Health can be assessed both in light of long term (chronic) conditions as well as short term (acute) conditions. Public Health can be affected by emissions and environmental effects on air quality, drinking water quality and food, among other factors.

Public Safety is a condition of the environment that relates to the prevention and protection of the general population from all manners of injury, damage or harm associated with potential Project-related accidents, malfunctions, or unplanned events (*e.g.*, fuel spill, vehicle collisions, accidental explosions). Public Safety is generally assessed with regard to acute (short term) incidents or environmental effects, resulting primarily from accidents, malfunctions, and unplanned events. Chronic (long-term) environmental effects are addressed through engineering design or mitigation aimed at addressing the public safety concerns. As such, the potential environmental effects of the Project on Public Safety will be addressed in the accidents, malfunctions, and unplanned events chapter of the EIA Report.

### **4.8.2 Potential Project-VEC Interactions**

The Project may interact with Public Health and Safety in the following ways.

- The Project may generate air and water emissions and release wastes into the air, water, and/or soil. If these emissions and wastes contain constituents that may be potentially toxic or otherwise harmful, they may cause a Change in Public Health if they come into contact with one or more individuals.
- Accidents, malfunctions or unplanned events arising from the Project could cause a Change in Public Safety.

The potential for environmental effects on Public Health are best characterized by conducting a Human Health and Ecological Risk Assessment (HHERA) that is used to assess the potential environmental effects of the Project on Public Health. The HHERA will examine the potential Project-Environment interactions and the different ways in which people and ecosystems can be affected from exposure to chemicals of potential concern (COPCs).

Project employees are protected by applicable occupational health and safety laws of the Province of New Brunswick that will be followed closely by Northcliff.

#### **4.8.3 Boundaries**

The assessment of Public Health and Safety will include spatial and temporal boundaries. In both cases, these boundaries will include those as established for the Atmospheric Environment (Section 4.1) and Water Resources (Section 4.3). Since much of the HHERA will focus on air quality and deposition, and potential water effluents, these two studies provide much of the source data for the HHERA.

Temporal boundaries will include the phases of construction, operation, and decommissioning, reclamation, and closure of the Project. The HHERA will be based on an average human lifetime of 80 years. Temporal boundaries for the air quality risk assessment (acute and chronic) are also expressed in terms of the averaging periods for environmental effects assessment (1-hour, 24-hour and annual averaging periods).

The administrative boundaries for the assessment of a Change in Public Health are governed by the accepted methodologies and guidelines for the conduct of HHRA in Canada. Although there is no specific guidance for facilities emissions risk assessment, the previously described protocols follow a standard risk assessment paradigm accepted by the federal and provincial governments. Administrative boundaries for other VECs (e.g., air quality objectives as part of the Atmospheric Environment, Health Canada *Guidelines for Drinking Water Health* as part of the Water Resources VEC) are also applicable to a Change in Public Health.

The administrative boundaries for a Change in Public Safety are established by various governing standards including the Canada Labour Code, the *Transportation of Dangerous Goods Act and Regulations*, the New Brunswick *Employment Standards Act*, and the New Brunswick *Occupational Health and Safety Act and Regulations*. These are applicable to the Project and will be followed through all phases of the Project.

#### **4.8.4 Significance Criteria**

A significant adverse residual environmental effect for a Change in Public Health will be one that results in the Project-related environmental exposures that are predicted through the HHERA to exceed the objectives established by a recognized health organization and are likely to result in a long-term, substantive change in the public health status.

A significant adverse residual environmental effect for a Change in Public Safety will be one where the Project directly and substantially endangers the safety of the public and/or Project employees to such an extent that an immediate danger exists to the life and/or health of the public and/or employees as a result of the Project, and for which planned design features, mitigation, or environmental management measures are unsuccessful at minimizing or eliminating the risks to public safety.

#### **4.8.5 Characterization of Existing Conditions**

The HHERA will be based primarily on the baseline data with regard to air quality, water quality, fish tissue quality, soil quality, vegetation (edible plants), and wildlife. These data will be collected as part of the baseline studies for other VECs or from literature sources and will comprise characterization of:

- background levels of metals substances in soils;
- background levels of metals in surface water;
- metal concentrations in fish tissue;
- metal concentrations in vegetation;
- metal concentrations in small mammals; and
- existing air quality conditions in the Project area.

Existing provincial data will be consulted with respect to the existing health status of New Brunswick people generally and in the closest communities to the Project, where data are available.

Information from Aboriginal peoples about their use of the area, as conveyed during the EIA process, will be used in evaluating potential exposure for the HHERA. In addition, information from Aboriginal peoples, conveyed during the EIA process, with respect to the types and quantities of country foods collected that may be affected by Project activities will also be used in developing the baseline program.

##### **4.8.5.1 Baseline Sampling to Support the HHERA**

A baseline sampling program will be carried out in the PDA to provide information on existing conditions to support the HHERA. Based on the current land use in the area, country foods that are expected to be consumed from the area include fish, game, and berries. Baseline sampling of fish tissue for standard trace metal concentrations (including lead, arsenic, tungsten, molybdenum, zinc, copper, antimony, and aluminum) is currently included as part of the Aquatic Environment program described previously. Small mammal samples will be collected from up to 10 sites in the PDA and tissues will be analyzed for standard trace metal concentrations. These will be collected during the summer sampling program, coinciding with up to 50 proposed soil sampling locations. The small mammal tissues are considered a conservative representation of potential metal concentrations in larger game. Based on previous field programs in New Brunswick that included trapping small mammals, meadow voles and/or shrews are the most likely species to be collected, as available.

Blueberries are expected to occur in the general area, and field crews will identify blueberry patches during the course of completing the other baseline programs. Sampling of the distinct blueberry patches will then be completed when the blueberries are in season. While the actual number of blueberry patches cannot be confirmed at this time, ideally five to ten blueberry samples would be collected and analyzed for standard trace metal concentrations.

Recommendations for subsequent sampling programs following Project construction and operation (*e.g.*, frequency of sampling, sampling locations, specific analytical parameters, etc.) will be based on the findings of the baseline sampling program and HHERA, and will be incorporated into the EIA report.

#### **4.8.6 Environmental Effects Analyses**

##### **4.8.6.1 Change in Public Health**

The potential environmental effects of the Project on Public Health will be characterized by conducting a Human Health and Ecological Risk Assessment (HHERA) that assesses the potential environmental effects of the Project on Public Health and on various biophysical VECs such as the Terrestrial Environment, Vegetated Environment, Wetland Environment, and the Aquatic Environment (discussed in Sections 4.4 to 4.7 of this TOR).

People and ecological receptors can come into contact with chemicals in their environment in a variety of ways, depending on their daily activities and land use patterns. The means by which a person comes into contact with a chemical (including metals) in environmental media are referred to as exposure pathways. The primary exposure pathways to human receptors are:

- inhalation of air, vapours, and dusts through the lungs;
- ingestion of soil, dust, drinking water, garden produce, food; and
- dermal absorption from soil, dust and water contact with skin.

Exposure pathways may require direct contact between receptors and media of concern (*e.g.*, incidental ingestion of soil), or may be indirect, requiring the movement of the chemical from one environmental medium to another (*e.g.*, the uptake and/or transfer of a chemical from soil into home garden vegetables which are then ingested by an individual).

The assessment of environmental effects for the Project involves predicting and evaluating changes (effects) to Valued Environmental Components (VECs) arising directly from four assessment scenarios: Baseline, Project, Application, and Future Cases. Potential project-specific environmental effects will be assessed by comparing calculated exposures to objectives established by recognized health organizations. The characterization of the potential human health risks will take into account the magnitude, geographic extent, duration/frequency, reversibility and the ecological/socio-economic context of the environmental effect. The HHERA

will focus only on potential environmental effects related to chemical changes in the environment in soil, air, biota and water as a result of Project activities. Activities such as grading, blasting, extraction, heavy machine operation, and processing have the potential to release chemicals and metals into the environment.

The HHERA will follow established methods published or endorsed by Health Canada, Environment Canada, the Canadian Council of Ministers of the Environment, and the United States Environmental Protection Agency. The scope of the HHERA will be confirmed with regulatory agencies.

The components of the risk assessment will relate to potential health effects associated with exposure to chemicals and metals in environmental media, including air, soil, surface water, sediment, vegetation and fish tissue. Predicted chemical and metal levels as a result of the Project will be added to baseline data collected for air quality, soils, and water quality in order to assess potential health effects arising from the total levels. If concentrations of contaminants in air, soils, and water are below regulatory guidelines in place for the protection of human and ecological health, then a qualitative assessment of potential effects on human and ecological health will be made and a quantitative evaluation of potential risk/effects is not required.

The HHERA for the Project will determine what, if any, environmental effect chemical releases from the Project would have on human and ecological receptors in the area. The nearest permanent residence appears to be approximately 9 km from the Project at Napadogan; however, the Project lies within territory that may be used by the public and Aboriginal persons, and there are recreational campsites approximately 1.5 km from the Project. The area surrounding the Project is likely used for recreation and for subsistence hunting, fishing and trapping. As such, particular attention will be paid to potential risks posed to traditional, subsistence and recreational visitors.

The risk assessment framework that will be used in the HHERA follows the standard paradigm presented in Figure 4.1, based on Health Canada, USEPA, and CCME guidance (Health Canada 2004; Health Canada 2009; USEPA 1989; CCME 1996). It is a staged approach to estimating the potential risk to receptors and involves public consultation and communication with regulatory authorities and scientific experts in the field.

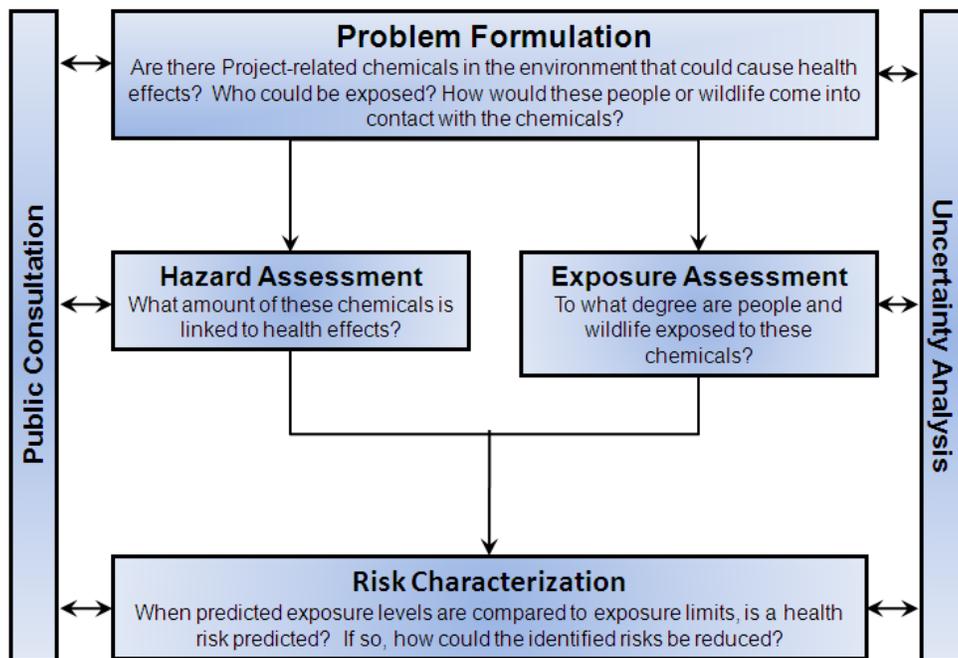


Figure 4.1 Risk Assessment Paradigm

#### 4.8.6.2 Change in Public Safety

As discussed above, Public Safety, including worker safety, will be assessed by determining credible accident, malfunction, and unplanned event scenarios that may result during the construction, operation, and decommissioning, reclamation and closure phases of the Project, and will be described in the accidents, malfunctions and unplanned events chapter of the EIA Report. Potential environmental effects will be assessed qualitatively through the application of professional judgment and planned mitigation.

### 4.9 LABOUR AND ECONOMY

#### 4.9.1 Definition of Labour and Economy

Labour and Economy refers to the labour market, employment, employment income, business income and their aggregate effects on provincial taxes and such indicators as the provincial gross domestic product (GDP).

In addition to the above-noted factors to be considered as part of Labour and Economy, the following additional factors required to be assessed as part of the NBENV Final Guidelines are addressed in other sections of this TOR, namely:

- tourism, recreation, and property values are addressed in the Land and Resource Use VEC (Section 4.11);

- effect on industries, including recreational, commercial and Aboriginal fishing industries are addressed in the Land and Resource Use VEC (Section 4.11) and the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons VEC (Section 4.12);
- visual effects and visual aesthetics are addressed in the Land and Resource Use VEC (Section 4.11); and
- total reserves, present day value, annual extraction rates will be addressed in the Project Description chapter of the EIA Report.

The length of mine life, and consequent socio-economic environmental effects on surrounding communities, will also be addressed in the Labour and Economy VEC.

#### **4.9.2 Potential Project-VEC Interactions**

The Project may interact with Labour and Economy in the following ways.

- Activities and physical works associated with the construction and operation of the Project will generate direct, indirect and induced employment, business activity, and income. This will also be reflected by environmental effects on provincial taxes and GDP.
- The environmental effects during the construction and operation of the Project will primarily be positive. However, if the local Project-related demand for labour, business or infrastructure exceeds the supply, this may create regional or provincial shortages that will have negative environmental effects such as wage and price inflation on other businesses and hence the economy as a whole.
- The Project may also result in changes to property values in the communities surrounding the Project as a consequence of increased demand for housing (addressed as part of Land and Resource Use).
- Decommissioning, reclamation and closure of the Project will see diminishing levels of Project-related activity, physical works and employment and business expenditures, and hence diminishing positive and negative effects on Labour and Economy.

#### **4.9.3 Boundaries**

The spatial boundaries (assessment area) of Labour and Economy include central New Brunswick (*i.e.*, York County and the eastern portion of Carleton County), with a particular focus on the City of Fredericton and the parishes of Stanley, Douglas, and Aberdeen, which include respectively the communities of Stanley, Burtts Corner and Napadogan, and Juniper.

The temporal boundaries include the phases of construction, operation, and decommissioning, reclamation, and closure (including post-closure) of the Project.

Both the local and the provincial economies may experience the employment, income, tax revenues, economic output, and labour supply impacts of the Project. The provincial government has primary responsibility for the management of economic development throughout the Province of New Brunswick.

The effects of direct and indirect employment, income, and provincial GDP will be determined using estimated multipliers. The availability of other secondary data will determine the technical boundaries of the assessment.

#### **4.9.4 Significance Criteria**

The assessment of Labour and Economy will consider the magnitude, geographic extent, duration and frequency of the environmental effects of the Project. It will also take into account the socio-economic context, insofar as it will consider the degree to which the area has previously been subject to, and hence may have developed methods of coping with, similar types of activity.

For Labour and Economy:

- a significant positive residual environmental effect of the Project will result if the Project causes substantial increases in the direct, indirect and induced employment, labour income, business income and provincial tax revenues over the life of the Project; or
- a significant adverse residual environmental effect of the Project will result if the Project causes greater wage and price (including housing prices) increases in the assessment area than in the Province as a whole, over the life of the Project.

It should also be noted that in some cases residual environmental effects will be both positive and adverse, for example, when the Project affects different groups in different ways. These potential outcomes will also be identified and discussed.

#### **4.9.5 Characterization of Existing Conditions**

The existing conditions in central New Brunswick will be established to support the assessment of environmental effects of the Project on Labour and Economy. The description of existing conditions will include profiles of population and labour force; training and education; employment, income and economic production; and business and industry. Publicly-available sources of information will be used, from sources such as Statistics Canada and the New Brunswick Department of Finance.

The profile of the population of the assessment area will include information on: total numbers of individuals; population change over time; population by gender; and highest level of schooling.

The labour force description will include information on experienced labour force by industry and occupation. Employment and income data will be collected related to: income levels, sources of income, unemployment rates; and labour force participation rates. Most of these data will be compiled from Census and other Statistics Canada information.

A profile of the existing employment and income for the assessment area will be developed, as well as GDP for the Province. Information will include: income levels; sources of income; unemployment rates; labour force participation rates; and provincial GDP. Data will be compiled from Statistics Canada based on the 2006 Census and information from other government agency information.

A profile of business, industry, and the economy, including information on provincial taxation and GDP, will be developed from data obtained from Statistics Canada and the Government of New Brunswick. The profile will include any available information on the current and future labour market and other planned major projects.

#### **4.9.6 Environmental Effects Analyses**

The feasibility study will provide information on expected employment and expenditures for all phases of the Project which will, in turn, allow for estimates of labour, supply and service requirements, as well as direct, indirect and induced employment, income, and provincial GDP environmental effects.

Using specific information on the design of the Project, predictions of the economic impacts of all phases of the Project will be developed to support the Labour and Economy effects analysis. Multipliers will be used to quantify the economic impacts of the Project on the provincial economy in terms of direct, indirect and induced impacts on employment, labour, income, business income, GDP and taxation. The potential environmental effects of the Project on Labour and Economy will then be assessed in consideration of existing conditions, SGPP and planned mitigation and management measures. Post-closure environmental effects on Labour and Economy will also be assessed as appropriate.

### **4.10 COMMUNITY SERVICES AND INFRASTRUCTURE**

#### **4.10.1 Definition of Community Services and Infrastructure**

Community Services and Infrastructure includes: local emergency response (fire, medical, police); ongoing support services (health and social services); accommodation and housing; recreation and entertainment facilities; and food services.

Outdoor recreation, transportation infrastructure, and community water supply are addressed in Sections 4.11 (Land and Resource Use), 4.14 (Transportation), and 4.3 (Water Resources) of this TOR and will be addressed in the EIA Report.

#### **4.10.2 Potential Project-VEC Interactions**

The Project may interact with Community Services and Infrastructure in the following ways.

- The Project may place an additional demand on local emergency response services (e.g., fire, medical and police) and on-going support services (e.g., health and social services). These services may be affected by the occurrence of an accidental event, or by the routine presence of workers associated with either the construction or operation phases of the Project.
- There may also be Project-related environmental effects on the availability of local housing and accommodations. The Project will create a large number of temporary construction and permanent employment opportunities. As such, many workers are expected to enter the central New Brunswick area, both on a temporary and permanent basis. Dependent on the Project worker housing strategy, this influx of workers may place certain demands on services and infrastructure currently in place.

#### **4.10.3 Boundaries**

The spatial boundaries for the assessment of the potential interactions between the Project and local emergency response, health and social services are determined in consideration of the local public service areas and capacities. It is expected that emergency and community services will primarily be delivered from the City of Fredericton, the towns of Hartland and Woodstock, and to some extent the Village of Stanley, though some may be provided at a more local level. The spatial boundaries for the potential environmental effects on housing and accommodation will be determined by both the location of the available accommodation and the anticipated housing preferences of the workers. It is expected that accommodation will be provided throughout central New Brunswick, including the communities of Stanley, Juniper, Napadogan, and Fredericton, with possible service from the Woodstock and Hartland areas as well. Additionally, a temporary construction camp may house workers during the construction phase. Accordingly, the assessment area includes Stanley, Juniper, Napadogan, Burtt's Corner, Woodstock, Hartland, and the City of Fredericton.

The temporal boundaries include the phases of construction, operation, and decommissioning, reclamation, and closure of the Project. Potential demands on community services and infrastructure can occur anytime during these Project phases. Because the construction, tourism, and recreation industries are seasonal in nature, any conflicting demands for services may be most apparent during the summer months.

#### **4.10.4 Significance Criteria**

A significant adverse residual environmental effect on Community Services and Infrastructure will be defined as one that results in demands on services and/or infrastructure above and

beyond current capacity, such that standards of service are routinely and persistently reduced below current levels for an extended period of time.

In the case of private housing, a significant adverse residual environmental effect will be defined as one that results in demands above and beyond current capacity of the housing market, such that housing costs (prices or rents) are routinely and persistently above current levels for an extended period of time.

#### **4.10.5 Characterization of Existing Conditions**

The existing conditions for Community Services and Infrastructure will be determined by reviewing information from the Government of New Brunswick, and other relevant agencies and organizations. Where information is not readily available, interviews may be conducted with key individuals in order to develop a profile of existing community services and infrastructure. The detailed profile will facilitate the subsequent evaluation of the potential environmental effects of the Project-related activities on Community Services and Infrastructure.

The infrastructure, major equipment, staffing and level of service currently provided by fire protection, police and emergency medical services (*i.e.*, ambulance, first aid and hospital emergency services) and other local emergency response services will be described for the local service area.

Similarly, infrastructure, major equipment, staffing and level of service provided within the local service area with respect to ongoing health and social services will be described. Health services will include primary, secondary and tertiary care. Social services will include those provided by government agencies, as well as those provided by NGOs locally and through community networks.

Local accommodations will be described. This will include both temporary and long-term accommodations by type (*e.g.*, guest houses, hotels, motels, bed and breakfasts (B&Bs), apartments, and single family homes), and accommodation vacancies or occupancy rates (including current levels and trends over time). The profile will also identify and describe planned accommodation developments, including a possible on-site construction camp. A description of the current housing market in the central New Brunswick area will be developed. This will include key indicators such as available housing infrastructure (*e.g.*, types of units and ages), prices, sale volumes, housing starts and completions, absorption rates and unsold inventory.

The characteristics, range and capacity of recreation and entertainment facilities will be described for the assessment area. The focus will be on infrastructure, such as parks, fitness centres, community halls, playgrounds and recreational clubs. The profile will also identify and describe planned developments. Outdoor recreation, which requires no or minimal infrastructure (*e.g.*, ATV use and snowmobiling) will be addressed as part of Land Use.

#### **4.10.6 Environmental Effects Analyses**

Using specific information on the design of the Project, the potential environmental effects of the Project on Community Services and Infrastructure of the Project will be assessed. To complete the environmental effects evaluation, a comparison of the projected Project demands with known baseline conditions, gap analysis, and professional opinion will be the primary methods employed.

The environmental effects of the Project with respect to increased demand for health services (including acute care), emergency services (fire, policing), ongoing support services, housing, food, accommodation, and recreational services will be assessed based on projections of labour requirements for the Project in comparison to existing capacity in the assessment area. Potential environmental effects of the Project on housing and planned mitigation will also be considered. The housing needs for the Project will be determined and considered in light of the market information to estimate the environmental effects of the Project on housing.

The potential environmental effects of the Project on Community Services and Infrastructure will be assessed in consideration of existing conditions, SGPP and planned mitigation and management measures.

### **4.11 LAND AND RESOURCE USE**

#### **4.11.1 Definition of Land and Resource Use**

Land and Resource Use is defined as current and future proposed occupation, and public and private use, of the lands and resources within and adjacent to the Project. Specifically, it includes consideration of zoning, development plans, existing outdoor recreational activities (including hunting and fishing), and residential, commercial and industrial structures and activities (including trapping and forestry). Residential property values and visual aesthetics will be examined as part of Land and Resource Use, as will environmentally significant areas designated or formally recognized by government agencies.

The EIA Report will evaluate potential interactions between the Project and use of land and resources, and address compatibility with rural planning, as well as designated natural areas. The Project may result in environmental effects that will result in a change in the ability of landowners and the public to continue to use and enjoy adjacent lands as is currently being done or as they are intended to be used.

#### **4.11.2 Potential Project-VEC Interactions**

The Project is located on Crown Land. Hunting, fishing, trapping and ATV/snowmobile riding are known to occur within the area. Construction and operation of the Project would likely disrupt these recreational uses. Access and trail connections to adjacent lands for recreational use may also be affected.

There is considerable activity in the area of the Project related to forest resources harvesting. The Project may interact with this activity as forestry roads may be used to access the Project, and the land on which the Project is located contains forestry resources that will be removed during the construction phase.

There are approximately 39 recreational campsites leases, including cabins, in the vicinity of the Project (Rescan 2008). The closest cabin to the Project is located approximately 1.5 km to the east of proposed location of the open pit. The Project may interact with the land uses associated with these campsite leases. Additionally, the Project may be visible from these campsites and will change the visual landscape of the area.

There do not appear to be any permanent residences located in the immediate vicinity of the Project. The closest residences to the Project appear to be located in Napadogan, which is a small community, located along Highway 107, approximately 9 km to the northeast of the Project.

The Project may result in changes to property values in the communities surrounding the Project as a result of increased demand for housing, and/or as a result of changes to the visual and recreational landscape.

In summary, the following interactions between the Project and Land and Resource Use are possible:

- Change to land use designations from rural Crown land to its use for industrial purposes;
- Disruption in recreation activities, such as hunting, fishing, trapping and ATV and/or snowmobile riding;
- Changes to forestry resources;
- Changes to land uses at recreational cabins;
- Changes to the local visual aesthetics; and
- Changes to property values in nearby communities.

#### **4.11.3 Boundaries**

The spatial boundaries for evaluation of potential environmental effects are primarily based on the location of the Project and the PDA. The area also includes a local assessment area (LAA) including zones of potential influence from the Project on Land and Resource Use with regard to visual aesthetics and sound emissions, that will also be used to assess cumulative environmental effects. Accordingly, the assessment area for Land and Resource Use includes all land on which Project components will be located, nearby campsite leases, and the surrounding communities, as appropriate.

The temporal boundaries include the periods of construction, operation, and decommissioning, reclamation, and closure of the Project.

The Project is located within an unincorporated area. Planning for the area is regulated under the *Community Planning Act* and is administered by the Rural Planning District Commission. There is no rural plan in place for the Project area.

#### **4.11.4 Significance Criteria**

A significant adverse residual environmental effect on Land and Resource Use will be defined as one where the proposed use of land for the Project and related facilities is not compatible with adjacent land use activities as designated through a regulatory land use process, and/or the proposed use of the land will create a change or disruption that widely restricts or degrades present land uses to a point where the activities cannot continue at current levels and for which the environmental effects are not mitigated or compensated.

#### **4.11.5 Characterization of Existing Conditions**

Existing conditions in the area will be compiled from a variety of sources, including existing maps, aerial photography, consultation with location recreations groups (*i.e.*, hunting and fishing clubs, snowmobile associations, forestry businesses, *etc.*), and consultation with members of the public. Site visits and personal observations will also be conducted to assist in the characterization of existing conditions. The visual aesthetics of the area, focusing on views from a number of different key vantage points surrounding the Project will be described in the EIA Report. Current and historical residential property values in communities surrounding the Project will be described based on data and information available from the Canada Mortgage and Housing Corporation (CMHC).

Current general land use will be described and mapped for the assessment area. Using existing sources of data and information, a profile of Land and Resource Use for the Project area will be developed, including forest resource harvesting activities, focusing on the structures and activities associated with residential, commercial and resource uses adjacent to the Project and potentially within the Project's zone of influence. Current outdoor recreational use of the lands and ecotourism activities will be described and mapped, including hiking, cross-country skiing, ATV riding, snowmobiling, and hunting, trapping, and fishing (both for recreational and commercial purposes, as applicable), on Project lands and adjacent lands. Environmentally significant areas, as designated or formally recognized by government agencies, will also be described and mapped,

#### **4.11.6 Environmental Effects Analyses**

To complete the environmental effects evaluation, a comparison of the predicted Project-related environmental effects with known existing conditions will be conducted. The compatibility of the Project with any existing planning strategies that may exist for the area will be considered. The

environmental effects on property values will be assessed based on a comparison to current and historical data. The potential for Project-related emissions, noise, and vibration to adversely affect current Land and Resource Use will be assessed.

The potential environmental effects of the Project on Land and Resource Use will then be assessed in consideration of existing conditions, SGPP and planned effects mitigation and management.

## **4.12 CURRENT USE OF LAND AND RESOURCES FOR TRADITIONAL PURPOSES BY ABORIGINAL PERSONS**

### **4.12.1 Definition of Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons**

Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons incorporates knowledge of contemporary Aboriginal hunting, fishing, trapping and gathering activities for traditional purposes, and use of lands and resources for social and ceremonial activities based on traditional or historic practices. This information will guide the Project design, mitigation planning, and the assessment.

### **4.12.2 Potential Project-VEC Interactions**

The Project is located on Crown land that may have been or is currently used by Aboriginal people for traditional activities. In the Project development area, and in some cases in the immediate vicinity of the Project, the area may become inaccessible or unsuitable for traditional uses such as hunting, fishing, trapping, gathering, or ceremonial activities, either on a temporary or on a permanent basis as a result of the Project.

### **4.12.3 Boundaries**

The spatial boundaries for Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons include the zone of influence of the Project that may overlap with Aboriginal land and resource use. This area consists of the PDA, as well as a regional assessment area (RAA) consisting of Central New Brunswick that will be used as boundaries for the cumulative environmental effects assessment. Together, these areas are defined as the assessment area.

The temporal boundaries include the construction, operation, and decommissioning, reclamation, and closure (including post-closure) phases of the Project.

The evaluation of potential environmental effects of the Project on the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons is required under *CEAA*, under the definition of “environmental effect” under Section 2(1) of *CEAA*.

#### **4.12.4 Significance Criteria**

The Proponent has determined that a significant adverse residual environmental effect on Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons will be defined as a long-term (more than 1 year) loss of the availability of, or access to, land and resources for use by Aboriginal persons for traditional purposes within the assessment area that cannot be mitigated.

This includes an effect that results in a long-term (more than 1 year) loss of the availability of, or access to, water resources, the aquatic environment, the terrestrial environment, the vegetated environment, the wetland environment, land and resource use and heritage resources located within the spatial boundaries for Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons that cannot be mitigated.

#### **4.12.5 Characterization of Existing Conditions**

Information sharing, discussion and dialogue with Aboriginal peoples will be conducted throughout the EIA to characterize conditions with respect to Aboriginal land and resource use, consistent with the Major Projects Management Office guidance for Aboriginal engagement (MPMO 2008). These discussions will be intended to obtain information on use of land and resources for traditional purposes by Aboriginal persons. These discussions will also support the federal and provincial governments with respect to any duty to consult with Aboriginal peoples regarding the Project.

A Traditional Use Study (TUS) is contemplated as a useful tool to understanding Aboriginal current and past use of the Project area. The form of the discussion with First Nations about past and current uses of land or resources in the Project area, and the approach to conducting a Traditional Use Study (TUS), will be established in consultation with the Assembly of First Nations Chiefs in New Brunswick (AFNCNB), as directed by Chiefs and Councils, and with individual Chiefs and Councils of individual Maliseet communities in New Brunswick. Community and Aboriginal leadership engagement activities will be conducted to ensure that Aboriginal peoples are informed of the Project, to hear concerns that will need to be considered, to obtain knowledge of the current use of land and resources for traditional purposes, and to identify opportunities for First Nations' participation in the Project. These activities will also be conducted to support any federal and provincial duty to consult with First Nations.

#### **4.12.6 Environmental Effects Analyses**

A key consideration in the assessment of environmental effects of the Project on this VEC is whether or not the land and resources affected by the Project are currently used by Aboriginal peoples for traditional purposes (including hunting, fishing, trapping, gathering, cultural, spiritual or ceremonial purposes).

The Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons will be assessed by liaising with potentially affected First Nations as well as federal and provincial government authorities to determine their existing knowledge of these activities. Direct discussions with the AFNCNB, First Nation Chiefs and Councils, and umbrella organizations to obtain their feedback will be ongoing. Information will be obtained through these direct discussions and by completing a TUS. Information from the TUS, if available for the EIA, will be used to determine if any use of the land or resources for traditional hunting, fishing, trapping, gathering, and ceremonial activities may be affected or interrupted by the Project. It will also inform an analysis of the potential environmental effects on land and resources that may be used for traditional purposes by Aboriginal persons.

The assessment of potential environmental effects of each of the applicable Project phases and activities will be conducted based on the collected information from interviews, discussions, and the Traditional Use Study, if available.

## **4.13 HERITAGE RESOURCES**

### **4.13.1 Definition of Heritage Resources**

Heritage Resources are defined as any physical remnants found on top of and/or below the surface of the ground that inform us of past human use of and interaction with the physical environment. These resources may be from the earliest times of human use of an area within the assessment area up to more recent times.

As required by the NBENV Final Guidelines (NBENV 2008), Heritage Resources will consider resources of archaeological, paleontological, and architectural significance. This approach is consistent with the CEAA definition of environmental effect, which includes “...*any structure, site or thing that is of historical, archaeological, paleontological or architectural significance...*”.

### **4.13.2 Potential Project-VEC Interactions**

Any Project-related ground-disturbing activities have the potential for interaction with Heritage Resources. The construction phase represents the greatest potential for interaction with Heritage Resources, as it is during this phase that the site preparation and ground disturbing activities take place and during which the bulk of the earth moving activities of the ground surface will occur. Concerns continue during the operation phase of the Project due to the potential to encounter paleontological resources should they exist in the Project area, but to a lesser extent as mining activities are conducted at depth and are less likely to result in the discovery of heritage resources. Earth moving during the decommissioning, reclamation, and closure phase could also result in the discovery of heritage resources.

### 4.13.3 Boundaries

The spatial boundaries for Heritage Resources include the locations of all Project-related activities associated with all phases of the Project that could involve any site preparation or surface ground disturbance. This includes the areas to be developed for the Project and any related infrastructure and facilities (known as the Project development area or PDA). The assessment of cumulative environmental effects will be based on a regional assessment area (RAA) consisting of Central New Brunswick. Together these areas will be referred to as the assessment area.

The temporal boundaries include the periods of construction, operation, and decommissioning, reclamation, and closure of the Project. Heritage Resources are relatively permanent features of the environment; however, their integrity is highly susceptible to ground disturbing activities. Construction activities carried out at any time of the year can therefore affect the integrity of any archaeological or heritage site encountered. Ground disturbance associated with the construction phase will be relatively short-term. Operation will continue for 20 years or more, but as stated above, because of the depths at which open pit excavation will occur, it is less likely for interactions to occur during this phase. Any potentially adverse environmental effects on Heritage Resources will be permanent, as no heritage site can be returned to the ground in its original state.

Archaeological resources in New Brunswick are administered by the Archaeological Services (AS), within the Heritage Branch of the New Brunswick Department of Wellness, Culture and Sport. Architectural resources (*i.e.*, built heritage) generally fall under the Historic Places Unit (HPU), within the same Branch and Department. The New Brunswick Museum is responsible for the inventory of paleontological sites, and is the primary source for obtaining baseline information on those resources.

Some heritage sites can be assigned a “protected” status under the New Brunswick *Heritage Conservation Act* if so designated by the Minister. Heritage sites are considered to be non-renewable resources and the disturbance of such resources is only authorized under strictly controlled conditions imposed by a permit. These permits are only issued to qualified personnel by the provincial government through the Minister responsible for the administration of the New Brunswick *Heritage Conservation Act*.

The Cultural Policy of New Brunswick defines heritage as “*the tangible and intangible aspects of our natural and cultural past, from prehistory to the present. Tangible aspects include buildings and structures, archaeological sites, cultural landscapes, cemeteries, sacred places, monuments, artifacts, specimen and collections. Intangible aspects include beliefs, ideas, customs, language, religion, stories and many others.*”

The assessment of Heritage Resources will have technical limitations. These pertain mainly to the methodology for field testing areas of high potential for encountering archaeological resources. The testing strategies are determined by the professional archaeologist applying for

the licence to conduct any required field work in consultation with the regulatory authority, AS, based on available data on the location and configurations of known archaeological sites within the general area of the Project.

The Heritage Resource Impact Assessment for the Project will follow provincial guidelines (AS 2009) and will be completed under a permit issued by the Province. The ability to determine the presence of paleontological resources of significance is limited by available knowledge of such resources and the potential for the known bedrock resources to contain fossils.

#### **4.13.4 Significance Criteria**

A significant adverse residual environmental effect on Heritage Resources will be defined as one that results in a permanent Project-related disturbance to, or destruction of, all or part of a heritage resource (including archaeological, paleontological and architectural resources of significance) considered by the provincial heritage regulators to be of major importance due to factors such as rarity, undisturbed condition, spiritual importance, or research importance, and that cannot be mitigated or compensated.

#### **4.13.5 Characterization of Existing Conditions**

Archaeological potential modeling, for example for pre-Contact era sites, is based largely on the identification of landscape features which are either known to have attracted past habitation or land use, or which appear to have potential for attracting human use. These features include: rivers and lakes; confluences of watercourses; smaller sources of potable water; ridges or knolls that overlook areas of resource potential; outcrops of high-quality stone for tool making; and, most importantly, combinations of these features (AS 2009).

Initial work to determine the potential for archaeological resources in the assessment area was conducted in 2008. However, this work was conducted under the 2004 Guidelines (Ferguson 2004). As new Guidelines were released in 2009, this work will be revisited and where it is not complete or consistent with the 2009 Guidelines, supplemental work will be conducted.

An assessment of the potential for the assessment area to contain heritage or archaeological sites will be undertaken. Known Heritage and Archaeological Resources within the assessment area will be reviewed and documented.

There are typically two methods for determining the existing conditions with regard to Heritage Resources:

- to determine known resources through a review of the provincial archives, provincial heritage records, documented archaeological sites, and provincial and local museum records, and by gathering information from local historical societies, community historians, and Aboriginal people; and

- to undertake a search for those resources that exist, but of which we currently have no knowledge (e.g., undiscovered archaeological resources).

Baseline information may include data from: the Maritime Archaeological Resource Inventory (MARI) files located at AS in Fredericton; the Canadian Register of Historic Places; the list of Provincially Designated Historic Sites; research at the Public Archives of New Brunswick and National Archives of Canada; local historical records; documented local histories; previous archaeological and heritage resource studies completed in close proximity to the assessment area; local informants; and information obtained during any field investigations. This information, while focused largely on potential archaeological resources, will also assist in the identification of potential presence of built heritage resources as well as issues of historical or architectural significance, as required by CEEA. It is expected that this background research will eliminate the need to further consider the issue of built heritage resources in the EIA, which given the relatively remote location of the Project is not anticipated to be a concern as built heritage sites are unlikely to be present in the assessment area. First Nations input will also be sought regarding special places, burial grounds, areas of spiritual importance, and other potential heritage areas.

Baseline information on paleontological resources will be obtained from the literature and through interviews with paleontologists and geologists with knowledge of the assessment area, including NBDNR and the New Brunswick Museum. These interviews and research will be aimed at determining if there is a potential for encountering such resources as part of the Project, to plan further research and field characterization (as necessary) to confirm the elevated paleontological potential of the site (if applicable), and to recommend mitigation should the area contain fossiliferous rock that would indicate an elevated potential for encountering paleontological resources. If there is low potential for encountering such resources as determined by interviews and research, paleontological resources will be addressed in the EIA Report through environmental effects predictions based on the low likelihood of encountering such resources in the PDA.

Field investigations will be conducted as necessary to discover those resources that may exist within the PDA. Planning of archaeological field work in the PDA will be informed by the background research of archaeological potential described above, as well as mapping of these areas using DEM data collected through LiDAR surveys of the PDA. This is expected to assist in focussing the field efforts to areas of high archaeological potential by eliminating areas of steep topography, clear cuts, areas where water is near the ground surface, areas of generally poor terrain, or wetlands that would cause archaeological potential to be lowered, and thus not necessitating a walkover survey as walkover of all areas adjacent to watercourses would be onerous. The purpose of the walkover survey will be to locate any visible archaeological sites, to determine if there are any additional (*i.e.*, additional to the watercourse perimeters) areas of elevated potential that may require test pitting, and to define areas of unsuitable terrain (*e.g.*, wetland and/or where the ground water is near the surface, and areas of steep slope) where test pitting is not warranted. Consultation with Archaeological Services (AS) will be carried out

to confirm the field data collection approach and to focus the field work on areas of high archaeological potential only, as determined by research and mapping.

Because of the large areal extent of the Project, the field surveys will consist of a walkover of high potential areas within the PDA that will likely be directly disturbed by the Project. Walkover of areas of low or medium potential as determined from examination of DEM data and other background research will not be conducted, subject to confirmation by AS.

Complete test pitting of high potential archaeological areas in accordance with the 2009 Guidelines will be conducted as a follow-up and monitoring measure to confirm the predictions of the EIA, but prior to construction activities being initiated. The test pitting strategy would be developed in consultation with AS, based on the results of the walkover field investigations of the PDA conducted in 2011.

#### **4.13.6 Environmental Effects Analyses**

The assessment of potential environmental effects of the Project on Heritage Resources will consider both pre-Contact and historic period resources, and will include consideration of resources of archaeological, paleontological or architectural significance.

The potential environmental effects of the Project on Heritage Resources will be assessed based on the findings of the review of available information, the field reconnaissance work, the areas to be developed for the Project, the significance of the findings, and the mitigation (including avoidance) to be employed.

### **4.14 TRANSPORTATION**

#### **4.14.1 Definition of Transportation**

Transportation refers specifically to transportation associated with the Project. This VEC includes consideration of road infrastructure condition, allowable weights and dimensions, traffic volumes, operations, and level of service, traffic safety, and collision data associated with travel on, and use of, the New Brunswick highway system, as well as rail infrastructure, in Central New Brunswick that could be used for the Project.

Transportation is defined as primary and secondary roads and intersections leading to and from the Project site, railway infrastructure in the vicinity of the Project, and any environmental effects as a result of changes, permanent and temporary, in traffic levels or usability of these roads, intersections, and rail infrastructure. During the construction and operation phases, there will be additional vehicle traffic due to workers, construction vehicles; trucks transporting materials, equipment, goods and products; and service vehicles traveling to and from the site.

#### **4.14.2 Potential Project-VEC Interactions**

The Project may interact with Transportation in the following ways.

- During the construction phase of the Project, the use of heavy equipment on site will not interact with Transportation. Traffic on roads leading to the Project site will increase as workers and trucks carrying materials and equipment travel to and from the site. This increase in traffic may adversely affect the level of service and the vehicle collision rates on existing routes leading to the Project. There may also be concern regarding the condition, allowable weights and dimensions of the existing road infrastructure.
- During the operation phase, Project-related traffic will continue in the form of personnel transportation and truck traffic carrying supplies, materials and products. These increased traffic volumes may lead to adverse environmental effects on level of service, infrastructure condition, and vehicle collision rates during the operation phase.

A rail spur is not currently being considered as part of the Project, though depending on the ultimate destination of the products and economics, shipping of concentrates and other products may be achieved from the nearest rail spur in the area of the Project.

Several shipping options are under consideration at this time, including: trucking to a local railhead for rail delivery to buyers; trucking directly to buyers in the northeastern USA; and trucking to a New Brunswick port for shipboard delivery to buyers. Possible ports under consideration include the ports of Dalhousie, Belledune, and Saint John. A single delivery method or a combination of methods may be used, to be determined as part of the feasibility study. The existing road and rail infrastructure would be used.

#### **4.14.3 Boundaries**

The spatial boundaries for the road network of Transportation include Highway 107, and may also include Highway 8, Highway 620 and/or Highway 104, depending on the location of the access road to the Project. These highways will carry traffic to and from the Project site and are referred to as the assessment area that will be used to assess both Project and cumulative environmental effects. The spatial boundaries also include existing rail infrastructure in the Napadogan, Juniper and Deersdale areas which could possibly be used by the Project for shipping of concentrates and products.

The temporal boundaries include the construction, operation, and decommissioning, reclamation, and closure phases of the Project.

Level of service (LOS) is one important measure of traffic operating conditions during peak traffic periods, and is based on prevailing traffic conditions, roadway geometry and traffic control measures in place on urban or rural highways and intersections. Six levels of service are designated by the letters A to F to define traffic flow conditions. LOS A represents the best traffic operating conditions, and LOS F the worst. Most urban and rural authorities will accept LOS D traffic flow conditions before considering traffic control or infrastructure upgrade measures.

#### 4.14.4 Significance Criteria

A significant adverse residual environmental effect on Transportation will be defined as one where Project-related traffic:

- results in a drop in the existing level of service of the road network below LOS D for roads and intersections that were otherwise classified as LOS A, B, or C, except for intermittent or short periods of time not exceeding one month; or
- degrades road network infrastructure so that it cannot function at the current level of service and/or results in damage to the infrastructure that is substantive; or
- results in an increase in the rate of vehicle collisions as a result of the Project where mitigation was not implemented or for which damage was not compensated.

#### 4.14.5 Characterization of Existing Conditions

The existing infrastructure of the road and rail networks within the spatial boundary will be established using data obtained from, and consultation with, the New Brunswick Department of Transportation (NBDOT) and rail service providers (e.g., CN Rail, NB Southern Railway). Traffic count surveys and other traffic observations may be conducted within the assessment area to supplement available information if and as determined necessary. Average annual daily traffic (AADT) and average annual daily truck traffic (AADTT) volumes and vehicle collision rate data for the assessment area will be compiled, as well as information on allowable truck weights and road dimensions. Preferred truck routes to and from the Project will also be determined, and the environmental effects evaluated on that basis.

The existing road network infrastructure condition, usage, LOS, and collision rates of the roads within the Transportation spatial boundaries will be established using available data from the NBDOT. This information will be supplemented by the results of consultation with transportation engineers from NBDOT and field observations, where available.

#### 4.14.6 Environmental Effects Analyses

The historical traffic information will be used to predict existing traffic volumes to future years corresponding with the construction and operation phases through a traffic study. Predictions of the future level of service and potential environmental effects to road infrastructure condition will serve as the basis of the environmental effects assessment of the Project on Transportation during the construction, operation, and decommissioning, reclamation, and closure phases of the Project.

Potential effects on traffic safety resulting from the potential increased rates of vehicle accidents will be addressed in the accidents, malfunctions, and unplanned events chapter of the EIA Report.

## **4.15 EFFECTS OF THE ENVIRONMENT ON THE PROJECT**

### **4.15.1 Definition of Effects of the Environment on the Project**

Effects of the environment on the Project are those effects that have the potential to substantively affect, positively or adversely, the Project. This includes the sensitivity of the Project to variations in meteorological conditions (including extreme weather events), to climate variability and climate change, and to natural and manufactured hazards (e.g., seismic events, fires).

### **4.15.2 Potential Project-VEC Interactions**

This section identifies those environmental phenomena that may have an adverse effect on the Project. These potential effects will be described in the EIA Report, and will be minimized by Project planning and design, mitigation, and adherence to applicable codes.

Environmental phenomena that could have an effect on this Project include:

- severe and/or extreme weather conditions (e.g., wind, precipitation, hail, electrical storms);
- climate change;
- seismic activity (earthquakes); and
- forest fires.

The EIA Report will assess potential effects of the environment on the Project and any consequent environmental effects.

Political, social, and economic environments are not considered in the assessment of effects of the environment on the Project.

Good engineering design involves consideration of the various types of environmental effects, loadings and stresses on the Project. The planning and engineering design for this Project are no exception. Mitigation strategies for minimizing the likelihood of a significant effect of the environment on the Project occurring are inherent in the planning process, engineering design codes, construction practices and monitoring.

### **4.15.3 Boundaries**

The spatial boundaries for the assessment of the effects of the environment on the Project include all areas where Project-related activities are expected to occur, including the location of the open pit, TSF, waste rock storage areas, ore storage areas, access roads, and electrical transmission line.

The temporal boundaries include the construction, operation, and decommissioning, reclamation, and closure phases of the Project.

Section 2(1) of *CEAA* defines effects of the environment as “*any change to the project that may be caused by the environment...whether any such change or effect occurs within or outside Canada*”. Typically, potential effects of the environment on any project are a function of project or infrastructure design and the risks of natural hazards and influences of nature. These effects may result from physical conditions, land forms, and general site characteristics which may act on the Project such that Project components, schedule and/or costs could be substantively and adversely changed.

#### **4.15.4 Significance Criteria**

A significant adverse residual effect of the environment on the Project will be defined as one that would result in:

- a substantial change of the Project schedule (e.g., a delay resulting in the construction period being extended by one season);
- a long-term interruption in service (e.g., interruption in mining activities such that market demands cannot be met);
- damage to Project infrastructure resulting in a significant environmental effect;
- damage to the Project infrastructure resulting in a substantial increase in a health and safety risk to the public or business interruption; and/or
- damage to the Project infrastructure resulting in repairs that could not be technically or economically implemented.

#### **4.15.5 Effects Analysis**

Numerous planning, design, construction, and operation mitigation strategies will be implemented to minimize the potential effects of the environment on the Project. These strategies are intended to reduce the risk of serious damage to the facilities or to the environment, or interruption of mining activities, to acceptable levels. These strategies include strategic design decisions, designing Project components and facilities to or above relevant codes to account for local threats and a changing climate, including quick access to remediation equipment, and scheduling of activities and storage capacities to allow for weather disruptions. In the EIA Report, the Effects of the Environment on the Project chapter will present the potential environmental effects that could affect the Project.

Information, analysis and data required to support complete the analysis of the effects of the environment on the Project will be collected from reliable and identified sources. They will include, but not be limited to the following:

- building and safety codes that may be relevant to the Project, including those of the Government of Canada, Province of New Brunswick, Canadian Standards Association, Canadian Dam Association, and others;
- climate normals for the area for the most recent 30-year period, including weather extremes for the period of record;
- the most recent predictions of Environment Canada on the potential climate changes in Atlantic Canada and their effects on the environment and environmental phenomena;
- historical information from the Geological Survey of Canada on seismic events in central New Brunswick; and
- any other relevant information that may assist in establishing existing conditions or potential effects of the environment of the Project.

The EIA Report will present an assessment of the effects of Climate on the Project, following 2003 guidance from the CEA Agency (CEA Agency 2003). Studies and other assessments will be cited as necessary to support those findings.

Data on Climate will be obtained from the Environment Canada database on weather parameters including temperatures, precipitation, humidity, maximums, minimums, and extremes. Other reference sources and experts will also be consulted, including publications by Environment Canada, and others. A table of baseline data will be prepared to illustrate the state of the climate in the central New Brunswick based on the most recent 30-year data set.

The changes to climate of most concern to the Project will be analyzed to determine which require more detailed consideration. The analysis will include examination of external sources such as climate modelling reports prepared by Environment Canada, the International Panel on Climate Change (IPCC) and others. Those climate phenomena that would pose a risk to the public, the environment or to the economic viability of the Project will be the ones examined in more detail. Local and regional trends will be considered. The predictions by climate modelers using regional climatological models will be considered in determining the likelihood and consequences of a changing climatic effect. These regional models are sensitive to the parameters that are of most consequence to environmental, economic and public safety issues of Atlantic Canada.

Based on these data, the potential effects of the environment on the Project will be assessed in consideration of existing conditions and planned design and mitigation.

## 5.0 PROJECT TEAM

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Northcliff has retained Stantec Consulting Ltd. and its team of technical experts and specialists to lead the preparation of the EIA for the Project. Northcliff has also retained Knight Piésold Ltd. to carry out the hydrology baseline and effects assessment work, and SRK Consulting (Canada) Inc. to carry out the metal leaching and acid rock drainage analyses for the Project. As required by the NBENV Final Guidelines, key Project team members of each of these companies are listed below.

### 5.1 STANTEC

**Project Director: Jeffrey L. Barnes, M.Sc.** will act as Project Director and will be responsible for overall technical direction of the EIA. Mr. Barnes is a Senior Principal and the Practice Leader for Environmental Management for Canada East within Stantec.

**Project Manager: Denis Marquis, M.Sc.E., P.Eng.** will act as Project Manager and, with the Project Director, is responsible for technical leadership of the EIA and the overall management of the Project Team. Mr. Marquis is a Principal, Senior Project Manager, and Environmental Engineer with over 18 years of experience in environmental impact assessment, environmental permitting, and air quality assessment and management.

**Assistant Project Manager and Biophysical Manager: Mary Murdoch, M.Sc.** will act as is the Assistant Project Manager and Biophysical Manager. She will coordinate and manage the Project Team, and be responsible for all biophysical elements of the EIA, including field programs and baseline studies. Ms. Murdoch is a Senior Associate with Stantec in Fredericton, NB, and has 18 years of environmental consulting experience with a focus on environmental assessment and aquatic environmental effects monitoring (EEM) projects for industrial and commercial clients.

**Technical Discipline Team Leaders** will direct a team of professionals in the completion of the environmental assessment, including any required baseline studies and/or field programs:

- Atmospheric Environment and Acoustic Environment Team Leader: Michael Murphy, PhD, P.Eng.;
- Water Resources EA Team Leader: Gilman G. Violette, M.Sc.E., P.Eng.;
- Human Health and Ecological Risk Assessment Technical Lead and Public Health and Safety Discipline Lead: Tania Noble-Sharpe, M.Eng., P.Eng.;
- Surface Water and Aquatic Environment Team Lead: Malcolm Stephenson, PhD;
- Terrestrial Environment Team Lead: Greg Johnson, M.Sc.;

- Vegetated Environment and Wetland Environment Team Lead: Greg Quinn, M.Sc.;
- Socio-Economic Environment Team Lead: Mark Shrimpton, M.A.;
- Aboriginal Land and Resource Use Team Lead: Randall Sweet, MAEM;
- Heritage Resources Team Lead: Christopher Blair, B.A.; and
- Transportation Team Lead: Gordon Murray, P.Eng., PTOE.

## 5.2 KNIGHT PIESOLD

**Project Principal: Ken Brouwer, P.Eng.**, will serve as the Project Principal for Knight Piésold Ltd. He will direct all work and provide overall technical review throughout the assignment. Mr. Brouwer is a geotechnical specialist with extensive experience in the investigation, evaluation and design of rock slopes for open pit mines, and all aspects of mine waste and water management. He is currently acting as the designer and/or specialist review for a number of mining projects around the world. Mr. Brouwer is the Managing Director of Knight Piésold's Canadian practice in Vancouver.

**Project Manager: Daniel Friedman, P.Eng.**, will act as the Project Manager responsible coordinating the work carried out by Knight Piésold. Mr. Friedman specializes in mine waste and water management planning and design, project management, design of hydraulic structures, and hydrologic analysis. He has been involved in all aspects of waste and water management for mining projects for over seven years.

## 5.3 SRK

**Project Principal: Stephen Day, P.Geo.**, will serve as the Project Principal for SRK. He will direct all work and provide overall technical review throughout the assignment. Mr. Day is an experienced specialist in the development of waste management plans to address acid rock drainage and leaching of mine wastes in general. He has particular expertise in the development of prediction methods for mine planning and modeling of leachate chemistry. His project experience includes numerous new mine developments, operating mines and mine closures in western, northern and central Canada, arctic and temperate regions of the USA, southeast Asia and South America.

**Project Manager: Christopher Kennedy, PhD, P.Geo.**, will act as the Project Manager responsible coordinating the work carried out by SRK. Dr. Kennedy has been involved with numerous waste management projects in BC, Northwest Territories, Yukon, Saskatchewan and Mexico characterizing the metal leaching and acid rock drainage (ML/ARD) potential from mine waste. He has over nine years of experience in geochemistry and environmental microbiology.

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# **Appendix A**

Final Guidelines for an Environmental Impact Assessment



**FINAL GUIDELINES  
FOR AN ENVIRONMENTAL IMPACT ASSESSMENT:  
GEODEX SISSON BROOK PROJECT  
(OPEN PIT MINE)**

**Issued by the Minister of Environment  
for the Province of New Brunswick**

**to**

**Geodex**

**March 1, 2009**

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## 1.0

## INTRODUCTION

### 1.1 Background

The proposed project includes the development, operation and ultimate reclamation of an open pit molybdenum (Mo) and tungsten (W) mine with an on-site ore processing facility to produce mineral concentrates. The concentrates would be shipped off-site by truck or, if feasible, by rail to a facility for further processing. The plant would operate at 20,000 tonnes of ore per day, 343 working days per year and employ approximately 300 people for a minimum of 30 years.

Development of the minesite would include construction and operation of the following:

- An approximately 90 ha open pit to mine ore by drilling and blasting. Approximately 20,000 tonnes per day of ore would be mined;
- An ore processing plant capable of producing 20 tonnes per day of tungsten and molybdenum concentrates;
- Tailings management area;
- Stockpile areas for waste rock and overburden;
- A power distribution system to link to existing power transmission line;
- Warehouses, maintenance offices, assay lab and administration complex;
- A freshwater supply, storage and distribution system;
- A sewage treatment system and waste disposal facilities;
- Fuel tanks and fuel handling facility; and
- Access and service roads.

Site preparation would include tree clearing, development of on-site roads, camp construction and installation of a permanent power supply.

### 1.2 Purpose

These Guidelines are to be used by Geodex Minerals Ltd (Geodex) as a framework for conducting an Environmental Impact Assessment (EIA) of the development, operation and ultimate reclamation of an open pit molybdenum (Mo) and tungsten (W) mine with an on-site ore processing facility.

The Final EIA Guidelines outline the requirements of the New Brunswick Clean Environment Act Environmental Impact Assessment Regulation (87-83). The environmental assessment will examine the potential environmental effects (both positive and negative) of the construction and operation of the project and all related facilities and infrastructure, and will identify appropriate mitigative/optimization measures.

### 1.3 Environmental Impact Assessment (EIA) Process

Under *Regulation 87-83* of the NB Clean Environment Act, Geodex, as the proponent of the

project, was required to register the Project as an undertaking for EIA review. The proposal was registered on September 5, 2008. On October 24, 2008 the Minister of the New Brunswick Department of Environment (the Minister) determined that the completion of a Comprehensive EIA was required to assess the nature and significance of the proposal's potential impacts.

This project will also likely require an environmental assessment federally and on October 2, 2008, the project description for the development proposal was distributed by the Canadian Environmental Assessment Agency to Environment Canada, Fisheries and Oceans Canada, Health Canada, Indian and Northern Affairs Canada, Natural Resources Canada, and Transport Canada, in accordance with the requirements of the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements*.

Federal authorities will meet to discuss the requirements of the environmental assessment process under the Canadian Environmental Assessment Act, including the type of review, scope of project and scope of assessment.

When the type of federal environmental assessment is determined, as well as the scope of the review, options for coordination of the federal and provincial environmental assessment requirements will be determined.

The Minister has appointed a Technical Review Committee (TRC) comprised of technical specialists from various government agencies whose jurisdictions may be affected by the undertaking. The agencies include:

- NB Department of Environment (DENV);
- NB Department of Agriculture and Aquaculture (DAA);
- NB Department of Natural Resources (DNR);
- NB Department of Public Safety (DPS);
- NB Department of Energy (DOE);
- NB Department of Fisheries (DOF);
- NB Department of Transportation (DOT);
- NB Museum (NBM);
- NB Wellness, Culture and Sport - Archaeological Services Unit (WC&S);
- NB Department of Health (DOH);
- Worksafe NB;
- Rural Planning District Commission;
- Canadian Environmental Assessment Agency (CEAA);
- Fisheries and Oceans Canada (DFO);
- Transport Canada (TC);
- Environment Canada (EC);
- Natural Resources Canada (NRCan);
- Local Service District of Bright;
- Health Canada (HC); and
- Indian and Northern Affairs Canada (INAC).

The TRC will include those listed above, with the addition of other provincial and federal

government agencies as required. The Guidelines outline the approach the proponent must follow in conducting the EIA. The Guidelines identify important issues, which must be considered in assessing the potential impacts of the proposal.

Members of the public, stakeholders and the Aboriginal community have been provided an opportunity to comment on the Draft Guidelines and to identify any issues of concern that do not appear in the document. The Draft EIA Guidelines were released for public comment from December 18, 2008 to January 30, 2009. Following the comment period, the draft guidelines were updated based on public input received and a detailed review by the TRC. The Minister will be issuing the Final Guidelines for the EIA.

In response to the Final EIA Guidelines Geodex and/or its consultant must provide the Minister with detailed Terms of Reference (TOR), which describe the approach to be used in conducting the EIA. The TOR will be evaluated through a consultative process involving the proponent and the appropriate government review agencies (TRC). Geodex will also be required to provide the public, stakeholders and the Aboriginal community with a meaningful opportunity to review and comment on the TOR.

The principle objective of the EIA is to predict the potential impacts that can be expected should the project proceed, evaluate them and propose methods to avoid, mitigate, and/or compensate for identified impacts. The EIA study, conducted in consultation with the residents from the area of potential impact, is also expected to identify methods of optimizing positive impacts and minimizing negative impacts resulting from the project.

Information gathered during the EIA study is compiled in a Draft EIA Report. The draft report is evaluated by the TRC to determine whether the study adequately addressed the issues raised in the Final EIA Guidelines. Should the TRC determine that the report does not adequately address the Guidelines; the proponent will be required to make revisions to address any identified deficiencies in order to advance the EIA process.

If, on the advice of the TRC, the Minister is satisfied that the EIA Report is adequate, the next step is additional consultation to involve the public, stakeholders and the Aboriginal community in evaluating the potential impacts anticipated from this project.

A summary of the Final EIA Report is prepared on behalf of the Minister to assist members of the public in becoming familiar with the information. A General Review Statement is also prepared summarizing TRC comments on the Final EIA Report. These documents are released for a period of at least 30 days for public review and comment, after which the schedule and location(s) of open houses/workshops and/or panel-type public meeting(s) are announced by the Minister.

Public meeting(s) generally take place near the area where the project is being proposed and provide all interested parties with an opportunity to make comments, raise concerns, or ask questions about any matter covered in the EIA study. Following the public meeting(s), a period of fifteen days is set aside for members of the public to submit written comments to the Minister. At the end of this period, a summary of public participation is made available to the public and presented to the Minister. At any time after this date, Cabinet (Lieutenant-Governor in Council)

may render a decision to issue or deny an approval for the project.

Specific procedures to be followed in conducting an EIA may be found in *Regulation 87-83, Environmental Impact Assessment Regulation - Clean Environment Act*. A procedural summary is available in the publication entitled "A Guide to Environmental Impact Assessment in New Brunswick." These documents may be obtained from the NB Department of Environment at the address provided below and the website:

<http://www.gnb.ca/0009/0377/0002/index-e.asp>

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#### **1.4 Definitions/Glossary**

**“Environment”** – Under section 31.1(1) of the Clean Environment Act, "environment" is defined as:

- (a) air, water, or soil;
- (b) plant and animal life including human life; and
- (c) the social, economic, cultural and aesthetic conditions that influence the life of humans or a community as they are related to the matters described in (a) and (b).

**“Environmental Effect”** - In respect of a project, means:

- a) any change that the project may cause in the environment (i.e., both positive and negative changes), including any change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by Aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, and
- b) any change to the project that may be caused by the environment whether any such change occurs within or outside Canada.

**“EIA”** – Environmental Impact Assessment.

**“EIS”** – Environmental Impact Statement (synonymous with EIA report).

**“Fauna”** – Animals.

**“Fish”** – Under Section 2 of the Fisheries Act, includes fish, shellfish, crustaceans and marine mammals.

**“Flora”** – Plants.

**“Proponent”** – Refers to the individual, private firm/company, or government agency/organization proposing a specific project (undertaking). In this case, Geodex Minerals Ltd.

**“TOR”** – Terms of Reference.

**“TRC”** – Technical Review Committee.

**“VECs”** – Valued Environmental Components (biophysical, social, or economic components).

## **2.0 METHODOLOGICAL APPROACH TO EIA**

### **2.1 General**

The EIA process results in a detailed study of potential environmental impacts and identification of procedures that may be used to avoid, mitigate and/or compensate for identified effects. The EIA study must also identify methods of optimizing positive impacts as well as minimizing negative impacts resulting from the proposed project. Additional options identified during the environmental assessment process may be considered as appropriate.

To provide a focus for the EIA, environmental components of principal concern, commonly referred to as Valued Environmental Components (VECs), must be identified early in the assessment process. The method for determining VECs must be clearly stated by the proponent. The proponent shall seek public, stakeholder and Aboriginal community knowledge, as appropriate, during the identification of appropriate VECs. The proposed VECs must be publically reviewed prior to acceptance by the TRC in the early phases of the EIA. The EIA must clearly indicate the provisions for compliance with relevant regulatory requirements, guidelines and best management practices.

Presented in Section 4.0 of these Guidelines are a number of specific issues related to the project for study, based in part on input received during the public comment period of the Draft EIA Guidelines. However, this framework does not limit the proposed EIA study. Should additional issues arise from discussion with members of the TRC, or consultation with regulatory agencies, members of the public, stakeholders or the Aboriginal community, the proponent must incorporate these issues into the assessment of the project's potential impacts.

### **2.2 Study Boundaries and Scope of Factors**

The review must consider the potential environmental effects of the proposed project and all associated infrastructure. Geodex must clearly describe the boundaries of the study in time (temporal) and space (spatial) used in the evaluation of environmental effects for each of the

VEC's.

The temporal boundaries of the study (the length of time over which project environmental effects are anticipated to occur) must reflect the construction period, the operating life of the project, and the extent of any potentially significant environmental effects that may remain beyond the operating period, including decommissioning/reclamation, and any potential accidents or malfunctions.

Spatial boundaries should reflect:

- the extent to which project activities are anticipated to occur in the existing environment;
- the extent of anticipated environmental effects, including cumulative environmental effects on the VEC's; and
- the extent of atmospheric, aquatic, and terrestrial ecosystems potentially affected by the project.

Boundaries such as administrative, technical, biophysical, socio-economic and project area should be defined and related to the impact assessment process as appropriate. In determining appropriate spatial boundaries, consideration should be given to environmental effects from the proposal on a local, regional and national scale as appropriate.

### **2.3 Prediction of Environmental Effects**

The main focus of the EIA is to predict environmental effects (i.e., both positive and negative) that may result from the proposed project and associated infrastructure, and their potential significance. Predictions must consider all aspects and phases (e.g., construction, operation, and decommissioning) of the proposed project, and any indirect environmental effects, cumulative effects, and any effects that may result from accidents or malfunctions. In addition, potential effects of the environment on the proposed project must be predicted, such as climate change effects, acid rock drainage, or effects that may be caused by extreme weather events (e.g., intense precipitation events, flooding), etc.

EIA predictions are generally based on a combination of objective and subjective evaluation. The use of objective (measurable) analysis is strongly preferred where it is technically feasible and reasonable to do so. However, in recognition of any factor that may limit the ability to predict or measure environmental responses, predictions may be based on subjective evaluation using professional judgement and experience. Community knowledge and Aboriginal traditional knowledge should also be utilized, as applicable. In consideration of this, predictive statements must be accompanied by a discussion of the limitations of the analysis, references to supporting documentation and the qualifying credentials of those making the predictions.

Predictions must be made regarding the nature (adverse or positive), magnitude, duration, frequency, geographic extent and reversibility of the proposed project's potential environmental effects. The significance of these effects must also be determined. These predictions must:

- facilitate decision-making with respect to the proposed project;
- clearly specify any degree of uncertainty inherent in the projections;

- clearly identify positive and negative environmental effects (both biophysical and socio-economic) of the proposed project; and
- be amenable to testing and verification where possible through ongoing monitoring initiatives.

To clearly distinguish potentially significant environmental effects from those likely to be insignificant, the proponent must first define "significant." The definition must be based on scientific determinations, social values, public concerns, and economic judgements, and shall be submitted to the TRC for review and approval along with the proposed VECs. In particular, the significance of proposed project-induced changes on VECs must be clearly stated in the EIA Report. The thresholds for significant effects on VECs (i.e., both positive and negative) must be related in terms of applicable criteria. Quantifiable reference to the magnitude, geographical extent, duration, frequency, reversibility and ecological context of the potential environmental effects is required. Significance must be determined in the context of project-specific and cumulative environmental effects and after taking into account the implementation of appropriate mitigation/optimization measures.

Significant effects on species (i.e., tolerance levels related to organisms in the environment), must take into account effects at the population-level. For species designated as endangered, effects on an individual constitute a population-level effect.

## **2.4 Cumulative Environmental Effects**

The term *cumulative environmental effects* refers to those effects, over a defined period of time and distance, resulting or likely to result from the proposed project and associated infrastructure, in combination with other past, present, or likely (imminent) future projects or activities. An assessment of cumulative environmental effects must be conducted as part of the EIA study, in consideration of identified VECs and future projects that may be developed.

The goal of the cumulative effects assessment will be to place project-related impacts, their significance, and approaches to their management in the context of the “bigger picture,” and must include (but is not limited to):

- identification of regional issues of concern;
- a comprehensive description of how VECs were selected;
- a clear justification for the spatial and temporal boundaries used to address cumulative effects;
- a clear description of the analysis undertaken to assess the cumulative effects on the selected VECs (i.e., both positive and negative), and presentation of the results;
- a clear description of how mitigation measures address the cumulative environmental impacts; and
- the rationale for determining whether residual cumulative effects on VECs are significant.

## 2.5 Mitigation, Contingency and Compensation

The EIA study must describe general and specific measures that are technically and economically feasible for the proponent to implement, to optimize any positive environmental effects and mitigate any negative effects resulting or potentially resulting from the proposed project and any associated infrastructure (i.e., maximize positive effects, and eliminate, prevent, avoid or minimize adverse effects). This must include a description of contingency measures (including emergency response plans) that have been designed to address potential accidents and malfunctions that could result in spills or unplanned releases of contaminants or products to the environment. Contingency plans must address worst-case scenarios and reflect a consideration of local conditions and sensitivities. Specific circumstances under which mitigative measures will be implemented must be clearly defined by the proponent including how scenarios would be reported, acted upon, and monitored. Mitigation options must be considered in a hierarchical manner with a clear priority placed on proactive measures for impact avoidance and pollution prevention opportunities. Opportunities to contribute to a regional approach to management of cumulative environmental effects must also be identified (refer to Section 2.4 above).

At a minimum, mitigative measures for the following for all phases of the project must be addressed:

- Air quality from all sources, including dust control;
- Water quantity and quality;
- Blasting operations;
- Processing effluents and sewage;
- Wetlands;
- Archaeological and heritage resources;
- Flora and fauna;
- Fish and fish habitat;
- Emergency releases and events; and
- Waste rock management and acid rock drainage.

An outline for contingency plans must also be provided:

- for use in the event of an environmental emergency attributable to the project and associated infrastructure, within the spatial boundaries of the study; and
- for use in the event of significant impacts, attributable to the project and associated infrastructure, which are detected through monitoring (this plan must be designed to be implemented should impacts be detected through monitoring).

The study must also consider compensation mechanisms to be used in the event that any unforeseen, accidental, or residual environmental effects occur. These compensation mechanisms/plans must be developed through consultation with federal and provincial agencies and other stakeholders, as appropriate.

In addition, Geodex must include in the study an outline for closure plans to identify site-specific objectives for mine closure and the intended post-closure land-use for the site. Closure plans must

detail the processes that will be used to decommission and reclaim all aspects of the mining facility including:

- mining and ore processing facilities;
- site infrastructure; and
- water and waste management facilities, including waste rock piles and tailings management facilities.

Further, in addition to the requirements under the Mining Act, the study must evaluate the requirement for a financial security deposit to address the implementation of the decommissioning/abandonment plan (i.e., to cover any required costs associated with on-going environmental protection measures beyond the operational phase).

## **2.6 Commitment to Monitoring and Follow-Up**

A well-defined program of monitoring and follow-up initiatives regarding environmental effects resulting or potentially resulting from the proposed project must be outlined in the EIA Report. Geodex must describe all of their proposed monitoring and follow-up programs, including their objectives, content, and implementation and reporting schedules. Monitoring programs will be required to:

- establish baseline conditions;
- determine regulatory compliance (compliance monitoring);
- test the predictions of the EIA (environmental effects monitoring, EEM); and
- evaluate the effectiveness of measures used to mitigate environmental effects (EEM).

Monitoring programs should include protocols that would guide interpretation of monitoring results and timely implementation of appropriate corrective actions. Monitoring initiatives must be based upon accurate baseline information for the existing physical, biological and socio-economic environments. The proponent is expected to collect the necessary information through existing data sources (“data mining”) and through primary research such as fieldwork and laboratory testing, as required.

Where the EIA predictions are not based on objective information, monitoring programs must be designed, where possible, to collect relevant data not previously available.

Monitoring and follow-up programs must allow for testing of the accuracy of effects predictions and effectiveness of mitigation measures. Programs must support an adaptive management approach and include provisions for changing impact mitigation in response to follow-up and monitoring results. Important components of monitoring programs will include:

- Elements of the environment that will be monitored;
- Where the monitoring will occur;
- Frequency and duration of monitoring;
- Detailed statement of objectives;

- Submission of results;
- Protocols for the interpretation of results and subsequent actions to be taken based on findings.

## **2.7 Public, Stakeholder and Aboriginal Community Consultation**

Public consultation is an essential component of the EIA. Geodex must consult with persons and organizations potentially affected by the proposed project and associated infrastructure, and must inform and engage any interested individuals, groups, stakeholders, local hunters and trappers, recreational users, affected communities, and Aboriginal communities in this assessment. This will include local governments and specific groups with mandates/initiatives in this area. The stakeholder consultation program is to be reviewed and accepted in the early stages of the study (e.g., at the TOR stage). Potential stakeholders identified to date, include:

- Canadian Rivers Institute;
- Nashwaak Watershed Association Inc.;
- Maliseet Nation Conservation Council;
- New Brunswick Trappers Federation; and
- Interested members of the public.

This list is to be supplemented as additional stakeholders are identified during the EIA study. Geodex will be expected to hold appropriate public consultation events and to use various media to engage the public (e.g., bulletins, website, e-mails, study updates, workshops, open-houses, etc). All interested parties will be provided with an opportunity to participate in consultation initiatives in order to provide input in the assessment and/or make their views known. Various stakeholders will be consulted throughout the environmental assessment process, including interested parties from the Aboriginal community; neighbouring residents; general public; non-government organizations and interest groups. The objectives of this consultation must be:

- to ensure that the potentially affected public, stakeholders and Aboriginal community are engaged in meaningful discussion and are well informed prior to the government's decision, as to the nature and extent of environmental effects attributable to the proposed project (i.e. both positive and negative effects);
- to ensure that the values and concerns of the public, stakeholders and Aboriginal community are incorporated and adequately addressed in the study; and
- to obtain expertise (where applicable) from various members of the public, stakeholders and the Aboriginal community.

Stakeholders, including the public and the Aboriginal community must be informed of the status of the study at regular intervals/at key milestones during the study. Consultation must continue through the construction and operation phases of the project (if approved), through specific consultation mechanisms (e.g., Community Liaison Committee, etc.).

The EIA must document the dates and formats for public and other stakeholder consultation initiatives undertaken, the material presented, the opportunity for receiving input, a summary

review of any concerns expressed, and how these concerns were addressed. It must be clear how the input from consultations was used in the assessment and what changes to the process or project were made as a result of comments provided.

## **2.8 Terms of Reference (TOR)**

The proponent must submit detailed TOR in response to the Final EIA Guidelines. The TOR must clearly describe the methods proposed for carrying out the EIA, and the means by which Geodex will consult with the public, stakeholders and Aboriginal community during the course of the EIA process.

The Proponent is required to provide, as part of the TOR, a cross-referenced index (Concordance or Disposition Table) showing where the content and issues of the Final EIA Guidelines have been addressed. The TRC will examine the TOR and comments/deficiencies may be provided to the proponent to address prior to finalization. In addition, the TOR must outline the components of any proposed field programs, any anticipated challenges/obstacles to be encountered, proposed modelling approaches, identify key members of the study team, and fully describe all specific tasks to be completed as part of the study.

The TRC will examine the TOR and comments may be provided to Geodex for inclusion. In addition, public and stakeholder consultation must be undertaken by the proponent to allow interested parties, the public, stakeholders, and Aboriginal community to provide input to the TOR prior to finalization. The final TOR must be approved by the TRC.

## **3.0 CONDUCT OF THE STUDY AND CONTENT OF REPORT**

The EIA Report must be written in the clearest language possible. Where the complexity of the issues addressed requires the use of technical language, a glossary defining technical words and acronyms must be included. The International System of Units (SI) must be used throughout the report and all supporting documents.

The EIA Report must provide a complete and accurate description of the project from planning through construction, operation, maintenance and decommissioning, supported with appropriate maps and diagrams. Emphasis will be placed on describing those aspects of the project, including accidents and malfunctions that have a reasonable probability of occurrence and that could be expected to affect the environment. An identification of how potential environmental and man-made hazards have influenced the design and operation of the project must also be included.

The following titles may be used as a tentative framework for the development of the EIA Report:

- Executive Summary
- Definitions/Glossary
- Introduction
- Regulatory Framework

- Scope of the Project
- Public, Stakeholder, and Aboriginal Consultation
- Scope of the Environmental Assessment
- Purpose and Description of the Project
- Alternative Means of Carrying Out the Project and their Environmental Effects
- Description of the Existing Environment
- Environmental Effects, including Effects of Malfunctions and Accidents & Cumulative Environmental Effects
- Effects of the Environment on the Project
- The Capacity of Renewable Resources that are Likely to be Significantly Affected by the Project (i.e. the sustainability of the project)
- Mitigation Measures
- Environmental Management Planning, Monitoring, and Follow-up
- Closure, Decommissioning and Reclamation
- Significance of Residual Effects
- Conclusion/Recommendation
- References

### **3.1 Project Description – Scope of Project**

The scope of the project will include the construction, operation, and decommissioning of an open pit mine and all associated infrastructure supported with appropriate maps and diagrams. Emphasis will be placed on describing those aspects of the project (including accidents and malfunctions) with a reasonable probability of occurrence that could be expected to affect the environment.

The project to be assessed and its description in the EIA Report must include:

- description of site preparation;
- project schedule;
- detailed description of the project area and boundaries;
- the location, size, layout, capacity, boundaries of the open pit mine and all associated facilities and infrastructure (e.g., ancillary facilities including tailings management and treatment, waste rock pile, water control structures, office buildings and assay lab, freshwater systems, wastewater systems, etc. Rights of Way (RoWs) for electrical distribution lines, rail spur, and access roads);
- description of the ores to be mined;
- hours of operation and blasting schedule;
- freshwater requirements and proposed systems;
- wastewater systems and discharge locations, volume, flow, quality, recycling, re-use;
- the regulatory standards to which the components of this project will be built and operated;
- the construction methodology and design description for the open pit, waste rock pile and tailings management etc;
- storage and handling facilities;
- secondary containment systems;

- a detailed description of emissions and wastes for all phases of the project;
- upsets of environmental control equipment which may change the nature of emissions and/or effluent;
- hazardous materials management (e.g., transportation, handling and storage systems of any hazardous materials, additives and by-products used/generated in the project; chemical storage facilities including estimated concentrations, quantities, list and MSDS of chemicals to be stored on site; quantities, handling and storage of explosives, etc.);
- site access and security;
- transportation of ore – road and/or rail;
- handling and storage of ore;
- waste rock and tailings chemistry and toxicity;
- mineral/ore processing details;
- watercourse alterations including bridges, culverts, stream diversions, and dewatering;
- the impact of project related traffic on road infrastructure and the transportation network;
- road networks used for transportation on-site and off-site for all phases of the project;
- increase in traffic;
- effluent treatment systems including process tailings and water, storm water, sewage, seepage and surface runoff;
- detailed descriptions of all health and safety, and environmental protection measures including contingency plans and emergency response plans - fire prevention and control equipment; and
- reclamation plan for the site, including site rehabilitation measures to be taken post operations.

### **3.2 Project Rationale**

The purpose and need of the project must be clearly identified. The report must provide clear justification for the project in order to allow for an evaluation of the relative environmental effects of the proposed development.

### **3.3 Identification and Analysis of Alternatives**

Using the approach indicated below, the study should evaluate alternatives to the project as proposed that are technically and economically feasible and alternative means of carrying out the project. This analysis will contribute to a further understanding of the project rationale and will facilitate decision-making with respect to its acceptability.

- (a) The null or "do nothing" alternative (not constructing and operating the mine) must be discussed. The study must examine the implications of not proceeding with the project with reference to environmental (both biophysical and socio-economic) factors/effects.
- (b) The analysis must include alternative means of construction, operation, and decommissioning of the project that are technically and economically feasible, the selection criteria, and the environmental effects of such alternative means. For example, alternate

means of tailings management must be discussed (e.g. both wet and dry management methods). Additional information on alternatives which may have been considered and rejected should be provided.

### **3.4 Description of the Existing Environment**

The EIA Report must describe the existing environment focusing on identified VECs within the study boundaries. This description must reflect the dynamics of environmental components (biophysical, social, and economic), and identify trends in the context of predicted changes over time.

A description of the existing environment in the study area should consider, but not be limited to, the following:

- Atmospheric environmental components, including climatic and ambient air quality data;
- Terrestrial environmental components, including topography, watershed hydrology and hydrogeology, surface and groundwater resources;
- The local geology and mineralogy; depth to water table and groundwater flow direction(s) for the site; recharge and discharge zones; aquifer characteristics, such as hydraulic conductivity, transmissivity, storativity, boundary conditions, location of bedrock fractures (especially in area of open pit); average groundwater flow rates; type, thickness and continuity of surficial overburden and any confining or impervious layers in the area;
- Potential for Acid Rock Drainage (ARD), metal leaching, and mobilization of other contaminants should be discussed in relation to the geology and mineralogy of the site;
- Terrestrial biological environmental components, including species at risk and their habitats (flora and fauna), ecologically sensitive or significant areas, and protected areas/critical habitat features. Migratory bird descriptions must include when each species is likely to be present in the study area and areas typically used for nesting, foraging, and/or staging;
- Wetlands – identification of wetland resources including location, size and functional assessment;
- Migratory routes for both birds and mammals;
- Aquatic biological environmental components including fish, fish habitat, fishery resources, benthic environment and species, species at risk and their habitats, species migratory patterns,
- Ecologically sensitive or significant areas, and protected areas/critical habitat features;
- Any commercial, recreational, or Aboriginal fisheries;
- Aquatic physical environmental components including bathymetric/geomorphologic, hydrodynamic, water quality, sediment and ice regime;
- The Provisional Classification of the Nashwaak watershed;
- Navigable waters;
- Ambient surface and ground water quality/quantity conditions (baseline assessment) prior to construction;
- Socio-economic environmental components, including demographic data (e.g., population and labour force), local economy, local services, past, current and foreseeable land use (including agriculture), zoning restrictions, the seasonal variations of fishing activities, archaeological and heritage resources, transportation and associated

infrastructure.

- With specific reference to fisheries, the description must include a socio-economic profile of each identified fishery;
- The potential for encountering contaminated soils/materials (including mobilization of naturally occurring contaminants), with attention paid to metals known to be elevated such as arsenic and lead that may be mobilized as the pit is accessed;
- Localized seismic activity;
- Local road networks;
- Existing public health and safety concerns;
- Ambient noise levels;
- Transportation (traffic volumes and types of vehicles), and
- Current use of land and resources for traditional purposes by Aboriginal persons.

In developing the description of the existing environmental setting, field investigations will be required to address information deficiencies and facilitate the assessment.

The above must also be characterized for all corridors related to infrastructure associated with this proposal including wastewater treatment, freshwater sources, railway spur, electrical, etc.

### **3.5 Cross-Referenced Index**

To assist the readers, a cross-referenced index (i.e., Concordance or Disposition Table), which shows where the content and issues outlined in the Final EIA Guidelines are addressed in the report, is required. This index must be submitted with the Draft EIA Report.

## **4.0 POTENTIAL ENVIRONMENTAL EFFECTS**

Presented here are a number of specific issues for study. However, this framework does not limit the assessment. Should additional relevant issues, concerns, or potentially significant environmental effects be identified through discussion with members of the TRC, regulatory agencies, the public, stakeholders or the Aboriginal community, Geodex must incorporate these issues into the assessment. The assessment must include consideration of, but not be limited to, the appropriate regulations and guidelines.

The capacity of renewable resources that are likely to be significantly affected by the project (either positively or negatively) to meet the needs of the present and those of the future should also be considered.

Baseline conditions for each VEC must be established and proposed assessment methods described. All potential project-related environmental effects (i.e., both positive and negative) resulting from the proposed construction and operation of the mine and all associated infrastructure (including potential effects resulting from accidents or malfunctions), must be included in the assessment. Cumulative environmental effects are to be considered individually for each identified VEC. The nature, spatial extent, frequency, duration, magnitude (qualitative and quantitative), and

significance of each, should be described. Mitigation measures, monitoring and follow-up must be proposed.

#### **4.1 Effects on Atmospheric Environment**

Assess the environmental effects of the construction, operational/maintenance and decommissioning phases of the project on the atmospheric environment, including air quality, sound quality, odour and climate. Any substantive emissions will first need to be quantified. This will be done on a local and regional basis. This will include an analysis of routine air emissions including sources from ore crushing, screening, stockpiles, vehicles, road surfaces, and upset conditions, including accidents and malfunctions. The effects of transportation-related emissions will be considered, including impacts on air quality and human health (e.g., emissions resulting from any change in traffic patterns, etc.). Transportation related emissions would include emissions from construction equipment, additional traffic associated with the facility, etc.

Potential impacts to climate change must be included.

An assessment of noise impact on humans and wildlife must be included.

Provide details on how emissions will be controlled and mitigated at each emissions source and briefly discuss why the proposed technology was selected over other potential methods of control.

A discussion of the climatology of the area shall be provided including both micro and macro climatological effects.

#### **4.2 Effects on Freshwater Resources (Groundwater and Surface Water)**

Assess the potential environmental effects of the construction, operational/maintenance and decommissioning phases on groundwater and surface water resources. Water conservation through innovative technologies including recycling and using treated wastewater will need to be fully explored and evaluated as part of this assessment.

A detailed water budget for the project that incorporates quantity and quality of water required for all components for each phase of the project (including domestic needs and fire protection) under a range of climatic conditions must be provided.

A *Water Supply Source Assessment* must be undertaken if the volume of water to be used is greater than 50 m<sup>3</sup> per day, including water for fire protection. The potential for interference with domestic wells and surface water supplies must be examined and assessed.

Potential project-related changes to groundwater flow regime, water balance and alterations to groundwater recharge and discharge areas must also be included. Potential changes to aquifer characteristics, such as hydraulic conductivity and storage, through blasting and open pit mining must also be evaluated.

In addition, any potential impacts to local groundwater users (water quantity and quality issues) due to construction and operation of the mine and associated infrastructure will need to be discussed.

The study will include characterization of the disposal area for tailings, and the hydraulic conductivity at the base of the pit and the potential to impact groundwater and surrounding watersheds.

A discussion of the environmental effects on freshwater quantity and quality is required for all watercourses within the project footprint and within the zone of influence of the project.

### **4.3 Effects on the Freshwater/Aquatic Environment**

Assess the environmental effects of the proposed project on the freshwater environment, including (but not limited to) water quality, fish and fish habitat, and benthic environment within the environmental assessment boundaries (including the corridors required for any associated infrastructure). A number of watercourses will potentially be impacted by this project (mine and associated infrastructure) and will need to be assessed. Predict the environmental effect of any potential deterioration/improvement in water quality and quantity on the freshwater environment.

Discuss in detail the mineralogy of the deposit, tailings and waste rock and potential changes in the composition of the deposit, tailings and waste rock as different areas are mined over time. Include a discussion of the processing of the ore and the chemicals used and the potential degradation or persistence of the chemicals in the environment and any chemical by-products that may be produced. Evaluate the geochemical reactivity of the tailings and waste rock and any potential changes in reactivity over time, in different conditions and with different seasons (temperatures, precipitation). The impacts of blasting and waste rock storage to water quality should be discussed.

Characterization of the tailings management area must also include details on the specific infrastructure required, collection and treatment of seepage water, discussion on the effects of climate and time on stability of tailings infrastructure and the maintenance and monitoring required.

Discuss the chemistry and reactivity of the pit water, along with storage, treatment and disposal of the pit water.

Discuss in detail all wastewater treatment and disposal options (domestic waste, pit water, tailings and waste rock water, surface runoff, etc.), as well as any chemicals of concern that cannot be removed by water treatment, treatment by-products and effluent quality.

Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan as they relate to the freshwater environment, including spill prevention and spill response contingency planning.

In addition, the following will need to be discussed:

- Potential for accidental releases of chemicals and petroleum products that could impact surface water/groundwater environment;
- Production of mine water and tailings; treatment and release and impacts to surface water/groundwater; and
- Expected loadings on the environment.

#### **4.4 Effects on the Terrestrial Environment**

Assess the potential environmental effects of construction, operation/maintenance and decommissioning of the project and associated infrastructure on terrestrial environments, including all plant and animal species and their habitat. Key issues that will need to be evaluated as part of this assessment are existing vegetation, terrestrial country foods, terrestrial wildlife (e.g., the pine marten and Canada lynx), and wildlife habitat. Since this project could affect a large area, this will require extensive field surveys and review.

The effects of the project (direct and indirect) and associated infrastructure on migratory birds and migratory bird habitat will also need to be evaluated. This would include any works that are likely to impact avian movement and/or migration routes, or any structure or infrastructure that may impact migratory species.

Assess the environmental effects of the project and associated infrastructure on species (flora and fauna) considered to be at risk under national, provincial and regional classification systems (i.e., endangered, threatened, species of special conservation status, and rare species) including species listed under the NB Endangered Species Act as well as the federal Species at Risk Act (SARA). Include consideration of any species at risk known to occur within the zones of influence of the proposed project and for which there are potential project-VEC interactions anticipated that could result in significant environmental effects.

The following information sources on species at risk in the general project area (and corridors for any associated infrastructure) must be consulted:

- Atlantic Canada Conservation Data Centre (AC CDC);
- SARA Species List (SARA Public Registry);
- COSEWIC List (latest version on the website);
- New Brunswick Museum;
- NB Endangered Species Act;
- Canadian Wildlife Service (CWS); and
- Local naturalist and interest groups such as the Fredericton Nature Club, the N.B. Nature Federation, the N.B. Botany Club, the Canadian Rivers Institute, etc.

Site-specific information must be obtained from field investigations carried out by the appropriate specialists.

#### **4.5 Effects on the Wetland Environment**

An assessment of all wetlands within the study area, including any impacts associated with infrastructure related to the project, must be undertaken. The approach described in the *Federal Policy on Wetland Conservation (EC, 1991)* and the *New Brunswick Wetlands Conservation Policy (2002)* and draft *NBDNR Wetland Mitigation Guidelines for New Brunswick (2003)* must be followed.

#### **4.6 Effects on Labour and Economy (and other Socio-economic Effects)**

Predict the benefits of the project on labour and economy within the area surrounding the mine and the Province of New Brunswick. Assess the direct and indirect creation of employment in the area associated with the construction and operation of this facility. The availability and potential use of skilled and unskilled workers in the local area to meet the job requirements should be outlined, along with predictions for the increase in the population of the surrounding area as vacant jobs are filled.

The effect on existing tourism and recreational activities must be included.

The effect on local property values must be considered.

The effect on industries, including the recreational, commercial and Aboriginal fishing industries must be included.

Discuss any aesthetic/potential visual impacts of the proposed project and how these could impact the local or regional economy.

The estimated total reserves and value in present day Canadian dollars and the planned annual extraction rates must be reported.

A study on socioeconomic impacts of the life cycle of the mine on surrounding communities must be carried out by a qualified individual, including the impacts of mine closure, unexpected or otherwise, citing examples of other mining projects where appropriate. The possible impacts on stakeholders including Aboriginal communities, residents within the project area, neighbouring communities, along haul roads, recreational businesses and recreational groups, hunters, trappers, guides, outfitters, etc. must also be included.

#### **4.7 Effects on Community Services and Infrastructure**

An assessment of the community services and infrastructure will be required in order to evaluate the potential impacts from the large number of workers associated with the construction and operation of this facility both on a temporary and permanent basis. Community services and infrastructure includes: local emergency response, ongoing support services (health and social services), accommodation, food services, and entertainment.

Any additional demand on local emergency response services and ongoing support services will need to be assessed. These services may be affected by the occurrence of an accidental event, or by the routine presence of workers associated with either construction or operation. There may also be impacts to local accommodations as a result of temporary and permanent workers required for this project.

Any increased demands on the above community services and infrastructure, (as large numbers of temporary workers in an area could create unique concerns during the construction phase) will need to be assessed. Such a situation may result in increased need for policing and social services in certain areas.

#### **4.8 Effects on Private/Public Land and Resource Use**

Assess the effects of the project and associated infrastructure on the current use of lands (including Crown land) and resources by the public and private sectors.

Describe the impacts the project would have on access to the lands surrounding or within the project site.

Evaluate the environmental and socio-economic effects of the project on land use in the immediate vicinity of the project (i.e., within the defined environmental assessment boundaries of the project).

Assess any potential impacts of the project on other areas that could be affected by the project and associated infrastructure.

#### **4.9 Effects on the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons**

Assess the effects of all aspects of the project (including any associated infrastructure) on the current use of lands and resources for traditional purposes by Aboriginal persons. This includes traditional hunting, fishing, snowshoeing, and gathering of food or medicine by Aboriginal communities.

#### **4.10 Effects on Heritage and Archaeological Resources**

An assessment of heritage and archaeological resources will be required for the mine site as well as for any required infrastructure.

The effect of the proposed project on physical and cultural heritage, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance must also be included.

#### **4.11 Effects on Land-Based Transportation/Road Infrastructure**

Assess the environmental effects of the proposed project on traffic patterns/flows, including a prediction with respect to current/future road infrastructure and use with reference to safety and the integrity of infrastructure on traffic flows, level of service, and accident rates. Predict the impacts of increased ground transportation in the region and specifically traffic to and from the proposed mine site with reference to noise, safety, risks of spills and air quality. The study should consider localized impacts that may occur from fossil fuel combustion as a result of increased traffic.

During the construction phase of the project there would be substantial land-based activity that will require the movement of equipment, material and personnel to and from the project site. There may be concern regarding the condition, allowable weights and dimensions of the existing road infrastructure. These potential effects will need to be evaluated.

Any effects associated with project-related traffic during the operation phase will also need to be assessed, as project related traffic will continue in the form of personnel transportation and truck traffic carrying supplies, materials and products.

A transportation plan outlining site access routes, description of loads and frequency of trips must be provided.

It is anticipated that some processed products may be shipped via rail. A new rail spur would be needed to allow for this. If a rail spur is to be constructed, an assessment of the routing will need to be undertaken. An additional concern is the potential environmental effects on road traffic, either resulting in greater congestion or higher collision rates, associated with any at grade crossings. In addition, an assessment of the emergency routes that may be impacted as a result of the rail spur will need to be undertaken.

#### **4.12 Effects of the Environment on the Project**

Sensitivity of the proposed project to variations in meteorological conditions, including extreme events, must be investigated. Among the parameters to be considered are the effect of extreme precipitation events on site water management and the influence of wind and ice on mine operations (including any associated infrastructure). In addition, the sensitivity of the proposed project to climate variability and climate change must be identified and discussed. Not only will the assessment look at the current climatic setting in the area, but must also include a consideration of the potential future climatic conditions due to climate changes in the foreseeable and long-term future (e.g., global warming over a 50 and 100 year period).

The assessment must take into account how the existing environment/natural and man-made hazards could adversely affect the project (e.g., acid rock drainage, severe meteorological conditions, seismic events, etc.).

#### 4.13 **Effects on Public Health and Safety**

Public health will need to be assessed both in light of long term (chronic) conditions as well as short term (acute) conditions. Public health can be affected by effluents and emissions and environmental effects on air quality, drinking water quality and food, among other factors.

An assessment of the potential for environmental effects on public health must be carried out by conducting a Human Health and Ecological Risk Assessment (HHERA). The HHERA will consider the potential risks of adverse environmental effects of all project-related effluents, emissions and waste products during all phases of the project. Cumulative environmental effects will need to be considered as part of the HHERA.

The potential effects of the project on the health and safety of employees, their families, local communities, Aboriginal communities and wildlife must be assessed and identified. Mitigation measures for any possible impacts must be described.

Provide a description of the source, quantity, mechanism, rate, form and characteristics of contaminants and other sources likely to be released to the environment (i.e., in the context of worker exposure during normal operation, a postulated malfunction and accident event).

Potential effects to public safety will be considered as they relate to accidents, spills, collisions, vehicle accidents, etc. Identify sources and characteristics of any potential risks to workers during construction and subsequent operation.

Describe the specific, important malfunction/accidental events that have a reasonable probability of occurring during the operational life of the project.

Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan for construction, commissioning, operation and decommissioning, including spill prevention, and spill response contingency planning.

Describe the key components relevant to safety during the construction activity and details regarding security considerations with respect to the site and associated infrastructure.

Potential impacts from metal contamination resulting from dust or airborne particulate matter (including metals such as lead and arsenic) must be investigated for significant on and off site impacts using dispersion modelling if necessary. Impacts to humans and wildlife must be considered.

# **Appendix B**

## General Table of Concordance



**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<b>2.0 METHODOLOGICAL APPROACH TO EIA</b>	
<b>2.1 GENERAL</b>	
The EIA process results in a detailed study of potential environmental impacts and identification of procedures that may be used to avoid, mitigate and/or compensate for identified effects. The EIA study must also identify methods of optimizing positive impacts as well as minimizing negative impacts resulting from the proposed project. Additional options identified during the environmental assessment process may be considered as appropriate.	Chapter 4
To provide a focus for the EIA, environmental components of principal concern, commonly referred to as Valued Environmental Components (VECs), must be identified early in the assessment process. The method for determining VECs must be clearly stated by the proponent. The proponent will seek public, stakeholder and Aboriginal community knowledge, as appropriate, during the identification of appropriate VECs. The proposed VECs must be publically reviewed prior to acceptance by the TRC in the early phases of the EIA. The EIA must clearly indicate the provisions for compliance with relevant regulatory requirements, guidelines and best management practices.	Section 4.0
Presented in Section 4.0 of these Guidelines are a number of specific issues related to the project for study, based in part on input received during the public comment period of the Draft EIA Guidelines. However, this framework does not limit the proposed EIA study. Should additional issues arise from discussion with members of the TRC, or consultation with regulatory agencies, members of the public, stakeholders or the Aboriginal community, the proponent must incorporate these issues into the assessment of the project's potential impacts.	Section 2.3 and Chapter 3
<b>2.2 STUDY BOUNDARIES AND SCOPE OF FACTORS</b>	
The review must consider the potential environmental effects of the proposed project and all associated infrastructure. The Proponent must clearly describe the boundaries of the study in time (temporal) and space (spatial) used in the evaluation of environmental effects for each of the VEC's.	Sections 4.1.3, 4.2.3, 4.3.3, 4.4.3, 4.5.3, 4.6.3, 4.7.3, 4.8.3, 4.9.3, 4.10.3, 4.11.3, 4.12.3, 4.13.3, 4.14.3, and 4.15.3
The temporal boundaries of the study (the length of time over which project environmental effects are anticipated to occur) must reflect the construction period, the operating life of the project, and the extent of any potentially significant environmental effects that may remain beyond the operating period, including decommissioning/reclamation, and any potential accidents or malfunctions.	Sections 4.1.3, 4.2.3, 4.3.3, 4.4.3, 4.5.3, 4.6.3, 4.7.3, 4.8.3, 4.9.3, 4.10.3, 4.11.3, 4.12.3, 4.13.3, 4.14.3, and 4.15.3
Spatial boundaries should reflect: <ul style="list-style-type: none"> <li>• the extent to which project activities are anticipated to occur in the existing environment;</li> <li>• the extent of anticipated environmental effects, including cumulative environmental effects on the VEC's; and</li> <li>• the extent of atmospheric, aquatic, and terrestrial ecosystems potentially affected by the project.</li> </ul>	Sections 4.1.3, 4.2.3, 4.3.3, 4.4.3, 4.5.3, 4.6.3, 4.7.3, 4.8.3, 4.9.3, 4.10.3, 4.11.3, 4.12.3, 4.13.3, 4.14.3, and 4.15.3
Boundaries such as administrative, technical, biophysical, socio-economic and project area should be defined and related to the impact assessment process as appropriate. In determining appropriate spatial boundaries, consideration should be given to environmental effects from the proposal on a local, regional and national scale as appropriate.	Sections 4.1.3, 4.2.3, 4.3.3, 4.4.3, 4.5.3, 4.6.3, 4.7.3, 4.8.3, 4.9.3, 4.10.3, 4.11.3, 4.12.3, 4.13.3, 4.14.3, and 4.15.3

\*Note - although the NBENV Final Guidelines were written with Geodex as the Proponent, Northcliff Resources Ltd. is now carrying out the Project.

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<b>2.3 PREDICTION OF ENVIRONMENTAL EFFECTS</b>	
<p>The main focus of the EIA is to predict environmental effects (<i>i.e.</i>, both positive and negative) that may result from the proposed project and associated infrastructure, and their potential significance. Predictions must consider all aspects and phases (<i>e.g.</i>, construction, operation, and decommissioning) of the proposed project, and any indirect environmental effects, cumulative effects, and any effects that may result from accidents or malfunctions. In addition, potential effects of the environment on the proposed project must be predicted, such as climate change effects, acid rock drainage, or effects that may be caused by extreme weather events (<i>e.g.</i>, intense precipitation events, flooding), etc.</p>	Section 2.2 and Chapter 4
<p>EIA predictions are generally based on a combination of objective and subjective evaluation. The use of objective (measurable) analysis is strongly preferred where it is technically feasible and reasonable to do so. However, in recognition of any factor that may limit the ability to predict or measure environmental responses, predictions may be based on subjective evaluation using professional judgment and experience. Community knowledge and Aboriginal traditional knowledge should also be utilized, as applicable. In consideration of this, predictive statements must be accompanied by a discussion of the limitations of the analysis, references to supporting documentation and the qualifying credentials of those making the predictions.</p>	Section 2.2 and Chapter 4
<p>Predictions must be made regarding the nature (adverse or positive), magnitude, duration, frequency, geographic extent and reversibility of the proposed project's potential environmental effects. The significance of these effects must also be determined. These predictions must:</p> <ul style="list-style-type: none"> <li>• facilitate decision-making with respect to the proposed project;</li> <li>• clearly specify any degree of uncertainty inherent in the projections;</li> <li>• clearly identify positive and negative environmental effects (both biophysical and socio- economic) of the proposed project; and</li> <li>• be amenable to testing and verification where possible through ongoing monitoring initiatives.</li> </ul>	Section 2.2
<p>To clearly distinguish potentially significant environmental effects from those likely to be insignificant, the proponent must first define "significant." The definition must be based on scientific determinations, social values, public concerns, and economic judgments, and will be submitted to the TRC for review and approval along with the proposed VECs. In particular, the significance of proposed project-induced changes on VECs must be clearly stated in the EIA Report. The thresholds for significant effects on VECs (<i>i.e.</i>, both positive and negative) must be related in terms of applicable criteria. Quantifiable reference to the magnitude, geographical extent, duration, frequency, reversibility and ecological context of the potential environmental effects is required. Significance must be determined in the context of project-specific and cumulative environmental effects and after taking into account the implementation of appropriate mitigation/optimization measures.</p>	Sections 4.1.4, 4.2.4, 4.3.4, 4.4.4, 4.5.4, 4.6.4, 4.7.4, 4.8.4, 4.9.4, 4.10.4, 4.11.4, 4.12.4, 4.13.4, 4.14.4, and 4.15.4

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
Significant effects on species ( <i>i.e.</i> , tolerance levels related to organisms in the environment), must take into account effects at the population-level. For species designated as endangered, effects on an individual constitute a population-level effect.	Sections 4.4.4, 4.5.4, 4.6.4, and 4.7.4
<b>2.4 CUMULATIVE ENVIRONMENTAL EFFECTS</b>	
The term cumulative environmental effects refers to those effects, over a defined period of time and distance, resulting or likely to result from the proposed project and associated infrastructure, in combination with other past, present, or likely (imminent) future projects or activities. An assessment of cumulative environmental effects must be conducted as part of the EIA study, in consideration of identified VECs and future projects that may be developed.	Section 2.2
The goal of the cumulative effects assessment will be to place project-related impacts, their significance, and approaches to their management in the context of the “bigger picture,” and must include (but is not limited to): <ul style="list-style-type: none"> <li>• identification of regional issues of concern; a comprehensive description of how VECs were selected;</li> <li>• a clear justification for the spatial and temporal boundaries used to address cumulative effects;</li> <li>• a clear description of the analysis undertaken to assess the cumulative effects on the selected VECs (<i>i.e.</i>, both positive and negative), and presentation of the results;</li> <li>• a clear description of how mitigation measures address the cumulative environmental impacts; and</li> <li>• the rationale for determining whether residual cumulative effects on VECs are significant.</li> </ul>	Section 2.2
<b>2.5 MITIGATION, CONTINGENCY AND COMPENSATION</b>	
The EIA study must describe general and specific measures that are technically and economically feasible for the proponent to implement, to optimize any positive environmental effects and mitigate any negative effects resulting or potentially resulting from the proposed project and any associated infrastructure ( <i>i.e.</i> , maximize positive effects, and eliminate, prevent, avoid or minimize adverse effects). This must include a description of contingency measures (including emergency response plans) that have been designed to address potential accidents and malfunctions that could result in spills or unplanned releases of contaminants or products to the environment. Contingency plans must address worst-case scenarios and reflect a consideration of local conditions and sensitivities. Specific circumstances under which mitigative measures will be implemented must be clearly defined by the proponent including how scenarios would be reported, acted upon, and monitored. Mitigation options must be considered in a hierarchical manner with a clear priority placed on proactive measures for impact avoidance and pollution prevention opportunities. Opportunities to contribute to a regional approach to management of cumulative environmental effects must also be identified (refer to Section 2.4 above).	Chapter 4

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<p>At a minimum, mitigative measures for the following for all phases of the project must be addressed:</p> <ul style="list-style-type: none"> <li>• air quality from all sources, including dust control;</li> <li>• water quantity and quality;</li> <li>• blasting operations;</li> <li>• processing effluents and sewage;</li> <li>• wetlands;</li> <li>• archaeological and heritage resources;</li> <li>• flora and fauna;</li> <li>• fish and fish habitat;</li> <li>• emergency releases and events; and</li> <li>• waste rock management and acid rock drainage.</li> </ul>	Chapter 4
<p>An outline for contingency plans must also be provided:</p> <ul style="list-style-type: none"> <li>• for use in the event of an environmental emergency attributable to the project and associated infrastructure, within the spatial boundaries of the study; and</li> <li>• for use in the event of significant impacts, attributable to the project and associated infrastructure, which are detected through monitoring (this plan must be designed to be implemented should impacts be detected through monitoring).</li> </ul>	Section 2.2
<p>The study must also consider compensation mechanisms to be used in the event that any unforeseen, accidental, or residual environmental effects occur. These compensation mechanisms/plans must be developed through consultation with federal and provincial agencies and other stakeholders, as appropriate.</p>	Chapter 4
<p>In addition, the Proponent must include in the study an outline for closure plans to identify site-specific objectives for mine closure and the intended post-closure land-use for the site. Closure plans must detail the processes that will be used to decommission and reclaim all aspects of the mining facility including:</p> <ul style="list-style-type: none"> <li>• mining and ore processing facilities;</li> <li>• site infrastructure; and</li> <li>• water and waste management facilities, including waste rock piles and tailings management facilities.</li> </ul>	Chapter 4
<p>Further, in addition to the requirements under the <i>Mining Act</i>, the study must evaluate the requirement for a financial security deposit to address the implementation of the decommissioning/ abandonment plan (<i>i.e.</i>, to cover any required costs associated with on-going environmental protection measures beyond the operational phase).</p>	Chapter 4

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<p><b>2.6 COMMITMENT TO MONITORING AND FOLLOW-UP</b></p> <p>A well-defined program of monitoring and follow-up initiatives regarding environmental effects resulting or potentially resulting from the proposed project must be outlined in the EIA Report. The Proponent must describe all of their proposed monitoring and follow-up programs, including their objectives, content, and implementation and reporting schedules. Monitoring programs will be required to:</p> <ul style="list-style-type: none"> <li>• establish baseline conditions;</li> <li>• determine regulatory compliance (compliance monitoring);</li> <li>• test the predictions of the EIA (environmental effects monitoring, EEM); and</li> <li>• evaluate the effectiveness of measures used to mitigate environmental effects (EEM).</li> </ul> <p>Monitoring programs should include protocols that would guide interpretation of monitoring results and timely implementation of appropriate corrective actions. Monitoring initiatives must be based upon accurate baseline information for the existing physical, biological and socio-economic environments. The proponent is expected to collect the necessary information through existing data sources (“data mining”) and through primary research such as fieldwork and laboratory testing, as required.</p> <p>Where the EIA predictions are not based on objective information, monitoring programs must be designed, where possible, to collect relevant data not previously available.</p> <p>Monitoring and follow-up programs must allow for testing of the accuracy of effects predictions and effectiveness of mitigation measures. Programs must support an adaptive management approach and include provisions for changing impact mitigation in response to follow-up and monitoring results. Important components of monitoring programs will include:</p> <ul style="list-style-type: none"> <li>• elements of the environment that will be monitored;</li> <li>• where the monitoring will occur;</li> <li>• frequency and duration of monitoring;</li> <li>• detailed statement of objectives;</li> <li>• submission of results;</li> <li>• protocols for the interpretation of results and subsequent actions to be taken based on findings.</li> </ul>	<p>Section 2.2, Chapter 4</p>

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<b>2.7 PUBLIC, STAKEHOLDER AND ABORIGINAL COMMUNITY CONSULTATION</b>	
<p>Public consultation is an essential component of the EIA. The Proponent must consult with persons and organizations potentially affected by the proposed project and associated infrastructure, and must inform and engage any interested individuals, groups, stakeholders, local hunters and trappers, recreational users, affected communities, and Aboriginal communities in this assessment. This will include local governments and specific groups with mandates/initiatives in this area. The stakeholder consultation program is to be reviewed and accepted in the early stages of the study (e.g., at the TOR stage). Potential stakeholders identified to date, include:</p> <ul style="list-style-type: none"> <li>• Canadian Rivers Institute;</li> <li>• Nashwaak Watershed Association Inc.;</li> <li>• Maliseet Nation Conservation Council;</li> <li>• New Brunswick Trappers Federation; and</li> <li>• Interested members of the public.</li> </ul>	Chapter 3
<p>This list is to be supplemented as additional stakeholders are identified during the EIA study. The Proponent will be expected to hold appropriate public consultation events and to use various media to engage the public (e.g., bulletins, website, e-mails, study updates, workshops, open-houses, etc). All interested parties will be provided with an opportunity to participate in consultation initiatives in order to provide input in the assessment and/or make their views known. Various stakeholders will be consulted throughout the environmental assessment process, including interested parties from the Aboriginal community; neighbouring residents; general public; non-government organizations and interest groups. The objectives of this consultation must be:</p> <ul style="list-style-type: none"> <li>• to ensure that the potentially affected public, stakeholders and Aboriginal community are engaged in meaningful discussion and are well informed prior to the government's decision, as to the nature and extent of environmental effects attributable to the proposed project (i.e., both positive and negative effects);</li> <li>• to ensure that the values and concerns of the public, stakeholders and Aboriginal community are incorporated and adequately addressed in the study; and</li> <li>• to obtain expertise (where applicable) from various members of the public, stakeholders and the Aboriginal community.</li> </ul>	Chapter 3
<p>Stakeholders, including the public and the Aboriginal community must be informed of the status of the study at regular intervals/at key milestones during the study. Consultation must continue through the construction and operation phases of the project (if approved), through specific consultation mechanisms (e.g., Community Liaison Committee, etc.).</p>	Chapter 3
<p>The EIA must document the dates and formats for public and other stakeholder consultation initiatives undertaken, the material presented, the opportunity for receiving input, a summary review of any concerns expressed, and how these concerns were addressed. It must be clear how the input from consultations was used in the assessment and what changes to the process or project were made as a result of comments provided.</p>	Chapter 3

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<b>2.8 TERMS OF REFERENCE (TOR)</b>	
The proponent must submit detailed TOR in response to the Final EIA Guidelines. The TOR must clearly describe the methods proposed for carrying out the EIA, and the means by which the Proponent will consult with the public, stakeholders and Aboriginal community during the course of the EIA process.	Chapters 2 and 3
The Proponent is required to provide, as part of the TOR, a cross-referenced index (Concordance or Disposition Table) showing where the content and issues of the Final EIA Guidelines have been addressed. The TRC will examine the TOR and comments/deficiencies may be provided to the proponent to address prior to finalization. In addition, the TOR must outline the components of any proposed field programs, any anticipated challenges/obstacles to be encountered, proposed modelling approaches, identify key members of the study team, and fully describe all specific tasks to be completed as part of the study.	Concordance Table, Chapter 4, and Chapter 5
The TRC will examine the TOR and comments may be provided to the Proponent for inclusion. In addition, public and stakeholder consultation must be undertaken by the proponent to allow interested parties, the public, stakeholders, and Aboriginal community to provide input to the TOR prior to finalization. The final TOR must be approved by the TRC.	Chapter 3
<b>3.0 CONDUCT OF THE STUDY AND CONTENT OF REPORT</b>	
The EIA Report must be written in the clearest language possible. Where the complexity of the issues addressed requires the use of technical language, a glossary defining technical words and acronyms must be included. The International System of Units (SI) must be used throughout the report and all supporting documents.	N/A. Noted.
The EIA Report must provide a complete and accurate description of the project from planning through construction, operation, maintenance and decommissioning, supported with appropriate maps and diagrams. Emphasis will be placed on describing those aspects of the project, including accidents and malfunctions that have a reasonable probability of occurrence and that could be expected to affect the environment. An identification of how potential environmental and man-made hazards have influenced the design and operation of the project must also be included.	Chapter 4

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<p>The following titles may be used as a tentative framework for the development of the EIA Report:</p> <ul style="list-style-type: none"> <li>• Executive Summary;</li> <li>• Definitions/Glossary;</li> <li>• Introduction;</li> <li>• Regulatory Framework;</li> <li>• Scope of the Project;</li> <li>• Public, Stakeholder, and Aboriginal Consultation;</li> <li>• Scope of the Environmental Assessment;</li> <li>• Purpose and Description of the Project;</li> <li>• Alternative Means of Carrying Out the Project and their Environmental Effects;</li> <li>• Description of the Existing Environment;</li> <li>• Environmental Effects, including Effects of Malfunctions and Accidents &amp; Cumulative Environmental Effects;</li> <li>• Effects of the Environment on the Project;</li> <li>• The Capacity of Renewable Resources that are Likely to be Significantly Affected by the Project (<i>i.e.</i>, the sustainability of the project);</li> <li>• Mitigation Measures;</li> <li>• Environmental Management Planning, Monitoring, and Follow-up;</li> <li>• Closure, Decommissioning and Reclamation;</li> <li>• Significance of Residual Effects;</li> <li>• Conclusion/Recommendation; and</li> <li>• References.</li> </ul>	Noted
<b>3.1 PROJECT DESCRIPTION – SCOPE OF PROJECT</b>	
<p>The scope of the project will include the construction, operation, and decommissioning of an open pit mine and all associated infrastructure supported with appropriate maps and diagrams. Emphasis will be placed on describing those aspects of the project (including accidents and malfunctions) with a reasonable probability of occurrence that could be expected to affect the environment.</p>	Section 2.2.1
<p>The project to be assessed and its description in the EIA Report must include:</p> <ul style="list-style-type: none"> <li>• description of site preparation;</li> <li>• project schedule;</li> <li>• detailed description of the project area and boundaries;</li> <li>• the location, size, layout, capacity, boundaries of the open pit mine and all associated facilities and infrastructure (<i>e.g.</i>, ancillary facilities including tailings management and treatment, waste rock pile, water control structures, office buildings and assay lab, freshwater systems, wastewater systems, etc. Rights of Way (RoWs) for electrical distribution lines, rail spur, and access roads);</li> <li>• description of the ores to be mined;</li> </ul>	Section 2.2.1

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<ul style="list-style-type: none"> <li>• hours of operation and blasting schedule;</li> <li>• freshwater requirements and proposed systems;</li> <li>• wastewater systems and discharge locations, volume, flow, quality, recycling, re-use;</li> <li>• the regulatory standards to which the components of this project will be built and operated;</li> <li>• the construction methodology and design description for the open pit, waste rock pile and tailings management etc;</li> <li>• storage and handling facilities;</li> <li>• secondary containment systems;</li> <li>• a detailed description of emissions and wastes for all phases of the project;</li> <li>• upsets of environmental control equipment which may change the nature of emissions and/or effluent;</li> <li>• hazardous materials management (e.g., transportation, handling and storage systems of any hazardous materials, additives and by-products used/generated in the project;</li> <li>• chemical storage facilities including estimated concentrations, quantities, list and MSDS of chemicals to be stored on site;</li> <li>• quantities, handling and storage of explosives, etc.);</li> <li>• site access and security;</li> <li>• transportation of ore – road and/or rail;</li> <li>• handling and storage of ore;</li> <li>• waste rock and tailings chemistry and toxicity;</li> <li>• mineral/ore processing details;</li> <li>• watercourse alterations including bridges, culverts, stream diversions, and dewatering;</li> <li>• the impact of project related traffic on road infrastructure and the transportation network;</li> <li>• road networks used for transportation on-site and off-site for all phases of the project;</li> <li>• increase in traffic;</li> <li>• effluent treatment systems including process tailings and water, storm water, sewage, seepage and surface runoff;</li> <li>• detailed descriptions of all health and safety, and environmental protection measures including contingency plans and emergency response plans -fire prevention and control equipment; and</li> <li>• reclamation plan for the site, including site rehabilitation measures to be taken post operations.</li> </ul>	

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<b>3.2 PROJECT RATIONALE</b>	
The purpose and need of the project must be clearly identified. The report must provide clear justification for the project in order to allow for an evaluation of the relative environmental effects of the proposed development.	Section 1.1.2
<b>3.3 IDENTIFICATION AND ANALYSIS OF ALTERNATIVES</b>	
Using the approach indicated below, the study should evaluate alternatives to the project as proposed that are technically and economically feasible and alternative means of carrying out the project. This analysis will contribute to a further understanding of the project rationale and will facilitate decision-making with respect to its acceptability. <ul style="list-style-type: none"> <li>a. The null or "do nothing" alternative (not constructing and operating the mine) must be discussed. The study must examine the implications of not proceeding with the project with reference to environmental (both biophysical and socio-economic) factors/effects.</li> <li>b. The analysis must include alternative means of construction, operation, and decommissioning of the project that are technically and economically feasible, the selection criteria, and the environmental effects of such alternative means. For example, alternate means of tailings management must be discussed (e.g., both wet and dry management methods). Additional information on alternatives which may have been considered and rejected should be provided.</li> </ul>	Section 2.2.2.5
<b>3.4 DESCRIPTION OF THE EXISTING ENVIRONMENT</b>	
The EIA Report must describe the existing environment focusing on identified VECs within the study boundaries. This description must reflect the dynamics of environmental components (biophysical, social, and economic), and identify trends in the context of predicted changes over time.	Section 2.3
A description of the existing environment in the study area should consider, but not be limited to, the following:	
<ul style="list-style-type: none"> <li>• atmospheric environmental components, including climatic and ambient air quality data;</li> </ul>	Section 4.1.5
<ul style="list-style-type: none"> <li>• terrestrial environmental components, including topography, watershed hydrology and hydrogeology, surface and groundwater resources;</li> </ul>	Section 4.5.5
<ul style="list-style-type: none"> <li>• the local geology and mineralogy; depth to water table and groundwater flow direction(s) for the site; recharge and discharge zones; aquifer characteristics, such as hydraulic conductivity, transmissivity, storativity, boundary conditions, location of bedrock fractures (especially in area of open pit);</li> </ul>	Section 4.2.5
<ul style="list-style-type: none"> <li>• average groundwater flow rates; type, thickness and continuity of surficial overburden and any confining or impervious layers in the area;</li> </ul>	Section 4.2.5
<ul style="list-style-type: none"> <li>• potential for Acid Rock Drainage (ARD), metal leaching, and mobilization of other contaminants should be discussed in relation to the geology and mineralogy of the site;</li> </ul>	Section 4.4.5
<ul style="list-style-type: none"> <li>• terrestrial biological environmental components, including species at risk and their habitats (flora and fauna), ecologically sensitive or significant areas, and protected areas/critical habitat features. Migratory bird descriptions must include when each species is likely to be present in the study area and areas typically used for nesting, foraging, and/or staging;</li> </ul>	Sections 4.5.5 and 4.6.5
<ul style="list-style-type: none"> <li>• wetlands – identification of wetland resources including location, size and functional assessment;</li> </ul>	Section 4.7.5

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<ul style="list-style-type: none"> <li>migratory routes for both birds and mammals;</li> </ul>	Section 4.5.5
<ul style="list-style-type: none"> <li>aquatic biological environmental components including fish, fish habitat, fishery resources, benthic environment and species, species at risk and their habitats, species migratory patterns;</li> </ul>	Section 4.4.5
<ul style="list-style-type: none"> <li>ecologically sensitive or significant areas, and protected areas/critical habitat features;</li> </ul>	Sections 4.5.5 and 4.6.5
<ul style="list-style-type: none"> <li>any commercial, recreational, or Aboriginal fisheries;</li> </ul>	Section 4.12.5
<ul style="list-style-type: none"> <li>aquatic physical environmental components including bathymetric/geomorphologic, hydrodynamic, water quality, sediment and ice regime;</li> </ul>	Section 4.2.5 and 4.4.5
<ul style="list-style-type: none"> <li>the Provisional Classification of the Nashwaak watershed;</li> </ul>	Section 4.4.5
<ul style="list-style-type: none"> <li>Navigable waters;</li> </ul>	Section 4.4.5
<ul style="list-style-type: none"> <li>ambient surface and ground water quality/quantity conditions (baseline assessment) prior to construction;</li> </ul>	Sections 4.2.5 and 4.4.5
<ul style="list-style-type: none"> <li>socio-economic environmental components, including demographic data (e.g., population and labour force), local economy, local services, past, current and foreseeable land use (including agriculture), zoning restrictions, the seasonal variations of fishing activities, archaeological and heritage resources, transportation and associated infrastructure.</li> </ul>	Sections 4.9.5, 4.10.5, 4.11.5, 4.12.5, 4.13.5, and 4.14.5
<ul style="list-style-type: none"> <li>with specific reference to fisheries, the description must include a socio-economic profile of each identified fishery;</li> </ul>	Section 4.11.5
<ul style="list-style-type: none"> <li>the potential for encountering contaminated soils/materials (including mobilization of naturally occurring contaminants), with attention paid to metals known to be elevated such as arsenic and lead that may be mobilized as the pit is accessed;</li> </ul>	Section 4.4.5 and 4.8.5
<ul style="list-style-type: none"> <li>localized seismic activity;</li> </ul>	Section 4.15.5
<ul style="list-style-type: none"> <li>local road networks;</li> </ul>	Section 4.14.5
<ul style="list-style-type: none"> <li>existing public health and safety concerns;</li> </ul>	Section 4.8.5
<ul style="list-style-type: none"> <li>ambient noise levels;</li> </ul>	Section 4.2.5
<ul style="list-style-type: none"> <li>transportation (traffic volumes and types of vehicles); and</li> </ul>	Section 4.14.5
<ul style="list-style-type: none"> <li>current use of land and resources for traditional purposes by Aboriginal persons.</li> </ul>	Section 4.12.5
<p>In developing the description of the existing environmental setting, field investigations will be required to address information deficiencies and facilitate the assessment.</p>	Sections 4.1.5, 4.2.5, 4.3.5, 4.4.5, 4.5.5, 4.6.5, 4.7.5, 4.8.5, 4.9.5, 4.10.5, 4.11.5, 4.12.5, 4.13.5, 4.14.5, and 4.15.5.
<p>The above must also be characterized for all corridors related to infrastructure associated with this proposal including wastewater treatment, freshwater sources, railway spur, electrical, etc.</p>	Sections 4.1.5, 4.2.5, 4.3.5, 4.4.5, 4.5.5, 4.6.5, 4.7.5, 4.8.5, 4.9.5, 4.10.5, 4.11.5, 4.12.5, 4.13.5, 4.14.5, and 4.15.5.

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<b>3.5 CROSS-REFERENCED INDEX</b>	
To assist the readers, a cross-referenced index ( <i>i.e.</i> , Concordance or Disposition Table), which shows where the content and issues outlined in the Final EIA Guidelines are addressed in the report, is required. This index must be submitted with the Draft EIA Report.	Noted
<b>4.0 POTENTIAL ENVIRONMENTAL EFFECTS</b>	
Presented here are a number of specific issues for study. However, this framework does not limit the assessment. Should additional relevant issues, concerns, or potentially significant environmental effects be identified through discussion with members of the TRC, regulatory agencies, the public, stakeholders or the Aboriginal community, The Proponent must incorporate these issues into the assessment. The assessment must include consideration of, but not be limited to, the appropriate regulations and guidelines.	Chapter 2
The capacity of renewable resources that are likely to be significantly affected by the project (either positively or negatively) to meet the needs of the present and those of the future should also be considered.	Section 2.2.2.7
Baseline conditions for each VEC must be established and proposed assessment methods described. All potential project-related environmental effects ( <i>i.e.</i> , both positive and negative) resulting from the proposed construction and operation of the mine and all associated infrastructure (including potential effects resulting from accidents or malfunctions), must be included in the assessment. Cumulative environmental effects are to be considered individually for each identified VEC. The nature, spatial extent, frequency, duration, magnitude (qualitative and quantitative), and significance of each, should be described. Mitigation measures, monitoring and follow-up must be proposed.	Chapter 4
<b>4.1 EFFECTS ON ATMOSPHERIC ENVIRONMENT</b>	
Assess the environmental effects of the construction, operational/maintenance and decommissioning phases of the project on the atmospheric environment, including air quality, sound quality, odour and climate. Any substantive emissions will first need to be quantified. This will be done on a local and regional basis. This will include an analysis of routine air emissions including sources from ore crushing, screening, stockpiles, vehicles, road surfaces, and upset conditions, including accidents and malfunctions. The effects of transportation-related emissions will be considered, including impacts on air quality and human health ( <i>e.g.</i> , emissions resulting from any change in traffic patterns, etc.). Transportation related emissions would include emissions from construction equipment, additional traffic associated with the facility, etc.	Sections 4.1.6 and 4.2.6
Potential impacts to climate change must be included.	Section 4.1.6
An assessment of noise impact on humans and wildlife must be included.	Section 4.2.6
Provide details on how emissions will be controlled and mitigated at each emissions source and briefly discuss why the proposed technology was selected over other potential methods of control.	Section 4.1.6
A discussion of the climatology of the area will be provided including both micro and macro climatological effects.	Sections 4.1.6 and 4.15.5
<b>4.2 EFFECTS ON FRESHWATER RESOURCES (GROUNDWATER AND SURFACE WATER)</b>	

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
Assess the potential environmental effects of the construction, operational/maintenance and decommissioning phases on groundwater and surface water resources. Water conservation through innovative technologies including recycling and using treated wastewater will need to be fully explored and evaluated as part of this assessment.	Section 4.3.6
A detailed water budget for the project that incorporates quantity and quality of water required for all components for each phase of the project (including domestic needs and fire protection) under a range of climatic conditions must be provided.	Section 4.3.6
A Water Supply Source Assessment must be undertaken if the volume of water to be used is greater than 50 m3 per day, including water for fire protection. The potential for interference with domestic wells and surface water supplies must be examined and assessed.	Section 4.3.6
Potential project-related changes to groundwater flow regime, water balance and alterations to groundwater recharge and discharge areas must also be included. Potential changes to aquifer characteristics, such as hydraulic conductivity and storage, through blasting and open pit mining must also be evaluated.	Section 4.3.6
In addition, any potential impacts to local groundwater users (water quantity and quality issues) due to construction and operation of the mine and associated infrastructure will need to be discussed.	Section 4.3.6
The study will include characterization of the disposal area for tailings, and the hydraulic conductivity at the base of the pit and the potential to impact groundwater and surrounding watersheds.	Section 4.3.6
A discussion of the environmental effects on freshwater quantity and quality is required for all watercourses within the project footprint and within the zone of influence of the project.	Section 4.3.6
<b>4.3 EFFECTS ON THE FRESHWATER/AQUATIC ENVIRONMENT</b>	
Assess the environmental effects of the proposed project on the freshwater environment, including (but not limited to) water quality, fish and fish habitat, and benthic environment within the environmental assessment boundaries (including the corridors required for any associated infrastructure). A number of watercourses will potentially be impacted by this project (mine and associated infrastructure) and will need to be assessed. Predict the environmental effect of any potential deterioration/improvement in water quality and quantity on the freshwater environment.	Section 4.4.6
Discuss in detail the mineralogy of the deposit, tailings and waste rock and potential changes in the composition of the deposit, tailings and waste rock as different areas are mined over time. Include a discussion of the processing of the ore and the chemicals used and the potential degradation or persistence of the chemicals in the environment and any chemical by-products that may be produced. Evaluate the geochemical reactivity of the tailings and waste rock and any potential changes in reactivity over time, in different conditions and with different seasons (temperatures, precipitation). The impacts of blasting and waste rock storage to water quality should be discussed.	Sections 4.3.6 and 4.4.6
Characterization of the tailings management area must also include details on the specific infrastructure required, collection and treatment of seepage water, discussion on the effects of climate and time on stability of tailings infrastructure and the maintenance and monitoring required.	Section 4.4.6
Discuss the chemistry and reactivity of the pit water, along with storage, treatment and disposal of the pit water.	Section 4.4.6

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
Discuss in detail all wastewater treatment and disposal options (domestic waste, pit water, tailings and waste rock water, surface runoff, etc.), as well as any chemicals of concern that cannot be removed by water treatment, treatment by-products and effluent quality.	Section 4.4.6
Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan as they relate to the freshwater environment, including spill prevention and spill response contingency planning.	Section 4.4.6
<p>In addition, the following will need to be discussed:</p> <ul style="list-style-type: none"> <li>• potential for accidental releases of chemicals and petroleum products that could impact surface water/groundwater environment;</li> <li>• production of mine water and tailings; treatment and release and impacts to surface water/groundwater; and</li> <li>• expected loadings on the environment.</li> </ul>	Sections 4.3.6 and 4.4.6
<b>4.4 EFFECTS ON THE TERRESTRIAL ENVIRONMENT</b>	
Assess the potential environmental effects of construction, operation/maintenance and decommissioning of the project and associated infrastructure on terrestrial environments, including all plant and animal species and their habitat. Key issues that will need to be evaluated as part of this assessment are existing vegetation, terrestrial country foods, terrestrial wildlife (e.g., the pine marten and Canada lynx), and wildlife habitat. Since this project could affect a large area, this will require extensive field surveys and review.	Sections 4.5.6 and 4.6.6
The effects of the project (direct and indirect) and associated infrastructure on migratory birds and migratory bird habitat will also need to be evaluated. This would include any works that are likely to impact avian movement and/or migration routes, or any structure or infrastructure that may impact migratory species.	Section 4.5.6
Assess the environmental effects of the project and associated infrastructure on species (flora and fauna) considered to be at risk under national, provincial and regional classification systems (i.e., endangered, threatened, species of special conservation status, and rare species) including species listed under the NB <i>Endangered Species Act</i> as well as the federal <i>Species at Risk Act (SARA)</i> . Include consideration of any species at risk known to occur within the zones of influence of the proposed project and for which there are potential project-VEC interactions anticipated that could result in significant environmental effects.	Sections 4.5.6 and 4.6.6

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
<p>The following information sources on species at risk in the general project area (and corridors for any associated infrastructure) must be consulted:</p> <ul style="list-style-type: none"> <li>• Atlantic Canada Conservation Data Centre (AC CDC);</li> <li>• SARA Species List (SARA Public Registry);</li> <li>• COSEWIC List (latest version on the website);</li> <li>• New Brunswick Museum;</li> <li>• NB <i>Endangered Species Act</i>;</li> <li>• Canadian Wildlife Service (CWS); and</li> <li>• Local naturalist and interest groups such as the Fredericton Nature Club, the NB Nature Federation, the NB Botany Club, the Canadian Rivers Institute, etc.</li> </ul>	Sections 4.5.6 and 4.6.6
<p>Site-specific information must be obtained from field investigations carried out by the appropriate specialists.</p>	Sections 4.5.6 and 4.6.6
<p><b>4.5 EFFECTS ON THE WETLAND ENVIRONMENT</b></p>	
<p>An assessment of all wetlands within the study area, including any impacts associated with infrastructure related to the project, must be undertaken. The approach described in the Federal Policy on Wetland Conservation (EC, 1991) and the New Brunswick Wetlands Conservation Policy (2002) and draft NBDNR Wetland Mitigation Guidelines for New Brunswick (2003) must be followed.</p>	Section 4.7.6
<p><b>4.6 EFFECTS ON LABOUR AND ECONOMY (AND OTHER SOCIO-ECONOMIC EFFECTS)</b></p>	
<p>Predict the benefits of the project on labour and economy within the area surrounding the mine and the Province of New Brunswick. Assess the direct and indirect creation of employment in the area associated with the construction and operation of this facility. The availability and potential use of skilled and unskilled workers in the local area to meet the job requirements should be outlined, along with predictions for the increase in the population of the surrounding area as vacant jobs are filled.</p>	Section 4.9.6
<p>The effect on existing tourism and recreational activities must be included.</p>	Section 4.11.6
<p>The effect on local property values must be considered.</p>	Section 4.11.6
<p>The effect on industries, including the recreational, commercial and Aboriginal fishing industries must be included.</p>	Section 4.11.6
<p>Discuss any aesthetic/potential visual impacts of the proposed project and how these could impact the local or regional economy.</p>	Section 4.11.6
<p>The estimated total reserves and value in present day Canadian dollars and the planned annual extraction rates must be reported.</p>	Section 4.9.6
<p>A study on socioeconomic impacts of the life cycle of the mine on surrounding communities must be carried out by a qualified individual, including the impacts of mine closure, unexpected or otherwise, citing examples of other mining projects where appropriate. The possible impacts on stakeholders including Aboriginal communities, residents within the project area, neighbouring communities, along haul roads, recreational businesses and recreational groups, hunters, trappers, guides, outfitters, etc. must also be included.</p>	Sections 4.9.6 and 4.2.11.6
<p><b>4.7 EFFECTS ON COMMUNITY SERVICES AND INFRASTRUCTURE</b></p>	

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
An assessment of the community services and infrastructure will be required in order to evaluate the potential impacts from the large number of workers associated with the construction and operation of this facility both on a temporary and permanent basis. Community services and infrastructure includes: local emergency response, ongoing support services (health and social services), accommodation, food services, and entertainment.	Section 4.10.6
Any additional demand on local emergency response services and ongoing support services will need to be assessed. These services may be affected by the occurrence of an accidental event, or by the routine presence of workers associated with either construction or operation. There may also be impacts to local accommodations as a result of temporary and permanent workers required for this project.	Section 4.10.6
Any increased demands on the above community services and infrastructure, (as large numbers of temporary workers in an area could create unique concerns during the construction phase) will need to be assessed. Such a situation may result in increased need for policing and social services in certain areas.	Section 4.10.6
<b>4.8 EFFECTS ON PRIVATE/PUBLIC LAND AND RESOURCE USE</b>	
Assess the effects of the project and associated infrastructure on the current use of lands (including Crown land) and resources by the public and private sectors.	Section 4.11.6
Describe the impacts the project would have on access to the lands surrounding or within the project site.	Section 4.11.6
Evaluate the environmental and socio-economic effects of the project on land use in the immediate vicinity of the project ( <i>i.e.</i> , within the defined environmental assessment boundaries of the project).	Section 4.11.6
Assess any potential impacts of the project on other areas that could be affected by the project and associated infrastructure.	Section 4.11.6
<b>4.9 EFFECTS ON THE CURRENT USE OF LAND AND RESOURCES FOR TRADITIONAL PURPOSES BY ABORIGINAL PERSONS</b>	
Assess the effects of all aspects of the project (including any associated infrastructure) on the current use of lands and resources for traditional purposes by Aboriginal persons. This includes traditional hunting, fishing, snowshoeing, and gathering of food or medicine by Aboriginal communities.	Section 4.12.6
<b>4.10 EFFECTS ON HERITAGE AND ARCHAEOLOGICAL RESOURCES</b>	
An assessment of heritage and archaeological resources will be required for the mine site as well as for any required infrastructure.	Section 4.13.6
The effect of the proposed project on physical and cultural heritage, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance must also be included.	Section 4.13.6
<b>4.11 EFFECTS ON LAND-BASED TRANSPORTATION/ROAD INFRASTRUCTURE</b>	
Assess the environmental effects of the proposed project on traffic patterns/flows, including a prediction with respect to current/future road infrastructure and use with reference to safety and the integrity of infrastructure on traffic flows, level of service, and accident rates. Predict the impacts of increased ground transportation in the region and specifically traffic to and from the proposed mine site with reference to noise, safety, risks of spills and air quality. The study should consider localized impacts that may occur from fossil fuel combustion as a result of increased traffic.	Section 4.14.6

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
During the construction phase of the project there would be substantial land-based activity that will require the movement of equipment, material and personnel to and from the project site. There may be concern regarding the condition, allowable weights and dimensions of the existing road infrastructure. These potential effects will need to be evaluated.	Section 4.14.6
Any effects associated with project-related traffic during the operation phase will also need to be assessed, as project related traffic will continue in the form of personnel transportation and truck traffic carrying supplies, materials and products.	Section 4.14.6
A transportation plan outlining site access routes, description of loads and frequency of trips must be provided.	Section 4.14.6
It is anticipated that some processed products may be shipped via rail. A new rail spur would be needed to allow for this. If a rail spur is to be constructed, an assessment of the routing will need to be undertaken. An additional concern is the potential environmental effects on road traffic, either resulting in greater congestion or higher collision rates, associated with any at grade crossings. In addition, an assessment of the emergency routes that may be impacted as a result of the rail spur will need to be undertaken.	Section 4.14.6
<b>4.12 EFFECTS OF THE ENVIRONMENT ON THE PROJECT</b>	
Sensitivity of the proposed project to variations in meteorological conditions, including extreme events, must be investigated. Among the parameters to be considered are the effect of extreme precipitation events on site water management and the influence of wind and ice on mine operations (including any associated infrastructure). In addition, the sensitivity of the proposed project to climate variability and climate change must be identified and discussed. Not only will the assessment look at the current climatic setting in the area, but must also include a consideration of the potential future climatic conditions due to climate changes in the foreseeable and long-term future (e.g., global warming over a 50 and 100 year period).	Section 4.15.5
The assessment must take into account how the existing environment/natural and man-made hazards could adversely affect the project (e.g., acid rock drainage, severe meteorological conditions, seismic events, etc.).	Section 4.15.5
<b>4.13 EFFECTS ON PUBLIC HEALTH AND SAFETY</b>	
Public health will need to be assessed both in light of long term (chronic) conditions as well as short term (acute) conditions. Public health can be affected by effluents and emissions and environmental effects on air quality, drinking water quality and food, among other factors.	Section 4.8.6
An assessment of the potential for environmental effects on public health must be carried out by conducting a Human Health and Ecological Risk Assessment (HHERA). The HHERA will consider the potential risks of adverse environmental effects of all project-related effluents, emissions and waste products during all phases of the project. Cumulative environmental effects will need to be considered as part of the HHERA.	Section 4.8.6
The potential effects of the project on the health and safety of employees, their families, local communities, Aboriginal communities and wildlife must be assessed and identified. Mitigation measures for any possible impacts must be described.	Section 4.8.6

**Table B.1 Sisson Project: General Table of Concordance for Terms of Reference**

Requirement of New Brunswick Final Guidelines	Location Where Requirement is Addressed in Terms of Reference
Provide a description of the source, quantity, mechanism, rate, form and characteristics of contaminants and other sources likely to be released to the environment ( <i>i.e.</i> , in the context of worker exposure during normal operation, a postulated malfunction and accident event).	Section 4.8.6
Potential effects to public safety will be considered as they relate to accidents, spills, collisions, vehicle accidents, etc. Identify sources and characteristics of any potential risks to workers during construction and subsequent operation.	Section 4.8.6
Describe the specific, important malfunction/accidental events that have a reasonable probability of occurring during the operational life of the project.	Section 4.8.6
Describe the procedures for the development and the anticipated components of an environmental protection/emergency response plan for construction, commissioning, operation and decommissioning, including spill prevention, and spill response contingency planning.	Section 4.8.6
Describe the key components relevant to safety during the construction activity and details regarding security considerations with respect to the site and associated infrastructure.	Section 4.8.6
Potential impacts from metal contamination resulting from dust or airborne particulate matter (including metals such as lead and arsenic) must be investigated for significant on and off site impacts using dispersion modelling if necessary. Impacts to humans and wildlife must be considered.	Sections 4.1.6 and 4.8.6

# **Appendix C**

Proposed Structure and Content of the EIA Report



## **STRUCTURE AND CONTENT OF THE EIA REPORT**

In this appendix, general information on the anticipated structure and content of the EIA Report as it is currently envisioned is provided. The structure and content of the EIA Report will likely evolve as the EIA is carried out; thus the structure and content that follows is intended for illustrative purposes only and is subject to change.

### **GENERAL STRUCTURE OF THE EIA REPORT**

In general, the EIA Report is expected to be organized in the following manner:

- Executive Summary;
- Chapter 1.0 – Introduction, including regulatory framework;
- Chapter 2.0 – Project Planning;
- Chapter 3.0 – Project Description;
- Chapter 4.0 – Scope of the Assessment, and Consultation and Engagement;
- Chapter 5.0 – Environmental Assessment Methods;
- Chapter 6.0 – Environmental Setting (*i.e.*, a summary of existing conditions);
- Chapter 7.0 – Environmental Effects Analysis for each VEC (*e.g.*, Atmospheric Environment, Water Resources, Aquatic Environment, *etc.*); includes the assessment of environmental effects for Effects of the Environment on the Project as well as for Accidents, Malfunctions and Unplanned Events;
- Chapter 8.0 – Follow-Up Program;
- Chapter 9.0 – Conclusions; and
- Chapter 10.0 – References.

In addition, various appendices would be provided to support the EIA Report (*e.g.*, Tables of Concordance, summary of mitigation, HADD compensation plan, *etc.*).

The results of technical studies (*e.g.*, air quality modeling, human health and ecological risk assessment, ML/ARD studies) that are conducted to provide background information for the environmental effects assessment will be released as separate, stand-alone reports to the EIA Report, to the extent possible. This will facilitate the review and finalization of these technical studies or reports and their discussion with the public, in a timely fashion, rather than to wait for the EIA Report to be released. These technical studies are stand-alone documents that are published outside the EIA Report to provide background information that may assist in the completion of the EIA Report.

Further details on the anticipated structure and content of the EIA Report are provided below as currently conceived. It is noted that the actual structure and content of the EIA Report may vary

from that described in this chapter, as appropriate and as the EIA evolves from this current scoping stage to the environmental effects assessment and reporting stages.

### **Executive Summary**

The EIA Report will include an executive summary of the essential facts and findings of the EIA of the Project. The executive summary will include a brief description of the Project. A summary of the public, regulatory and Aboriginal engagement undertaken during the preparation of the EIA Report will also be included. The environmental effects analyses conducted and the main findings of the EIA will be summarized.

### **Chapter 1.0 – Introduction**

Chapter 1.0 of the EIA Report will provide an introduction to the EIA Report that will discuss the following elements:

- (a) the purpose of the EIA Report;
- (b) a brief Project overview, including;
- (c) the Proponent of the Project, including contact information;
- (d) the applicable regulatory framework to the Project; and
- (e) the organization of the EIA Report.

### **Chapter 2.0 – Project Planning**

This chapter will provide an overview of the planning process undertaken by the Proponent in developing the Project and the principles that will be followed through its construction, operation, and ultimate decommissioning, reclamation and closure. Environmental management measures will also be described. The benefits to Canadians arising from the EA process that was followed, and consideration of how the Project was planned in a sustainable and precautionary manner will be described.

### **Chapter 3.0 – Project Description**

Chapter 3.0 of the EIA Report will provide a detailed Project Description, upon which the EIA is based. This will include but will not be limited to:

- (a) the purpose of the Project, including the need for the Project;
- (b) alternatives to the Project;
- (c) a description of the Project facilities, including its geographic location, layout, and description of the facilities, assets, and infrastructure that are anticipated to be associated with the Project;

- (d) alternative means of carrying out the Project that are technically and economically feasible and were evaluated during the feasibility study and EIA;
- (e) a description of the various phases (construction, operation, decommissioning, reclamation and closure) of the Project, and activities to be conducted in each phase;
- (f) a description of the key environmental management initiatives that will be implemented to minimize environmental effects, and component plans to manage various environmental risks associated with operating and closing the Project; and
- (g) a discussion of key emissions and wastes associated with the Project, including a summary of the results of any fate and transport or modeling studies that may be carried out to support the EIA.

#### **Chapter 4.0 – Scope of the Assessment, and Consultation and Engagement**

Chapter 4.0 of the EIA Report will include the scope of the assessment, as determined by federal and provincial regulatory agencies and a detailed account of all public, stakeholder, and Aboriginal engagement activities conducted as part of the EIA of the Project.

The EIA Report will document the dates and formats of all public and stakeholder engagement and Aboriginal engagement initiatives. This will include the material presented, opportunities for receiving input, a summary review of concerns expressed and how each concern was or will be addressed.

The EIA Report will demonstrate how the input received was considered and what changes to the process or project were made as a result of those comments including how these activities directly supported the identification of VECs, key indicators, and issues of concern.

#### **Chapter 5.0 – Environmental Assessment Methods**

In Chapter 5.0 of the EIA Report, the environmental assessment methodological framework that will be used throughout the EIA Report, will be described.

#### **Chapter 6.0 – Environmental Setting**

Chapter 6.0 of the EIA Report will include a summary of the existing environment within the study boundaries. The description will reflect the dynamics of environmental components (biophysical, social, and economic), and identify trends in the context of predicted changes over time where applicable and appropriate. The summary will also include components of the environment that are not specifically VECs (e.g., geology, climate).

Specific and detailed descriptions of the existing conditions relevant to the evaluation of potential environmental effects will be provided in each of the environmental effects assessment chapter for each VEC of the EIA Report. Those descriptions will provide the detailed

information necessary to do the environmental effects assessment, develop mitigation, and design follow-up and monitoring programs.

### **Chapter 7.0 – Environmental Effects Analysis for each VEC**

In Chapter 7.0 of the EIA Report, the environmental effects analysis for each VEC will be presented. The approach to the environmental effects analysis will be described for each of the VECs.

Interactions between Project activities to be conducted within each phase (identified in earlier sections of the EIA Report), and each VEC will be identified and characterized, according to the potential of an activity to interact with one or more of the VECs. Accompanying text will focus the remainder of the environmental effects assessment on those issues that may result in substantive interactions or have potential for significant environmental effects.

All VECs will be organized in a standard format following the multi-step EIA methodology, which will have been described in Chapter 5 of the EIA Report. To that end, the individual VEC sections of the EIA Report will be organized as follows.

- (a) Rationale for VEC selection.
- (b) Selection of potential environmental effects and measurable parameters.
- (c) Spatial, temporal, administrative and technical boundaries for the environmental assessment of the VEC.
- (d) Criteria for establishing the threshold of significance.
- (e) Description of the existing environment for the VEC to support the environmental effects assessment.
- (f) Environmental effects analysis of the Project as planned during the phases of construction, operation, and decommissioning, reclamation and closure (and post-closure, as appropriate), that includes:
  - Project-VEC interactions;
  - Assessment of the residual environmental effects (*i.e.*, after mitigation has been applied) of the Project during each phase, and the identification of specific planned mitigation to minimize environmental effects;
  - An integrated evaluation of Project-related 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; and

- Determination of significance of the residual environmental effects of the Project during each phase, including cumulative environmental effects, and for the Project overall.

(g) Proposed follow-up program, if applicable.

The effects of the environment on the Project will also be evaluated in Chapter 7.0. A general description of potential environmental effects as defined in *CEAA* that may affect the Project will be provided. These potential effects of the environment will be described with reference to each project activity that may be affected.

The effects of the environment will include but are not limited to the following:

- (a) severe weather;
- (b) climate change;
- (c) seismic activity; and
- (d) forest fires resulting from natural causes other.

Based on the likely interactions, the effects of the environment on the Project will then be assessed. Proposed mitigation, including design strategies, will be considered in the evaluation of the effects of the environment on the Project and the determination of their significance.

Accidents, malfunctions, and unplanned events will also be assessed in Chapter 7.0. The environmental effects of credible accidents, malfunctions, and unplanned events of the Project during each applicable Project phase will be assessed. A generalized description of credible accidents, malfunctions, and unplanned events that may occur during construction, operation, or decommissioning, reclamation and closure of the Project will be provided in this chapter, followed by an environmental effects analysis of these accidents, malfunctions, and unplanned events.

The following will be provided as applicable:

- (a) a description of credible accidents, malfunctions, or unplanned events that may occur as part of the Project during each applicable phase;
- (b) historical summaries or statistics on the occurrence of such events, if available;
- (c) information on the probability or likelihood of such events, where applicable;
- (d) mitigation measures, response procedures, or remedial measures to be undertaken to prevent these events, to minimize their extent, or to remediate their environmental effects;

- (e) the assessment of the environmental effects of each accident, malfunction, and unplanned event for the Project on each applicable VEC; and
- (f) a determination of the significance of the residual environmental effects of each accident, malfunction, or unplanned event on each of the associated VECs.

The chapter will provide information on the steps that will be taken in the design, construction and operation of the Project to minimize the effects of credible incidents on the public and the environment, including the development of appropriate response plans.

### **Chapter 8.0 – Follow-Up Program**

The follow-up program recommended as part of the EIA to verify the environmental effects prediction or to determine the effectiveness of mitigation will be described.

### **Chapter 9.0 – Conclusions**

The conclusions of the EIA will be provided with respect to the Project's environmental effects, management and mitigation measures, follow-up program, monitoring measures, and/or limitations of the EIA.

### **Chapter 10.0 – References**

A list of all references cited in the EIA report will be provided, including literature, internet sites, and personal communications.

### **Appendices**

The EIA Report will contain various appendices to support the main body of the report. These will include, at a minimum:

- Table of Concordance;
- a glossary; and
- a list of acronyms and units.

The EIA Report will contain a tables of concordance to identify where the various required components listed in the NBENV Final Guidelines have been addressed in the EIA Report. The table of concordance will be presented in a separate appendix. The purpose of this table is to enable regulatory agencies, members of the public, and stakeholder groups to rapidly locate the specific sections and/or topics of the EIA Report that are of interest to them.

The concordance table will be formatted similarly to the table provided in the Terms of Reference for the Project (see Appendix B of the TOR document).

Other appendices (e.g., technical report summaries, compensation plans, etc) may also be appended to the EIA Report, as appropriate.

## **Plain Language Summary**

In addition to the executive summary, in order to enhance understanding of the EIA and facilitate consultation activities, a separate Plain Language Summary of the EIA, which summarizes the project and major findings and conclusions of associated EA process, will be prepared as a companion document to the EIA Report. The Plain Language Summary (maximum 50 pages) will briefly describe the proponent, the proposed project (including decommissioning and reclamation activities), and the environmental effects assessment of the Project. Maps indicating project location and project components will be included.

To the extent possible, the Plain Language Summary will be organized as follows.

- Introduction
  - Project Overview
  - Environmental Assessment Process
    - Purpose of the CSR
    - Federal EA process
    - Cooperative EA 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 Consultation Activities
    - Cooperative and Provincial Consultation Activities
    - Public Participation in the Comprehensive Study Process
    - Public Participation Activities by the Proponent
  - Aboriginal Consultation Activities
    - Cooperative and Provincial Consultation Activities
    - Aboriginal Consultation in the Comprehensive Study Process
    - Aboriginal Consultation/Engagement Activities by the Proponent
- Existing Environment
- Environmental Effects Analysis
  - Approach
  - Valued Ecosystem Components (impact matrix should be provided)
    - Potential Environmental Effects
    - Mitigation Measures
    - Residual Environmental Effects
    - Government, Public and Aboriginal Comments and Proponent's Response
  - Effects of the Environment on the Project
    - Approach
    - Potential Effects

- Mitigation
- Residual Effects
- Government, Public and Aboriginal Comments and Proponent's Response
- Effects of Possible Accidents or Malfunctions
  - Approach
  - Potential Effects
  - Mitigation
  - Residual Effects
  - Government, Public and Aboriginal Comments and Proponent's Response
- Effects on Capacity of Renewable Resources
- Cumulative Environmental Effects
  - Approach
  - Scoping
  - Potential cumulative effects
  - Mitigation measures
  - Residual Effects
  - Government, Public and Aboriginal Comments and Proponent's Response
- Follow-Up Program
- Benefits to Canadians
- Overall Conclusions of the Proponent