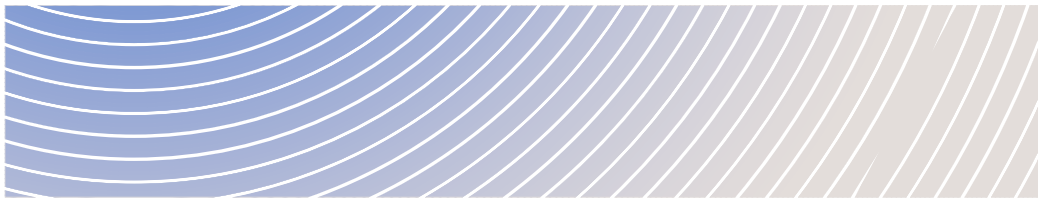
Wasamac Gold Mine Project



TAILORED IMPACT STATEMENT GUIDELINES

March 2021

Impact Assessment Agency of Canada
Agence d'évaluation d'impact du Canada

Canada

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List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
AAQC	Ambient Air Quality Criteria
AQMS	Air Quality Management System
BCR	Bird Conservation Regions
BBS	Breeding Bird Survey
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CDPNQ	Centre de données sur le patrimoine naturel du Québec
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COPC	Contaminant of Potential Concern
GBA+	Gender-Based Analysis Plus
GHG	Greenhouse Gas
GIS	Geographic Information Systems
HHRA	Human Health Risk Assessment
IAA	Impact Assessment Act

Abbreviation/Acronym	Definition
LSA	Local Study Area
MELCC	Ministère de l'Environnement et de la Lutte contre les changements climatiques
MFFP	Ministère des Forêts, de la Faune et des Parcs
NAAQO	National Ambient Air Quality Objectives
NCQA	National Committee for Quality Assurance
OCAP	Ownership, Control, Access and Possession
PM	Particulate Matter
RSA	Regional Study Area
SACC	Strategic Assessment of Climate Change
SARA	Species at Risk Act
SOS-POP	Suivi des populations d'oiseaux en péril
VC	Valued Component
WHO	World Health Organization
Chemical formulas	
CO	carbon monoxyde
DBT	dibenzothiophene
H_2S	hydrogen sulphide
NO_x	nitrogen oxide
PAH	polycyclic aromatic hydrocarbon
$PM_{2.5}$	fine particulate matter smaller than 2.5 microns
PM_{10}	respirable particulate matter smaller than 10 microns
SO_x	sulfur oxide
VOC	volatile organic compound

Glossary

Term	Definition
Abundance	The number of individuals per species and the uniformity of distribution of individuals among the species of a community.
Acidic drainage	Acidic water (and possibly water that contains metal(s)) resulting from the chemical weathering of rock or soil material primarily caused by the oxidation of sulphide minerals.
Adaptive management	Management approach that: considers uncertainty; involves iterative decision-making (evaluating results and adjusting on the basis of what has been learned); and, emphasizes continual improvement to optimize decision-making.
Biodiversity	Variability of living organisms of all origins, including, in particular, the terrestrial, marine and other aquatic ecosystems and the ecological system of which they are part. This includes diversity within species, among species and among ecosystems.
Contaminant of potential concern	A contaminant at a site that has the potential to adversely affect a human or non-human biological receptor.
Enhancement measures	Measures to increase positive effects (e.g., local and regional training efforts, investment in infrastructure and services, projects to rehabilitate degraded environments).
Fish	Fish, shellfish, crustaceans, marine animals and their eggs, sperm, spawn, larvae, spat and juvenile stages (*as defined in Section 2 of the Fisheries Act*)
Fish habitat	Water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas.
Gender	Refers to the roles and behaviours that society associates with being female or male. Rigid gender norms can result in stereotyping and curb

Term	Definition
	our expectations of both women and men. A society's understanding of gender changes over time and varies from culture to culture.
Gender-based Analysis Plus (GBA+)	An analytical process used to help identify the potential impacts of policies, programs and services on diverse groups of women, men and gender-diverse people. The "plus" acknowledges that GBA goes beyond sex and gender differences. We all have multiple identity factors that intersect to make us who we are; GBA+ considered many other identity factors, such as race, ethnicity, religion, age, place of residence, Indigenous origin or identity, and mental or physical disability.
Gender-based violence (GBV)	Violence based on gender norms and unequal power dynamics, perpetrated against someone based on their gender, gender expression, gender identity, or perceived gender. It takes many forms, including physical, economic, sexual, as well as emotional (psychological) abuse.
Mitigation measures	Technically and economically feasible measures to eliminate, reduce, control or offset the adverse effects of a designated project, and include restitution for any damage caused by those effects through replacement, restoration or compensation.
Receptor	The entity (e.g., organism, population, community, ecosystem, humans) that might be adversely affected by contact with or exposure to a contaminant of concern.
Regional assessment	Any relevant studies conducted in the study area. May also be a study conducted in areas of existing projects or anticipated development to inform planning and management of cumulative effects and inform project impact assessments.
Sensitive human receptor	Any person who may have heightened sensitivity to exposure to contamination and can include individuals with acute or chronic health conditions (e.g., asthma, diabetes), infants/toddlers, pregnant women, and elders.

Term	Definition
Sex	Refers to the biological and physiological characteristics that define males, females and intersex persons.
Social determinants of health	Conditions in which people are born, grow, work, live, and age, and the system put in place to deal with diseases. These include, among others, income and social status; social support networks; education; employment/working conditions; social environments; physical environments; personal health practices and coping skills; healthy child development; gender; and culture.
Strategic assessment	Assessment of the Government of Canada's existing or proposed policies, plans, or programs relevant to impact assessment. A strategic assessment may also focus on issues relevant to impact assessment.
Traditional foods	All food trapped, fished, hunted, gathered or cultivated for medicinal or subsistence purposes outside the commercial food chain.
Watershed	Geographical area delimited by natural boundaries constituted by the whole territory drained by a main river and its tributaries, which flow and converge towards the same exit point called an outlet.

1. Introduction

A key element for the federal impact assessment process is the preparation of the Tailored Impact Statement Guidelines (the Guidelines). The Guidelines provide the proponent with directions and requirements for the preparation of an Impact Statement.

The development of the Guidelines by the Impact Assessment Agency of Canada (the Agency) is based on the characteristics of the designated project and is informed by consultation and engagement with the public, Indigenous peoples, federal authorities and other interested jurisdictions.

Notwithstanding the proponent's preferred structure, it is essential that the Impact Statement address all requirements outlined in the Guidelines. If the proponent does not submit the information required in the Guidelines, they must include an explanation justifying the exclusion. In order to facilitate the review of the Impact Statement, the proponent must provide a concordance table that indicates where each requirement of the Guidelines is addressed.

1.1. Factors for Consideration in the Impact Assessment

The Guidelines establish factors to be considered in the impact assessment. These factors are listed in subsection 22(1) of the *Impact Assessment Act* (IAA) and prescribe that a designated project's impact assessment must take into account the following:

a) Changes to the environment or to health, social or economic conditions and the positive as well as negative impacts of these changes that the carrying out of the designated project is likely to cause, including:
   - those caused by accidents or malfunctions, or malfunctions that may result from them;
   - cumulative effects that are likely to result from the carrying out of the designated project in combination with other physical activities that have been or will be carried out; and
   - the result of any interaction between those effects;

b) Mitigation measures that are technically and economically feasible for mitigating the project's adverse effects;

c) Impacts that the designated project may have on any Indigenous group as well as any adverse impact that it may have on the rights of the Indigenous peoples of Canada, recognized and affirmed by section 35 of the *Constitution Act, 1982*;

d) The designated project's purpose and need;

e) Alternative means of carrying out the project that are technically and economically feasible, including through the use of best available technologies, and the effects of those means;

f) Any alternatives to the project that are technically and economically feasible and are directly related to the project;

g) Indigenous knowledge provided for the designated project;

h) The extent to which the designated project contributes to sustainability;

i) The extent to which the project's effects hinder the Government of Canada's ability to meet its environmental obligations and its climate change commitments, or contribute to it;

j) Any potential change to the project from the environment;

k) The project's follow-up program requirements;

l) The issues raised regarding Indigenous cultures with respect to the project;

m) Community knowledge provided for the project;

n) Comments received from the public;

o) Comments received from a jurisdiction as part of consultations conducted under section 21 of the IAA;

p) Any relevant assessment referred to in sections 92, 93 or 95 of the IAA*;*

q) Any assessment of the project's effects that was conducted by or on behalf of an Indigenous governing body, and that is provided for the project;

r) Any study or plan that was conducted or prepared by a jurisdiction – or an Indigenous governing body not referred to in paragraph (f) or (g) of the definition of a *jurisdiction* in section 2 of the IAA – and provided for the project and that is related to a region relevant to the project;

s) The interaction of sex and gender with other identity factors; and

t) Any other matter relevant to the impact assessment which the Agency may require to be considered.

The scope of the factors to be examined in paragraphs 22(1)(a) to (f), (h) to (l), (s) and (t), including the extent of their relevance to the impact assessment, is determined by the Agency and will be outlined in the Guidelines.

Regarding paragraph 22(1)(s), the text will refer to Gender-Based Analysis Plus (GBA+), which provides a framework to describe the full scope of potential adverse and positive effects under the IAA. GBA+ is an analytical framework that guides practitioners, proponents and participants to ask important questions about how designated projects may affect diverse or potentially vulnerable population groups. These Guidelines refer to "various subgroups" in the context of GBA+, either in reference to groups within the general population or within communities. The Agency's Guidance: Gender-Based Analysis Plus in Impact Assessment provides guiding principles to allow proponents to use this analytical framework in their Impact Statement.

1.2. Elements to be Included in the Impact Statement

The proponent must prepare in a distinct document a plain language summary of the Impact Statement in both of Canada's official languages (French and English). The summary must contain sufficient details for the reader to understand the project, any potential environmental, health, social and economic effects, potential adverse impacts on Indigenous peoples, proposed mitigation measures, residual effects and any required follow-up programs.

This summary provides an opportunity for the proponent to demonstrate that the assessment addresses issues raised during the planning phase. It should be divided by valued component (VC) and allow the proponent to demonstrate the completeness of the assessment and provide the results of the analysis. The summary must include maps and figures illustrating the project location and key project components.

The Impact Statement must also include a series of tables summarizing the following information:

- Potential environmental, health, social and economic effects and the potential impacts on Indigenous peoples;
- Potential mitigation and enhancement measures;
- Characterization of the residual effects of the project according to the selected criteria;
- Cumulative effects and proposed mitigation measures to address them;
- Any other commitments made by the proponent or recommendations made by the proponent to other parties; and
- Effects falling within an area of federal jurisdiction as well as direct or indirect effects and the extent to which they are significant. According to the IAA, direct or indirect effects are defined as "effects that are directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of a physical activity or designated project, or to a federal authority's provision of financial assistance to a person for the purpose of enabling that activity or project to be carried out, in whole or in part". According to the IAA, effects that fall under federal jurisdiction are as follows:
  a) Changes to the following components of the environment that are within the legislative authority of Parliament:
     (i) Fish and fish habitat, as defined in subsection 2(1) of the *Fisheries Act*;
     (ii) Aquatic species, as defined in subsection 2(1) of the *Species at Risk Act*; and
     (iii) Migratory birds, as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*;
  b) Changes to the environment that would occur:
     (i) on federal lands;
     (ii) in a province other than the one where the physical activity or the designated project is being carried out; and

(iii) outside Canada;

c) With respect to the Indigenous peoples of Canada, an impact – occurring in Canada and resulting from any change to the environment – on the following:

(iv) Physical and cultural heritage;

(v) The current use of lands and resources for traditional purposes;

(vi) Any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and

(vii) Any change occurring in Canada to the health, social or economic conditions of the Indigenous peoples of Canada.

1.3. Data Reporting Requirements for Impact Assessment

The proponent is required to provide information in a computer-readable and accessible format, in order to support the Government of Canada's commitment to open science and data and to facilitate the sharing of information with the public through the Canadian Impact Assessment Registry (the Registry), the Agency's website, and the Government's open science and data platform. The proponent must contact the Agency to obtain additional direction regarding the format and distribution of the Impact Statement.

1.3.1. Requirements for Geospatial Data

Maps must be provided to the Agency in the form of geospatial data files. Where data is required in geographic information systems (GIS) format, they must be provided to the Agency as electronic geospatial data file(s) compliant with the Government of Canada's Standard on Geospatial Data and ISO 19115 metadata standard. For more information, please refer to the Government of Canada's Guidance on Submitting Geospatial Data.

Geospatial data files will be made available to the public according to the Open Government Licence – Canada. Providing publicly accessible GIS files is intended to support the Government of Canada's commitment to Open Science and Data and to facilitate the sharing of information with the public through the Registry, the Agency's website and the Government's Open Science and Data Platform.

This document contains more specific requirements for maps and geospatial data in the sections to which they apply.

1.3.2. Requirements for Reference Documents

The impact assessment must be based on information that is publicly accessible. Therefore, the proponent must provide a summary for the documents that will serve as key references in the Impact Statement and that are not otherwise publicly accessible, or consider appending them to the Impact Statement.

The Impact Statement must provide detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental, health, social and economic condition that is described, in order to corroborate the validity and accuracy of the baseline information collected. The Impact Statement must include a bibliography of all documents and information sources consulted.

When existing data sources are used, the Impact Statement must provide a justification to show that the data sources are relevant in the project's spatial and temporal coverage. Certain data sources may have targeted coverage in areas near the road networks or contain biases that should be noted and discussed before they are considered reliable.

2. Overview

2.1. Proponent

The Impact Statement must:

- provide the proponent's representatives' contact information for the project (e.g., name, address, phone, fax, email);
- identify the proponent(s) and, where applicable, the name of the legal entity or entities that would develop, manage and operate the project;
- describe the corporate structure, including roles and responsibilities of key personnel;
- specify the mechanism used to ensure that corporate policies will be implemented and respected for the project; and
- identify key personnel, contractors, and/or sub-contractors responsible for preparing the Impact Statement.

2.2. Project Overview

The Impact Statement must describe the project, including the project's physical activities and ancillary physical activities, by detailing its key components, scheduling details, the timing of each phase of the project and any other key features. If the project is part of a series of projects, the impact assessment must describe the project's overall context.

2.3. Project Location

The Impact Statement must describe the geographical and socio-ecological contexts in which the project is to take place. The description should focus on aspects of the project and its setting that are important in order to understand the project's potential environmental, health, social and economic effects. The following information must be included and, where appropriate, presented on maps:

- The geographic coordinates (i.e., longitude and latitude in degrees, minutes and seconds) of the main site's centre or, for a linear project, the start and end points;
- The project footprint, including the extent of land use;
- Local businesses/industries likely to be affected by the environmental impacts (e.g., fisheries, forestry, hunting, etc.);
- Ecozones, ecoregions and ecodistricts according to the province's or Canada's ecological land classification;
- Land cover data, such as terrestrial ecosystem mapping, forest cover maps, remote sensing data including important habitat features such as riparian habitats, stream banks, artificial water sources, forests, tree patches, solitary trees, decaying trees, snags, forest edges, tree rows, ridges, eskers, caves, mines, cliffs, rock outcrops, exposed bedrock, slopes, karst topography, buildings, bridges, other human-made features, linear features, artificial light sources attracting insects, critical habitat and any other habitat features known to be important in the area. Note that information on the location of these habitat features must be reviewed to support project planning and assessment of the project's effects on species;
- Protected areas, ecologically sensitive areas and any other ecologically significant areas, including critical habitat for designated or endangered species at risk, ecological reserves and protected areas near the project, national parks and national wildlife areas;
- Current land and water uses in the region;
- The location of any federal lands within the regional study area;
- All affected (directly or indirectly) waterbodies, waterways (permanent and temporary) and watersheds;
- Navigable waters;
- The environmental significance and value of the geographical setting in which the project will take place and the surrounding area;
- Lands subject to conservation agreements;
- Description and locations of all potable drinking water sources (i.e., natural, municipal or private);
- Description of local and Indigenous communities;
- Indigenous traditional territories and/or consultation areas, Treaty and/or Title lands, lands in a reserve within the meaning of subsection 2(1) of the *Indian Act*, Indigenous harvesting regions (with permission of Indigenous peoples); and
- Culturally important features of the landscape.

2.4. Regulatory Framework and the Role of the Government

The Impact Statement must identify the following:

- Any federal power, duty or function that may be exercised that would permit the carrying out (in whole or in part) of the project or associated activities;
- Legislation and other regulatory approvals that are applicable to the project at the federal, provincial, regional and municipal levels or from any body – including a co-management body – established under a land claim agreement referred to in section 5 of the *Constitution Act, 1982*, or from an Indigenous governing body as defined in the IAA that has powers, duties or functions in relation to the environmental effects of a project;
- A list of federal, provincial or territorial legislation, regulations or policies on greenhouse gas (GHG) applicable to the project in accordance with the Strategic Assessment of Climate Change (SACC);
- Government policies, resource management plans, planning or study initiatives relevant to the project and/or impact assessment and their implications, including relevant regional studies and strategic assessments;
- Any treaty, self-government, land claims or other agreements between federal or provincial governments and Indigenous peoples that are pertinent to the project or the impact assessment;
- Any relevant land use plans, land zoning, or community master plans;
- Information on land lease agreement or land tenure, when applicable; and
- Municipal, regional, provincial and/or national objectives, standards, regulations or guidelines that have been used by the proponent to assist in the evaluation of any predicted environmental, health, social or economic effects or impacts.

2.5. Qualifications of Individuals Preparing the Impact Statement

The proponent must provide information on the individuals who prepared the sections of the Impact Statement related to environmental, economic, social and health effects as well as impacts on Indigenous peoples. The proponent is required to demonstrate that qualified individuals have prepared the information or studies provided. Where possible, the proponent should consult with experts who are members of a professional body or recognized association. A qualified individual would include someone who, through education, experience or knowledge relevant to a particular matter, may be relied upon by the proponent to provide advice within a given area of expertise. Knowledge relevant to a particular matter may include Indigenous and community knowledge.

3. Project Description

3.1. Project Components

The Impact Statement must describe the project by describing the project components, associated works, and other characteristics to assist in understanding the project's environmental, health, social and economic effects, and impacts on Indigenous peoples and their rights, as they have identified. This description must be detailed using maps of key project components, boundaries of the proposed site with geographic coordinates, major existing infrastructure, proponent lands, and leased properties or lands, adjacent resource lease boundaries, adjacent land uses and any important environmental features.

A list of key project components, informed by a detailed project description, must be drawn up during the preparatory stage of the impact assessment. The following elements are provided for guidance:

3.1.1. Current Project Components

- Water management infrastructure to divert, control, collect and discharge surface drainage and groundwater from all major components of mining infrastructure into the receiving environment, including collection ditches, groundwater interceptor wells, sedimentation ponds, sumps and pumping and piping systems;
- Water, wastewater and effluent treatment facilities, including their footprint and location (including location of discharge points) and proposed treatment technologies;
- Diversions/realignments of waterbodies;
- Water and stream crossings, including bridges and culverts;
- Construction of workspace and laydown areas;
- Ancillary infrastructure, including administrative buildings, warehouses, garages, maintenance offices and temporary housing camps for workers;
- Storage of materials, including chemicals, hazardous waste, petroleum storage tanks and explosives warehouses;
- Sources of drinking water and industrial water;
- Source of energy supply;
- Waste disposal (types of waste, methods of disposal, quantity, sites, or disposal facilities);
- Remediation of the project site;
- Site access roads or paths;
- Worker camps;
- Borrow pits and quarries; and
- Any other infrastructure relevant to the project.

3.1.2. Mining Facilities

- Mine waste management facilities (footprint, location and preliminary design);
- Waste rock, overburden, topsoil and low-grade ore deposits (footprint, location, volumes, development and management plans and design criteria);
- Open pit and underground mines (footprint, location, development plans, including mine phases);
- Crushing and processing facilities (footprint, process, technology, location).
- Storage and loading facilities for concentrates or finished products;
- Truck or vehicle refuelling stations or power sources (e.g., dams, generators, wind turbines, solar power);
- Facilities for the manufacture and storage of explosives (method, location, licensing, management);
- Aggregate deposits (borrow pits and/or quarries) and aggregate plant (footprint, location, volumes) if necessary;
- Permanent and temporary linear infrastructure (access roads, railways, conveyors, service roads, power lines and pipelines), including the route of each and the location and types of structures used for water crossings;
- Drinking and industrial water requirements (source, quantity required, need for water treatment);
- Design features of all collection and diversion ditches, culverts, bridges, weirs and water storage facilities (including sedimentation and accumulation basins and seepage collection basins);
- Construction of dikes and dams;
- Lake sediment storage; and
- Construction of the tailings management facility and associated piping (including tailings and return water piping).

3.2. Project activities

The Impact Statement must include descriptions of project activities to be carried out during each project phase, the location of each activity, the anticipated start date for each activity, and the activity's duration, magnitude and scale.

The Impact Statement must provide a complete list of project activities and focus on activities with the greatest potential to have environmental, health, social and economic effects, or impacts on Indigenous peoples and the exercise of their rights, as they have identified. Sufficient information must be included to adequately predict positive and adverse effects, the interaction between those effects and any significant effects for subgroups representing diversity.

Evidence that input from diverse subgroups was sought through engagement activities to identify potential effects or other concerns and issues must be provided. The information must be sufficient to provide an analysis regarding the project's effects in the context of potential interaction between valued components.

The Impact Statement must highlight activities that involve periods of increased disturbance to environmental, health, social and economic conditions or impacts on Indigenous peoples and the exercise of their rights, as determined by them. It must include a schedule including time of year, frequency, and duration for all project activities.

The final list of key project activities must be completed during the planning phase of the impact assessment, and is informed by the Detailed Project Description to be submitted by the proponent. The Impact Statement must include a summary of the changes that have been made to the project since it was originally proposed in the Detailed Project Description, including positive and adverse impacts of these changes to the project on the environment, health, social and economic conditions of Indigenous peoples and the public. Information on project activities may include a description of the elements listed below:

3.2.1. Site Preparation and Construction

- Preparation of construction work, including land surveying, site staking, clearing, grubbing and excavation, including the removal of trees and vegetation (frequency, duration, time of year, time of day and methods);
- Excavation and recovery of topsoil, soil, bedrock and rock substrates, including potentially acid-generating materials and metal leachate (frequency, duration, time of year, time of day and methods); management of excavated materials, including potentially acid-generating or leachable materials;
- Clearing, grubbing and grading of the site, including removal of trees and vegetation (frequency, duration, time of year, time of day, and methods). Please note: it is important to provide sufficient detail on the timing of project activities to allow for consideration of effects on migratory birds and species at risk;
- Blasting (frequency, duration, time of year, time of day and methods);
- Manufacture, transportation, storage and management of explosives;
- Clearing of transmission corridor and construction of powerline to site if required (frequency, duration, time of year, time of day and methods), the construction of access roads or the modification of existing roads including watercourse crossings or the placement, replacement or widening of bridges or culverts;
- Construction of temporary and permanent infrastructures (garages, administrative buildings, fences);
- Changes to existing infrastructure (e.g., relocation of pipelines);
- Borrowing material requirements (source and quantity);
- Areas for stockpiling materials;
- Construction of water management infrastructure, including the diversion of water bodies and watercourses, dewatering or deposition activities, required stormwater management, site drainage, runoff management, and sediment and erosion control (location, methods, timing);
- Construction of a mine waste management facility;
- Transportation and management of borrow materials (source and quantity);
- Operation of light duty, heavy-duty and mobile off-road material (type, quantity);

- Storage, management and disposal of hazardous materials, fuels and waste (types, methods, amount of waste);
- Housing for workers (capacity, wastewater treatment);
- Transportation of employees; and
- Storage and management of hazardous materials, fuels and waste.

3.2.2. Operation

- The mining plan, production, processing and storage of ore, production of concentrate, production and storage of products, extraction, processing and treatment of products;
- Drilling and blasting on land, manufacturing, storage and use of explosives;
- Seismic profiling and vertical seismic profiling;
- The management and disposal of waste on land;
- Storage, handling and transportation of materials;
- Water management at the project site, including:
  - Diversion, site drainage, stormwater management, sediment and erosion control, as well and site dewatering;
  - Water use requirements;
  - Drinking water, stormwater, process water and wastewater;
  - Water recycling and effluent treatment (quantity, treatment requirements, location of discharge point[s] and description of receiving environment) and discharge arrangements (pipes, piping, pumping, diffuser);
- Storage and handling of reagents, petroleum products, chemicals, hazardous materials and residual materials;
- Management of mine waste, including tailings, waste rock, ore, overburden and topsoil;
- A plan to reduce the amount of mine waste that will have to be dumped on the pile by optimising the portion destined to backfill the underground pits;
- Waste management and recycling (other than mine waste such as tailings and waste rock); and
- Workforce management, including transportation, work schedules and lodging.

3.2.3. Suspension, Closure or Decommissioning

- A preliminary outline of a plan for the suspension, closure, decommissioning or remediation of any element associated with the project;
- A cost estimate for each of the major phases of site recovery and post-recovery monitoring;

- Consideration of the concerns, views and information provided by Indigenous peoples, the public and other participants regarding the closure, decommissioning or remediation of any element associated with the project;
- Ownership, transfer and control of the different project elements;
- Final site restoration;
- Removal of surface contamination from facilities and equipment;
- Details regarding the inclusion and configuration of mine ponds in the post-closure landscape, including the overall water management of the ponds and whether the ponds support aquatic ecosystems. This should include information on:
  - surface water connectivity;
  - the presence or absence of residues; and
  - the source of filling (fresh or process water) and the filling schedule;
- Ongoing management of liquid waste treatment, including transportation, treatment and disposal;
- Dismantling and removal of equipment and systems;
- Demolition of buildings and ancillary structures;
- Long-term care, monitoring and maintaining the integrity of the site (including site drainage and water management) and any remaining structures;
- Transfer of fuels and associated wastes to licensed interim and long-term storage facilities; and
- The closure or decommissioning of temporary or permanent facilities or the suspension of their operation.

3.3. Workforce Requirements

The Impact Statement must describe the anticipated labour requirements, employee programs and policies, and workforce development opportunities for the designated project, including the following:

- Opportunities for employment outlining the anticipated number of full-time and part-time positions to be created and how this can change during the project;
- Anticipated workforce region of origin (i.e., local, regional, out-of-province or international employees), as well as criteria for favouring the local and Indigenous workforce;
- The skill and education levels required for the positions, and the capacity of the existing local and Indigenous workforce;
- Investment in training opportunities, including investments anticipated for Indigenous peoples;
- Expected workforce requirements based on the National Occupational Classification system and timelines for employment opportunities;
- Working conditions and anticipated work scheduling for construction and operation (e.g., hours of work, rotational schedules, workers' modes of travel to work sites, fly-in/fly-out);

- Anticipated hiring policies, including hiring programs;
- Workplace policies and programs for Indigenous employment, workforce diversity and employment of women and other underrepresented groups;
- Employee assistance programs and benefits programs; and;
- Workplace policies and programs including codes of conduct, workplace safety programs and cultural training programs.

In addition to the above, the analysis of workforce requirements must take into consideration Gender Based Analysis Plus (GBA+). It must also specify how hiring policies and programs, access to employment and training opportunities, investment in training and workplace policies and programs consider vulnerable or underrepresented groups, including Indigenous peoples or other relevant community subgroups (e.g., women, youth, seniors).

4. Purpose of the Project, Need for the Project and Considered Alternatives

The proponent must identify the purpose of the project. The proponent must also analyze and consider the need for the project and alternatives to it in the Impact Statement. The proponent must consult the Agency's guidance documents, such as the following: Guidance: "Need for", "Purpose of", "Alternatives to" and "Alternative Means" and Policy Context: "Need for", "Purpose of", "Alternatives" and "Alternative Means".

4.1. Purpose of the Project

The Impact Statement must outline what is to be achieved by carrying out the project (e.g., extraction and processing of minerals, supply of electricity, etc.) and indicate the target market (international, domestic, local, etc.). The purpose must include any objective the proponent has in carrying out the project. The proponent is encouraged to consider the perspectives of participants (i.e., public, Indigenous peoples, governments) in establishing objectives that relate to the intended effect of the project on society.

4.2. Need for the Project

The Impact Statement describes the project's offered opportunities or the issue it intends to solve, according to the proponent. In many cases, the need for the project may be described based on a resource request. The proponent must provide supporting information that demonstrates the need for the project. The

information provided must make it possible to reasonably conclude that there is an opportunity or issue that warrants a response and that the proposed project is an appropriate approach (e.g., production does not excessively exceed projected request). The proponent should report comments and views of Indigenous peoples, the public and other participants on their statement regarding the need for the project.

4.3. Alternative Means of Carrying Out the Project

The Impact Statement must identify and consider the potential environmental, health, social and economic effects and the impacts on the rights of Indigenous peoples of alternative means of carrying out the project that are technically and economically feasible.

For the selection of the alternative means of carrying out the project, the Impact Statement must firstly describe:

- the criteria to determine technical and economic feasibility of possible alternative means;
- the best available technologies considered and applied in determining alternative means;
- all alternative means that are technically and economically feasible, presented in sufficient and appropriate detail;
- the particularities of each alternative means and their potential adverse and positive environmental, health, social and economic effects, and their impacts on the rights of Indigenous peoples, as identified by them;
- the quantity and importance of water bodies, wetlands and watercourses to be crossed (size, sensitivity, etc.); and
- any effects on the critical habitat of species listed under the *Species at Risk Act* (SARA).

The Impact Statement must secondly describe the following:

- The criteria for examining the environmental, health, social and economic effects of each alternative to identify a preferred alternative. Environmental criteria should include effects on air quality, water quality, wildlife and wildlife habitat, including wetlands, and the potential for accidents and malfunctions. Effects on SARA species at risk, including any critical habitat, must be considered in the evaluation of alternatives;
- The application of GBA+ to the analysis of alternative means of carrying out the project;
- The concerns, views and information provided by Indigenous peoples (e.g., resource use, land use, valued landscapes and sensitive locations), the public and other participants in establishing criteria for comparing the project's alternative means;

In its alternative means analysis, the proponent must address all project elements including, but not limited to, the following elements and components if relevant to the project activities and design:

- Location of the project site;
- Access to the project site;
- Location of key project components;
- Facility design;
- Energy sources to power the project site and other stationary sources to provide heat or steam to the project;
- Management of water and waste water supply;
- Water management and location of final effluent discharge points (during construction, operation and closure phases);
- Alternative treatment technologies and techniques to control effluent quality;
- Methods of construction and crossing of water bodies, streams, wetlands and other obstructions;
- Management of excavated materials, including potentially acid-generating or leachable materials;
- Construction alternatives;
- Timing options for various components and phases of the project;
- Options for suspension, closure or decommissioning; and
- Mining-related activities:
    - Mining operations (open pit, underground);
    - Processing facilities location and design, including related units (crushing, separation, concentration and dewatering, pulp replenishment unit, tailings filtration plant, etc.);
    - For mine waste management facilities (tailings, waste rock, overburden, low-grade ore, effluent), an assessment of alternatives report must be prepared and submitted. The assessment must be conducted in such a way that it clearly demonstrates that the chosen location is the most appropriate option for mine waste disposal from environmental, technical, economic, social and health perspectives. The assessment of alternatives report must include the following steps and all supporting documents and/or references:
        1. Identification of candidate alternatives (including threshold criteria);
        2. Pre-screening assessment;
        3. Alternatives characterization (including environmental, technical, economic, social and health considerations);
        4. Multiple accounts ledger (including the determination and evaluation of impacts generated by each option);
        5. Value-based decision process;
        6. Sensitivity analysis.

If applicable, the assessment of alternatives should include, but not be limited to, the following information sources:

- Any strategic or regional assessment;
- Any study or plan conducted or prepared by a jurisdiction, or an Indigenous governing body, related to the area affected by the project and provided with respect to the project;
- Any relevant assessment of the effects of the project that is conducted by or on behalf of an Indigenous governing body and that is provided with respect to the project;
- Indigenous knowledge, community knowledge, comments received from the public, comments received from jurisdictions; and
- Other studies or assessments realized by other proponents.

The study must allow visualizing the location of all alternatives.

5. Description of Public Participation and Views

The proponent must engage local communities, associations and stakeholders. Engagement activities must be inclusive and ensure that interested members of the public have the opportunity to share their views. The activities must also consider official languages needs of those involved. Particular attention must be paid to the engagement of individuals and communities that have rights and interests in the lands affected by the proposed project.

Given the impact of the COVID-19 pandemic on the population, the proponent must be flexible in engaging the public. Preferred approaches must respect local authority and public health guidelines and allow anyone who wishes to participate to do so safely.

5.1. Engagement Activities Summary

The Impact Statement must describe the proponent's ongoing and proposed public engagement activities regarding the project. The Impact Statement must provide a description of efforts made to distribute project information and provide a description of information and materials that were distributed during the consultation process. The Impact Statement must indicate, for example, the methods used, where the consultation was held, the persons, organizations and diverse groups consulted, the views expressed and the extent to which this information was incorporated in the design of the project as well as in the Impact Statement.

The proponent must consult Agency guidance documents on this topic, such as the following: Framework: Public Participation Under the *Impact Assessment Act*, and Guidance: Public Participation under the *Impact Assessment Act*.

5.2. Analysis and Response to Questions, Comments and Raised Issues

The Impact Statement must provide a summary of key issues related to the project and that were identified through engagement with the public, as well as the potential environmental, health, social and economic effects, including disproportionate effects, for diverse subgroups within the population. The Impact Statement must describe any questions and comments raised by the public, and how they influenced the project's design, construction, operation, or closure at the end of its life. The Impact Statement must identify the alternative means, mitigation measures or the monitoring and follow-up programs identified to deal with public uncertainties. The Impact Statement must identify public concerns that have not been addressed, if any, and provide the reasons why they have not been.

In addition to the activities carried out as part of the impact assessment, an engagement program specific to the project must be developed by the proponent and included in the Impact Statement. The engagement program must include the proponent's policy or vision for engagement and set out the principles and goals that will guide the proponent on this topic. The engagement program should enable the proponent to anticipate, prevent, mitigate and manage conditions that may affect individuals, groups or communities. The engagement program should be integrated into the proponent's management system to ensure the protection of the public, employees, assets and the environment throughout the life cycle of the project (i.e., design, construction, operation, decomissioning and closure).

5.3. Private Lands Analysis and Potentially Affected Stakeholders

In addition to the general public engagement approach, the Impact Statement must describe how the proponent identified and consulted specific individuals and communities that have rights or interests on the lands affected by the project.

The proponent must also contact residents, land users and other persons likely to be affected by the project in order to keep them informed. Examples of these persons include:

- persons who may be affected by nuisances (noise, dust, lights, traffic, vibrations, damage to properties, variability in quality and quantity of groundwater in supply wells, etc.) resulting from the construction and operation of the facilities;

- persons who have registered or recognized hunting, trapping or guiding areas, as well as recreational and commercial fishing areas; and
- users of parks and recreational areas (including local, provincial or territorial parks and areas recognized as scenic).

6. Description of Engagement With Indigenous Peoples

The proponent must collaborate with Indigenous peoples in completing its Impact Statement, and then throughout the lifecycle of the project if it is approved. For the purposes of the Impact Statement, the proponent must primarily:

- collect available Indigenous knowledge and expertise and integrate it into its Impact Statement, just as it integrates scientific knowledge;
- share project information, including data in digital format, frequently, in a timely manner and transparently with Indigenous peoples;
- support the participation of Indigenous peoples in the completion of the Impact Statement, which could include funding studies conducted by potentially affected Indigenous peoples who will have demonstrated interest in this regard;
- cooperate with Indigenous peoples to identify the valued components (VC) and indicators to be used in the Impact Statement;
- cooperate with Indigenous peoples to identify preferred mitigation measures to avoid, minimize, compensate or accommodate adverse impacts of the project on Indigenous peoples and their rights, and to maximize the benefits of the project to their communities;
- conduct a preliminary assessment of potential effects on the rights of Indigenous peoples that cannot be mitigated. The proponent is not responsible for evaluating the severity of these effects, but is responsible for discussing them with the Indigenous peoples consulted about the project and giving Indigenous peoples the opportunity to draw their own preliminary conclusions in the Impact Statement, if they so choose, at this stage of the impact assessment process.

The Agency notes that not all Indigenous peoples may be willing to collaborate with the proponent, therefore the proponent must demonstrate they have made best efforts at collaboration, and provide the Agency with an explanation regarding circumstances where collaboration was not possible.

In order to facilitate the participation of each Indigenous peoples in the development of the Impact Statement, the proponent is required to work with each Indigenous people named in Table 1 to establish a mutually agreed approach to their participation, should they wish to participate.

The proponent must allow Indigenous peoples a reasonable amount of time to document Indigenous knowledge and land use information and to verify that this information has been properly incorporated into the Impact Statement before it is submitted to the Agency.

The engagement efforts should be consistent with the Government of Canada's commitment to implement the United Nations Declaration on the Rights of Indigenous Peoples (the Declaration) as a comprehensive international human rights instrument and Canada's roadmap for reconciliation. The Declaration emphasizes the importance of recognizing and upholding the rights of Indigenous peoples and ensuring that there is effective and meaningful participation of Indigenous groups in decisions that affect them, their communities, and territories. The Declaration also emphasizes the need to work together in partnership and respect, as articulated through the principle of free, prior and informed consent. This principle reflects a need to work together in good faith on decisions that impact Indigenous peoples, with the intention to achive consensus.

The record of engagement and inclusion of Indigenous knowledge in the Impact Statement should demonstrate that the proponent sought to build consensus and obtain the agreement of Indigenous groups regarding information presented in the Impact Statement.

The proponent must consult the Agency's guidance documents on Indigenous participation and engagement, which are available in the Practitioner's Guide to Federal Impact Assessments under the *Impact Assessment Act*. The proponent is expected to follow and refer to the guidance provided in the following documents throughout the Impact Statement:

- Policy Context: Indigenous Participation in Impact Assessment;
- Guidance: Indigenous Participation in Impact Assessment;
- Policy Context : Assessment of Potential Impacts on the Rights of Indigenous Peoples;
- Guidance: Assessment of Potential Impacts on the Rights of Indigenous Peoples;
- Guidance: Collaboration with Indigenous Peoples in Impact Assessments;
- Guidance: Indigenous Knowledge under the *Impact Assessment Act*: Procedures for Working with Indigenous Communities; and
- Guidance: Protecting Confidential Indigenous Knowledge under the *Impact Assessment Act*.

In addition to the requirements listed in this section, specific expectations for the engagement of Indigenous peoples are included in the sections dealing with establishing baseline conditions, the assessment of potential effects on VCs, and the analysis of the potential impacts on the rights of Indigenous peoples.

Given that the COVID-19 pandemic continues to impact the population, the proponent must be flexible in engaging Indigenous peoples. The approach will need to combine virtual and physical activities that respond to technological limitations and respect local authority and public health guidelines. If necessary, the proponent will offer the necessary assistance or arrangements to facilitate meetings with Indigenous communities.

6.1. Analysis of Potentially Affected Indigenous Peoples

The proponent will engage the Indigenous peoples listed below, prepared by the Crown, to understand and consider the concerns and adverse impacts the project may have on the rights of Indigenous peoples.

This list is subject to change based on what is known about the effects and potential impacts of the project, in the event of changes to the project or its components, or based on any other information gathered during the impact assessment.

Table 1: Crown List of Indigenous Peoples to Be Consulted

Province	Indigenous Peoples
QC	Algonquins of Barriere Lake
QC	Communauté Anicinape de Kitcisakik
QC	Nation Anishnabe du Lac Simon
QC	Première Nation Abitibiwinni
QC	Kebaowek First Nation
QC	Kitigan Zibi Anishinabeg
QC	Long Point First Nation
QC	Timiskaming First Nation
QC	Wolf Lake First Nation
ON	Wahgoshig First Nation
ON	Taykwa Tagamou Nation
QC	Grand Council of the Crees (Eeyou Istchee) / Cree Nation Government

If the proponent becomes aware of potential adverse effects on an Indigenous community that is not listed above, they are required to notify the Agency as soon as they have the opportunity to do so.

The Impact Statement must provide the following:

- A list of potential effects on environmental, health, social and economic conditions of each Indigenous community;
- The rights of each Indigenous community, that the peoples themselves have identified, that may be impacted by the project;
- An analysis of the extent of the potential effects on each Indigenous community, and the views of Indigenous peoples regarding the extent of impact on the exercise of their rights;
- The sources of information and analysis used.

It is recommended that the proponent analyze information on each Indigenous community potentially affected by the project, in separate sections organized by nation, community, or other grouping based on the preference expressed by the Indigenous peoples. Where applicable, the information and analysis must also be sufficiently disaggregated to support the GBA+ analysis of disproportionate effects (see section 1.1 for more details on GBA+). In all cases, ethical guidelines and culturally appropriate protocols governing research, data collection and confidentiality must be followed. This is particularly important in the case of information collected and studies conducted with vulnerable subgroups.

Overlaps are to be expected between the information required in the guidelines, and the sections specific to each Indigenous community. For example, the analysis of physical health can be summarized under the health section that applies to every group, detailing the specific context for each community in the separate sections for each Indigenous community. The location and level of detail of the information presented in the Impact Statement will depend on its importance to the selected VCs, and some repetition between sections is to be expected.

6.2. Record of Engagement

The Impact Statement must provide a record of engagement that describes all efforts, successful and unsuccessful, taken to seek the views of each potentially affected Indigenous peoples with respect to the project. This record of engagement is to include all engagement activities undertaken prior to the submission of the Impact Statement during the Planning Phase and in the preparation of the Impact Statement.

The Record of Engagement must include the following:

- The list of Indigenous peoples engaged by the proponent, including those who rarely or not at all responded to the promoter's invitations;
- An explanation for cases where engagement efforts have proven unsuccessful;
- The engagement activities undertaken with each Indigenous community, including the date, means and results of engagement, including a description of the outcomes of conversations with each Indigenous community about how they wish to be consulted by the proponent;
- A description of the mechanisms established by the proponent to provide Indigenous peoples with access to the resources and support necessary to facilitate their participation in the preparation of the Impact Statement;
- The list of the consultation protocols adopted by Indigenous peoples, if applicable. A copy of the consultation protocols must be attached as an appendix;
- A description of the preferred methods for sharing information, including alternative solutions implemented for people and locations where technological resources are limited;
- A description of efforts to ensure that Indigenous peoples have access to information about the project in the official language of their choice (French or English);

- A description of how barriers to participation resulting from the COVID-19 pandemic were taken into account in the design and implementation of the promoter's engagement activities;
- A description of efforts to engage diverse segments of each Indigenous community in culturally appropriate ways, including groups identified by gender, age or other community relevant factors (e.g., hunters, trappers, and other harvesters) to support the collection of information needed to complete the GBA+;
- A description of how engagement activities by the proponent were intended to ensure Indigenous peoples were provided an opportunity to evaluate the project's potential positive and negative effects on their members, communities, activities, and impacts to rights, as identified by the Indigenous peoples; and
- Any agreements pertaining to engagement that are finalized or in progress, with anticipated timelines to complete.

The Record of Engagement must demonstrate that the capacity needs of Indigenous peoples were taken into account. The Record must also demonstrate that timelines were adequately communicated for the review of information in the Impact Statement and in the comments, as well as in specific procedures for drafting sections of the Impact Statement, where applicable.

The engagement activities for the preparation of the Impact Statement must be carried out with integrity and transparency, without conflicts of interest, in good faith, and conducted in a manner that is attentive to the concerns of Indigenous peoples and committed to producing mutually beneficial outcomes.

6.3. Analysis and Responses to Questions, Comments and Raised Issues

The Impact Statement must provide an analysis of the input received from Indigenous peoples with respect to the project, as well as a description of how Indigenous peoples reviewed the information contained in the Impact Statement. This analysis must include all comments received from Indigenous peoples before and since the beginning of the impact assessment process. It should help identify potential effects on every applicable VC potential impacts on the rights of Indigenous peoples, as well as identify mitigation and enhancement measures.

If the Indigenous peoples provide specific studies, the proponent must attach them as an appendix to the Impact Statement, but only if they have obtained the permission of the Indigenous peoples concerned to publish them. The proponent is also encouraged to work with Indigenous peoples who demonstrate an interest in drafting sections of the Impact Statement that concern them; including sections describing Indigenous knowledge, current use of lands and resources for traditional purposes, potential impacts on their rights, and the mitigation or enhancement measures. Where applicable, sections of the Impact Statement prepared by Indigenous peoples must be clearly identified as such.

The analysis presented in the Impact Statement must also include consideration of knowledge provided by Indigenous peoples. The proponent must discuss with the concerned Indigenous peoples to understand and consider their definition of "Indigenous knowledge". Indigenous knowledge that is not already publicly available or where written consent has not been provided by the Indigenous peoples must not be included. Permission from the concerned Indigenous community must be sought before including Indigenous knowledge in the Impact Statement, regardless of the source of the Indigenous knowledge. The guidance document Protecting Confidential Indigenous Knowledge under the *Impact Assessment Act*, to which the proponent must refer, describes the approaches to be favoured.

Indigenous knowledge must be included in all sections of the Impact Statement. Given the holistic nature of Indigenous knowledge, it may be presented in one distinct section of the Impact Statement, rather than being inserted into the technical sections or chapters. However, if such an avenue is chosen, Indigenous knowledge must also be reflected in the relevant technical chapters. It is also important to capture the context in which Indigenous peoples provide their Indigenous knowledge and to convey it in a culturally appropriate manner. The Impact Statement must reflect as accurately as possible the input of Indigenous peoples who have participated in its development.

The Impact Statement must also document how the proponent responded to questions, comments and issues raised by Indigenous peoples, and how unresolved matters have been addressed in the Impact Statement. Any proposed mitigation measures are to be clearly linked, to the extent possible, to VCs in the Impact Statement as well as to project components or activities.

The Impact Statement must use precise and respectful terms to refer to Indigenous peoples, according to the terminological preferences expressed by Indigenous peoples, where appropriate.

The Impact Statement must:

- describe the type of information received from Indigenous peoples (observations, questions, issues, comments, knowledge, expertise or other);
- describe how the information gathered during the planning phase of the impact assessment of the project was included, including the documents uploaded to the Registry by Indigenous peoples during that phase of the impact assessment;
- describe the main issues, questions and comments raised during the engagement activities by each Indigenous community and the proponent's responses, including how matters have been addressed in the Impact Statement or will be addressed in the future;
- indicate where and how the information received was integrated into or contributed to decisions regarding the project or its impact assessment, including:
    - the construction, operation, decommissioning and closure plans;
    - development and collection of baseline information;
    - the establishment of spatial and temporal boundaries;
    - the evaluation of alternatives to the project;

  - characterization of the nature of the predicted environmental, health, social and economic effects of the project for each Indigenous community;
  - the development of mitigation measures; and
  - follow-up and monitoring;
- describe how Indigenous expertise and knowledge would be considered in carrying out the project, should the project be approved;
- include in the engagement program (see section 5.2), a component outlining the Indigenous engagement policy, as well as established policies and stated principles related to the collection of traditional knowledge and traditional land use information; and
- where impacts on the rights of Indigenous peoples are apprehended, provide a description, for each Indigenous community, of how each potential impact would be avoided, mitigated, managed, or otherwise accommodated.

6.4. Collaboration With Indigenous Peoples Following the Submission of the Impact Statement

The proponent must explain in the Impact Statement how they plan to continue to work with Indigenous peoples during subsequent phases of the impact assessment process and throughout the lifecycle of the project, if it is approved.

The Impact Statement must:

- describe the type of work the proponent intends to accomplish with Indigenous peoples during subsequent phases of the impact assessment process, including the monitoring and follow-up phase if the project is approved; and
- describe how Indigenous peoples will be involved in decision making processes related to the project throughout the lifecycle of the project.

For this section, the proponent may refer to information presented in other sections of the Impact Statement (e.g., section 26).

7. Baseline Conditions

7.1. Method

The Impact Statement must provide a description of the baseline conditions that include both the current state and the conditions that would be expected in the absence of the project. The examined conditions must include the environmental, health, economic and social components directly and indirectly linked to the designated project, their interrelations and interactions, as well as their variability depending on the appropriate spatial and temporal boundaries. The variability in relation to climate changes must also be taken into consideration. Constructive dialogue with Indigenous peoples and communities can provide useful information about how these components and processes are interrelated. This dialogue may also allow the establishment of a common understanding of what Indigenous knowledge contributes to understanding the project's potential effects and impacts.

The information describing the baseline conditions may be collected in a stand-alone chapter in the Impact Statement or integrated into the sections dealing with the relevant VCs, including the assessment of the effects of each VC and the interactions between the VCs, the identification of mitigation measures, the residual effects analysis and the cumulative effects assessment.

It is necessary to apply Gender-Based Analysis Plus (GBA+) to these basic descriptions in order to subdivide and specify the baseline conditions for subgroups representative of diversity and allow GBA+ regarding the effects. Qualitative and quantitative data may be required to describe the baseline conditions for the subgroups, including the existing subgroups within the Indigenous peoples. This allows for the examination of differences in baseline conditions by subgroup to better define how the effects can vary. The application of GBA+ to the baseline conditions should not be limited to simple descriptions of differences but include an explanation of the underlying causes of these inequalities. The proponent must refer to the Agency's Guidance: Gender-based Analysis Plus in Impact Assessment for the application of GBA+ in the Impact Statement.

In describing the biophysical environment, the Impact Statement must take an ecosystem approach that considers how the project may affect the structure and functioning of biotic and abiotic components with the ecosystem using scientific, community and Indigenous knowledge regarding ecosystem health and integrity. The Impact Statement must describe the indicators and the measurements used to assess the health and integrity of the ecosystems. The presence of threatened ecosystems, rare, limited or important habitats (e.g., federal, provincial or Indigenous protected areas, Wildlife sensitivity maps, Ramsar sites, critical habitats identified or proposed in the recovery programs and action plans, etc.) that could be affected by the project should be indicated in the description of the baseline biophysical conditions.

The environmental baseline conditions must consider the resilience of relevant species populations, communities and associated habitats to the effects of the project. Ecological processes should be evaluated for potential susceptibility to adverse effects from the project. Considerations include: configuration and

connectivity of habitat patches; continuation of key natural disturbance regimes; structural complexity; nutrient cycling; interactions of biotic components with each other and with abiotic components; population dynamics and genetic diversity; and Indigenous knowledge relevant to the conservation and sustainable use of relevant species populations and associated habitats.

If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas. If surrogate data from reference sites are used rather than specific measurements at the project site, the Impact Statement must show how it is representative of the site conditions.

The Impact Statement must establish appropriate study area boundaries to describe the baseline conditions. The data must be provided in a geospatial format and located on maps. Section 7.4 further describes the appropriate limit selection approaches. The specific requirements for baseline conditions are described further in sections 8 to 12. Considerations in assigning appropriate study areas or boundaries would include, but not be limited to:

- areas potentially impacted by changes to water quality and quantity or changes in flow in the catchment basin and the hydrographic network, regardless of whether the changes are permanent, temporary or seasonal;
- areas potentially impacted by airborne emissions or odours;
- air zones affected, based on consideration of the Canadian Ambient Air Quality Standards (CAAQS), the Air Quality Management System (AQMS) and airshed management (see CCME website);
- existing local emissions that are considered significant;
- receptors particularly affected by the historical load or poor mitigation, including species and soil types;
- areas of importance to the population, including communities and recreational areas;
- International, interprovincial and territorial boundaries that require transboundary assessment;
- the status of fulfilment of the CAAQS in the air zone, as well as the associated management levels, as they are described in the Guidance Document on Air Zone Management (after suppression of transboundary flows and exceptional events in accordance with the Guidance Document on Transboundary Flows and Exceptional Events for Air Zone Management);
- areas within the range of vision, light and sound, and the location and characteristics of receptors;
- species habitat areas, period of use and migratory habits;
- emergency planning and emergency response zones;
- the geographic extent of local and regional services;
- any affected communities;
- all Indigenous peoples who could be affected;
- known areas of use of Indigenous lands and resources, practice of culture and spirituality;
- existing affected infrastructure.

7.2. Sources of Baseline Information

Information sources and data collection methods used for describing the baseline environmental, health, social and economic setting may consist of:

- the federal government, including the departments and agencies with relevant expertise for the impact assessment;
- federal environmental assessments of other projects within a 200 km radius of the project under review and available on the Canadian Impact Assessment Registry;
- Quebec Government resources (Ministère des Forêts, de la Faune et des Parcs [MFFP]), including:
  - Centre de données sur le patrimoine naturel du Québec (CDPNQ) (French only);
- Bird Conservation Regions (BCR) strategies;
- universities;
- field studies, including study area site-specific survey methods;
- database searches, including federal, provincial, territorial and local data banks, namely:
  - Quebec Breeding Bird Atlas (2010-2014);
  - Other monitoring program databases:
  - eBird Canada;
  - Breeding Bird Survey (BBS);
  - Christmas Bird Count;
  - Birds Canada's Canadian Migration Monitoring Network;
  - NatureCounts;
  - iNaturalist;
  - Suivi des populations d'oiseaux en péril (SOS-POP) (French only);
  - Atlas des amphibiens et reptiles du Québec (AARQ) (French only);
  - Neighbourhood Bat Watch; and
  - Carapace.
- Protected areas and watershed management plans;
- Natural resource management plans;
- Species recovery and restoration plans;
- Field measurements to gather data on ambient or background levels for air, water, soil and sediment quality, light levels or acoustic environment (soundscape) and on wildlife and its habitat;
- Land cover data including terrestrial ecosystem mapping products, forest cover maps, remote sensing information. Habitats and important characteristics to be included:
  - Waterbodies, wetlands and watercourses;

  - Riparian habitat;
  - Creek and river banks and other eroded habitats;
  - Artificial water sources;
  - Forests, tracts of trees, solitary trees (decaying trees and snags);
  - Forest edges and tree line;
  - Crests, eskers, caves and mines;
  - Cliffs, rocky outcrops, exposed rock substratum;
  - Embankments and karst topographies;
  - Buildings, bridges and other anthropogenic features, including linear features (e.g., roads, electrical transmission lines);
  - Artificial light sources that attract insects;
  - Critical habitat as described in recovery programs; and
  - Any other habitat characteristics recognized as important in the area;
- Data tools or data sources that include potentially relevant indicators on health determinants:
  - Health Inequalities Data Tool (Public Health Agency of Canada);
  - Social Determinants of Health for the Off-reserve First Nations Population, 15 Years of Age and Older (Statistics Canada);
  - Community and Health System Characteristics (Canadian Institute for Health Information);
  - First Nations Regional Health Survey Reports and associated online data (First Nations Information Governance Centre);
  - Positive Mental Health Surveillance Indicator Framework (Government of Canada);
  - Previous health impact projects;
  - Local public health authorities;
- Specialized publications;
- Academic institutions;
- Research programs of regional industries or committees on resources or species;
- Environmental assessment documentation, including monitoring reports, from prior projects in the area and similar projects outside the area;
- Regional studies, including studies by Indigenous peoples, strategic assessments and project assessments;
- Renewable harvest data;
- Renewable resource management plans;
- Indigenous knowledge, including oral stories and knowledge held by Indigenous custodians, and scientific expertise held by Indigenous peoples;

- Engagement and consultation activities with experts, communities, the public and Indigenous peoples, including workshops, meetings, open houses, and surveys;
- Participant comments submitted during the Planning Phase (posted on the Registry) can be used to identify specific areas and existing conditions of concern to be considered in the Impact Statement;
- Qualitative information gathered from interviews, focus groups or observation;
- Census data;
- Health impact assessments;
- Human health risk assessments (HHRA);
- Studies on community well-being and other socio-economic studies;
- Community and regional economic profiles; and
- Statistical surveys, as applicable.

The Species at Risk Public Registry must be consulted to obtain information on the list of species at risk and their protection status, as well as the available recovery documents. The proponent must ensure that the most up-to-date documents were used and that the species status is up to date.

For the field surveys, the proponent must provide for the inclusion of several sampling locations and multiple visits to each location to support the analyses required. Use of the existing data should be limited and only to supplement new data. Please see the following sections on the baseline conditions in the present Guidelines for recommendations on the survey design and methodology. The surveys and analyses must be conducted by qualified experts.

The proponent must contact the provincial or local authorities, as well as Indigenous peoples, to determine the relevant information sources and the survey methodology, in addition to the other recommendations contained in these Guidelines.

The baseline data must be collected in a way that makes possible analyses, extrapolations and reliable predictions. The collected data should make it possible to carry out analyses to estimate pre-project baseline conditions, predict impacts, assess and compare post-project conditions, all at the scale of the project, and the local and regional study areas. Modelling methods, error estimates and hypotheses should be presented. The modelling and simulations should be used at the beginning of the Impact Statement Phase to assess the sampling effort required and determine quantitatively the effectiveness of design options.

Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to. This is particularly important in the case of information gathered and studies conducted with vulnerable subgroups. The proponent must respect the obligation of protecting personal information and adopt the established standards for the management of Indigenous data (e.g., the First Nations principles of Ownership, Control, Access and Possession [OCAP], or protocols adopted by an Indigenous people).

7.3. Method and Factors for Selection of the Valued Components

The Impact Statement must describe the VCs, processes and interactions that are deemed to be of concern or likely to be affected by the project. The Impact Statement must indicate to whom these concerns are important (e.g., the public, federal authorities or Indigenous peoples) and the reasons why, whether for environmental, cultural, historical, social, economic, recreational and aesthetic considerations, or due to its importance for Indigenous peoples or Indigenous knowledge. The VC must be defined not only by its role in the ecosystem, but also by the value people place on it.

The Impact Statement must provide the rationale for selecting specific VCs and for excluding others. Selection of VCs to be included and assessed should be project-specific and focused on appropriateness, not influenced by the quantity of information available or the use of the VCs in other assessments.

In selecting a VC to be included, the following factors should be considered:

- VC presence in the study area, or in the watersheds located in the study area;
- the extent to which the effects of the project and related activities have the potential to interact with the VC;
- the extent to which the VC may be affected by other past, current or future projects in combination with other human activities and natural processes;
- the extent to which the VC is linked to Indigenous interests, governance or rights;
- the fact that an Indigenous community has requested the VC;
- the extent to which the VC is linked to federal, provincial, territorial or municipal government priorities;
- information from any ongoing or completed regional assessment processes;
- the possibility that an adverse effect on the VC would be of particular concern to Indigenous peoples, the public, or federal, provincial, territorial, municipal or Indigenous governments; and
- whether the potential effects of the project on the VC can be measured or monitored, or would be better ascertained through the analysis of a proxy VC.

The VCs must be described in sufficient detail to allow the reviewer to understand their importance and to assess the potential adverse and positive effects arising from the project activities on the environment, health, social and economic conditions. When the effects are significant or small, quantitative data on the VCs and their units of measure must be provided.

Each species at risk should be considered separately as a VC. In addition, key habitats associated with species at risk should be considered during the selection of the VC, namely bogs and other wetlands, mixed forests and virgin forests, as well as eskers and other similar geographical characteristics.

7.4. Spatial and Temporal Boundaries

The spatial and temporal boundaries determined and established for the impact assessment will vary depending on the VC and should be considered separately for each VC.

The Impact Statement must:

- describe the spatial boundaries, including local and regional study areas, for each VC included in assessing the potential adverse and positive environmental, health, social and economic effects of the project and provide a rationale for each boundary;
- define spatial boundaries by taking into account the appropriate scale and spatial extent of potential effects and impacts (direct and indirect) of the project; community knowledge and Indigenous traditional knowledge; current or traditional land and resource use by Indigenous peoples; rights of Indigenous peoples, including cultural and spiritual practices; and physical, ecological, technical, social, health, economic and cultural considerations; and
- take into account the size, nature and location of past, present and foreseeable projects and activities as factors included in the definition of spatial boundaries, particularly for the regional study areas.

Transboundary spatial boundaries should be identified where transboundary effects are expected and these transboundary effects should be considered in the Impact Statement.

The Impact Statement must explain how the proponent considered the information received by Indigenous peoples in its definition of spatial and temporal boundaries for each VC, and more particularly for VCs related to effects on Indigenous peoples and those in which Indigenous peoples have expertise, where appropriate. The spatial and temporal boundaries specific to VCs that are recommended for the Impact Statement in these Guidelines have been elaborated during the Planning Phase and reflect participant comments and contributions, including federal authorities, Indigenous peoples and the public.

The establishment of the spatial limits must be supported by maps to facilitate the reader's comprehension.

To establish baseline conditions, the study area boundaries need to encompass the spatial boundaries of the project including any associated project components or related activities, and the anticipated boundaries of the project effects. Since spatial boundaries can vary for each VC, the study area can also vary. Considerations in assigning appropriate study areas or boundaries would include, but not be limited to:

- areas potentially impacted by changes to water quality and quantity or changes in flow in the catchment basin and the hydrographic network;
- areas potentially impacted by airborne emissions or odours;
- areas determined by dispersion and deposition modelling;
- areas within the range of vision, light and sound;
- the location and characteristics of the receptors that could be affected by project-related activities. The study must particularly consider the most sensitive human receptors. Receptors may include, but not be

limited to, significant areas for wildlife, residences, health and social services institutions, educational institutions (schools, daycare centres, early childhood centres, etc.), tourism establishments (tourism information offices, museums, ski resorts, summer camps, outdoor recreation areas, campsites, etc.) and recreational areas (recreational land, urban parks, parks and conservation areas, etc.);

- terrestrial and aquatic species habitat areas likely to be affected directly or indirectly, use timing and species migratory patterns;
- emergency planning and emergency response zones;
- the geographic extent of local and regional services;
- any affected communities;
- potentially affected Indigenous peoples;
- known areas of current use of Indigenous lands and resources, practice of culture and spirituality;
- existing affected infrastructure.

Generally, it is recommended that the proponent establish three spatial boundaries of study areas to assess the impacts on each VC:

- the project area: defined as the project footprint, including all temporary and permanent areas associated with the project and the other options envisioned;
- the Local Study Area (LSA): defined as the area beyond the project footprint, where the project's effects may extend, for each VC;
- the Regional Study Area (RSA): defined as the area containing the region where the cumulative effects may extend, for each VC.

The terminology chosen to refer to the project area, the LSA and the RSA can vary depending on the context of the project, for example during the project development phase (development area), the assessment methods (modelling area), the effects assessment phase (local or regional effects assessment areas), but it is common to have at least three areas that correspond to the project, the local and the regional scales. For the RSA, which is usually the area used for the assessment of cumulative effects, it will be important to correctly identify which project and past, present and reasonably foreseeable physical activities are included or excluded. The proponent must provide a rationale for each boundary.

The spatial boundaries for the project area, the LSA and the RSA for the biophysical VCs should be defined using an ecosystem-centred approach (i.e., the components of the natural areas such as eskers, wetlands, birds, species at risk, etc.). The boundaries of ecoregions or derivatives should not be used, since the project will take place within, near or beyond the boundaries of ecoregions.

For the VC habitats potentially affected by the project, a land cover analysis must be performed to determine the ecological boundaries and define the appropriate buffer distances around the project area. Other considerations must be taken into account in the definition of specific spatial boundaries (i.e., the shape of the LSA and the RSA) to achieve the following objectives:

- the diversity of land cover types should be representative of the defined spatial extent;

- the spatial profile of land cover types should be well distributed in the defined spatial extent (e.g., change the spatial boundaries if one or more land cover types are concentrated in a sub-area and are uncommon in other parts of the region); and
- a low to moderate rate of change of the predominance of one or more land cover types based on an increasing distance with respect to the project area (i.e., use the distribution of land cover types to limit the distances within which comparisons must be made).

When a habitat is part of a VC, the determination of an LSA and an RSA must be adapted to its spatial extent and its functions. The spatial limits of the LSA must be modified if one or more types of land cover is or are concentrated in a subarea and rare in other parts of the region.

When a VC is a species, the LSA must correspond to the project study area plus a buffer zone defined by accounting for the project's direct and indirect effects on the species, including the effects on habitat, the connectivity changes, alteration of the predator-prey dynamics, mortality, sensory disturbance and pollution. Simulation modelling must be used to define buffer zones that concern the species or the group of species assessed.

The Impact Statement must take into account the following recommendations with respect to wolverine and bats:

- **Wolverine:** The LSA should be at least: project area + 10-km buffer zone; simulation modelling could indicate a larger buffer zone;
- **Bats:** The LSA should be at least: project area + 1-km buffer zone; simulation modelling could indicate a larger buffer zone.

When the expertise on a wildlife species is mainly provincial, it is recommended to contact provincial or local authorities to verify the appropriate spatial boundaries.

Defining temporal boundaries for baseline conditions should account for the historical context in order to situate the temporal patterns or trends within adequate spatial boundaries. Information on past conditions may also help establish if present-day conditions are representative and how the project may influence them. The temporal boundaries for the effects assessment should be defined according to related timelines for the different phases of the project in order to profile the effects according to these key periods. If potential effects are predicted after project decommissioning or closure, this must be taken into consideration in defining specific boundaries.

For biophysical VCs (i.e., natural components including eskers, wetlands, birds and species at risk, etc.), the temporal boundaries to establish the baseline conditions must be defined to allow for the detection of all species that use the study areas during the year and from one year to another, and then estimate the temporal use pattern of these areas (e.g., breeding or stopover for individuals migrating north or south). Relying on data from a temporal scale of over one year allows consideration of the variation due to irregular events to be considered (e.g., mast seeding, storms during migrations, late snowfalls, etc.).

For greenhouse gas (GHG) emissions, the proponent must describe how the designated project could have an impact on global GHG emissions, thus defining the spatial boundary as extending beyond Canada.

For the evaluation of the project's contribution to sustainability, the proponent must consider long-term effects on the well-being of present and future generations.

Please see Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012* for more information on establishing spatial and temporal boundaries.

8. Baseline Conditions – Biophysical Environment

The objective is to obtain a fair and complete picture of the baseline conditions of the environment before the project is implemented. As a result, once the project has been implemented, it will be possible to measure the magnitude of the effects on the natural environment and assess the proportions attributable to the project itself.

The components of the natural environment described in this section should be recognized as VCs. A detailed description of the baseline conditions for each VC should then be presented in the Impact Statement. In the event that other environmental components are identified as important by Indigenous peoples and local communities during engagement and consultation activities with the proponent, they must be integrated into the list.

8.1. Atmospheric, Acoustic and Visual Environments

8.1.1. Atmospheric Environment

The Impact Statement must:

- assess the ambient air quality in the project study areas and identify existing contaminant emissions sources. The description and assessment of ambient concentrations and deposition of existing contaminants may be carried out in various ways (e.g., using long-term or short-term monitoring data, using the air quality of representative areas or using results obtained from air quality models). If long-term monitoring date is unavailable, one of the following methods may be acceptable:
  - use of short-term monitoring data;
  - use of a substitute with similar weather conditions and a similar air quality regime in order to represent the site in question (e.g., use of data for a sensitive environment surveyed on an existing

network of sampling stations). The choice of the substitute will have to be justified and clearly described; and

- dispersal modelling to indicate the spatial distribution of the contaminants and their concentrations;

- provide the results of a baseline survey of ambient air quality, in particular near receptors, by identifying and quantifying emission sources for the following contaminants:
  - total suspended solids;
  - fine particulate matter smaller than 2.5 microns ($PM_{2.5}$);
  - respirable particulate matter smaller than 10 microns (PM_{10});
  - carbon monoxide (CO);
  - sulphur oxides (SO_x);
  - nitrogen oxides (NO_x);
  - volatile organic compounds (VOCs), including the VOC subgroups;
  - hydrogen sulphide (H_2S) and other sulphur compounds;
  - polycyclic aromatic hydrocarbons (PAH) (including alkaline PAHs, PAH-transformation products, including nitro- and oxy-PAHs, and dibenzothiophenes [DBT]);
  - any other toxic air pollutants from mobile, stationary or fugitive sources, including contaminants produced by the combustion of diesel fuel, such as particulate matter and metals; and
  - any other air pollutant known to be a respiratory irritant (likely to be emitted by the project)
- provide the baseline data for any other project-related contaminant;
- compare ambient air quality results must be compared with provincial and federal standards. For air pollutants with standards, the proponent must use the averaging period, the values and the statistical format associated with each numerical value. Standards include: Canadian Ambient Air Quality Standards (CAAQS), National Ambient Air Quality Objectives (NAAQO), and Quebec Air Quality Standards. The proponent must refer to the new CAAQS established by the Canadian Council of Ministers of the Environment (CCME) for $PM_{2.5}$, O_3, SO_2 and NO_2 to take effect in 2020 and 2025;
- highlight and resolve the issues related to the quality of the monitoring data, including seasonal viability in the baseline reading, and determine the ambient concentrations of contaminants based on complete, exhaustive and representative monitoring data (2 years) and an appropriate geographic scope so as to have a sufficient data set to detect an effect once the project is in operation. Data validation and quality control methods must also be described. Where possible, the proponent is encouraged to submit data for a period longer than 2 years for contaminants relevant to the CAAQS. In particular, if data are available for a longer period, it is suggested that 3-year averages be submitted;
- assess and identify the existing GHG emissions sources for the project study areas;

8.1.2. Acoustic Environment

The Impact Statement must:

- present the current ambient noise levels at the receptors (Indigenous communities, users of ancestral lands, human receptors and wildlife), including the results of a survey of the populations regarding baseline ambient noise and the admissible sound levels for each receptor. The information on usual noise sources (natural or anthropogenic), their geographic scope and their temporal variations must be included. At the time of collecting baseline data for the study on ambient noise where there are human receptors, it is recommended that the following aspects be considered:
  - natural sounds;
  - soundscapes (see standard ISO 12913-1:2014. Acoustics – Soundscape – Part 1: Definition and conceptual framework);
  - expectations regarding quiet conditions in specific places or at specific times;
  - usual sleeping hours (the default assumption is 10 p.m. to 7 a.m.); and
  - degree of baseline annoyance attributable to existing noise sources (e.g., vehicle traffic, aircraft, other industrial noise);
- provide information on all noise receptors that may be affected by the project in the study area, including any foreseeable receptors and sensitive human receptors. Justify the selection of receptors and specify the distance between the receptors and the project. Provide a map indicating the approximate locations of the permanent residences, the temporary uses and the known locations of the human receptors in relation to the project site;

8.1.3. Visual Environment

The Impact Statement must:

- describe existing ambient night-time light levels at the project site and at any other areas where project activities could have an effect on light levels;
- describe night-time illumination levels during different weather conditions and seasons; and
- describe landscapes of interest, visual screens and other components of the visual environment, and locate them on maps.

For the evaluation of the project's human health impacts associated with the changes in ambient noise and air quality, the proponent must refer to the following Health Canada guides: Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise and Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality (see references in Appendix 1). It is recommended that the proponent complete the checklists provided in these guides (Appendix B in the guide on noise and Appendix A in the guide on air quality) to ensure the presence of all the elements expected in the Impact Statement.

8.2. Meteorological Environment

The Impact Statement must:

- provide reference documents that describe the local and regional climate, including the historical readings of the relevant meteorological data, e.g., total precipitation (rain and snow);
- indicate the references to the sources (and to the unique identifiers of the weather stations for the data sources) of the following types of data:
  - mean, maximum and minimum monthly temperatures and unique identifiers of the weather stations for the data source; and
  - mean, maximum and minimum monthly precipitation;
- provide typical wind speed and direction;
- provide hourly meteorological data (wind speed and direction, air temperature, dew point temperature [or humidity], atmospheric pressure and precipitation data) for at least one year to support the dispersal modelling that captures the normal variability of weather conditions. Where possible, the proponent is encouraged to submit data for a period longer than 1 year. If data are available for a longer period, it is suggested that 5-year averages be presented to account for seasonal and inter-annual variations. The proponent may also use prognostic data for atmospheric modelling of contaminants;
- establish the potential for extreme weather events such as wind, precipitation and temperature extremes; and
- use standard meteorological measurements to provide estimates of the range of evaporation measurements, particularly by using the Penman (1948), Morton (1983) or Meyer (1942, 1993) methods or monthly (or daily) evapotranspiration measurements. Using evaporation pan measurements is not recommended.

The data mentioned must be accessible for the examiners.

8.3. Geology, Geochemistry and Geological Hazards

The Impact Statement must:

- describe the geology of the rocky substratum, the host rock of the deposit and the surface formation (Quaternary), including a table of the geological descriptions, the styles of changes, geological maps and cross-sections to the appropriate scale;
- describe the geomorphology, topography and geotechnical characteristics of areas proposed for construction of major project components;

- define the areas that can contain acid-generating rocks and forecast leaching of metals and acid rock drainage, including oxidation of primary sulphides and secondary soluble sulphate minerals;
- provide a characterization of the geochemical composition of the projected mineral materials, such as waste rock, ore, low-grade ore, tailings, overburden and eventual construction materials, which should include the mineralogy of the ore, the major elements, the trace elements, and the possibilities of acid generation, neutralization and contaminated neutral drainage;
- provide a sufficient geochemical characterization of the potential leaching of the waste rock, ore, low-grade ore, tailings, overburden and eventual construction materials, so as to be able to predict prudent dispersal scenarios that will serve to decide mine waste management on the site. To do this, the proponent must follow the recommendations of the NEDEM 1.20.1 Prediction manual for drainage chemistry from sulphidic geologic materials (2009) report and the Guide de caractérisation des résidus miniers et du minerai (Tailings and ore characterization guide) of the Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC);
- describe the baseline concentrations of contaminants of special concern (which non-exhaustively include selenium, sulphate, cadmium, nitrate, calcite and heavy metals) in the local, regional and downstream receiving environments;
- use examples of other neighbouring mining sites of similar geology in the evaluation of the leaching potential from waste rock, ore, low-grade ore, tailings, overburden and eventual construction materials; and
- highlight any geological hazards that exist in the areas planned for the project facilities and infrastructure, as well as for residential areas on the surface of the proposed underground ore mining areas, including:
  - history of seismic activity in the area, including induced earthquakes, and side effects, landslides and liquefaction generated by earthquakes;
  - proof of active faults;
  - isostatic rise or subsidence; and
  - history of landslides and slope erosion, risk of ground and rock instability, and the potential for landslides and subsidence occurring during and after project activities.

8.4. Topography, Soil and Sediment

The Impact Statement must:

- describe the terrain, sediment and soil in the project's local and regional zones, including sediment stratigraphy, surficial geology maps and cross-sections of appropriate scale;
- describe the potential changes to soil quality, soil loss and soil compaction and erosion of soils that could affect soil productivity;
- identify any areas of ground instability and soils potentially vulnerable to vibrations;

- provide maps and sections depicting the depth of surface formations by horizon at the approaches to and within the mining site, to support land recover and rehabilitation and establish the risk of soil erosion;
- describe the capacity of the topsoil and the overburden to be used for rehabilitation of the disturbed areas, and then provide an assessment of the acid-generating potential of the overburden to be used;
- for agricultural lands or forested lands with agricultural capability, describe:
  - the soil classification, including the order, group, family, series and type of soil prior to construction, and quantify the soil classification;
  - the productivity of land and the type of agricultural resource;
  - the soil types in the study area that are highly susceptible to wind and erosion, compaction and loss of structure and tilth;
  - any other soil type requiring special management by mitigation measures; and
  - soil conservation and protection measures;
- describe the historical land use and the risk of contamination of soils and sediments and thus any known or suspected soil contamination with the study area that could be re-suspended, released or otherwise disturbed as a result of the project;
- identify the ecosystems sensitive or vulnerable to acidification resulting from the deposit of air pollutants; and
- describe the presence and location of any relief associated with a wildlife habitat, particularly eskers, crests, cliffs, rocky outcrops, exposed bedrock, embankments, karst caves and mines.

8.5. Riparian and Wetland Environments

The Impact Statement must:

- provide a description and maps of the primary, secondary and tertiary wetland catchments, as well as the minor and major rivers and lakes;
- provide a written description and maps of the ecozones, ecoregions and ecodistricts in accordance with the provincial or Canadian ecological classifications of land;
- identify, map and categorize all wetlands (autonomous and interconnected) potentially directly or indirectly affected by the project;
- provide GIS files of mapped features depicting natural areas and wildlife presence within the study area;
- characterize banks, current and future flood risk areas, wetland catchment boundaries;
- quantify, delineate and describe wetlands (fens, marshes, bogs, etc.) within the local and regional study areas potentially directly, indirectly or cumulatively affected by the project in the context of the following:
  - wetland class, ecological community type and conservation status;
  - biodiversity (flora and fauna);
  - wetland habitats that meet the needs of species at risk;

  - abundance at local, regional and provincial scales;
  - distribution; and
  - current level of disturbance;
- take into account the Regional Wetland and Water Environment Plan developed by the City of Rouyn-Noranda;
- determine whether these wetlands are within a geographic area of Canada where wetland loss or degradation has reached critical levels, or whether they are considered ecologically or socially or economically important to a region. To do so, consult the Wetlands and Water Conservation Objectives of the Organisme de bassin versant du Témiscaminque (available in spring 2021);
- identify an RSA of sufficient size to fully understand the effects on wetlands in the wider drainage area, including wetlands outside the LSA that may be affected by hydrological changes due to cumulative effects;
- identify and describe wetland capacity to perform hydrological and water quality functions, provide for wildlife and wildlife habitat or other ecological functions;
- provide a wetland functions assessment in accordance with the guiding principles of Wetland Ecological Functions Assessment: An Overview of Approaches or any subsequent approved guidelines by which to determine the most appropriate functions assessment methodology to use (see Appendix 1);
  - the assessment mustbe conducted for all wetlands directly affected by the project and for all hydrologically related wetlands. As part of this assessment, the proponent must ensure that wetlands are taken into account in the context of:
    - major watersheds of which they are a part;
    - the use of adjoining land, with an emphasis on hydrology and other functions; and
    - the terrain and/or watershed, taking into account topography, soil types and hydrologic connections;
  - the assessment must be quantitative and include the collection of baseline information on the functions of the wetlands specific to the site, including:
    - a description of all wildlife species using wetlands;
    - surveys aimed at determining the presence, abundance, density and distribution of migratory birds, species at risk listed under the Species at Risk Act (SARA) and the Quebec Act Respecting Threatened or Vulnerable Species, and species assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being endangered. The surveys must comply with established standards, be specific to one species or group of birds, and be conducted during appropriate times of the year, as specified in sections 8.8, 8.9, and 8.10 of this document. Whenever possible, surveys of species at risk should focus on each species individually. Generally speaking, an indicator-based approach is not suitable for species at risk. The surveys should not be limited to wetland-reliant species or groups of species; rather, they should include all species known to frequent wetland habitats as part of their life cycle. Data should be sufficiently reliable to make it possible to identify the wetland classes important to each species;

  - the spatial location and the biological characteristics of each potentially impacted wetland, as well as the ecological functions (hydrologic properties, biochemical cycle, habitat, climate) each one performs.
  - design surveys associated with the assessment so they faithfully represent spatial and temporal targets of modelling and extrapolations, and so they produce scientifically defensible forecasts of the consequences and estimates of the effectiveness of scientifically defensible mitigation measures. The sample size and the spatial balance of its location must be sufficient to allow reliable spatial and temporal assessments and forecasts. The study plans should be sufficiently sensitive to detect and quantify impacts at the above-mentioned spatial and temporal scales (i.e., the project study area, the LSA and the RSA), the variations relative to the forecasts and the effectiveness of the mitigation measures. Provide a rationale for the choice of modelling techniques using recent scientific literature;
  - a justification and detailed description of the methodology used to conduct the wetland functions assessment; and
  - complete sets of data for all project sites, including GIS files;
- provide the information necessary to determine whether the Federal Policy on Wetland Conservation applies; and
- communicate with provincial or local authorities to determine if other wetland conservation policies, regulations and guidelines apply (see the Wetland Network website).

8.6. Groundwater and Surface Water

8.6.1. Surface Water

The Impact Statement must:

- provide complete hydrometric data (temperature, precipitation, evapotranspiration) based on the data from the neighbouring weather stations or a weather station on-site;
- describe the hydrographic and hydroclimatic context of the project site (e.g., the climate models);
- define and map the drainage basins at appropriate scales (bodies of water and watercourses), including the intermittent watercourses, the flood zones and the wetlands, as well as the limits of the watersheds and the sub-watersheds, superimposing the main components of the project;
- describe the local monitoring program and collection of the hydrological data;
- quantify the existing surface water conditions, including the full range of seasonal and interannual variations, the ice cover and the snow regime, as well as the baseline and low flows. This may be based on data coming from gauging stations located on the site or regional baseline gauging stations and histories of temporal data;
- identify and describe the bodies of water, watercourses and water resources potentially affected by the project;

- provide hydrographs for the neighbouring rivers or streams, showing the full range of seasonal and interannual flow variations. They may be based on data from gauging stations located near or on the site;
- provide limnigrams for the neighbouring rivers or streams, showing the full range of seasonal and interannual level variations;
- provide the calendar of freeze-thaw cycles, ice cover and ice conditions for the bodies of surface water in the project area;
- describe how the effects of climate change are taken into account in the assessment of the project's effects;
- for each body of water that could be affected by the project, provide the total surface, the bathymetry, the maximum and mean depths, and the composition of the sediments (i.e., particle size and sediments quality);
- establish a quantitative surface water balance, detailing the inflow and outflow in the environment, including the seasonal variations;
- identify all springs and any other potable surface water resources within the local and regional project areas and describe their current use, potential for future use, and then specify whether their consumption has Indigenous cultural importance;
- describe the baseline surface water quality characterization program, including the choice of sampling sites, the sampling duration and frequency, the sampling methodology and the analysis protocol, the quality assurance and quality control measures in the field and in the laboratory (accreditation) and the reference data assessment and analysis methods. Explain the addition of any applicable historical data or existing information. Please refer to the Metal Mining Technical Guidance for Environmental Effects Monitoring;
    - the sampling site selection must include locations in the project area, the LSA and the RSA (i.e., in all the locations that could be affected by the project);
    - baseline samples must also be collected from baseline locations with little likelihood of being affected by the project;
- provide physical limnology data (e.g., data on the vertical profile of the lake, information on stratification and renewal, on the ice cover), and baseline data on surface water quality for the physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, turbidity, total suspended solids, total hardness, total dissolved solids, dissolved organic and inorganic carbon, alkalinity, turbidity and suspended solids) and the relevant chemical constituents (major and minor ions, trace metals [total and dissolved], radionuclides, nutrients and organic compounds, including those potentially of concern). The collection and analysis of water samples must use appropriate detection limits and the data must illustrate the seasonal and interannual variability of the baseline surface water quality, with enough years of baseline data to characterize the natural variations fully, including the variations attributable to the groundwater-surface water interactions. The data must be collected so as to produce a sufficient data set to detect a statistically significant change in water quality once the project is in operation;
- present baseline concentrations of naturally occurring elements in surface waters relative to applicable water quality guidelines;

- present concentrations of contaminants of concern in surface waters relative to applicable water quality guidelines;
- provide a sufficient physical description of the sediments (silt, clay, organic carbon and other content) so as to produce a sufficient data set to detect a statistically significant change in sediment quality once the project is in operation;
- provide enough information on the natural concentrations of major ions, selenium and heavy metals, so as to produce a sufficient data set to detect a statistically significant change in sediment quality once the project is in operation;

8.6.2. Groundwater

- draw up the list of all the domestic, community and municipal water wells in the local and regional areas of the project, including their hydrostratigraphic units and their piezometric level. Describe their current use and their potential future use. Specify if their consumption has Indigenous cultural importance;
- provide domestic water well owners in the project LSA with the opportunity to sample and characterize their wells for potential flow prior to the start of the operations phase;
- provide hydraulic properties of hydrostratigraphic units, including data on hydraulic conductivity, specific storage capacity, transmissivity, storage, saturated thickness, porosity, and specific yield, as appropriate, with a standard error measure provided for each;
- draw up the list of all the groundwater monitoring wells in the project area, with their location, the details of their execution (diameter, depth of the filter), the geological register, the filtered hydrostratigraphic unit, the piezometric level and the monitoring frequency;
- provide monitoring well hydrographs showing the full range of seasonal and inter-annual water level variations;
- describe the groundwater quality baseline characterization program, including the choice of sampling sites, the sampling duration and frequency, the sampling methodology and the analysis protocol, the quality assurance and quality control measures in the field and in the laboratory (accreditation) and the reference data assessment and analysis methods. Describe the addition of any applicable historical data or existing information:
  - the sampling site selection must include locations in the project area, the LSA and the RSA (i.e., in all the locations that could be affected by the project);
  - baseline groundwater samples must also be collected from baseline locations with little likelihood of being affected by the project;
- provide baseline data on groundwater quality for the physicochemical parameters (e.g., temperature, pH, alkalinity, electrical conductivity, dissolved oxygen, dissolved organic carbon) and the relevant chemical constituents according to the past and future use of the site (total and dissolved metals, major and minor ions, trace metals, nutrients and organic compounds). The data should illustrate the seasonal and interannual variability of baseline groundwater quality and any other small-scale temporal variability (e.g., discharges upstream of the reservoirs), including the possible changes attributable to the

groundwater-surface water interactions. The data must be collected so as to have a sufficient data set to detect a statistically significant change in water quality once the project is in operation;

- present baseline concentrations of naturally occurring elements in groundwater relative to applicable water quality guidelines;
- present concentrations of contaminants of concern in groundwater relative to applicable water quality guidelines;
- describe the hydrostratigraphic units (aquifers, aquitards, aquicludes) of the hydrogeological environment in the rocky substratum and the overburden;
- provide hydrogeological maps, such as the recharge, the groundwater emergence areas, containment of the aquifers, vulnerability, piezometry and the geochemical contexts, depending on the water types;
- describe the structural geology of the hydrogeological environment, including the major faults, the density of the fractures and the orientation of the groundwater flow;
- define the vertical variation of the fracturing and its relationship with hydraulic conductivity;
- describe the groundwater flow boundaries of the hydrogeological environment;
- define and characterize groundwater-surface water interactions and identify groundwater-dependent ecosystems, wetlands and recharge and discharge areas;
- describe the delimitation and characterization of the groundwater-surface water interactions, including the temperature and the flow of the groundwater to the surface water, and the surface water supply from the groundwater;
- provide the hydraulic properties of the hydrostratigraphic units, including the data on hydraulic conductivity, specific storage capacity, transmissibility, storage, saturated thickness, porosity and specific yield, as the case may be;
- provide hydrogeological maps, including the fracture and fault areas in the rocky substratum, and cross-sections of the study area showing the water table elevations, the potentiometric contours, the interpreted directions of groundwater flow, the groundwater divides and the recharge and discharge areas;
- present a conceptual model of the hydrogeological environment, including an analysis of the geomorphological, hydrostratigraphic, hydrological, climate and anthropogenic controls of the groundwater flow;
- develop a three-dimensional digital groundwater flow model for the project area, based on the conceptual model of the hydrogeological environment;
- state the limits and the assumptions of the modelling approach;
- calibrate the digital model according to the baseline hydrogeological conditions, using groundwater level and streamflow monitoring data, and provide measurements and graphs describing the quality of the calibration produced;
- analyze the sensitivity of the model's key parameters;
- quantify the uncertainty of the modelling results (drawdown area, contaminant transport, etc.);

- using the calibrated digital hydrogeological model, provide a baseline water balance of the groundwater, including the baseline flow in the wetlands, the watercourses and the rivers, the recharge of the lakes or watercourses, and any anthropogenic withdrawal;
- describe the state of the initial hydrogeological conditions during construction and closure and account for the cumulative effects in the analyses; and
- predict the quality of the groundwater resource after rehabilitation.

8.7. Vegetation

The Impact Statement must:

- in the project's local study area, provide a description of the following:
  - the biodiversity, relative abundance and distribution of plant species and communities of ecological, economic and social importance (e.g., traditional use, forestry, cultivated pasturage, Indigenous grassland, wetlands, mature forest and virgin forest);
  - conservation status (i.e., listed under the SARA or assessed by the COSEWIC as "endangered", including species of special concern) applicable to a species or a specific community;
  - the essential habitat of the species at risk, as described in the recovery strategies or the final or draft action plans;
  - the current degree of anthropogenic and natural disturbance (fire, flood, drought, etc.) associated with the vegetation, including a description of the degree of habitat fragmentation and loss, historical and current disturbance, any immediate activity that led to changes in the fire regimes (e.g., extinction of fires, floods, insect infestations, etc.);
  - the quantity, merchantability and location of any commercial timber that must be removed during construction of the project;
- determine the biodiversity parameters and the biotic and abiotic indicators used to characterize the baseline vegetation biodiversity, and explain the rationale of their selection;
- provide data files of mapped features depicting vegetation presence within the study area;
- describe any weed species or any other invasive species or introduced species of special concern;
- describe the natural disturbance regime (e.g., fire, flood, drought, etc.);
- describe the use of terrestrial wildlife as a source of country foods (traditional foods) and whether its consumption has Indigenous cultural importance;
  - traditional foods mean all foods that do not come from commercial systems. They include all food trapped, fished, hunted, gathered or cultivated for medicinal or subsistence purposes outside the commercial food chain. This definition encompasses the following foods:
    - fruits and vegetables gathered in nature (e.g., berries, seeds, leaves, roots and lichens);
    - plant tissue (e.g., roots, barks, leaves and seeds) consumed for medicinal or other purposes (e.g., teas);

    - agricultural produce (e.g., fruits, vegetables and mushrooms) cultivated in private gardens or orchards;
    - aquatic and terrestrial fauna that is fished, trapped, hunted or gathered (e.g., game animals or birds, fish and seafood) and intended for domestic consumption; and
    - aquatic and terrestrial fauna (and their by-products) produced only for domestic consumption (e.g., ducks, chickens or other poultry, eggs and dairy products); and
- describe the forest management methods, the performance period and the means adopted for timber marketing and their impacts on biodiversity and sociocultural values.

8.8. Fish and Fish Habitat

For any body of water and any watercourse (permanent and intermittent) likely to be affected (directly or indirectly) by the project, the Impact Statement must:

- provide a description of the aquatic environment:
    - for watercourses, it is recommended that characterization be performed on homogeneous segments. The parameters to be measured include, but are not limited to, length of the section, width at the ordinary high-water mark, depth, streamflow types and characteristics (velocity, turbidity, peak and low flows, etc.), substrate type (shoreline and bottom), aquatic (grass flat) and riparian vegetation, natural barriers (significant vertical drop, waterfall, subsurface flow over large distances, beaver dam, etc.), and other barriers (stream crossing structures, etc.) that impede or obstruct free passage of fish. The obstacles must be documented (size, condition, etc.) and their passability by fish must be assessed; and
    - for bodies of water, the parameters that must be measured include, but are not limited to, bathymetry, maximum and average depths, seasonal water level fluctuations, substrate type (sediment), aquatic (submerged, floating and emergent) and riparian vegetation, and water quality (temperature and dissolved oxygen profile, turbidity, transparency, pH);
- provide a description of fish populations, including species and life cycle stages, based on field surveys (standardized experimental fisheries) and available data (e.g., government and historical database, fisheries data, information from consultation and engagement activities, traditional knowledge of Indigenous peoples affected by the project, etc.). The data sources must be identified, and detailed information relating to fisheries must be provided (description of gear and catch methods, location of sampling stations, date of surveys, species surveyed, size and life cycle stage, catch per unit of effort, etc.). It is recommended that the information be presented in the form of tables; and
- provide the location and area of potential and confirmed habitat in or near the work area and describe how they are used fish in terms of habitat function (spawning, nursery, growth, foraging, movement and migration, shelter and resting, thermal and winter refuge, etc.) and habitat suitability for species present. It is recommended that the information be presented on one or more maps at appropriate scales, and in the form of tables accompanied by photos.

The Impact Statement must also:

- provide a description of the baseline information on the habitat, which includes the overall composition of the sediments (e.g., sediment quality, particle size analysis, total organic carbon, heavy metal concentrations, major ions, pH and organic carbon, etc.);
- include biological productivity measurements, including characterization of the benthic invertebrate community and plankton communities, and the associated variability;
- prepare a list of aquatic species at risk (provincial and federal) that are known or likely to be present and provide the location and a description of suitable or potential habitat for these species (residence and critical habitat) at or near work areas; and
- describe the use of fish and aquatic species as country foods, and whether their consumption and use have Indigenous cultural importance, including medicinal uses. Furthermore, all sites used in the study area or historically important sites for the collection of country foods must be identified and mapped, such as important fishing sites.

It is worthwhile noting that certain intermittent streams or wetlands (marshes, bogs, ponds, etc.) may constitute fish habitat or contribute indirectly to fish habitat. The absence of fish or water at the time of the survey does not irrefutably indicate an absence of fish and/or fish habitat (e.g., migratory corridor). Similarly, beaver dams and accumulations of woody debris are not considered impassable barriers to fish.

8.9. Birds, Migratory Birds and Their Habitat

The Impact Statement must:

- consider the following bird groups as unique VCs: waterfowl, aquatic birds (other than waterfowl), songbirds, birds of prey, shorebirds, wetland birds (i.e., bogs, fens and other wetland habitats), and bird species at risk;
- also consider the important habitats associated with species at risk to be VCs;
- describe biodiversity of bird species and their habitats that are found or are likely to be found in the study area, including the presence of bird conservation regions (BCR). The relevant information sources are provided in section 7.2. Take into account the following technical recommendations:
  - gather data on birds so as to represent the temporal sources of variation between years, during and between seasons (e.g., spring migration, breeding, fall migration, overwintering), and in the 24-hour daily cycle;
  - gather the explanatory data (i.e., covariables) required for modelling so as to represent the following spatial sources of variation: land cover composition, soil type, geomorphology, hydrological processes, climate conditions, temporal variability, particularly annual, local climate, and interannual and intra-annual climate variability;
  - collect data so as to permit sufficiently reliable extrapolations in space (i.e., at a minimum in the project area, local and regional study areas) and in time (i.e., over the years);

- design surveys so they represent spatial and temporal targets of modelling and extrapolations, and so they produce scientifically defendable forecasts of impacts and estimates of the effectiveness of mitigation measures. The surveys should be sufficiently sensitive to detect and quantify impacts at the above-mentioned spatial and temporal scales, any variations from the forecasts and the effectiveness of the mitigation measures. Provide a rationale for the choice modelling techniques using current and recent scientific literature;

- plan survey protocols using modelling and simulations to estimate sampling needs, as well as analysis to evaluate the design options that result. It is recommended to:
  - collect field data to account for natural variability in populations. To achieve this, a minimum of two years of inventory is normally required. However, if existing data is available for the study area, it can be used to complement the data collected in the field (minimum one year). The available data must be sufficiently robust to assess the variability of populations between years and a demonstration must be presented for that purpose;
  - plan the sample size to ensure an assessment of the project area in the context of the LSA and the RSA. Proper survey planning will have to involve a number of survey locations in order to represent the heterogeneity of the RSA habitat and obtain a sufficient number of survey locations by land cover or habitat category without the need to group habitat classes post-project;
  - plan for the sampling effort per unit area such that field surveys are more intensive in the project area. The level of effort per unit area may be similar to or slightly lower in the rest of the LSA, but it should be proportional to the probability that the effects of the project will affect birds in this area. The steps taken outside the project area must be carefully designed so the comparative estimates between the project area, LSA and RSA are impartial and as accurate as possible;
  - take into account that rare species require much greater detection efforts than common species, an aspect that must be taken into consideration during the survey development by increasing their number and duration;
  - use simulation modelling to assess bias and accuracy between the project area, LSA and RSA in order to verify whether these estimates are useful for comparison purposes. Field surveys should be conducted in the RSA when there are few data that effectively describe the regional bird populations living in areas far from road networks; and
  - develop the songbird survey plan based on a standardized approach across both the project area and the LSA. An example of a standardized approach and methodology recommendations for designing a songbird survey plan are provided in Appendix 2;
- at minimum, the combined information from existing data and field surveys must be detailed to describe the distribution and abundance of all bird species in relation to the study areas; and
- include complete data from all the survey sites. It should be presented in the form of complete, high-quality relational databases, with precisely georeferenced site information, information from observation and precise visits, and unsummarized observations and measurements;

- attach documents and digital files for all analysis results to provide a clear understanding of methods and ensure that results can be replicated. Preference is given to data processing procedures rather than descriptive documentation;
- provide raw survey data and analysis results for 1) all birds, 2) each VC and 3) BCR priority species based on the following criteria: frequency of occurrence, abundance, abundance in each type of habitat, and a map showing the areas with the highest concentrations of the species;
- identify the biotic and abiotic indicators that are used to characterize the baseline avifauna biodiversity conditions and discuss the rationale for their selection;
    - species communities should not be grouped together by diversity indicator and should not be limited to the indicator species. The identification of species, distribution, abundance and, when possible, estimates of species' breeding status should be the main quantification objectives;
    - the biodiversity metrics for each VC should include the following: distribution in space, frequency of occurrence, occurrence and abundance trends over time, abundance and density, as well as the types of associated habitats and the strength of the associations;
- provide abundance and distribution estimates, and information on the birds' biological cycles, in relation to the study areas. The information may be based on a combination of existing information and field surveys in order to provide sufficient current data for reliable estimates. The following recommendations should be applied:
    - Generate abundance and distribution measurements using spatially distributed and randomly chosen sampling sites. Sampling should include the borders and transitions between the habitat types and should not be geared exclusively to homogeneous parcels of a given habitat type. Ensure that the coverage is large enough to estimate and take into account detection errors and provide unbiased estimates of abundance and distributions using, as best practice, simulation modelling before sampling;
        - Sampling within temporal boundaries should be spatially and temporally balanced so that all spatial areas receive comparable temporal coverage;
    - Provide estimates of confidence or error values for all abundance and distribution estimates. The estimates should be defined (e.g., mean over several years, mean over several sites, modelled predictions) and confidence intervals or other intervals should be defined (e.g., 95% confidence intervals, credible intervals). The use of hypothesis tests with p values is not generally appropriate in this context and a rationale should be provided for their use;
    - Each time that species' densities are estimated, take into account the detection error induced by observers to ensure the validity of comparisons between the counts (e.g., between surveys, before and after surveys, or between affected and unaffected sites). When detection errors are counted, the method used should take into account random variation between visits, as well as the detection variability dependent on the types of land cover, observers, meteorological conditions, period of year and species. Simulation methods can help to determine whether a specific method is appropriate for a survey model and a specific analysis. Care must be taken to avoid affecting the reliability of abundance estimates;

- Preferably use stratified random sampling in space. Sites should be chosen according to a random sampling procedure that takes the project's footprint into account. To select specific sampling sites, the sites in the area of interest must be well distributed and there must be coverage of the different types of habitat. The location should be chosen randomly using an approach to avoid implicit bias in the selection of a site;
  - Provide a rationale for the approach chosen. If necessary to guide or adjust the selection of the site based on access limitations, simulation modelling should provide evidence that this sampling strategy has not led to the introduction of bias;
  - Survey the relevant characteristics of the vegetation in a way that is not disproportionate with respect to the other types of vegetation. Bias in abundance estimates would compromise extrapolation and statistical deduction possibilities; and
  - Record all the criteria used to choose the location of parcels;

- identify areas of concentration of migratory birds, including sites used for migration, staging, breeding, feeding and resting;
  - Counts of migrating birds are influenced by the presence of species and the length of their stay. Any attempt to estimate their abundance during a migratory period must include an estimate of the length of their stay and annual and intra-annual trends. With respect to abundance, irruptive species (e.g., Evening Grosbeak) may act in the same manner as migrating birds. They can withdraw from an area until the conditions change;
- characterize habitat functions within the project area that are associated with the presence of potentially affected bird species, based on the best available data (e.g., land cover types, vegetation, aquatic features), including habitat fragmentation;
- provide detailed bird habitat descriptions, which at least characterize the biophysical conditions concerning the ecoregion and the BCR, and include local and on-site aerial photos. The habitat surveys in the local and regional study areas must be detailed enough to explain the availability and quality of the local and regional habitat:
  - the mixed and old forest cover and other types of upland vegetation can be especially important for many forest birds, because they ensure support for birds during the migration and breeding periods, and in winter. Peatlands and wetlands, including fens and bogs, are ecologically significant elements of the landscape; The riparian corridors of the watercourses form another relatively rare component of the adjacent mixed forest;
  - if the project's impacts (e.g., habitat losses or disturbance) were to force the nesting birds to relocate, the baseline date should show that there are enough equivalent habitats capable of accommodating the displaced birds and that the removed vegetation is not unique to the project area;
- describe the use of birds for traditional purposes (as food source, culture, and other). As applicable, determine the importance and timing per type of use for the Indigenous peoples; and
- provide an estimate of use of the area by birds throughout the year (e.g., winter, spring migration, breeding season, fall migration), based on the data from existing sources and surveys, in order to provide current field data, if necessary, to produce reliable estimates. For each part of the year, the survey effort

must take into account differences in the species' movements, particularly winter use of species highly dependent on the habitat and highly mobile species, that accurately characterize the use of a site;

- for avian species at risk, locate on an appropriately scaled map the potential habitats, survey locations, records of the species, residences and critical habitat:
  - Include sites that are likely to be sensitive locations and habitat for birds or environmentally significant areas. These include, without being limited to, national parks, areas of natural or scientific interest, migratory bird sanctuaries or other priority areas or sanctuaries for birds, national wildlife areas or world biosphere reserves;
  - Illustrate on the map the project's footprint, identifying temporary and permanent infrastructures. Locate the highest concentrations or areas of use by species.

Since data directly relevant to the study areas may be limited, other than data sourced from existing seasonal counting programs (e.g., BBS, eBird, Canard noir), existing sources may be used solely to estimate bird species likely to be found in the study area and to indicate potential migration dates (for migratory birds) or general breeding dates (for species breeding in the study area). When existing sources are used, supporting evidence is required to demonstrate that they are relevant to the project's spatial and temporal scales, and that they are representative of the avifauna and habitats of the study area.

Avian surveys should be designed in light of a thorough review of the available scientific literature pertinent to the specific region, bird groups and anticipated impacts. The Framework for the Scientific Assessment of Potential Project Impacts on Birds provides examples of project types and recommended techniques for assessment of the effects on migratory birds.

8.10. Terrestrial Wildlife and Their Habitat

The Impact Statement must:

- within the LSA of the project, provide a description of the biodiversity of wildlife species (animal and other organisms) and vegetation;
- identify the biodiversity metrics, biotic and abiotic indicators that are used to characterize the baseline biodiversity (e.g., population size, recruitment rates, etc.) and discuss the rationale for their selection;
- identify wildlife species and communities of ecological, economic or human importance (e.g., traditional use, tame pasture, native prairie, wetlands or old growth). For these species, describe:
  - numbers, population status, and distribution;
  - life cycle, seasonal ranges, migration and movements;
  - habitat requirements; and
  - sensitive periods (e.g., seasonal, diurnal and nocturnal);
- as biodiversity indicators, account for the species identified as being important or sensitive in ecological, economic or human terms, including insects and arthropods. For example, the baseline conditions of

certain insect larvae in the aquatic environment can serve as indicators relevant to the subsequent development of biodiversity follow-up programs;

- for vegetation surveys:
  - provide GIS data files of mapped features depicting vegetation presence within the study;
- communicate with the provincial or local authorities to verify the appropriate spatial limits concerning wildlife, specific data source and survey methodologies;
- for inventories of animal species (fauna):
  - collect data to represent sources of temporal variation between years, within and between seasons (e.g. spring migration, breeding, autumn migration, wintering), and within the daily 24-hour cycle;
- describe and quantify the habitat type for animal species, including its functions, location, suitability, structure, diversity, relative use, natural inter-annual and seasonal variability, and abundance as it exists before project construction;
- describe the use of all wildlife species and plants as a source of country foods and whether its consumption and use have Indigenous cultural importance, including for medical purposes;
- describe the use and harvesting of fur-bearing species and whether their harvesting has Indigenous cultural importance;
- list, and depict on a map, wildlife management areas and established or proposed sanctuaries;
- describe the levels of disturbance currently affecting wildlife and its habitat, such as habitat fragmentation and the extent of human access and use; and
- describe the natural disturbance regimes and their sources (e.g., fire, floods, droughts, diseases, insects and other pests, etc.).

8.11.Species at Risk and Their Habitat

The Impact Statement must:

- provide a list of all species at risk that are likely to be in the project area and the LSA and may be directly or indirectly affected by the project, including:
  - species listed in Schedule 1 of the federal SARA. A preliminary list of species at risk likely to use the project, and which may be directly or indirectly affected by the designated project, is presented in the table below. Use the existing data and documentation, traditional knowledge and the information shared by the Indigenous peoples, as well as the surveys, to provide current field data that reflects the interannual and seasonal variability of each species. The proponent must consider each of these species separately as a VC and organize the discussion on the potential impacts accordingly;
  - species protected under provincial legislation, and species assessed by COSEWIC as extirpated, endangered, threatened or of special concern. It is recommended to refer to the most recent COSEWIC annual report for the list of assessed wildlife species posted on its website;

Table 2: Preliminary List of Species at Risk Likely to Use the Project Area and the Local Study Area

French Name	English Name	Scientific Name
Reptiles		
Tortue mouchetée	Blandin's Turtle	*Emydoidea blandingii*
Tortue peinte	Painted Turtle	*Chrysemys picta*
Tortue serpentine	Snapping Turtle	*Chelydra serpentina*
Birds		
Engoulevent bois-pourri	Eastern Whip-poor-will	*Antrostomus vociferus*
Engoulevent d'Amérique	Common Nighthawk	*Chordeiles minor*
Faucon pèlerin anatum / tundrius	Peregrine Falcon anatum / tundrius	*Falco peregrinus anatum / tundrius*
Goglu des prés	Bobolink	*Dolichonyx oryzivorus*
Grive des bois	Wood Thrush	*Hylocichla mustelina*
Gros-bec errant	Evening Grosbeak	*Coccothraustes vespertinus*
Hibou des marais	Short-eared Owl	*Asio flammeus*
Hirondelle de rivage	Bank Swallow	*Riparia riparia*
Hirondelle rustique	Barn Swallow	*Hirundo rustica*
Martinet ramoneur	Chimney swift	*Chaetura pelagica*
Moucherolle à côtés olive	Olive-sided Flycatcher	*Contopus cooperi*
Paruline du Canada	Canada Warbler	*Cardellina canadensis*
Pioui de l'Est	Eastern Wood-pewee	*Contopus virens*
Quiscale rouilleux	Rusty Blackbird	*Euphagus carolinus*
Râle jaune	Yellow Rail	*Coturnicops noveboracensis*
Sturnelle des prés	Eastern Meadowlark	*Sturnella magna*
Mammals		
Carcajou	Wolverine	*Gulo gulo*
Chauve-souris nordique	Northern Myotis	*Myotis septentrionalis*
Petite chauve-souris brune	Little Brown Myotis	*Myotis lucifugus*
Pipistrelle de l'Est	Eastern Pipistrelle	*Perimyotis subflavus*

- include traditional knowledge and describe Indigenous importance, notably pertaining to the practice of rights;
- take into account that the detection of species at risk will require more survey effort, since they are generally less abundant, which needs to be considered in the survey design by increasing the number and duration of surveys. A minimum effort of inventories must be established with Indigenous peoples for all culturally important species before deciding on the absence of a species. For the surveys:
    - collect wildlife data in order to represent sources of time variation between years, during and between seasons (e.g., spring migration, breeding, fall migration, wintering), and in the daily 24-hour cycle;
    - collect field data to account for natural variability in populations. To achieve this, a minimum of two years of inventory is normally required. However, if existing data are available for the study area, it can be used to complement the data collected in the field (minimum one year). The available data must be sufficiently robust to assess the variability of populations between years and a demonstration must be presented for that purpose;
    - plan the sample size to ensure sufficient assessment of the project area in the context of the LSA and RSA. Survey design will need to consider a large number of sites to represent the heterogeneity of RSA habitat and to plan the number of sites by land cover or by habitat class so that aggregation of post hoc habitat classes is not necessary. In terms of sampling effort per unit area, focus primarily on field surveys within the project area. The level of effort per unit area may be similar or slightly lower in the remainder of the LSA, but should be proportional to the likelihood that project effects will affect species at risk in that area. Actions undertaken outside the project area must be carefully designed to ensure that comparative estimates between the project area, LSA and RSA are unbiased and sufficiently accurate;
    - preferably use stratified random sampling of habitat. Sample sites must be selected using a random procedure such as a GIS grid overlay;
    - plan surveys so as to include several sampling stations and several visits to each station to support all required assessment analyses. Inventories and analyses should be conducted by qualified experts; and
    - consult recovery plans for which a survey schedule would have been created to identify information gaps for these species, including for the designation of critical habitat.

For the species named in the table above, the Impact Statement must:

- provide any published studies that describe the significance (including the economic significance, abundance and distribution of species at risk), including recovery strategies or plans;
- refer to the Species at Risk Public Registry or the most recent COSEWIC annual report for the list of assessed wildlife species posted on their website;
- provide data and summary lists for each species at risk based on the following:
    - abundance;

  - distribution across the sampling sites (i.e., percentage of sampling stations where they are recorded);
  - abundance in each habitat type; and
  - a map showing the highest concentrations or areas of use by species;
- supplement data with surveys, if necessary. The survey protocols should optimize detectability and survey efforts should provide for comprehensive coverage at the appropriate time of year (e.g., survey breeding habitat during the breeding season, stopover habitat during migration);
- provide a rationale for the scope and methodology used for the surveys, including design, sampling protocols and data handling;
- when using recognized standards, provide details of any modifications to the recommended methods and the rationale for those modifications; Indicate who was consulted in the development of the baseline surveys (e.g., federal and provincial wildlife experts, specialists and local Indigenous peoples);
- collect field data to account for natural variability in populations. The objective of collecting field data over several years is to improve understanding of the natural variability of populations. To achieve this, a minimum of two years is normally required. However, if existing data are available for the study area, it can be used to complement the data collected in the field (minimum one year). The available data must be sufficiently robust to assess the variability of populations between years and a demonstration to this effect must be presented; and
- provide information or mapping at an appropriate scale (the appropriate scale is the project area and the LSA, as defined above for each valued component) for residences, seasonal movements, movement corridors, habitat requirements, key habitat areas, identified or proposed critical habitat and/or recovery habitat (where applicable).

The combined information from existing data and field surveys must at least be able to describe the distribution and abundance of species at risk in relation to the study areas. The Impact Statement must:

- locate, species by species, on a map at an appropriate scale, potential habitats, survey sites, species sighting records, residences and critical habitat. Illustrate, on the maps, the project footprint by identifying temporary and permanent infrastructures. Locate the highest concentrations or areas of use by the species;
- submit complete data sets of all target sites, and the metadata. These data sets should be presented as comprehensive, high-quality relational databases, containing accurately georeferenced information on the site, precise data on observations and visits, as well as observations and measurements in non-summary form; and
- attach to the analysis results, documentation and digital files that allow for a clear understanding of the methodology, the analyses and a replication of results (preference is given to data processing procedures rather than descriptive documentation).

The proponent must consult the Species at Risk Public Registry to obtain information on the list of species at risk and their protection status, as well as available recovery. The Impact Statement must specify the references to consulted documents and dates consulted. The proponent is responsible for ensuring that the most up-to-date documents have been used and that the status of the species is up to date.

The proponent should contact provincial or local government authorities to determine additional data sources and survey methods.

8.11.1. Bat-Specific Requirements

The Impact Statement must document baseline conditions in the project area and LSA. The proponent should consult provincial government experts on appropriate survey methods for bats, and provide a rationale for the methodology used, and include the following elements:

- conduct site-specific surveys to provide an overview of the species (present/undetected);
- quantify bat baseline activity (e.g., using acoustic detection to calculate a bat activity index) to assess the relative use of different habitats or features in the project area in order to justify decisions related to project location and anticipated impacts. In addition, locate and confirm the use of high-value features such as nurseries and resting sites (such as hollow trees and buildings), feeding areas and hibernacula;
- identify potential regional migration corridors and identify site-specific travel corridors and movement patterns;
- include the following types of surveys:
  - acoustic surveys, ensuring the study design is statistically valid;
  - continuous acoustic monitoring throughout the night (at least from sunset to sunrise: 30 minutes before sunset to 30 minutes after sunrise is recommended), active season (spring dispersal/migration, summer breeding/fall migration and swarming [fall staging]), as well as appropriate surveys of hibernation sites;
- locate and assess potential hibernation sites for bat use, taking into account the inter-annual and seasonal variability of use.

Data or reports must:

- include information on the acoustic detection methods used, including:
  - detector make and model;
  - microphone model used;
  - location of detectors;
  - height of microphones;
  - orientation of microphones;
  - special housing that may affect microphone sensitivity (e.g., wind screen, cones, weatherproofing);
  - mounting method (e.g., meteorological tower, pole);

  - device-specific settings (e.g., gain/sensitivity, etc.);
  - recording mode (i.e., full spectrum or zero crossing); and
  - a summary of any equipment failure issues and a description of procedures used to ensure equipment was functional during deployment (including ensuring microphone sensitivity remains within an acceptable range);
- clearly describe how bat "passage" is defined, consistent with the definition used for any control group, and justify the choice of modality;
- clearly describe the methods used for acoustic identification, including validation procedures, species classification criteria and software used, if applicable (including versions and parameters); and
- consider that when the results are compared from year to year: The survey schedule, the equipment and the installation protocols must remain consistent from year to year.

8.11.2. Turtle-Specific Requirements

The Impact Statement must provide and be based on the best information available from the provincial governments and Indigenous peoples regarding population size and trends. The proponent should consult provincial governments' and Indigenous peoples' experts on appropriate survey methods for turtles and provide justification for the methodology used.

A permit under the SARA should be obtained in advance for surveys on federal land if there is a chance that species at risk other than migratory birds will be harmed, harassed, captured or killed.

9. Baseline Conditions – Human Health

Baseline information on existing human health conditions is needed to prepare community health profiles. This information must include the current state of physical, mental and social well-being, and incorporate a determinants of health approach. The following references can be used as a starting point when considering and selecting the determinants of health:

- The Social Determinants of Health and Health Inequalities recognized by the Public Health Agency of Canada;
- Resources from the National Collaborating Centre for Determinants of Health, such as the fact sheet What Are the Social Determinants of Health?;
- Resources from the National Collaborating Centre for Healthy Public Policy;
- Resources from the National Collaborating Centre for Indigenous Health, such as the report Health Inequalities and the Social Determinants of Aboriginal Peoples' health;

- Resources from the National Collaborating Centre for Environmental Health on Health Impact Assessments; and
- The Positive Mental Health Surveillance Indicator Framework.

Examples of determinants of health that may be relevant to the project are provided in section 16.2 for review. Additional guidance on the collection of basic information concerning social and economic factors, including those that may affect general well-being, are detailed in section 10 and 11, respectively, and section 12 for factors related to Indigenous peoples.

The scope and content of the human health baseline must reflect the specific project context, take into account input from the public and Indigenous peoples, and include indicators that are meaningful for the effects analysis. The information provided must:

- be sufficiently detailed and targeted to allow a complete understanding of the current state of health of communities, particularly concerning disproportionately affected local communities and Indigenous peoples, while respecting the necessity to protect personal information and the standards for the management of Indigenous data (e.g., the First Nations principles of Ownership, Control, Access and Possession [OCAP], or standards adopted by an Indigenous people). This will help understand how these determinants have been taken into account and why certain indicators or information are presented when analyzing expected effects;
- account for the people in the community who are considered to be particularly vulnerable to the changes provoked by the project;
- provide a comparison of data at the provincial, regional or national level, if possible, to better interpret baseline health and social conditions;
- describe how community and Indigenous knowledge from relevant populations was used in establishing baseline health conditions, including input from diverse subgroups;
- when secondary information sources are used, show that the information is representative of the community studied;
- describe baseline health conditions and establish a specific health profile for each Indigenous community, while applying GBA+; and
- describe baseline health conditions and existing health inequalities using disaggregated data for diverse subgroups (e.g., women, youth, and elders) and their different access to resources, opportunities and services within the community to support GBA+.

Information on those likely to be directly or indirectly affected by the project should be provided taking into account community members who are considered particularly vulnerable to changes brought about by the project.

Additional efforts may be required to ensure the meaningful participation of vulnerable subgroups. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.

During preparation of the baseline information, the proponent must develop community health profiles. In addition to Ville de Rouyn-Noranda, a certain number of Indigenous communities could be affected by the project, but not all to the same extent, depending on the level of use of traditional lands and the possibility of home-to-work commutes to the city. Consequently, the profile of their communities may not be as extensive, and the points enumerated below may not all be applicable. Moreover, it would be appropriate to justify the exclusion of the Indigenous communities initially involved from any subsequent consideration. To understand the local community and its Indigenous context, as well as the Indigenous communities that may also be affected, and to prepare their community health profiles, the proponent, as applicable, must:

- determine the project's potential areas of environmental and social influence and illustrate them on maps;
- describe any context-specific definitions of physical, mental and social health and well-being that are specific to the context of communities, including community and spiritual well-being, including from the perspective of the relevant Indigenous cultures and local communities;
- describe relevant community and Indigenous history or context, including historical impacts on health, such as intergenerational traumas;
- describe the determinants of health selected specifically for Indigenous communities (e.g., workforce integration, social tension), including for subgroups within them (e.g., Indigenous workers);
- document and describe the relevant protection factors that contribute to community well-being and resilience (e.g., sense of belonging, cultural continuity, language, family supports);
- develop health profiles for the communities that have interests in the project's area of influence. The level of detail of the community health profiles may be adapted to the potential scope of the project’s impacts. Include the following items, as applicable:
    - the overall health of each community, according to the standard health indicators, in particular, the birth and mortality rates, transmissible diseases, injuries, the chronic disease rate, mental health (particularly the addiction rate), well-being, protection factors that contribute to the well-being and resilience of the community (e.g., the sense of belonging, community activities and existing social networks, and social capital and confidence);
    - other information relevant to the community (e.g., the crime rates);
    - information on the health VCs that immediately underlie the health outcomes, such as consumption of traditional foods, smoking, problematic alcohol and drug consumption, and stress or relief/comfort (to account for the biological effects), arising from social and/or economic conditions.
- use, where known, secondary information sources (e.g., Public Health Agency of Canada, Statistics Canada, provincial health authorities);
- describe the interconnections between the determinants of health (i.e., the environmental, social, economic and health VCs), including the considerations related to GBA+;
- provide the approximate location and distance of likely human receptors, including foreseeable future receptors, which could be affected by changes in the quality of air, water, soil, sediments and traditional foods, as well as noise and light levels. Include communities’ gathering, hunting, trapping and fishing areas, including for Indigenous peoples;

- at minimum, provide a map showing the approximate locations of permanent residences, temporary seasonal and recreational land uses (e.g., Indigenous cottages and camps identified in collaboration with Indigenous peoples) and sensitive human receptors (e.g., schools, hospitals, community centres, retirement complexes, healthcare centres) near the project;
- describe the drinking water sources that could be affected by the project. This includes all the water intakes of the drinking water treatment facilities and their capacity to eliminate chemicals of potential concern resulting from the project's activities. The drinking water sources must also include surface water or groundwater sources (permanent, seasonal, periodic or temporary), including approximate catchment areas at wellheads and their distance from project activities;
- describe the consumption of traditional foods as a health-related behaviour, including what species are used and consumed, quantities, frequency, harvesting locations and how the data was collected (e.g., site-specific consumption surveys, see the *First Nations Food, Nutrition and Environment Study* [Chan et al., 2014 and 2019]);
- provide baseline concentrations of contaminants in ambient air, drinking water and tissue of traditional foods used and consumed by Indigenous peoples and local communities. For game, the proponent should work with local Indigenous peoples to collect tissue samples where appropriate; and
- ensure that the data are representative of site conditions; if surrogate data from reference sites are used rather than project site-specific measurements, demonstrate how the data are representative of site conditions.

Section 7.2 and Appendix 1 refer to advice to help establish the relevant baseline profile for human health. The proponent must refer to the Health Canada guides to ensure that best practices are followed in collecting baseline information for assessment of the project's impacts on human health caused by changes in air quality, noise levels, the quality of drinking water and water used for recreational purposes, traditional foods and the multiple contaminant exposure routes. The proponent must justify any omission or deviation from the recommended baseline characterization approaches and methods, including the Health Canada guidelines.

10. Baseline Conditions – Social Context

Baseline information is required on existing social conditions and must include influences, resources and social activities related to social well-being for every potentially affected communities, including Indigenous peoples. The scope and content of the baseline social conditions should be tailored to the specific project context, take into account community and Indigenous input, and include indicators and information that are useful and meaningful for the effects analysis. The provided information must:

- be sufficiently detailed and focused to provide a comprehensive understanding of the current health status of communities, particularly with regard to local communities and Indigenous peoples

disproportionately affected. This will allow an understanding of how these determinants have been addressed and why certain indicators or information is presented when analyzing expected effects;

- be sufficient to provide a complete description of the current state of each VC, including relevant trends;
- provide a comparison of data at the provincial, regional or national level, if possible, to better interpret baseline health and social conditions;
- describe how community and Indigenous knowledge were used in establishing baseline social conditions, including observations from diverse subgroups;
- describe baseline social conditions using disaggregated data to understand different access to resources, opportunities and services for diverse groups and subgroups (e.g., women, youth and elders) within the community to support GBA+; and
- describe the baseline conditions for each Indigenous community, applying GBA+, and taking into account community members who are considered particularly vulnerable to changes resulting from the project.

Baseline data can be found in secondary information sources, such as census data, government publications and academic literature, as well as in through primary sources, such as surveys, key informant interviews, or focus groups. In all instances, ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.

In preparing a baseline for the social context, the proponent must identify the potential area of social influence of the project and develop community profiles. In addition to the City of Rouyn-Noranda, a number of Indigenous communities could be affected by the project, but not all to the same extent, depending on the use of traditional lands and the possibility of commuting to the city. As a result, the profile of their communities may not be as extensive, and not all of the elements listed below may be applicable. In addition, it is necessary to justify the exclusion of Indigenous communities, initially involved, from any further consideration. In preparing the community profiles, the proponent must describe, where applicable, the following:

- Influences on community well-being (e.g., disposable income, cost of living, lifestyle; language; rates of alcohol and substance abuse, and of illegal activities and violence; rates of sexually transmitted infections and gender-based violence; etc.), including indicators proposed by each Indigenous community;
- Expectations raised by the project within the community regarding opportunities for social and economic development;
- Community cohesion, including factors such as perceptions of racism, discrimination, and inclusion in the affected communities and expectations regarding any issues related to the immigration of additional workers;
- The psychosocial environment and its influence on community well-being;
- The socio-cultural environment, distinguishing Indigenous peoples and predominant cultural communities; demographic characteristics and major socio-cultural concerns of the population;
- Access, ownership and use of resources (e.g., land tenure, minerals, food, water, social infrastructure);

- The capacity (available or planned) of institutions to deliver public services and infrastructure (e.g., access to health and social services centres, daycares); and
- The community's relevant historical background.

The Impact Statement must describe baseline conditions for land and resource use, including, where applicable, the following:

- General patterns of human occupancy and of land resource use in the study area based on selected spatial and temporal boundaries (include maps, if possible);
- The degree of food security and food sovereignty in local and Indigenous communities. to the proponent must refer to the Public Health Agency of Canada's website on Food Security and the First Nations Food, Nutrition and Environmental Studies (Chan et al., 2014 and 2019) for more information;
- Relevant local, regional, or provincial land use or resource development plans;
- Sites or areas that are used by local people and Indigenous peoples either as a permanent residence or as a seasonal/temporary location, and the number of people using each identified site or area (include a map, if possible);
- Identification of:
  - remote, rural and urban Indigenous residential areas (including seasonally and year-round occupied establishments), lands in a reserve within the meaning of subsection 2(1) of the *Indian Act* and of the Indigenous traditional territories;
  - agricultural areas (including special crops, orchards and vineyards);
  - parks and recreation areas (including local and provincial/territorial parks and recognized scenic areas);
  - conservation area lands, International Biological Program sites or other ecological reserves;
  - industrial and commercial sectors;
  - Monitored or administered forest areas (including forests under agreement and areas designated for timber sales);
  - Registered or recognized hunting, trapping or guiding areas, recreational and commercial fishing areas, preferred harvesting areas; and
  - Water supplies and water lots, as well as water sources and intakes for farms, industries, residents and municipalities.

The Impact Statement must describe baseline conditions for navigation, including the following:

- Existing navigable waterways, and all their uses; and
- A list of potentially affected waterway users and concerns regarding waterway use and access.

The Impact Statement must describe the existing local and regional infrastructure facilities in the study area, including the following:

- Road infrastructure and traffic safety;
- Railways;
- Pipelines, water mains and sewer lines;
- Power lines;
- Utilities; and
- Any other potentially affected infrastructure and transportation routes.

The Impact Statement must describe the existing local and regional services in the study area, including the following:

- Accommodation and lodging (e.g., affordability, availability, suitability), including camping facilities;
- Recreation and parks;
- Waste disposal;
- Educational services, facilities and daycare;
- Elder care and services;
- Health facilities and their existing health services and programs, including mental health resources, as well as the capacity of health care providers to deliver preventive and emergency services (e.g. ambulance services);
- Social and community services (e.g., child care, child care and early learning) and community programs (e.g., skills training and literacy);
- Differences in access to these health and social services;
- Differences in access to resources and economic opportunities for communities (e.g., jobs, local hiring practices);
- Police and fire departments; and
- All other potentially affected services.

11. Baseline Conditions – Economic Context

The economic baseline must document the local and regional economic conditions and trends based on the spatial and temporal boundaries selected. The scope and content of the economic baseline must reflect the specific project context, take into account community and Indigenous peoples input, and must include indicators and information that are useful and meaningful for the effects analysis. The provided information must:

- be sufficiently detailed and focused to provide a comprehensive understanding of the current health status of communities, particularly with regard to local communities and Indigenous peoples disproportionately affected. This will allow an understanding of how these determinants have been addressed and why certain indicators or information is presented when analyzing expected effects;
- be sufficient to provide a comprehensive understanding of the current state of each VC, including relevant trends;
- describe how community and Indigenous knowledge from affected populations, including input from diverse subgroups, such as Indigenous women, was used in establishing baseline conditions; and
- describe baseline economic conditions for diverse subgroups (e.g., women, youth, and elders) within the community to support GBA+.

Information on those likely to be directly or indirectly affected by the project must be provided considering community members considered to be particularly vulnerable to changes brought about by the project. As applicable, baseline economic conditions must be sufficiently disaggregated and analyzed to support the analysis of disproportionate effects under GBA+, by sex, age and ethnicity, if possible.

The Impact Statement must:

- describe the main economic activities in the study area, including a more detailed overview of the importance of the mining sector in the Abitibi-Temiscamingue region;
- describe ongoing socio-economic development initiatives in the study area, including initiatives led by Indigenous peoples;
- provide an overview of current labour market statistics, including jobs likely to be in demand over the life of the project. This includes an overview of indirect jobs that are likely to be in demand, which may have fewer candidates available in the region. Indirect employment is also important because of the importance of contracts awarded by mining companies, particularly in construction and in professional, scientific and technical services;
- describe the workforce, including the availability of skilled and unskilled workers, existing working conditions, wages and average salary range, full-time and part-time employment and training, and gender gaps (e.g., for skilled trades and in wages and qualifications);
- describe the workforce, the demographic characteristics, economic concerns and economic aspirations for each Indigenous community;
- describe the demographic features of the local and regional population as well as the economic concerns and economic aspirations of residents, families and workers in the study area;
- describe local and regional workforce development and training plans including those specific for Indigenous peoples;
- provide an overview of the businesses that could provide products and services required for the project;
- provide an overview of the existing employment rates and economic well-being in the study area and impacted communities; and

- describe the current use of land and water bodies in the study area, including for food, social and ceremonial purposes, including as defined by Aboriginal and Treaty rights, and include a description of hunting, recreational and commercial fishing, trapping, outdoor recreation, use of seasonal cabins, outfitters, agriculture, forestry, and institutions.

12. Baseline Conditions – Indigenous Peoples

The proponent must engage with Indigenous peoples in developing baseline conditions, in order to identify and understand the potential impacts of the project on them, and to incorporate Indigenous knowledge into the Impact Statement. The results of any engagement should be included in the Impact Statement, and should consider the involved Indigenous peoples' perspective as much as possible.

The proponent must provide Indigenous peoples with an opportunity to review and validate the information related to reference conditions prior to submission of the Impact Statement. The Impact Statement must indicate where input from Indigenous peoples, including Indigenous knowledge, has been incorporated and how it was considered in relation to scientific knowledge. Information must be specific to the individual Indigenous community involved in the assessment and include contextual information about the members within an Indigenous community (e.g., women, men, elders and youth). The proponent must obtain the approval of Indigenous peoples to include this information in the Impact Statement or explain why the information could not be validated or approved.

Where Indigenous peoples do not wish to participate, the proponent is encouraged to continue to share with them information and analysis about the potential impacts of the project and to use publicly available sources of information to support the assessment, while documenting their efforts in that respect.

The proponent must consult the Agency's guidelines on engaging Indigenous peoples, in particular the document Guidance: Assessment of Potential Impacts on the Rights of Indigenous Peoples.

The Impact Statement must include contextual information, both historic and current, on pre-existing impacts and cumulative effects, an Indigenous community's history and cultural practices, land use, as well as the manner in which rights of Indigenous peoples are, or may be, exercised and impacted by the project, as identified by the Indigenous peoples. The contextual information may include the following:

- The physical and cultural heritage as well as any structure, site or thing that is of historical, archaeological, paleontological or architectural significance for each Indigenous community;
- The current use of lands and resources for traditional purposes;
- The health, social, and economic conditions of Indigenous peoples; and
- The nature and extent of the rights exercised.

Contextual information in the Impact Statement must also include the relevant history of engagement with Indigenous peoples by previous proponents, according to the information provided by Indigenous peoples, including if and how Indigenous peoples were involved as well as the results of these efforts. The history of engagement activities must be examined from the perspective of Indigenous peoples. This information can be used to establish the baseline conditions regarding the frequency and the intensity of the solicitation to each Indigenous community. This history can also be used to shed light on how the proponent was able to take into account lessons learned from other projects in order to improve their engagement activities.

12.1. Physical and Cultural Heritage, and Structures, Sites or Things of Significance

The Impact Statement must include a description of the baseline conditions associated with physical and cultural heritage and structures, sites or things of significance for Indigenous peoples in the assessment area. The proponent must provide maps to illustrate the location of these components, but only if they obtain the agreement of the concerned Indigenous peoples to publish this information. The provided description should take into account an understanding of the historical baseline conditions associated with the means of transmission of their transmit culture, including through language, ceremonies, harvesting, teaching of sacred laws, traditional laws and stewardship laws, as well as traditional knowledge.

Physical and cultural heritage as well as sites, structures or things of significance for Indigenous peoples include, but are not limited to, lands and resources deemed as heritage, or the structures, the sites or the things that are distinguished by their archaeological, paleontological, historical or architectural significance.

Lands and resources designated as such can correspond to elements also identified in the assessment for the current use of lands and resources for traditional purposes. Cultural and spiritual practices for Indigenous peoples are often integrally linked to specific sites and elements of the surrounding landscape, as well as to objects of social significance.

Information on heritage and structures, sites and things of significance for Indigenous peoples may include the following:

- Burial sites;
- Spiritual sites, including rivers and watercourses;
- Oral history;
- Teaching areas used to transfer knowledge between generations;
- Cultural values and experiences on the land;
- Indigenous governance systems and Indigenous laws associated with the landscape;
- Sacred, ceremonial or culturally important places and landscapes, plants, animals, objects, beings or things;
- The toponymy, language and other components that make up a culture;

- Places with archaeological potential or artefacts; and
- Historically occupied areas.

The proponent is encouraged to consult the Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing on the Agency's Website.

12.2. Current Use of Lands and Resources for Traditional Purposes

The Impact Statement must include information on the current use of lands and resources for traditional purposes (e.g., hunting, fishing, trapping, plant gathering, spiritual or ceremonial practices). In addition, uses that may have ceased due to external factors must also be considered if they can reasonably be expected to resume once conditions change. The proponent must refer to the Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under the CEAA, 2012, on the Agency's website.

The Impact Statement must include the following:

- A description of the Indigenous governance systems and Indigenous laws associated with the current land and resource use for traditional purposes;
- The location of reserves and Indigenous communities;
- Traditional activities presently or historically practised (e.g., hunting, fishing, trapping, gathering of plants or medicines);
- The location of traditional use such as hunting, trapping and fishing camps, cabins, and gathering or teaching grounds;
- Types of traditional resources (e.g., fish, animals, birds and plants or other natural resources) important for traditional and cultural purposes;
- A description of naturally harvested foods (traditional foods);
- Places where culturally important fish, wild species, birds, plants and other natural resources are harvested;
- Access and travel routes for conducting traditional practices;
- The frequency, duration and timing of traditional practices;
- Where known, efforts by Indigenous peoples to revitalize traditional practices;
- The quality and quantity of resources (e.g., preferred species and perception of quality);
- Access to resources (e.g., physical access to harvestable species, culturally important harvesting locations, timing, seasonality, distance from the community);
- The experience of the practice (e.g., connection to the landscape without artificial noise and sensory disturbance, air quality, visual landscape, perceived or actual contamination, etc.); and

- Other current uses recognized by Indigenous peoples.

The information must be provided in sufficient detail to allow analysis of the effects on Indigenous peoples that result from changes to the environment and on health, social and economic conditions. If this type of information is found in public sources, the proponent must, to the extent possible, inform the Indigenous peoples and give them a reasonable opportunity to review and comment on it before including it in the Impact Statement.

12.3. Health, Social and Economic Conditions of Indigenous peoples

The baseline conditions established in the sections 9, 10, and 11 include general and specific requirements for Indigenous peoples, including GBA+ requirements specific to Indigenous peoples.

The baseline conditions established for Indigenous peoples must take into account Indigenous governance regimes and Indigenous laws associated with health and socio-economic conditions.

12.4. Conditions Related to the Rights of Indigenous Peoples

The Impact Statement must document the nature and extent of the exercise of the rights of the Indigenous peoples, potentially impacted by the project, as identified by the Indigenous peoples. Indigenous peoples may also provide their perspective through consultations with the Agency. Indigenous peoples must be involved in the choice for the scoping and assessment of the nature and extent of the exercise of rights of Indigenous peoples.

The information related to rights may include, but is not limited to, the following:

- A general description of the section 35 rights that are exercised in the project area, including historic, regional and community context. The description should include maps, when available, to illustrate the location of areas with titles, land claims and traditional territories;
- The quality and quantity of resources needed to exercise of rights (e.g., preferred species);
- Access to the resources needed to exercise rights (e.g., physical access to culturally important locations, timing, seasonality, distance from the community);
- The experience associated to the exercise of rights (e.g., noise and sensory disturbances, air quality, visual landscape);
- Specific areas of cultural importance where rights are exercised;

- Landscape conditions that support the Indigenous peoples' exercise of rights (e.g., large, intact and diverse landscapes, areas of solitude, connection to landscape);
- The governance systems and Indigenous laws associated with the exercise of rights;
- Where possible, information about the members of an Indigenous people and their role in the exercise of rights (e.g., women, men, elders, youth);
- How the Indigenous peoples' cultural traditions, laws and governance systems inform the manner in which they exercise their rights (who, what, when, how, where and why);
- Where they exist, identification of thresholds identified by the community that, if exceeded, may impair the ability to meaningfully exercise rights;
- Maps and data sets (e.g., overlay of the project footprint, places of cultural and spiritual importance, traditional territories, fish catch numbers); and
- Pre-existing impacts and cumulative effects that are already interfering with the ability to exercise rights or to pass along Indigenous knowledge, cultures and cultural practices (e.g., language, ceremonies).

13. Effects Assessment

13.1.Methodology

The Impact Statement must describe the project's potential effects, whether direct or indirect, adverse or positive, for each phase of the project (construction, operation, decommissioning, closure, cumulative and future development). If certain details cannot be provided (e.g., for future events such as closure), a rationale must be provided, as well as a general description of the expected activities and effects. The environmental, health, social or economic effects must be described in terms of the context, magnitude, geographic extent, ecological context, timing, duration, frequency and reversibility. The spatial scoping of the assessment will vary depending on the VC and should be consistent with the spatial boundaries that were established for baseline data collection. VC studies conducted by Indigenous peoples must be included in the analyses..

The assessment of the effects of each project component and physical activities, in all phases, must be based upon a comparison of baseline environmental, health, social and economic conditions, and the predicted future conditions with the project and the predicted future conditions without the project. The "null" assumption that no action is taken must be described, noting the baseline conditions of the VCs associated with the project, as well as changes to these baseline conditions that are likely to occur in the future if the project does not proceed (e.g., changes resulting from other projects already planned for the region, changes in socio-economic conditions, etc.). Predictions must be made on clearly stated assumptions and the Impact Statement must clearly describe how it has tested each assumption. As applicable, the effects assessment must be sufficiently disaggregated and analyzed to support the analysis of disproportionate effects as per the GBA+.

The description of the effect can be either qualitative or quantitative. Effects must be described using criteria to quantify and qualify adverse effects, taking into account any important contextual factors. With respect to quantitative models and predictions, the Impact Statement must detail the model assumptions, parameters, the quality of the data and the degree of certainty of the predictions obtained. For other effects, it may be more appropriate to use other criteria, such as the nature of the effects, directionality, causation and probability. The effects assessment should also set out their probability or their likelihood of occurring and describe the degree of uncertainty related to the data, information and methods used. With respect to qualitative predictions, the impact assessment should also present information on the parameters measured, as well as the sources and quality of the data. The effects assessment must recognize and describe the quality of the original assumptions to help interpret uncertainties related to exposure and risk. In any case, ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.

The perception of the same effect may vary among different individuals, groups and communities. Consequently, characterizing effects should take into account the level of concern expressed through engagement with the affected Indigenous peoples and community members. Tolerance levels established by the public and Indigenous peoples, if any, must be taken into account when assessing the effects on VCs. There are tools that can assist with these predictions and analyses, including multi-criteria analysis, risk assessment, modelling, in addition to seeking out expert and stakeholder input, including Indigenous guardians.

The assessment of effects, should take into account interactions between the project and past, present and reasonably foreseeable physical activities to be carried out, as described in section 22.

13.2. Interactions Between Effects and Valued Components

The Impact Statement must consider and describe the interactions between the environmental, health, social and economic effects, as well as the interaction and interconnectedness of selected valued components, while taking into account community values. For example, an adverse effect on a physical component, such as water, could have an adverse effect on the biological component “fish” that could in turn have an adverse social effect on fishing and/or an adverse economic effect on an outfitter that provides guiding services. Alternatively, the same components could also be impacted by a positive effect on water (e.g., in remediation-related projects). Considering and describing effects holistically, both positive and negative, requires taking a ecosystems approach that considers interactions between VCs and with other environmental, health, social and economic factors.

14. Anticipated Changes to the Natural Environment

The changes to the components of the natural environment described below are related to other components within the broader ecosystem framework. The description of the changes to the natural environment must be integrated into the assessment of the effects of each valued component and of the interaction between the valued components in the Impact Statement.

14.1. Changes to the Atmospheric, Acoustic and Visual Environments

The proponent must refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise and Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality to ensure that they provide the information and analysis considered necessary to assess the effects of the project on human health in relation to changes in noise and air quality. The proponent must complete the checklists provided in these guides (Appendix B in the Noise Guide and Appendix A in the Air Quality Guide) to assist participants in verifying that the key elements of a noise or air quality assessment have been completed and to determine the location of this information in the Impact Statement.

The Impact Statement must describe all interactions between the project and the atmospheric, acoustic and visual environment, including the following:

14.1.1. Atmospheric Environment

- A detailed description of the study area including maps for all phases of the project (construction, operation, decommissioning and closure);
- A detailed description that includes the characteristics of all contaminant emission sources including, but not limited to, off-road and on-road equipment, generators, fugitive emissions, dust from unpaved roads, maintenance activities, start-up and running-in operations, burning (please note that except for certain cases, open burning is prohibited in Quebec, and that the proponent must enquire about provincial requirements);
- A detailed description of the methodology and assumptions used to estimate the emissions of air pollutants from each phase of the project. All relevant emission factors must be provided and referenced;
- A detailed justification and description of the air dispersion model and its configuration, including description and type of emission sources, meteorology, land use, surface parameters by season and land cover type, modelling domain, receptor grid density, land users, default options and chemical and physical transformation parameters, where applicable;

- A description of the following characteristics and types of sources for each of the scenarios considered:
  - Point sources (e.g. power generation equipment [i.e. generators], turbines, compressor engines, incinerators, process plant exhaust vents and stacks, ventilation vents and stacks, boilers and other heating equipment, engines of idling locomotives and other transport vehicles, fugitive emissions from storage tanks) This description should also include emissions during start-up and shut-down of equipment and operations, if applicable;
  - Large sources (e.g., drilling and blasting activities, material handling and transportation, wind erosion of material piles, fugitive emissions from processing areas and overburden storage areas, waste rock piles, ore and tailings facilities);
  - Mobile and road sources, including exhaust emissions from combustion gases and fugitive dust emissions from paved and unpaved roads;
- A detailed description of the emission modelling scenarios (description of the scenarios considered, construction and operation). The modelling of the scenarios must aim to represent the construction and operation conditions that will maximize the impact on air quality;
- A detailed description of the emissions calculations for each phase of the project (construction, operation, decommissioning and closure) and for each associated source;
- A quantitative assessment of all potential emissions of air contaminants during all phases of the project, including nitrogen oxides, hydrogen sulphide, sulphur oxides, particulate matter (PM) from diesel engine combustion, VOCs (benzene, toluene, ethylbenzene, xylene, acetaldehyde, formaldehyde), PAHs, mercaptan, carbon monoxide, and particulate matter, i.e., total PM, PM_{10} and $PM_{2.5}$ and any other air contaminant known to be a respiratory irritant and likely to be emitted by the project;
- A quantitative assessment of the deposition of dust and other contaminants on receptors including dust deposition resulting from construction activities;
- An assessment of project emissions that could contribute to or increase current levels of ground-level tropospheric ozone;
- Established methodologies to estimate emissions from all sources, including but not limited to those from on-road and off-road activities;
- A complete list of sources of air pollutant emissions that may affect ambient air quality (e.g., emissions from heavy machinery, boilers and heaters, fugitive dust from vehicle traffic and soil handling, fuel combustion by-products, blasting by-products);
- Provide emission rates for all project sources, including emission factors (with methodology, uncertainty and references) and all related assumptions and parameters that would allow the calculations to be replicated (provide sample calculations);
- Provide isopleth maps at the appropriate scale (that clearly visualize the extent of dispersion and receptors) illustrating the predicted emissions for the modelling scenarios;
- Assess the uncertainty in the modelled air pollutant concentrations using an appropriate data spectrum. All sources of uncertainty must be considered, including the following:
  - Model uncertainty, including consideration of how the uncertainty in the modelled forecasts may vary in space and time;

  - Uncertainty in the estimates of reference concentrations;
  - Uncertainty in the estimates of meteorological data; and
  - Uncertainty in the estimates of source emissions (from both project-related and external sources);
- Conduct an analysis to assess the relative contributions of project and non-project emission sources on pollutant concentrations at receptors. Emission sources should be grouped into appropriate categories, including transportation routes, materials handling, tailings storage areas, etc.;
- Provide a comparison of predicted air quality concentrations at receptors, including traditional land-use sites, against the CAAQS for fine particulate matter ($PM_{2.5}$), sulphur dioxide and nitrogen dioxide. Expected concentrations of other air pollutants relevant to the project should be compared to applicable provincial standards or others, as appropriate (e.g. World Health Organisation for PM_{10});
- For air pollutants with standards, use the time periods, average values and associated statistical forms (e.g., CAAQS, NAAQO, MELCC air quality criteria, NCQA or AAQC). Assessment compared to CAAQS should be based on the principles of continuous improvement and keeping clean areas clean, and in the context of airsheds and air zones of the Air Quality Management System (AQMS). For non-threshold substances such as $PM_{2.5}$, nitrogen dioxide and ozone, CAAQS also recognizes that there is no threshold for human health effects, meaning that any increase in exposure will result in additional risk to the population. Therefore, it should be recognized that health risks exist below the CAAQS values, which must not be interpreted as limits at which pollution is permitted;
- Provide a description of any methods and practices (e.g., control equipment, heat or gas recovery systems during operation phase, dust control) to be implemented to reduce and control emissions. If the best available technologies are not selected in the project design, the proponent will have to justify the technologies selected;
- Document and justify the contaminant emission reduction efficiencies applied in the calculation of emission rates, including details of all assumptions associated with these mitigation measures and their feasibility;
- Describe participation in national or regional air emissions monitoring and reporting programs (e.g., National Pollutant Release Inventory) or explain why participation is not required;
- Provide details on the achievement of emission standards for all mobile and stationary engines used in the project;
- Assess the effects on the receiving environment:
  - Comparison with applicable ambient standards, including the CAAQS (consider airsheds and specific air zones). Assessment compared to CAAQS should be based on the principles of continuous improvement and keeping clean areas clean, and in the context of airsheds and air zones in the AQMS;
  - Comparison with critical thresholds for acidifying emissions, where applicable (consider current and historical loads and buffer capacity, including critical loads for acid deposition);
  - Comparison with sensitive ecological receptors (consider effects thresholds for the species in question); and

- Comparison with other relevant existing guidelines, objectives or standards, including MELCC air quality criteria. This includes regional and community air quality guidelines;
- Verify radon concentrations in tunnels, pits and residences for nearby communities given the proximity of underground tunnels and planned blasting (movement of gas in the ground) or provide justification if not deemed necessary. The absence of uranium concentrations in the soil cannot be a justification for the absence of a radon increase problem in nearby residences. For more information on radon and its health effects, please see: https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/radon.html.

14.1.2. Acoustic Environment

- Describe the changes in ambient vibration and sound levels resulting from the project, including changes in perception of non-anthropogenic noise, at receptors, including traditional land-use sites;
- When there is public concern associated with an increase in sound levels during construction, provide a vibration and noise effects assessment, including an overview of the concerns;
- Determine whether the project has the potential to result in increased noise emissions during construction, operation or decommissioning:
  - Quantify sound levels at appropriate distances (e.g., distance from the point of maximum impact to receptors) from any project facilities and describe for each noise source the timing (e.g., overnight activity hours), number and duration of sound events and sound characteristics, including the frequency spectrum;
  - Provide scaled noise isopleth maps to identify current and future noise levels at human receptor locations;
  - Describe the locations and characteristics of the most sensitive receptors, including species at risk;
  - Describe consultations with regulators, stakeholders, community groups, landowners and Indigenous peoples regarding potential effects on the acoustic environment; and
  - Provide noise management plans for the construction and operation phases, including identification of noise sources, assessment of current noise mitigation measures, performance effectiveness of noise control devices, best practice programs and continuous improvement programs. Determine the need for follow-up monitoring for the purpose of model validation or due to concerns raised by the public. Noise management plans must address the following:
    - notification and planning of maintenance activities, such as express purging and ventilation of equipment during daylight hours, notification of nearby residences and local authorities regarding noise prevention and management plans and procedures;
- Provide the distribution of the reference nighttime sound events relative to the individual sound events expected at night at the location of each receptor;
- Take into account expectations of peace and quiet for receptors (e.g., in a quiet rural area or during land use by Indigenous peoples) and noise policies (e.g., processes for resolving and dealing with public complaints);

- Specify and justify the approach used to determine the extent to which noise effects resulting from the project are adverse;

14.1.3. Visual Environment

- Describe any change in night lighting levels resulting from the project, including the following:
  - Quantifying sound levels at appropriate distances from any project facilities and describe the timing (e.g., day, night), frequency, duration, distribution and character of light emissions;
  - Describing the locations and characteristics of the most sensitive receptors, including species at risk and areas favoured by Indigenous peoples for the practice of traditional activities; and
  - Describing consultations and, where appropriate, providing a record of engagement with regulators, stakeholders, community groups, landowners and Indigenous peoples regarding potential effects on the visual environment; and
- Describe any positive changes.

14.2.Changes to Groundwater and Surface Water

14.2.1. Hydrogeology

With respect to the potential effects of the project on the physical hydrogeological system, the Impact Statement must:

- describe how the effects of climate change are considered in the assessment of project effects;
- present a three-dimensional digital model of groundwater flow in the hydrogeological system, including all major components of the project, such as open pits, underground works, waste rock piles, tailings management facilities, dewatering wells and water diversion ditches:
  - the model must be based on the calibrated model that is used to describe the reference conditions; and
  - it is recommended that telescopic groundwater flow models be used near mines and tailings management facilities;
- using the digital groundwater flow model, estimate the major project flows, including mine flows, mine dewatering and flooding rates, and tailings discharge rates during operation and post-decommissioning;
- use the digital groundwater flow model to estimate changes to surface and groundwater flow regimes during operation and post-decommissioning, including the effects of mine dewatering on lake water levels, effects on river and stream base flows, effects on wetlands, effects on perennial flow and discharge, effects on drinking water supply, and effects on natural flow divides; and
- provide drawings and figures showing groundwater isopiezometric curves that illustrate predicted infiltration patterns for the applicable project components.

14.2.2. Hydrology

With respect to the physical hydrogeological system, the Impact Statement must:

- quantify the effects of the project on surface water bodies and resources at each stage of the project (including the effects of water use or diversion on seasonal stream flows and local water body levels and temperatures). The quantification of effects should include the intake and discharge of water into the environment, the change in surface water use and the detour of watercourses, while taking into account how and where wastewater and diverted water would be discharged;
- describe changes to watersheds, including the flow path and condition of all watercourses, water bodies, and wetlands, whether permanent or temporary, including those created, destroyed or modified by the project;

14.2.3. Water Management

With respect to the potential effects of the project on the variation in water flows, which may have impacts on the water quality of the receiving environment, the Impact Statement must:

- present comprehensive site water management plans for the life cycle of the project (construction, operation, decommissioning, closure and post-decommissioning). Both natural and engineered water management structures should be presented in conceptual models that describe water inflows and outflows from the project site, as well as water management within the project site;
- present key flows for all project components and water management structures (e.g., inlets, outlets, and surface runoff from storage piles, tailings management facilities, contaminated material storage, vehicle running areas, diversion channels, etc.);
- present an integrated site water balance model that includes surface and groundwater flows to and from the major project components for all phases of the project, consistent with the water management system described above;
- provide detailed maps showing the main flows for natural and man-made water management structures for each phase of the project life cycle. These maps should clearly illustrate all water flows through the site, their direction, the type of pipe (ditch, pressure pipe, canal, etc.), the retention infrastructure (storage ponds, sedimentation ponds, etc.) and water treatment infrastructure, and the final discharge points (effluents). Several different maps should be presented to illustrate the construction progress, as well as the other phases of the project, separately;
- present an integrated chemical mass balance model of potential contaminants, including metals that will be extracted by the mine. This model must include surface and groundwater chemical inputs to and from the major project components for all project phases. This should include the following:
  - A clear description and justification of all parameters of the model and of the assumptions; and
  - An estimate of the base case (i.e., most likely scenario), worst case, best case, and relevant sensitivity scenarios;

14.2.4. Water Quality

With respect to water quality, the Impact Statement must:

- describe the proposed sampling points for each phase of the project's life cycle to assess potential changes in surface water and groundwater quality, such as the following:
  - All point and non-point sources of discharge;
  - The immediate receiving environment of any non-point sources of discharge from the project;
  - The outer boundary of the mixing zone;
  - Where the water quality of the immediate receiving environment meets the guidelines for water quality or ambient concentrations for a given contaminant;
  - At the project boundary;
  - At the boundary of the LSA; and
  - At the boundary of the RSA;
- describe all applicable water quality treatment measures and provide the rationale to support the effectiveness of these measures. Without providing the detailed engineering of the different water treatment systems, it is requested to present the estimates of the concentrations for all relevant inlet and outlet water quality parameters using, among other things, the existing drawdown rates for the different water treatment technologies;
- describe the quantity and quality of effluent that will be discharged from the site to the receiving environment, including, but not limited to, treatment facility effluents, dewatering activities (e.g., mine water, pumping water for groundwater drawdown), seepage and surface runoff from project components and the mine site;
- describe changes to groundwater quality due to project effluents, including changes in physicochemical parameters (temperature, pH, salinity, dissolved oxygen), chemical constituents (major and minor ions, trace metals, radionuclides, nutrients and organic compounds);
- describe any changes in groundwater quality that could affect surface water quality;
- in order to better identify potential adverse effects of the effluent on the receiving environment, compare the quality of all effluents to applicable guidelines, objectives or standards;
- provide an assessment of off-site contaminants migration of affected groundwater and an analysis of contaminant attenuation capabilities within hydrogeological units in the project area;
- describe the predicted changes in surface water quality due to project discharges, including impacts to surface water from groundwater-surface water interactions. This should include project-relevant changes in physicochemical parameters (temperature, pH, salinity, dissolved oxygen, turbidity, suspended solids, total hardness, total dissolved solids) and chemical constituents (major and minor ions, trace metals [dissolved and total], radionuclides, nutrients, organic and inorganic compounds);
- compare any changes in surface or ground water quality to applicable guidelines, objectives or standards. When these are met, the risk of adverse effects on components of the receiving environment

must be assessed using a site-specific approach. Adaptive management practices must be identified where appropriate;

- describe potential changes to surface water quality due to erosion and sedimentation; and
- describe potential changes to water quality due to the deposition of fugitive dust and particulate matter containing contaminants such as metals (including total mercury and methylmercury, where applicable).

With respect to the potential effects of the project on water quality resulting from acid mine drainage or metal leaching, the Impact Statement must:

- describe the sampling methods and the type of methods used to predict acid mine drainage and metal leaching on samples;
- Map areas with potential for acid mine drainage and metal leaching and describe the effects of exposure due to the project;
- highlight the results of metal leaching and acid mine drainage testing to inform surface water and groundwater quality predictions and chemical mass balance modelling as outlined above;
- provide a short-term and long-term assessment of the results of acid mine drainage and metal leaching on water quality;
- estimate the potential effects of the project on the effluent and water quality of the receiving environment resulting from acid mine drainage and metal leaching;
- provide estimates of the quality of surface water and runoff from areas of potentially acid-generating and metal-leachable rock and other infrastructure during construction, operation, decommissioning, closure and post-decommissioning periods; and
- assess the potential for materials extracted during excavation and drilling to be sources of acid rock drainage or metal leaching, the areas and volumes affected, and an estimate of the time that could elapse before acid mine drainage or metal leaching occurs, and describe the effects on the receiving environment, if any;

14.3. Changes to Riparian, Wetland and Terrestrial Environments

The Impact Statement must describe the interactions between the project and riparian, wetland and terrestrial environments, including the following:

- The anticipated positive and negative effects, both direct and indirect, on riparian, wetland and terrestrial biodiversity, the effects of fragmentation and changes to regional biodiversity that could be caused by all project activities;
- A comprehensive description of changes related to landscape disturbance, including, but not limited to, habitat loss and fragmentation (direct and indirect), shoreline alteration, and the effects of the project on areas of soil instability;

- The quantity of the area of riparian, wetland and terrestrial environments that may be cleared or otherwise disturbed during project construction, operation, decommissioning, closure and post-decommissioning activities;
- A description any changes in hydrologic or water flow, whether permanent or temporary, that could alter moisture regimes or drainage conditions, and describe the effects on vegetation and wetlands, migratory birds, species at risk and their habitat and, where applicable, fish and fish habitat;
- A description any change or loss of wetland function and area, including consideration of ecological and socio-economic functions. Define impacts on the ecological functions of wetlands, including impacts that may alter the wetland's ability to perform hydrological, biogeochemical, habitat and climatic functions. Describe the methodology used to identify impacts;
- A description of any changes in soil quality, compaction, erosion and soil loss that could result in a loss of soil productivity, including the risk of pipe collapse if the pipe remains buried during the post-decommissioning period;
- A description of methods for clearing and maintaining the project's right-of-way and the potential effects on drinking water source quality, biodiversity and species, including those of cultural, traditional or other importance to Indigenous peoples;
- The assessment of the quantity, merchantability and location of any merchantable timber to be removed during project construction;
- The identification of any other forest resources that may be harvested by Indigenous peoples before and during project construction;
- A description of the nature of the surface formations and the depth at which the mine will be installed, including a map (at the appropriate scale) of the eskers found therein;
- An indication of whether eskers will be affected to a much greater degree than their prevalence on the landscape, and describe at the landscape scale rather than at the scale of a single multi-hectare assessment;
- A description of potential changes to soils and sediments from trenching, drilling, underground infrastructure burial and compaction, stream and water crossings, dewatering, diversions and water withdrawals (e.g., hydrostatic testing). This includes the modification of topography, erosion, modification of bank slopes and sediment resuspension;
- A description of the risk of soil and sediment contamination taking into account historical land use, as well as the potential for loss of soil fertility. Describe any known or suspected soil contamination in the study area that may be re-suspended, discharged or otherwise disturbed as a result of the project; and
- A description of any positive changes (e.g., revegetation procedures to be implemented as part of the project).

15. Effects on Valued Components – Environment

In the context of anticipated changes to the natural environment, the proponent must assess the impacts of the project on environmental VCs. The proponent must also describe the interconnections between environmental VCs and social, health and economic valued components, as well as the interactions between these impacts.

15.1. Fish and Their Habitat

The Impact Statement must describe the potential effects (positive and negative, direct and indirect, temporary and permanent) on fish and fish habitat within the meaning of subsection 2(1) of the *Fisheries Act*. These potential effects must be the same as those defined in the requirements of the Metal and Diamond Mining Effluent Regulations (MDMER). Without limitation, for each water body and watercourse affected by the project, the following must be documented and considered in the determination of effects:

- Geomorphological and hydrodynamic changes and their effects conditions and fish and fish habitat (e.g., encroachment into the aquatic environment, substrate modification, dynamic imbalance, clogging of spawning grounds, etc.);
- Changes in hydrological and hydrometric conditions on fish habitat and the life cycle activities of fish species (e.g., reproduction, rearing, feeding and growth, movement and migration, thermal winter or summer refuge, and any changes within aquatic invertebrate communities), including, where appropriate, on aquatic species at risk;
- Changes in fish passage conditions (upstream and downstream movement) as a result of construction (crossing structures) and operation of structures (hydraulic barriers);
- Anticipated changes in the composition and population characteristics of various fish species, including shellfish and forage fish;
- The potential effects of project activities on riparian areas that could affect fish and fish habitat. For example, the removal or alteration of shoreline vegetation at watercourse and watercourse crossings that may affect fish and fish habitat by increasing runoff and sediment transport;
- The effects on the primary and secondary productivity of water bodies and how mining-related effects can affect food sources for fish;
- The risk of fish mortality caused by project activities in or near the aquatic environment (e.g., associated with noise and vibrations during blasting, or by fish entrainment during water pumping or water withdrawal activities). Where applicable, an assessment of mortality must be provided (species, number of individuals, etc.);

- The risks associated with the introduction of deleterious substances into the aquatic environment frequented by fish (i.e., effects on sediments and their benthic communities) as a result of effluent deposition, which would be treated with best practices. Emphasis must be placed on prevention;
- Anticipated changes in the composition and characteristics of provincially or federally listed fish populations and aquatic species at risk;
- Any alteration and use of habitat (including the risk of creating or increasing habitat fragmentation and the ability to access habitat), including, where applicable, the residence and critical habitat of species at risk;
- Contaminant levels in harvested species and their prey, with a focus on traditional foods harvested by Indigenous peoples;
- Any other effect that may affect fish and fish habitat as a result of the project;
- Changes in water quality at the point of discharge and in the receiving environment; with reference to the assessment of water quality changes in section 14.2;
- The potential to predict or model the direct effects of contaminants on fish and also the bioaccumulation of contaminants (e.g., selenium, mercury) in fish downstream of the project;
- The potential effects of contaminants on fish must be examined by comparing the predicted water quality for all phases of the project, at all key locations in the receiving environment (from section 14.2), to the:
  - applicable water quality guidelines;
  - site-specific objectives;
  - relevant toxicity test results (site-specific or published); and
  - other applicable methods;
- The proposed appropriate monitoring points proposed to assess potential changes to surface water, including:
  - all point and non-point sources of discharges;
  - the immediate receiving environment of any point or non-point sources of discharges from the project;
  - at the outer edge of the mixing zone;
  - where the water quality of the immediate receiving environment meets the water quality guidelines, or background levels for that contaminant;
  - at the project boundary;
  - at the boundary of the LSA; and
  - at the RSA boundary.

The Impact Statement must:

- include an examination of the overlapping between construction and operation (altering of water inputs to fish habitat) periods and sensitive periods for fish (e.g., reproduction), and any potential effects due to overlapping periods;

- describe any need for a *Fisheries Act* authorization or a permit under the SARA and describe any review of Fisheries and Oceans Canada guidance documents; and
- evaluate, where applicable, fish mortalities as well as anticipated habitat losses (temporary or permanent) in terms of area, sensitivity of habitat lost (e.g., resilience of affected species and their dependence on habitat, habitat scarcity, habitat resilience, contribution due to fisheries productivity, species at risk, etc.) and significance (e.g., magnitude, intensity and persistence). Habitat losses (deterioration, destruction and disruption) must be clearly located and described. It is recommended that the information be collected in the form of a map at appropriate scales, as well as in the form of a table.

The Impact Statement must also take into account the tolerance thresholds for potential adverse effects that the Indigenous peoples will have identified.

15.2.Birds, Migratory Birds and Their Habitat

The Impact Statement must describe the interactions between the project and birds, both migratory and resident, and their habitat, including the following:

- The potential direct and incidental, positive and adverse effects to birds, on endangered bird species, their nests and their eggs, including population-level effects that could be caused by all project activities, including:
  - site preparation or vegetation removal, in particular for habitats important for nesting, feeding, staging and wintering, as well as movement corridors between habitats;
  - changes in water quality that could affect migratory birds, including:
    - the construction and operation of tailings disposal facilities (i.e., tailings ponds), sewage ponds or other ponds containing process liquids or substances harmful to migratory and non-migratory birds. It should be noted that the deposit of substances harmful to migratory birds in waters or areas frequented by migratory birds, and the direct and incidental taking of birds, nests and eggs, is an offence under *the Migratory Birds Convention Act, 1994*;
  - changes in flow regime and sediment load;
  - construction and operation of overhead structures, including power transmission and distribution lines;
  - site reclamation; and
  - changes to the atmospheric, acoustic and visual environment (noise, vibrations, lighting, air emissions and dust);
- An analysis of the predicted effects for (1) all birds, (2) each VC, and (3) priority BCR species, and include relevant effects described in Appendix 2 and section 8.11, Table 2. Include separate analyses for each activity, component and project phase. Distinguish between migratory and non-migratory birds. Consider sources of error for all analyses to ensure that the final effects predictions indicate the best estimate of precision:

  - wherever possible, non-linear, indirect and synergistic responses to the project should be explicitly examined; and
  - any assumptions regarding relocation of temporary birding during the construction and operation of the project should be justified using scientific references. Surveys should provide evidence that there is available habitat to allow relocation under a variety of population scenarios. For example, it should be clear that a growing population will not be limited by habitat loss along the project area;
- A description of short- and long-term changes to habitats and food sources for migratory and non-migratory birds (types of cover, ecological units of the area in terms of quality, quantity, distribution, and functions), including losses, structural changes, and fragmentation of riparian habitats, terrestrial environments, and wetlands frequented by birds. Describe changes in habitat related to health, integrity and availability:
  - considering important habitats, including: forests, riparian buffer zones, ombrotrophic or minerotrophic bogs, other wetland areas, eskers and other similar geological formations, as well as open waters;
- A description of changes in bird-habitat relationships, biodiversity, abundance and density of the avian community which involve various ecosystems and habitat types:
  - particular attention will have to be paid to the change in detection before and after the project is carried out. For example, linear structures allow larger detection distances as described in the article Experimentally derived detection distances from audio recordings and human observers enable integrated analysis of point count data (Yip et al., 2017). Therefore, any estimates of abundance or occurrence must reflect differential detection;
- A description of the risks of change in mortality, including as a result of the collision of migratory birds with project infrastructure, particularly with buildings, airlines and vehicles:
  - surveys should cover a time window that includes a variety of uses of the project area by day and night species; and
  - indirect effects must be considered, such as increased movement of predators, in assessing and predicting mortality effects;
- A description of the activities most likely to result in disturbance, injury or incidental take of migratory birds, their nests and eggs, such as land clearing, increased noise from industrial machinery, and whether these activities would be permanent or not;
- A description of the incidental effects, including mortality, caused by increased disturbance (e.g., sound, light, presence of workers), relative abundance of movement considering critical periods for birds, including breeding, migration and overwintering:
  - if a temporary relocation hypothesis is made during the operational phases of the project, support the hypothesis with scientific evidence or through study and monitoring within the project area as the project proceeds; and
- A description of the potential direct effects of contaminants and bioaccumulation of contaminants on resident and migratory birds, including those that may be consumed by Indigenous peoples.

The Impact Statement must also take into account the tolerance thresholds for potential adverse effects that the Indigenous peoples will have identified.

In describing activities that may result in positive or negative direct, incidental and cumulative effects on migratory and non-migratory birds, the proponent must describe the amount, duration, frequency and timing of disturbance. The proponent may refer to the Government of Canada guidelines on this topic, including Prevention of Adverse Effects on Migratory Birds (2019). For an overview of the potential effects of the project on birds, the proponent may refer to A framework for the scientific assessment of potential project impacts on birds, the Migratory birds environmental assessment guideline, as well as Appendix 2 and section 8.11, Table 2.

15.3. Vegetation and Other Wildlife and Its Habitat

The Impact Statement must describe the interactions between the project and wildlife and their habitat, including the following:

- The potential direct and incidental effects, whether positive or adverse, on wildlife and its habitat and vegetation, including population-level effects that could be caused by project activities, including, but not limited to, any linear access corridors (roads, transmission lines, rights-of-way), particularly in the vicinity of wetlands, lake and riparian habitats and on migration corridors, project noise and sensory disturbance, habitat alteration, air emissions and dust, bioaccumulation of contaminants in wildlife, disease, increased predation and poaching opportunities;
- An assessment of the effects of any new road access or right-of-way on wildlife mortality risk and movement patterns;
- The effects on wildlife biodiversity considering biodiversity parameters, effects of fragmentation or loss of habitat, and changes to regional biodiversity, coming from, for instance:
  - loss and fragmentation of forest cover;
  - the introduction of invasive species;
  - increased wildlife predation during all phases of the project;
  - noise and light pollution on fauna and light pollution on flora; and
  - diseases or other elements affecting the health of wild species (e.g., contamination);
- The potential direct effects of contaminants, including atmospheric emissions and dust deposition, and bioaccumulation of contaminants in wildlife;
- The potential direct and indirect effects of noise and vibrations in the project area on the uses of this area by wildlife;
- The potential direct and indirect effects of artificial light in the project area on the uses in this area by wildlife and on migratory behaviour of wildlife;
- The effects on pollinators;

- Identification of the species mentioned as being important for indigenous peoples and local communities in the effects assessment; and
- Changes to the primary habitat of species important to current use of lands and resources for traditional purposes by Indigenous peoples.

Resources from the Quebec government should be considered as a source of information on appropriate methodologies for predicting effects on wildlife and vegetation (see section 7.2).

The Impact Statement must also take into account the tolerance thresholds for potential adverse effects that the Indigenous peoples will have identified.

15.4. Species at Risk

The Impact Statement must describe the potential direct and incidental effects of the project, positive and adverse, on species at risk listed under Schedule 1 of SARA and, where applicable, on their critical habitat (including its extent, availability and biophysical attributes).

The analysis of potential effects should be provided separately for each species at risk, including separate analyses for each activity, component and phase of the project. To fully understand the effects or benefits of one alternative over another, all parameters relevant to species at risk should be considered.

Concerning the description of the effects on bats, the Impact Statement must:

- consider all effects on feeding habitats, hibernacula, resting sites, maternity wards and movement corridors when assessing effects on local and regional populations;
- describe potential resting areas, maternity wards, hibernacula, feeding habitat and movement corridors in the local area, as well as the project's potential impacts on these habitats or on their particular functions for bats. Where artificial resting places (i.e., buildings) are rare on the landscape, special attention should be paid to identifying natural structures; and
- with regard to the description of effects on turtles, including the known and documented snapping turtle, the Impact Statement must:
  - consider all effects on feeding, hibernation, nesting and movement habitats when assessing the effects on local and regional populations and the anticipated impacts of the project on these components;
  - consider the data collected by the MFFP regarding the monitored local population of snapping turtles.

In addition to species at risk listed under Schedule 1 of SARA, the Impact Statement must describe the potential direct, indirect and cumulative adverse effects of the project on species protected under provincial legislation, on ecological communities, and on species assessed by the COSEWIC as extirpated, endangered, threatened or of special concern (flora and fauna), as well as on the potential habitat of these

species that are not currently listed under SARA. Each of these species must be considered separately as a VC.

The Impact Statement must:

- describe the surface area, biophysical attributes and location of habitat, including critical habitat affected (e.g., destroyed, permanently altered, disturbed);
- describe the project's potential effects, including the extent, duration and magnitude of the effects on the number of individuals killed, harmed and harassed, as well as on the number of damaged or destroyed residences;
- take into account the direct and indirect effects related to vibration and artificial light in the project area on use patterns and migratory behaviour of species at risk;
- describe all reasonable alternatives to the project that would avoid the potential effect on the species and its habitat, with particular attention to critical habitat. To fully understand the effects or benefits of one alternative over another, all parameters relevant to species at risk should be considered;
- demonstrate that avoidance and mitigation measures will be applied for species at risk. Recovery strategies will provide information such as population and distribution objectives, and strategic direction for recovery; and
- describe the discussions held with the appropriate federal authority (ECCC, Fisheries and Oceans Canada) to obtain a SARA permit.

The Impact Statement must also take into account the tolerance thresholds for potential adverse effects that the Indigenous peoples will have identified.

With respect to effects on bird species at risk, the information required is presented in section 15.2.

15.5.Climate change

The following requirements are based on the Strategic Assessment of Climate Change (SACC) developed by ECCC. This document provides guidance on climate change information requirements throughout the impact assessment process.

With regards to GHG emissions, the Impact Statement must provide the following:

- A description of each of the project's main GHG emission sources and their estimated annual GHG emissions over the lifetime of the project;
- Net GHG emissions by year for each phase of the project based on a project's maximum capacity, as outlined is section 3.1.1 of the SACC;
- Each term of Equation 1 of the SACC (direct GHG emissions, acquired energy GHG emissions, CO_2 captured and stored, avoided domestic GHG emissions and offset credits, if applicable), per year for each phase of the project (SACC section 3.1.1);

- Emissions intensity in kt CO2e/tonne of gold ore produced (or equivalent) for each year of the operation phase of the project based on equation 2 of the SACC (SACC section 3.1.1);
- The quantity and description of the ”units produced” (in tonnes of gold ore or equivalent) used in Equation 2 of the SACC for each year of the operation phase of the project;
- Methodology, data, emission factors and assumptions used to quantify each element of the net GHG emissions (SACC section 3.1.1);
- A discussion on the development of emissions estimates and the uncertainty assessment (SACC section 3.3);
- A description of large sources of GHG emissions that may be the consequence of accidents or malfunctions; and

With regards to carbon sinks, the Impact Statement must provide the following:

- A qualitative description of the project’s positive or negative effects on carbon sinks;
- A description of project activities in relation to significant landscape features such as topography, hydrology and regionally dominant ecosystems;
- Land areas directly impacted by the project, by ecosystem type (forests, cropland, grassland, wetlands, built-up land) over the course of the project lifetime; this includes the areas of restored or reclaimed ecosystem(s);
- Initial carbon stocks in living biomass, dead biomass and soils (by ecosystem type) on land directly impacted by the project over the course of the project lifetime;
- Fate of carbon stocks on directly impacted land, by ecosystem type: immediate emissions, delayed emissions (timeframe), storage (e.g., in wood products).
- Anticipated land cover on the impacted land areas after the project is in place; and
- Quantification of impacts on carbon sinks;

With regard to the project’s impact on federal emissions reduction efforts and on global GHG emissions, the Impact Statement must provide the following:

- An explanation of how the project may hinder or contribute to Canada’s efforts to reduce GHG emissions, if applicable. For example, the Impact Statement may be able to explain how the project would result in GHG emission reductions in Canada (e.g., by replacing higher emitting activities);
- A discussion on how the project might affect global GHG emissions. This could include, for example:
    - the potential for carbon leakage if the project does not proceed in Canada, the Impact Statement could include an explanation of the likelihood and potential magnitude of carbon leakage if the project is not approved; and
    - the potential for international emissions displacement, the Impact Statement could describe how the project is likely to result in global emissions reductions. For example, a project that promotes the substitution of high-emission energy abroad with low-emission energy produced in Canada could be considered to have a positive impact.

- Further information on the quantification of net greenhouse gas emissions and the impact of the project on carbon sinks will be included in the technical guide to the strategic climate change assessment to be provided to the proponent shortly. Please refer to: https://www.strategicassessmentclimatechange.ca/

16. Effects on Valued Components – Human Health

Social, economic, health, and (biophysical) environment effects are interconnected. The proponent must assess the adverse and positive effects of the project on human health. Interconnections between human health determinants and other VCs must be described (e.g., between behavioural factors such as healthy eating and biological factors such as chronic stress or exposure to contaminants), as well as the interactions between effects, especially when the proponent foresees a potential indirect effect.

The evaluation must illustrate an understanding of the linkages between VCs and sequences of effects, so that when a change in one VC is predicted, there is an understanding of the effects or consequences that may be felt in other VCs.

The proponent should develop indicators using best practices, Agency guidance and through engagement of Indigenous peoples and the public and provide a rationale for the selected indicators. If, after engaging Indigenous peoples and the public, the proponent determines that other VCs need to be assessed, the proponent should do so by explaining how the engagement has demonstrated their importance. If, after consulting with communities and conducting further analysis, the proponent determines that the information and VCs could be better organized and presented in a different manner, they may do so by providing an explanation and rationale for these changes.

Where possible, the proponent must describe how Indigenous and community knowledge was used to collect baseline data and assess health effects across diverse subgroups (e.g., women, youth, elders) for which the effects could vary. In assessing effects, the analysis should consider circumstances in a community where diverse subgroups could, because of their particular circumstances in their community, experience adverse effects from the project more severely than others or be excluded from potential benefits. As for Indigenous peoples, the data must be presented separately for each Indigenous community, and must be broken down by community.

It is recommended that the proponent consult the following references, which contain best practices for health impact assessment methods:

- Guidance document: Analyzing Health, Social and Economic Effects under the *Impact Assessment Act* by the Impact Assessment Agency of Canada, 2020;
- Minimum Elements and Practice Standards for Health Impact Assessment, Version 3 (Bathia et al, 2014);

- resources from the National Collaborating Centre for Healthy Public Policy;
- the Health Equity Impact Assessment (HEIA) Tool by the Ministry of Health of Ontario;
- Health impact assessment. A guide for the oil and gas industry by the International Association of Oil and Gas Producers (IPIECA);
- Health Impact Assessment of Transportation and Land Use Planning Activities Guide Book and Toolkit, Metro Vancouver;
- Health Impact Assessment of Transportation and Land Use Planning Activities Guide Book and Toolkit, Metro Vancouver.

16.1. Biophysical Determinants of Health

With regard to the biophysical determinants of health, the Impact Statement must provide an assessment of the potential adverse and positive effects on human health taking into consideration, but not limited to, potential changes in:

- air quality;
- current and future availability and quality of water for drinking, recreational and cultural uses);
- current and future availability and quality of country foods (traditional foods);
- noise exposure and the effects of vibrations; and
- light levels.

For a definition of traditional foods, the proponent must consult the document Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods.

As a first step, the proponent must complete a problem statement (or hazard identification) to document the main routes of exposure to chemical contaminants and the main effects associated with them, as well as the identification of populations at risk. The problem statement is a step of the Human Health Risk Assessment (HHRA) which briefly discusses the following:

- Study limitations;
- Current and future contaminants of potential concern (COPCs);
- Current and future human receptors;
- Current and future exposure pathways (consider potential infiltration of carbon monoxide into populated areas during blasting activities and refer to Les intoxications au monoxide de carbone et les travaux de sautage, Guide des pratiques préventives [French only]); and
- Conceptual site model illustrating the links between CPPs, receptors and exposure pathways.
    - However, if it is determined that the sum of modelled and background concentrations is below guidelines, standards or criteria – based on health protection – for the affected environment, the

problem statement stage of the risk assessment may conclude that it is not necessary to treat the chemical as a COPC in a quantitative risk assessment.

Secondly, the proponent must Indicate whether a more extensive or quantitative HHRA is required and provide an explanation if the problem statement indicates that it is not warranted. The proponent must provide a detailed justification for any CPP or pathway that would be excluded from the impact assessment.

Air quality and inhalation exposure:

- As described in section 14.1, the proponent must provide a comparison of predicted air quality concentrations at potential receptors, including locations of current traditional land use, and interpret these human health outcomes against the most stringent guideline values of the following criteria: Canadian Ambient Air Quality Standards (CAAQS), Quebec Air Quality Standards or other relevant criteria, standards or guidelines;
- Where predicted COPC concentrations approach or exceed air quality guidelines and standards, explain the potential impacts of these exceedances on human health. In some cases, it may be prudent to continue the assessment by conducting a detailed quantitative human health risk assessment (HHRA).
- For substances such as $PM_{2.5}$, nitrogen dioxide and ozone, the CAAQS also recognizes that there is no threshold for human health effects, meaning that any increase in exposure will result in additional risk to the population. Therefore, it should be recognized that health risks exist below the CAAQS values, which must not be interpreted as limits at which pollution is permitted;
- Provide an assessment of the carcinogenicity of diesel exhaust gases when diesel engines are a source of air pollutant emissions for the project. In characterizing the carcinogenic risk of project-related diesel exhaust gases, the proponent has two options:
  - Carry out a quantitative risk assessment using the associated unit risk value published by the Environmental Protection Agency of California that, despite not being expressly recognized in Canada, can provide an overview of the potential impacts that a particular project may have on the risks associated with diesel emissions; or
  - Provide a qualitative risk assessment of the carcinogenic risk of diesel exhaust gases related to the project, which must include three different elements to ensure transparency:
    - A description of the main sources of diesel emissions for the project and acknowledgement of the relative importance of diesel emissions as a source of air pollution for the project;
    - The acknowledgement that diesel emissions have been labelled a human carcinogen by international authorities such as Health Canada, World Health Organization’s International Agency for Research on Cancer, the U.S. Environmental Protection Agenc'y and the California Environmental Protection Agency; and
    - Why a quantitative assessment of the carcinogenic risk of diesel emissions for the project is not being done.

Water availability and quality, and exposure by ingestion

- The proponent must determine the anticipated effects of the project on the quality and quantity of groundwater or surface water used for domestic or recreational purposes based on the strictest guideline values for the following criteria: Guidelines for Canadian Drinking Water Quality, Quebec Regulation respecting the quality of drinking water;
- Where predicted concentrations of COPCs approach or exceed drinking water quality guidelines and standards, include a discussion of the potential impacts of these exceedances on human health. In some cases, it may be prudent to further the assessment by conducting a detailed quantitative human health risk assessment (HHRA).

Traditional (or wild-collected) foods and exposure through ingestion:

- The proponent must describe how the contaminants (e.g., arsenic, cadmium, lead, mercury) related to the project and that can potentially end up in the water, air, soil or sediments, which could be absorbed in country foods (i.e., foods that are trapped, fished, hunted, harvested or grown for subsistence, cultural or medicinal purposes). It must evaluate the potential effects that these contaminants could have on human health, including analysis specific to Indigenous peoples;
- The proponent must take into account biomagnification and bioaccumulation.

In-depth HHRA:

- If an in-depth or quantitative HHRA is required, it must examine all exposure pathways for COPC to adequately characterize potential biophysical risks to human health. A multimedia HHRA may need to be considered and conducted for any COPC with an identified risk and multiple pathways;
- Use best practices in HHRA methods (refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment). It is requested that the proponent complete the checklist provided in this guide (Appendix B) to assist participants in verifying that the key elements of a human health risk assessment have been completed and to determine the location of this information in the impact assessment. This checklist will facilitate the review of the impact assessment and will be particularly useful if analyses are found in several sections of the impact assessment.

Exposure to noise an vibration:

- Provide an assessment of the significance of changes in predicted noise levels and how these may affect human health taking these steps into account:
  - Identify human receptors that may be affected by project-related noise;
  - As described in section 8.1, determine ambient (baseline) noise levels at representative human receptor locations using measurements or estimates;
  - As described in section 14.1, predict changes in project-related noise levels for each phase of the project (construction, operation and decommissioning) and describe the noise characteristics. Describe how noise associated with blasting activities has been considered;

- Compare predicted noise levels to relevant standards or guidelines (e.g., provincial guidelines); and
- Identify and analyze the potential human health impacts associated with the predicted changes in noise levels using criteria relevant to the health effects project (WHO sleep disturbance criteria for night-time activities, the strong discomfort and interaction with speech). It should be noted that the change in the percentage of people severely annoyed is only one indicator of the impacts of noise on human health, and that all possible effects on human health must be taken into account in the assessment.

The proponent must refer to Health Canada's guide: Guidance for the Assessment of Human Health Impacts in Environmental Assessments: Noise for the assessment of the effects of the project on human health in relation to changes in the noise environment. It is recommended that the proponent complete the checklists provided in the guides (Appendix 1) to help participants verify the presence and location of the main elements expected for this assessment in the impact study.

Other considerations:

- Document and take into account tolerance thresholds for potential adverse effects on health identified by Indigenous peoples;
- In situations where project-related air, water, soil or sediments, noise or light emissions meet local, provincial, territorial or federal guidelines, and yet public concerns were raised regarding human health effects, provide a description of the public concerns and how they were or will be addressed;
- Describe public concerns about food contamination and how they have been or will be addressed;
- Describe potential effects on food security, including:
  - changes in terms of availability, use, consumption and quality of country foods (traditional foods), and the potential effects related to these changes on physical and mental health of communities, including for Indigenous peoples. See Health Canada's Eating Well with Canada's Food Guide – First Nations, Inuit and Métis; and
  - Possibilities for Indigenous Peoples of avoidance of certain country food sources or drinking or recreational water sources due to the perception of contamination; and
- Describe any project-related changes that could result in a positive health effect (e.g., remediation projects).

16.2. Social Determinants of Health

With regard to the social determinants of health and their potential relations with biophysical determinants, the Impact Statement must:

- describe the project's components and relevant activities as well as their direct and indirect effects (whether positive or negative) on valued environmental, social and economic components, and describe interactions of these effects with health conditions (e.g., health-related behaviours and stress

experiences) related to mental and physical well-being. Pay particular attention to potential stressors related to VCs, such as social tensions, vibrations inside homes from mining activities, and depreciation of home values and other negative situations resulting from a degraded natural environment. Relevant indicators must be included;

- analyze these effects according to important characteristics such as the extent (e.g., short – or long-term), timing (e.g., seasonality), magnitude and likelihood of changes in well-being and health risks relative to each phase of the project, as well as equity considerations (GBA+);
- use community participation to inform the scope and depth of the selection of VCs for each community consulted;
- provide an appropriate rationale for the analytical approach taken, but consider including the following:
  - The results of sequence of effects analyses (i.e., VC interconnections and related effects interactions) with well-being and health risks as endpoints, reflecting input from potentially affected communities and the use of evidence; and
  - A description of priority indicators that need to be identified or validated by community members;
- describe the potential effects on the safety of women and girls in relation to mobile, rotational and, where applicable, camp-based workers. Pay particular attention to the potential effects on Indigenous women and girls, in light of the findings of the final report of the National Missing and Murdered Aboriginal Women and Girls Survey;
- describe how community and Indigenous knowledge were used in assessing the human health effects;
- determine the anticipated visual or aesthetic effects of the project on current land use in the study area; and
- apply GBA+ across all health effects, including effects on access to and use of social and health services, by examining how potential changes to these determinants could have different effects for diverse subgroups, including for Indigenous peoples and relevant community subgroups (e.g., women, youth, elders), and ensuring that different needs, particularly those related to health, are considered.

The proponent must refer to the Social Impact Assessment in the Environmental Sector: health network support guide by the Institut national de santé publique du Québec (2014).

17. Effects on Valued Components – Social Conditions

Within the context of the predicted changes to the biophysical environment, health and economic conditions resulting from the project, the proponent must assess the effects of the project on social conditions. Interconnections between social VCs and other VCs and interactions between effects must be described.

The VCs that require assessment are listed below, including select considerations and indicators to be included in the analysis. If, after engaging with communities and conducting further analysis, the proponent determines that the information and VCs listed below could be more meaningfully organized and presented in an alternate way, it may do so and provide a rationale for these changes.

The proponent must describe how community and Indigenous knowledge were used to collect baseline data and assess social effects and how they differ for diverse subgroups, as observed by these groups, where possible. In assessing effects to VCs listed below, the analysis should discuss circumstances where diverse subgroups, because of their particular circumstances, could experience adverse effects from the project more severely than others, or be excluded from potential benefits.

The analysis should describe the goals of local or regional land development or use plans that are relevant to the assessment, and the extent to which the project is aligned with such plans to avoid or enhance social effects. For the VCs listed below, the effects assessment should explore and discuss opportunities by which benefits to local communities can be enhanced.

17.1.Services and Infrastructure

The Impact Statement must:

- describe the predicted effects to the infrastructure and services in the study area, including adverse and positive effects to the following:
  - Housing (e.g., availability, affordability, suitability);
  - Road infrastructure and traffic safety;
  - Railways;
  - Pipelines, water mains and sewer lines;
  - Power lines;
  - Utilities;
  - Access to green spaces, parks, recreation facilities and resorts;
  - Waste disposal;
  - Police and firefighters;
  - Educational services, facilities and daycare;
  - Ambulance and health care services, including elder care and services;
  - Mental health and social services; and
  - Any other potentially affected infrastructure facilities or services;
- take into account potential effects arising from a higher risk of accidents for each phase of the project, e.g., a higher risk for the road system and emergency services during the construction phase due to an increased use of roads; and
- describe any need for new or expanded services, facilities or infrastructure, arising out of project-related effects.

17.2. Use of Land and Resources

The Impact Statement must:

- describe the possible interactions of the project with activities for use of land and resources, including the positive or adverse effects on the following:
  - Transportation and utility corridors;
  - Residential land use;
  - Forestry operations;
  - Commercial outfitters;
  - Agriculture, including the anticipated effects on livestock health and productivity;
  - Water supplies and water lots, as well as water sources and intakes for agricultural operations, industries, residents and municipalities; and
  - Other land uses;
- describe the potential effects on recreation and tourist activities (e.g., hunting, fishing, gathering, hiking wildlife and landscape viewing) by the communities, including the effects on the following:
  - Access to resources;
  - The quantity and quality of resources;
  - Access to parks and other recreation and conservation areas; and
  - The overall experience acquired in the context of recreational and tourist activities, including the effects of noise and artificial light;
- describe potential effects arising from the changes made to the visual and acoustic landscapes, including to visual and acoustic landscapes identified by Indigenous peoples;
- describe the land use losses associated with the security buffer zones applicable to the project; and
- determine the anticipated effects of the project on the quality and quantity of groundwater or surface water used for their recreational purposes as well as its consequences.

17.3.Navigation

The Impact Statement must:

- describe navigable waterways that could be impacted by the project, and specify the proposed crossing method;
- describe ancillary project components that will be constructed in, on, under, over, through or across navigable waterways to support the project (e.g., temporary or permanent bridges), and specify the proposed crossing method;

- describe potentially affected waterway users and describe consultation with waterway users and Indigenous peoples regarding navigation, issues raised and how issues were addressed; and
- describe project effects to navigation and navigation safety.

17.4.Community Well-Being

The Impact Statement must:

- assess potential adverse and positive effects, at the community level, of changes to social conditions including, such as those considered for the analysis of the social determinants of health in section 15.2;
- consider potential effects on physical and cultural heritage in assessing effects on social and economic conditions;
- provide copies of correspondence with provincial or territorial heritage resource authorities containing their comments on the heritage resource assessment and proposed mitigation measures;
- describe the results of consultation and engagement activities with communities with heritage resource concerns in the project area and indicate the involvement of community members in related studies, if applicable;
- describe, at the community level, the expected interactions between the project's construction, operation and maintenance workforce and local communities, businesses and residents;
- describe potential effects related to in- and out-migration, including on social and cultural make-up of affected communities and changes in populations;
- identify whether social divisions might be intensified as a result of the project;
- evaluate potential social effects associated with the increase in disposable income, including potential effects on cost of living, adverse and positive lifestyle changes and distribution of benefits among diverse subgroups;
- evaluate effects on access, ownership (including depreciation in value) and use of resources (e.g., land tenure, minerals, food, water, social infrastructure);
- assess the effects of vibration on the daily activities of residents within properties and the risk of damage to properties depending on the type of building (foundations) and the type of soil in place;
- assess the effects of increased traffic and heavy vehicles on the well-being of communities and on the practice of their usual activities;
- assess changes in visual aesthetics over the life of the project and after the project is abandoned or decommissioned;
- describe any anticipated effects on language dynamics;
- describe how changes to landscape, including nocturnal landscape, as a result of the project could result in effects on community well-being;

- consider the potential for stresses on communities, families and households cohesion, as well as on the prevalence of alcohol and substance abuse, and illegal or other potentially disruptive activities, including violence;
- describe potential effects related to greater propagation of sexually transmitted infections and gender-based violence (e.g., harassment or human trafficking);
- identify and consider the barriers that impede taking advantage of the positive effects on social conditions and how they are accentuated across diverse subgroups; and
- document the consultation undertaken with local, regional and Indigenous communities, as appropriate.

The proponent must apply GBA+ within the information related to community well-being and document how potential effects are different across diverse subgroups, including among Indigenous peoples and other relevant subgroups (e.g., women, youth, elders). Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.

18. Effects on Valued Components – Economic Conditions

The proponent must assess the effects of the project on the economic VCs, stemming from the predicted project changes to the biophysical environment, health and social conditions. All interconnections between these economic VCs and other VCs and interactions between effects must be described.

The proponent must describe how community and Indigenous knowledge was used to collect baseline data and assess for diverse subgroups, where possible, the way in which economic effects would be different for these subgroups. The Impact Statement must apply GBA+ to all effects and document how the potential effects or the changes in the economic conditions could be different for specific subgroups, including Indigenous peoples or other relevant subgroups (e.g., women, youth, elders).

As much as possible, the data must be subdivided by sex, age and ethnicity, and presented distinctly for each Indigenous community and all subgroups which form their communities.

During the assessment of the effects, the analysis must address the circumstances in which diverse subgroups could suffer from more severe adverse effects of the project than others, or not benefit from future economic benefits. The Impact Statement must also take into account the tolerance thresholds regarding the negative effects that Indigenous peoples will have identified.

The Impact Statement must describe potential positive and adverse effects to the local, regional and provincial economies, including, if applicable, whether and how local benefits can be maximized.

The assessment of economic effects must consider the temporal scale for construction, operation and beyond in order to assess the potential for boom-and-bust cycles potentially associated with the project and avoid them.

Other requirements regarding training, employment, contracting and procurement and economics are discussed in section 20.12, with respect to mitigation and enhancement measures.

18.1. Training

The Impact Statement must describe, if applicable, the training requirements related to the project needs and the potential economic effects that these requirements could cause. The proponent must indicate whether a strategy for training and employment of Indigenous workers exists.

It is recommended that the proponent work with the service delivery networks established in Quebec and Ontario as part of the Indigenous Skills and Employment Training Program. The program provides funding to Indigenous organizations across Canada that design and deliver employment training services to First Nations, Inuit, Métis and urban or unaffiliated Indigenous people in their communities.

While the detailed project description states that consultation and engagement activities and key informant interviews will be conducted with Indigenous communities, it is important to ensure that the network of Indigenous training organizations (e.g., the ASETS program service delivery network) is aware of all plans that the proponent is implementing in relation to the project. This includes the timing of labour requirements, the duration and type of employment available, employment support plans, and procurement and contracting opportunities for Indigenous people and communities.

18.2. Employment

The Impact Statement must:

- describe the potential changes in employment including the following aspects:
  - An estimate of the number of workers affected at each phase of the project;
  - A description of the employment likely to be in demand due to the project and the project requirements in terms of skilled and unskilled labour;
  - An estimate of the availability of local workers to occupy these jobs;
  - An analysis of the potential labour shortages in certain sectors within communities affected by the project, particularly considering other potential projects in the region, such as Falco Resources' Horne 5 project, which would require 1,000 workers during the construction phase and 500 during the planned 15 years of operation; and

  - If applicable, a description of the plans to fill the positions and the justification for hiring of temporary workers to make up for the shortage of labour and skills;
- describe the situations where the project could directly or indirectly create economic difficulties or the displacement of workers;
- provide an estimate of direct, indirect or induced income or wages, and the allocation of this income or wages, resulting from the project's expenditures during construction, operation and decommissioning;
- describe the potential positive effects related to the possibility for long-term careers and quality employment (e.g., full-time vs. precarious part time, temporary or permanent, skilled or unskilled) for the life of the project. It is suggested to take into account that wages in the mining sector are generally higher, which could have an overall positive impact on the regional economy. In 2018, the average hourly wage was $36.45 in the mining sector in Quebec, while it was $24.60 in all industries;
- analyze the potential for increasing employment for women and other subgroups and local workers more generally;
- provide an estimate of the anticipated levels of participation of Indigenous peoples in the project in relation to the project's total requirements (e.g., number of workers);
- describe, if applicable, the co-development processes with Indigenous peoples to ensure common development and management of programs for Indigenous employment. It is suggested to take into account that there are currently 4 Indigenous service delivery organizations in Quebec and 17 in Ontario. Although the construction, operation, decommissioning and closure of an underground gold mine is located in the Abitibi-Témiscamingue region of Quebec, there could be a potential partnership between one or more of the Indigenous organizations in Quebec or Ontario to support the participation of the Indigenous workforce. Please refer to the established network of Indigenous service delivery organizations; and
- describe the diversity and inclusion workforce plans, policies and practices including gender-neutral signage and appropriate safety equipment and apparel.

18.3.Contracting and Procurement

The Impact Statement must:

- describe the products and services that would be required for the project, including those that the proponent anticipates concluding procurement contracts;
- provide construction procurement and contract values;
- describe how the proponent anticipates they will attribute construction contracts and procurement of products and services;
- evaluate the ability of local businesses to compete for project-related contracting or to establish a partnership with the proponent;
- summarize business commitments made if the proponent has prepared an economic benefits plan or has become involved in specific cooperation agreements with communities or Indigenous peoples;

- provide an estimate of the anticipated levels of local and regional economic participation in comparison to the total project requirements (e.g., total dollar value of contracts), as well as for the Indigenous peoples; and
- describe situations when the project could directly or indirectly create economic hardships or the displacement of businesses.

18.4.Economy

The Impact Statement must:

- include an estimate and description of direct, indirect and induced economic effects of the project in the short and long term. The impact study must take into account fluctuating variables that could have economic effects. For example, the price of gold remains at high levels for the moment, which is favourable to the project; however, this value is very volatile and fluctuations can be significant, which always represents a risk for mining projects;
- document the sources and methodologies used for developing multipliers and estimates and, where a generic multiplier may not accurately reflect the specific situation of the project, provide evidence of specific economic activity that will result from the project going ahead;
- describe the potential effects of changes to economic conditions in affected communities, including Indigenous communities, for example, to the following:
  - Forestry and logging operations, including the recovery of wood cut during the construction phase;
  - Fishing, hunting, and trapping;
  - Commercial outfitters;
  - Commercial recreation and tourism; and
  - Agriculture, including predicted effects to livestock health and productivity;
- consider the indirect effects on the economy resulting from changes in land use;
- describe the potential effects on Indigenous peoples' local economies;
- describe the potential effects of the project on the availability and quality of land and the short-term and long-term disturbance of the related sectors of activity;
- describe the potential effects of the project on the quality and quantity of groundwater or surface water used for commercial purposes;
- provide a quantitative evaluation of effects on local, regional, provincial, territorial, federal government or Indigenous peoples revenues from tax levies, royalties, revenue sharing and other means for each phase of the project;
- discuss how the project would affect the gross domestic product at the federal and provincial levels;
- evaluate the net economic benefits to the Canadian economy as a whole, which requires a detailed forecast of annual cash flows for the life of the project, including a sensitivity analysis showing the impact of changes in the discount rate, prices, capital and operating costs, or other significant parameters;

- estimate the potential effects of the project on the traditional economy, including the potential loss of related jobs; and
- provide an analysis of the project's potential impact to property values and to the cost of living, both short-term and long-term;
- provide an analysis of the potential changes in social class disparities that may occur with the completion of the project;
- examine the possibility of a boom and bust cycle in the local economy from the construction phase through to the operation phase, as well as at the end of the project.

19. Indigenous Peoples

Proponents must engage with Indigenous peoples, in order to identify and understand the potential impacts of their projects on them, and to incorporate each Indigenous community's knowledge into the impact assessment. Engagement with Indigenous peoples is required to inform the impact assessment and identify measures to avoid or minimize potential impacts on Indigenous peoples from the project. This engagement may also help identify potential positive impacts that would lead to improvement of the underlying baseline conditions that support the exercise of rights. Ideally, the project will be designed not only in such a way as to minimize its negative effects, but also to maximize its positive impact on the quality of life of Indigenous peoples.

The engagement with Indigenous peoples must involve ongoing information sharing and collaboration between the proponent and the Indigenous peoples to help validate the assessment findings. The results of any engagement must be presented in the Impact Statement, and, as best as possible must reflect the perspective of the Indigenous peoples involved as described in section 6. In cases where a specific study addressing elements relevant to the impact assessment of the project has been prepared by an Indigenous community, the proponent must incorporate it into the Impact Statement and explain how it was taken into account. In addition, the proponent must append the full studies, as they were presented by each Indigenous community, except in cases where they would contain Indigenous knowledge shared in confidence.

The proponent must provide an opportunity for Indigenous peoples to review the information prior to submission of the Impact Statement. The Impact Statement must indicate where input from Indigenous peoples has been incorporated, including Indigenous knowledge. To the extent possible, information must be presented separately for each Indigenous community involved in the assessment, and include contextual information about the members of the Indigenous community, by relevant subgroups (e.g., women, men, elders, youth).

Where Indigenous peoples do not wish to participate, the proponent is encouraged to continue sharing with them information and analyses pertaining to potential effects of the project, to document its efforts in that respect, and to use available public sources of information to support the assessment.

19.1.Effects on Indigenous Peoples

The Impact Statement must provide information on how the project may affect Indigenous peoples, as informed by the Indigenous peoples involved. For instance, it is important to document and use the tolerance thresholds that have been identified to describe potential effects. Information on measures proposed to mitigate adverse effects must also be provided, including the perspectives of Indigenous peoples on potential mitigation measures. The proponent must apply Agency guidance on engaging with Indigenous peoples and appropriate methodologies for assessing effects and impacts on Indigenous peoples and their rights.

The assessment of potential effects must include both adverse and positive effects to the current use of land and resources for traditional purposes, to physical and cultural heritage, to structures, sites or things of historical, archaeological, paleontological or architectural significance, and to environmental, health, social and economic conditions of Indigenous peoples affected by the project. To describe the potential effects of the project, the Impact Statement must use explicit wording and avoid wording that leaves room for interpretation (i.e. "change in land use").

19.1.1. Physical and Cultural Heritage, and Structures, Sites or Things of Significance

The Impact Statement must:

- assess potential effects to physical and cultural heritage and to structures, sites or things of historical, archaeological, paleontological or architectural significance for Indigenous peoples, including the following:
  - The loss or destruction of physical and cultural heritage;
  - Changes to access to the physical and cultural heritage;
  - Changes to the cultural value, spirituality or importance attached to the physical and cultural heritage;
  - Changes to sacred, ceremonial or culturally important places, objects or elements, including languages, stories and traditions; and
  - Changes to visual aesthetics over the life of the project and after decommissioning of the project;
- take into account potential effects on physical and cultural heritage when assessing the effects on social and economic conditions;
- provide copies of correspondence with provincial or territorial authorities responsible for heritage resources with comments on any heritage resource assessment and proposed mitigation measures;
- describe the outcomes of engagement activities with Indigenous communities with concerns about heritage resources in the project area and indicate the participation of the members of these communities in the related studies, if applicable;

- describe how each Indigenous community's knowledge informed studies, including the identification of the sites to assess and include studies conducted by Indigenous peoples; and
- consider natural and cultural heritage as a multidimensional concept which is not limited to particular sites or objects and which can also include components of the environment identified by Indigenous peoples as having heritage value.

Regarding archaeological and historical resources:

- On lands under provincial jurisdiction in Quebec, work that may disturb the soil on the surface or at depth should comply with Quebec's *Cultural Heritage Act* and *Archaeological Research Regulation*.

19.1.2. Current Use of Lands and Resources for Traditional Purposes

The Impact Statement must:

- assess the potential effects on current use of lands and resources for traditional purposes, including to the following:
  - Current and future availability and quality of country foods (traditional foods);
  - Quality and quantity of resources available for harvesting, other than for subsistence (e.g., species of cultural importance, traditional and medicinal plants);
  - Experiences of being on the land (e.g., the changes in air quality, noise exposure, effects of vibrations from blasting or other activities, increase in artificial light at permanent and temporary sites);
  - The use of travel routes, navigable waterways and water bodies;
  - Sites of interest to communities including for commercial and non-commercial fishing, hunting, trapping and gathering sites, as well as on cultural and ceremonial activities and practices that could be taking place on those sites; and
  - Access to the territory and to the distribution and availability of harvested wildlife (e.g., wildlife avoidance);
- describe potential effects on the transmission of traditional knowledge linked to activities potentially affected by the project;
- describe all reasonable alternatives considered that would avoid impacts on current use of lands and resources for traditional purposes considered during project development;
- take into account expectations pertaining to the preservation of landscapes, including nighttime landscapes and, if applicable, regulatory requirements in place concerning light pollution;
- describe how Indigenous peoples who participated in the gathering of traditional use information took part in the impact assessment and in the development of proposed mitigation measures, including undertaking their own assessment of effects. Include all Indigenous comments on potential effect to current use of lands and resources for traditional purposes; and

- determine as precisely as possible when traditional activities can be carried out again, for those that can, and provide an exhaustive list of traditional activities that can no longer be carried out.

19.1.3. Health, Social and Economic Conditions

The Impact Statement must meet the requirements set out in sections 16, 17 and 18 above with regard to the effects on health, social and economic conditions, which must take into account Indigenous peoples and GBA+ specific to Indigenous peoples.

The assessment of these effects on Indigenous peoples must describe and take into account interactions with the effects on physical and cultural heritage, on structures, sites or things of significance, and on the current use of lands and resources for traditional purposes. For example, an effect on a traditional food may have consequences for the practice of traditional activities, and could lead to an impact on the cost of living, food security, and mental health at the community level or on vulnerable subgroups.

19.2.Impacts on the Rights of Indigenous Peoples

The Impact Statement must describe the level of engagement with Indigenous peoples regarding potential impacts of the project on the exercise of rights, and where possible, the project's potential interference with the exercise of rights. It is preferable that Indigenous peoples have all the information about the project and its potential effects on hand to be able to assess the potential impacts of the project on their rights. The proponent is therefore encouraged to share VC studies with Indigenous peoples prior to assessing the impact on their rights. In the absence of this information, the proponent must document the approach taken to support Indigenous peoples in order to identify the potential impacts of the project on their rights, including the hypotheses put forward on the potential effects.

Where an Indigenous community has not provided this information to the proponent, or both parties agree that it is better to provide information related to the impact on the exercise of rights directly to the Agency, the proponent must describe the rationale for the approach taken. The proponent is encouraged to discuss with Indigenous peoples their views on how best to reflect the assessment of impacts on rights in their Impact Statement. This may include supporting Indigenous-led studies that are to be provided publicly and to the Government of Canada.

The proponent and Indigenous peoples must document and consider the following factors, when relevant:

- How the project may contribute cumulatively to any existing impacts on the exercise of rights, as identified by the Indigenous people;
- The interference of the project on the quality and quantity of resources available for the exercise of rights;
- The interference of the project on the access to areas important to the exercise of rights;
- The interference of the project on the experience associated with the exercise of rights;
- The interference of the project on Indigenous traditions, laws and governance;

- How the project will affect the planning, management or stewardship of traditional lands and resources by Indigenous peoples;
- How the project will affect the ability of Indigenous peoples to derive future economic benefits from the land or water or to maintain an ongoing relationship with the land or water;
- How the project and its impacts weaken or strengthen the authority of Indigenous peoples on their territory; and
- How the project affects any other component of significance identified by Indigenous peoples.

The proponent must work together with Indigenous peoples in order to find mutually agreeable solutions to concerns raised about the project, especially for those concerns raised by Indigenous peoples about impacts on the exercise of their rights.

The Impact Statement must:

- document the project's potential impacts on the exercise or practice of the rights of Indigenous peoples or the rights arising from treaties in the project area, as expressed by potentially impacted Indigenous peoples;
- describe the impact on the rights of Indigenous peoples, taking into account the concept of the link between resources, access and experience.
- describe any measures identified in an attempt to avoid, minimize, offset or otherwise address potential adverse impacts of the project on the rights of Indigenous peoples, and identify if these are measures for which the proponent or other parties would be responsible;
- describe if and how these measures will be integrated into the project design, if applicable;
- regarding mitigation measures proposed by the proponent, include perspectives of the potentially impacted Indigenous peoples, on the effectiveness of particular mitigation measures on such impacts; and
- determine, as precisely as possible, when the affected rights can be exercised again, if applicable, and provide a comprehensive list of Indigenous rights that can no longer be exercised.

Where no mitigation measures are proposed or mitigation is not possible, the Impact Statement must describe the potential adverse impacts on the rights of Indigenous peoples, as identified by the Indigenous peoples.

The proponent must consult the following Agency guidance documents on this topic: Policy Context: Assessment of Potential Impacts on the Rights of Indigenous Peoples and Interim Guidance on Assessing Potential Impacts on the Rights of Indigenous Peoples.

Mitigation measures are further discussed in section 20**Error! Reference source not found.**.

20. Mitigation and Improvement Measures

Every impact assessment conducted under the IAA must identify measures that are technically and economically feasible that would mitigate all of the project's adverse environmental, health, social and economic effects. Conversely, the proponent can identify enhancement measures to increase positive effects. Mitigation and enhancement measures that are proposed are discussed during the review of the Impact Statement and may be modified as a result of the review. Mitigation and enhancement measures may be considered for inclusion as conditions in the decision statement.

Mitigation measures are technically and economically feasible measures to eliminate, reduce, control or offset the adverse effects of a designated project, and include restitution for any damage caused by those effects through replacement, restoration or compensation. The "hierarchy of mitigation measures" means the descending sequence of the following three options:

- **Eliminate:** Refers to the elimination of effects, such as by changing the location or design of the project. It can also be referred to as "avoidance" of effects.
- **Reduce and control:** Aims to reduce effects to the extent possible, for example, by modifying the most adversely impactful project activities or components or by taking measures specific to the potential effects. There may still be residual effects where measures are not sufficient to eliminate the effects, or where their absolute effectiveness is uncertain. Effects may also be "minimized" when it is not possible to "avoid" them.
- **Offset:** Aimed at offsetting residual effects following consideration of elimination and reduction measures, through measures referred to as "compensation" or "restitution". For example, where an effect on fish habitat persists, it may be possible to offset through the creation of new habitat (replacement) or to propose measures to restore degraded habitat conditions. These include measures referred to as replacement, restoration or (financial) compensation. For compensation plans targeting species at risk, please refer to Template 2 in the *Species at Risk Act* Permitting Policy. If offsets are necessary to remedy the residual effects, please refer to the Operational Framework for Use of Conservation Allowances.

As a first step, the proponent is encouraged to use an approach based on the avoidance and reduction of the adverse effects at the source, namely consider modifying the design or changing the location of certain project components.

Enhancement measures for positive effects are not necessarily required to mitigate negative effects, but are measures that may be developed to make use of opportunities presented by the project to contribute to, for example, local and regional training efforts, investment in infrastructure and services, projects to rehabilitate degraded environments, etc.

Measures are to be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation and implementation.

The Impact Statement must:

- describe the standard mitigation meaures that are proven to be technically and economically feasible, as well as any new or innovative mitigation measure proposed;
- where appropriate, use information generated through ongoing or completed regional assessments in the project area to inform proposed mitigation and enhancement measures;
- describe the mitigation measures specific to each environmental, health, social or environmental effect. Mitigation measures are to be written as specific commitments that clearly describe how the proponent intends to implement them and the outcome these mitigation measures are designed to address;
- include the details of all the mitigation practices, policies and commitments that are part of the project's design and that are necessary to achieve the changes anticipated in the physical environment (e.g., all the mitigation measures taken into account in the water quality modelling, such as the water treatment stations and diversion of surface water);
- describe the additional mitigation measures that can be applied and that seek to protect the VCs of the changes anticipated in the physical environment (for example, the TSS management plan) and further reduce the residual effects. Discuss how these mitigation measures will be applied and when they will be applied, as well as their effectiveness to reduce the residual effects;
- describe the adaptive management plans that will be implemented if the mitigation measures do not give the expected results;
- when components must be decommissioned and abandoned, include the activities projected for this purpose. The components of the project that can be decommissioned and abandoned during the construction or operating phases may include access roads, temporary deposit areas, aggregate extraction sites and other temporary sites;
- specify the interventions, the work, the ecological footprint reduction techniques, the existing best technology, the best environmental practices, the corrective actions that would be put in place and any addition anticipated in the various stages of the project with a view to eliminating or mitigating the adverse effects of the project;
- describe any environmental protection plan being prepared for the project and, if applicable, the environmental management system through which plans will be delivered. The plan(s) must provide an overall perspective on how potentially adverse effects would be minimized and managed over time;
- define the mechanisms that will guarantee that the contractors and subcontractors will comply with the proponent's commitments and policies and their audit and law enforcement programs;
- describe the approach that would be taken if a mitigation measure is no longer feasible while the project is carried out;
- describe how, throughout the project's duration, the lessons learned through follow-up programs will be used to continually improve mitigation measures (adaptive management);
- identify other technically and economically feasible mitigation measures that were considered but are not proposed for implementation, and explain why they were rejected. Justify any trade-offs between cost savings and effectiveness of the various forms of mitigation measures;

- assess the potentially adverse effects associated with the mitigation method itself (e.g., potential failures related to fish habitat rehabilitation and resulting effects);
- include a mitigation and decommissioning plan for the access roads and the other temporary components of the project;
- explain how mitigation and enhancement measures were developed with communities and Indigenous peoples, as well as federal, provincial and municipal authorities, as applicable;
- provide an assessment of the likely effectiveness of the proposed technically and economically feasible mitigation measures and describe the relevant uncertainty in the measure's effectiveness. The reasons for determining if the mitigation measure reduces the extent to which the effects are significant must be made explicit;
- describe all the relevant uncertainties related to the mitigation measures and assess how they will affect the residual efforts and/or the projected changes to the environment;
- describe how the Best Available Technologies and Best Environmental Practices will be used, including their effectiveness on the contaminants of concern, in order to prevent the harmful effects on the receiving environment; and
- identify the party responsible for implementation of the mitigation measures and the accountability mechanism.

Where mitigation measures are proposed to be implemented for which there is little experience or for which there is some question as to their effectiveness, the potential risks and effects should those measures not be effective must be clearly and concisely described. In addition, the Impact Statement must identify the extent to which technological innovations may help mitigate effects. Where possible, the Impact Statement must provide detailed information on the nature of these measures, their implementation, management and related requirements of the follow-up program.

In addition to the general factors above, the following subsections present additional requirements specific to individual VCs. The proponent may wish to propose measures that differ from the following requirements and recommendations. In which case, the proponent must provide a rationale.

20.1. Atmospheric, Acoustic and Visual Environments

The Impact Statement must describe the mitigation measures for the potential effects on the atmospheric, acoustic and visual environment, including:

20.1.1. Atmospheric Environment

- provide a description of all the methods and practices (e.g., control equipment, heat or gas recovery system) to be deployed to reduce and control emissions;

- provide a description of any methods and practices to be implemented to reduce and control radon emissions, if applicable;
- define the specific requirements for the project necessary to address specific effects (e.g., application of stronger emissions reductions, adaptive management);
- develop and implement strategies compliant with the commitment of the CCME regarding prevention of pollution;
- ensure that the best available economically feasible technologies to reduce airborne particulate matter concentrations and other contaminants are implemented. If the best available technologies are not included in the design of the project, the proponent must provide a justification of the technologies selected;
- implement measures to reduce atmospheric emissions and formation of dust and particulate matter from land development and construction operations, including those coming from machinery and vehicles. The mitigation measures should include design factors specific to the site, operating practices, precise technologies, and the products and equipment that will be used to prevent or control emissions;
- apply various methods to reduce dust emissions, such as imposing speed limits, using dust removals, using wet spraying on material piles, building gravel roads using a material with low silt content and, where applicable, deploying a particulate matter monitoring program outside the boundaries of the project site;
- refer to best management practices for the mitigation of atmospheric emissions, such as those presented in the document Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities;
- produce and apply a precise and rigorous management plan for dust emissions from non-asphalted roads for all phases of the project. The plan must describe the emission sources and the related control methods and mitigation measures to be applied;
- reduce road and off-road vehicle engine emissions by adopting technological strategies (e.g., use of exhaust gas post-treatment devices, use of replacement fuels) and operational strategies (e.g., establish limits for idling); and
- describe the adaptive management strategies that will be deployed for situations where the concentrations of the main air pollutants exceed the modelled forecasts, the applicable air quality criteria and/or the reference points specific to the project.

20.1.2. Acoustic Environment

- provide a noise management plan, including identification of the noise sources, common noise mitigation measures, the performance efficiency of the noise control devices, the best practices programs and the continuous improvement programs, and establish the need for follow-up monitoring for the purposes of validation of the model or due to any concern raised by participants. The noise management plans must also consider the following factors:
  - advance notices of maintenance work and planning of this work;

- notification of nearby residences and local authorities regarding the noise prevention and management plans and procedures;
- implementation of a complaint resolution protocol to document the complaints received and the mitigation measures taken to resolve them (including the nature of the sound produced, e.g., tonal, impulsive, highly impulsive, time of the event); and
- regular reports to the agency on the efficiency of complaint resolution (time) and the mitigation measures;

20.1.3. Visual Environment

- provide a lighting management plan, including the planning and management of lighting and of the ambient light for every activity site and the consideration of measures for the reduction of excessive light during construction and operation. Measures to reduce excessive light must be considered and applied during the construction and operation, while maintaining safe lighting levels, particularly in the choice of fixtures, lighting level, their direction and height, and their limited period of use:
- consider the following options of measures for lighting management:
  - avoid or minimize the use of artificial light;
  - select low-intensity lighting;
  - use lighting fixtures that limit or concentrate the lighting to targeted areas and avoid light spilling out of the spaces to be illuminated;
  - limit the projection of light toward the sky by using fixtures that produce dark, uniform lighting that meets actual lighting needs;
  - avoid the emission of light at more than 90 degrees; and
  - avoid lights that emit blue/green/white/UV wavelengths.
- consider measures for temporary activity sites (work camp, work area, storage area, workers' camps etc.) as well as for permanent activity sites (administration buildings, control centre and other related equipment);

20.2. Groundwater and Surface Water

The Impact Statement must describe the mitigation measures for the potential effects on groundwater and surface water, including:

- describe the mitigation measures for the possible effects on the quantity and quality of surface water, groundwater and well water, including the rationale that explains the effectiveness of proposed measures;
- provide any water management plan applicable to waterbodies and watercourses likely to be affected for each phase of the project;

- describe methods for the prevention, management and control of acid rock drainage and metal leaching during construction, operation, decommissioning and closure phases;
- provide volumes and tonnages of potentially acid generating and leachable materials and disposal methods;
- describe the strategies for preventing or managing acid mine drainage and metal leaching throughout the project;
- provide an assessment of alternative methods for segregating potentially acid generating and non-acid generating tailings over the life of the project; and
- describe contingency plans, monitoring during construction, operation, decommissioning, closure and post-closure, as well as maintenance plans and adaptive management if required.

For the projects necessitating the use of natural bodies of water inhabited by fish for mine waste disposal, an amendment to the MDMER will be required. For the purposes of this document, mine waste means waste rock and effluents in accordance with subsection 5(1) of the MDMER. This regulatory process will not be launched as long as the proponent has not undertaken a detailed assessment of the mine waste disposal alternatives. If the regulatory authorization requirements during the impact assessment are satisfied, accelerated authorizations may be granted. For more guidance, the proponent must consult the Guidelines for the assessment of alternatives for mine waste disposal.

20.3. Riparian and Terrestrial Environments and Wetlands

The Impact Statement must describe the mitigation measures for the potential effects on the riparian and terrestrial environments as well as wetlands, including:

- describe and justify the soil treatment methods to eliminate or reduce the adverse effects on the soils and materials in the root area, including recovery techniques (e.g., soil stripping, stump removal and other soil treatment techniques), soil separation maintenance measures, control measures for wind and water erosion, work shutdown procedures in case of wet conditions, and soil settlement prevention measures;
- describe and justify how to locate preexisting soil or sediment contamination, the mitigation and monitoring measures that will be undertaken in this regard, and the applicable regulatory restoration measures;
- describe and justify the biosafety measures that will be employed to identify the biological risks and eliminate their propagation, such as diseases in the soil or the roots;
- describe and justify the construction methods used to cross wetlands and other sensitive terrestrial habitats, and the criteria for determination of techniques proposed for each crossing, including the locations where trenchless crossing methods will be employed;

- describe and justify the ways of avoiding or reducing the temporary or permanent adverse effects on wetlands and riparian habitats;
- describe and justify the proposed measures to mitigate bank erosion, including measures to eliminate the potential for erosion, such as bank stabilization using vegetation;
- describe the vegetation standards and controls that will be deployed during construction and operation of the project;
- relating to invasive species and vegetation management:
  - describe and justify the measures allowing identification of invasive species or other undesirable introduced species, avoid their propagation and control them during all phases of the project, including the necessity of preconstruction surveys to identify the areas with a high density of these;
  - if applicable, identify the criteria and circumstances of application of chemical, biological or mechanical control methods as well as the pertinent regulation and determine the adverse effects associated; and
  - describe the selection of plant species to be conserved and planted in order to promote vegetation communities with low natural growth;
- concerning wetlands:
  - explain how avoidance of wetlands was considered, namely by considering other locations for project components and activities;
  - explain how the effects will be reduced and controlled when applying special mitigation or by modifying the activities and components that have the potential to affect wetlands during all of the phases of the project, including how the available procedures, practices and technologies that are standardized, proven, or experimental and wetland-specific were considered;
  - explain how mitigation measures consider the natural succession and the variability of the environment over time; and
  - describe proposed compensation measures (see section 20.8)
- describe the revegetation procedures proposed as mitigation measures, including:
  - the revegetation techniques and the locations where they would be implemented;
  - the seed mixes to use, the spreading rates and the location of the spreading. Native and indigenous species adapted to the local conditions should be used when the purpose of revegetation is to naturalize or regenerate the area;
  - the fertilizers that will be used, the spreading rates and the locations, the criteria for determining these technical features;
  - the emergency seeding and planting plans, which include a description of the species to be replanted, the replanting locations and the criteria for determining these specifications; and
  - the improvement or restoration standards to be used to assess the ecological equivalence of the landscapes reclaimed after operation;
    - with respect to the right-of-way :

- describe and justify the width of the construction right-of-way and permanent right-of-way, including where the right-of-way will be narrowed to avoid or reduce adverse effects;
- describe and justify the need for temporary construction sites, including considerations taken to minimize adverse effects, including siting and management measures.

20.4.Fish and fish habitat

The Impact Statement must describe the evasion and mitigation measures for the potential effects on fish and fish habitat, including:

- describe the measures recommended for crossing of temporary or permanent watercourses (access and maintenance roads), including the locations where trenchless methods of crossing watercourses will be used, particularly to ensure the free circulation of fish when necessary. As applicable, non-maintenance of free passage for fish will have to be documented and justified (e.g., by showing that a barrier exists to free passage at the location of the crossing structure or near it upstream or downstream, or that the quantity and quality of habitats upstream from the structure are marginal);
- describe measures to prevent and mitigate the risk of harmful, destructive or disruptive activities during sensitive periods and in sensitive locations (e.g., spawning and migration) for fish, in water or in any place frequented by fish, such as consideration of sensitive periods for fish;
- include measures to counter the sensory disturbances and the resulting functional habitat loss;
- describe the measures recommended to avoid fish mortality during use of explosives in the aquatic environment or nearby, or by fish entrainment during pumping and water withdrawal operations (e.g., during the construction of temporary structures);
- describe mitigation measures to prevent the deposit of harmful substances to fish in the water or in the zones frequented by fish;
- identify the timing of the project activities in the water, including the periods and windows of limited activity;
- describe the conditions on which the crossings of watercourses and riparian areas would be restored and maintained after construction of the project;
- describe the measures recommended for restoration of locations in the riparian and aquatic environments;
- describe the criteria for assessment of the successful restoration of fish-bearing watercourses, as well as the mode and timing and the conditions of documentation of this assessment;
- describe the measures recommended to eliminate the introduction of invasive aquatic species during work in the aquatic environment; and
- describe the standard mitigation measures that are proven to be technically and economically feasible, as well as any new or innovative mitigation measure proposed.

Please also consult section 20.8 below.

20.5.Resident and Migratory Birds and Their Habitat

The Impact Statement must describe the measures for mitigating potential effects on resident and migratory birds and their habitat, including:

- indicate the measures for prevention and mitigation of the risk of harmful, destructive or disturbing activities during sensitive periods or in sensitive locations (e.g., migration and nesting) for birds, their nests and their eggs, or the areas frequented by birds, for example, by avoiding night lighting during the peak migration periods or avoiding excessive loud noises, vibrations or explosions during the breeding season;
- include measures to counter the sensory disturbances and the resulting functional habitat loss;
- describe the recommended measures for preventing the deposit of substances harmful to migratory birds in areas frequented by migratory birds (e.g., drilling mud from watercourse and wetland crossings);
- demonstrate how the proponent considered the timing of vegetation removal and construction to be outside the main breeding season.
    - In this regard, and for nesting periods, the proponent is encouraged to refer to the Guidelines to reduce risk to migratory birds and to ECCC's website on General nesting periods for migratory birds. It should be noted that these dates cover the main nesting period of migratory birds, which reduces the risk of taking their nests or eggs. This recommendation does not authorize the disruption, destruction or taking of a migratory bird, its nest or its eggs outside these periods; and
    - In addition, the Nesting Calendar Query Tool by Birds Canada can be used to create customized nesting calendars for particular species and places of interest. The nesting calendars are created based on the main portion of the nesting season and can be sorted by different categories, such as species, ecodistricts, bird conservation regions, ecoregions, nesting areas, provinces and territories, federal protection, habitats, nest type and species type. For example, calendars subdivided by ecodistrict indicate the percentage of selected bird species that are likely to nest based on the ecodistrict selected. The tool contains a warning, which provides important information about the definition of the nesting periods, the accuracy of nesting dates and the protection of bird nests and eggs. This warning should be read before using the tool.

20.6.Vegetation and Other Wildlife and Its Habitat

In addition to the wildlife discussed above, the Impact Statement must describe the measures for mitigating potential effects on vegetation and other wildlife and their habitat, including:

- describe and explain the condition in which the temporary construction areas and the permanent right of way will be restored or maintained following construction, and explain the mitigation measures considered including possible revegetation, obstruction of the sightline, restoration of wildlife corridors and habitat connectivity, reduction of fragmentation and reduction of long-term cumulative effects;

- describe and explain the measures to control the use of the right-of-way and new access roads to access areas that were previously difficult to reach, including by wildlife predators as well as by hunters, off-roading recreationalists, and other users;
- provide the best technically and economically feasible approaches for mitigating effects on habitat, aligned with the hierarchy of mitigation measures, and justify moving from one mitigation option to another;
- include measures to address sensory disturbance and the resulting functional loss of wildlife habitat; and
- take into account species of interest to Indigenous peoples in the identification of mitigation measures for potential effects on species and ecological communities.

20.7.Species at Risk

The Impact Statement must describe the measures for mitigating potential effects on species at risk, as well as ecological communities at risk, including:

- describe the proposed mitigation measures for potential adverse effects on species and critical habitat listed under Schedule 1 of the SARA. These measures must be compatible with any applicable recovery strategy and action or management plan and be described in terms of the effectiveness of each measure in avoiding negative effects. Include a full justification, based on scientific data, for the proposed measures;
- describe mitigation measures to reduce the risk of harmful, destructive or disruptive activities in sensitive times and places of importance to species at risk;
- describe measures to prevent the release of harmful substances into waters or areas frequented or occupied by species at risk; and
- provide mitigation measures for effects on habitat, aligned with the hierarchy of mitigation measures and justify moving from one mitigation option to another.

With respect to bats:

- describe the effectiveness of the mitigation measures, taking into account the configuration of the resources in the environment and how local bat populations use these resources;
- describe how bat behaviour (differentiated by species) has been taken into account, based on the geographical location and time period; and
- at minimum, the following mitigation measures should be implemented:
    - spatial avoidance:
        - a buffer zone of 120 m is recommended;
        - for resting areas and nurseries in trees, apply a buffer zone to the entire complex of roosts and nurseries; and
        - for hibernacula, apply the buffer zone to the entire underground cave and mine system;

- temporal avoidance (timing of disruption, destruction of resting areas or exclusion):
  - avoid disruption, destruction and exclusion between April 30 and September 1;
- lighting:
  - avoid or minimize the use of artificial light in bat habitats;
  - select low-intensity lighting;
  - use lighting fixtures that restrict or focus illumination to target areas; and
  - avoid lights that emit blue/green/white/UV wavelengths;
- follow the Canadian National White-nose Syndrome Decontamination Protocol for entering bat hibernacula (Canadian Wildlife Health Cooperative);
- in collaboration with Indigenous peoples, present a program to excavate caves to provide habitat for bats during the mine closure phase in accordance with existing laws and regulations; and
- other compensation.

With respect to turtles:

- follow the advice and recommendations of the Quebec Turtle Recovery Team, particularly with respect to protection and mitigation measures for roads, gravel pits, sand pits and agricultural and forest environments.

Please also consult section 20.8 hereinafter.

20.8.Compensatory Plans

Residual effects resulting from the project may need to be offset by implementing compensatory measures. Where compensatory measures are proposed as measures to mitigate residual effects on species at risk and their critical habitats, fish and fish habitat, and wetland functions, the Impact Statement must include offsetting or compensation plans for consideration during the impact assessment process.

In general, these plans should address the following elements, or refer to locations in the Impact Statement where this information is presented:

- Describe the baseline conditions of the species at risk, critical habitat, and wetland functions potentially impacted by the project;
- Explain and justify the hierarchy of mitigation measures considered;
- Identify and describe residual effects that are the subject of the compensatory measures;
- Identify a compensation ratio with rationale, including how any policies or guidance provided by federal and provincial authorities and Indigenous peoples have been considered;
- Where feasible, identify the location and timing of implementation of compensation projects;
- Identify and describe the success criteria;

- Identify and describe in detail non-habitat-related compensation measures (e.g., predator control);
- Describe how the proposed measures align with published provincial and federal recovery management or action plans and strategies for species at risk, or for fish and fish habitat;
- Describe how the proposed measures align with published provincial and federal recovery management or action plans and strategies for wetlands;
- Identify, if possible, the parties responsible for implementation of the compensatory measures, including monitoring and review;
- Identify indicator species for setting compensation objectives. The choice of indicator species should be based on baseline data. Species at risk should not be used as indicator species, since compensation efforts must be specifically directed to these species;
- Describe the selection process for proposed compensation sites and associated baseline conditions;
- Provide a description of the monitoring schedule and activities to be completed to verify the success of compensation activities; and
- If offsets are required to address residual effects, refer to the Operational Framework for Use of Conservation Allowances.

The proponent must explain how Indigenous peoples were involved in the development of the compensation plans. The proponent must demonstrate how the information received from Indigenous peoples has been taken into account, including the choice of compensation ratios, if applicable. The proponent must also elaborate on how Indigenous peoples will be involved in the implementation of the compensation measures and the evaluation of the success of these measures.

For compensation plans targeting species at risk, the proponent can refer to Template 2 in the *Species at Risk Act* Permitting Policy.

To develop a compensatory plan to offset residual harmful effects on fish and fish habitat, the proponent may refer to the Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the *Fisheries Act*. Each compensation plan should include the following:

- An exact location for the proposed measures of the project (latitude and longitude, lot number, municipality, regional municipality county, etc.) and property rights;
- Baseline information including a description of the environment (biological, hydrological, physical, chemical, etc.), an estimation of the quality of the environment in question and a description of the issue to address. Ideally, the description of the environment should be accompanied by georeferenced and dated photographs;
- A description of the proposed measures (nature, extent, method, timetable, etc.);
- The fish species affected by the proposed measures, including the resulting fish habitat functions (feeding, reproduction, rearing, shelter, growth, migration);
- An assessment of the benefits to fish and fish habitat resulting from the offsetting measures in terms of the significance, magnitude and adequacy of the gains to be achieved with respect to the current situation; and

- A follow-up program to measure the success of offsetting objectives, including the details of its implementation. Offsetting objectives as well as the methods and criteria used to evaluate success (parameters, frequency, duration, etc.) must be clearly identified and described. Deliverables must be identified (e.g., baseline information, follow-up protocol, plans and specifications, work report, follow-up report, etc.), along with contingency measures in case success criteria are not met. The offsetting objectives and the timelines of the follow-up program (including deliverables) should be compiled in one or more tables.

With respect to wetlands, compensation plans should:

- clearly indicate the location and total area of each type of wetland, as well as their respective locations, for which the residual effects should be mitigated by compensation measures;
- favour the restoration of drained or altered natural wetlands of the same type and function as those affected by the project. Wetland restoration is preferable to wetland enhancement, both of which are preferable to the development of existing wetlands or the creation of new wetlands;
- demonstrate that wetland functions can be replaced by the proposed compensation activities;
- indicate where it is not possible to compensate for the loss of functions in cases where wetlands are unique, perform habitat functions that ensure the survival of a large proportion of migratory birds, or provide habitat for species at risk; and take this information into consideration when developing compensation measures;
- use a minimum ratio of 2:1 for the area of wetlands to be restored or created, versus the original area of wetlands affected. A higher compensation ratio is recommended for wetland types where compensation is more difficult or where there is uncertainty about the success of the compensation measures. The choice of ratio for wetland compensation needs to be justified;
- prioritize compensating for locally affected wetland functions. If this is not possible, the preference is to compensate within the same watershed, and then within the same ecosystem as the one where functions are affected;
- minimize the delay between the time the adverse effects occur and the time habitat and functions are restored; and
- explain how vegetation removals, as well as soil and peat excavation activities will be managed for reclamation of disturbed wetlands (e.g., methods, conditions and timing of stockpiling).

20.9. Climate Change and Greenhouse Gas Emissions

The Impact Statement must:

- in accordance with section 5.1.4 of the SACC, describe the measures that the proponent will put in place to minimize GHG emissions in each phase of the project. The emphasis must be placed on reduction of absolute emissions as soon as possible during the project's lifecycle;

- include a process for determining the Best Available Technologies and Best Environmental Practices (BAT/BEP), in order to identify means of minimizing the project's GHG emissions during every phase of the project. The determination of BAT/BEP must include the following:
  - The technologies that will be used to reduce the project's GHG emissions. These technologies could include, but are not limited to, the use of low-emission technologies, the use of low-carbon or renewable fuels, electrification or carbon capture and storage;
  - The practices that will be followed to mitigate GHG emissions from the project, such as anti-idling measures for mobile equipment, leak detection and repair systems, continuous monitoring systems, or fleet optimization;
  - Additional technologies and practices that could be used during project maintenance and facility upgrade periods to further reduce GHG emissions from the project over its lifecycle, as well as the planning processes, timing and circumstances linked to these potential technologies and practices;
- A description of any additional mitigation measures (such as direct air capture technology and reforestation) to further mitigate the remaining GHG emissions, if applicable;
- A description of any offset credits that have been or will be obtained to further mitigate the remaining GHG emissions, if applicable. Proponents may also provide information on their intention to acquire or generate international offset credits. Offset credits must meet the criteria in section 3.1.1. of the SACC and be considered as the last option in terms of GHG mitigation measures;
- Include a description of the measures taken to mitigate the project's impact on carbon sinks, including measures to rehabilitate disturbed carbon sinks, if applicable; and
- Depending on the public availability of information, provide a comparison of the project's projected GHG emissions intensity with the emissions intensity of similar projects in Canada and internationally that are good examples of energy efficient or low emissions projects. If applicable, the comparison should explain why the emissions intensity may be different.

20.10. Human Health

The Impact Statement must describe the proposed mitigation and enhancement measures for any potential effects on human health, including:

- state the applicable mitigation measures, in case of impacts, on air quality, availability and current and future quality of drinking water and water used for recreational and cultural purposes, availability and current and future quality of wild foods (traditional foods), noise, vibration and light effects;
- describe the mitigation and enhancement measures proposed separately for Indigenous peoples and for each Indigenous community;
- describe mitigation measures to protect drinking water sources (quality and supply);
- if the level of emissions from a particular project or effluent discharge is below or at the applicable limits, identify if additional mitigation measures will still be considered. However, if the change may be substantial (even within established limits) as a result of local or regional circumstances or the extent of

the change, the proponent must provide additional mitigation measures to minimize pollution and risks to human health;

- when potential effects on human health exist due to exposure to a non-threshold contaminant (e.g., certain air pollutants such as fine particulate matter and nitrogen dioxide, as well as arsenic and lead in drinking water), describe mitigation measures aimed at reducing residual effects to as low a level as reasonably possible;
- describe how the GBA+ results on disproportionate effects have been used to inform mitigation and enhancement measures;
- propose differentiated mitigation measures, if applicable, so that adverse effects do not fall disproportionately on Indigenous peoples and vulnerable subgroups, and they are not disadvantaged in sharing any positive effect resulting from the project. These mitigation measures should be developed in collaboration with the potentially affected communities and subgroups;
- identify mitigation and enhancement measures presented in other sections that are also applicable to health and well-being effects; and
- describe the compensation measures and how they will be implemented, if applicable.

The proponent must refer to the National Collaborating Centre for Healthy Public Policy's publication entitled Tools and approaches for assessing and supporting public health action on the social determinants of health and health equity.

20.11. Social Components

The Impact Statement must describe the mitigation and enhancement measures that will be implemented for all potential effects on social VCs, including:

- identify opportunities to enhance positive impacts, such as improving infrastructure;
- take into account local and regional land use and development plans where applicable mitigation or enhancement measures are proposed;
- describe mitigation measures considered for heritage and structures, sites, and things of significance, as well as contingency plans and communications plans in the event of such discoveries during construction;
- propose differentiated mitigation measures, if applicable, so that adverse effects do not fall disproportionately on Indigenous peoples and vulnerable subgroups, and they are not disadvantaged in sharing any positive effect resulting from the project. These mitigation measures should be developed in collaboration with the potentially affected communities and subgroups; and
- describe how the results of GBA+ regarding the disproportionate effects were used to clarify mitigation and improvement measures, including measures with a view to preventing sexual harassment and gender-based violence;

- propose traffic and heavy vehicle management measures to ensure the peace of mind of the residents of the Rang des Cavaliers road and to establish the need for a follow-up program due to concerns raised by participants;
- provide a soil vibration management plan to minimize effects on nearby communities and their property, including identification of vibration sources, current vibration mitigation measures, performance effectiveness of vibration control devices, and establish the need for a follow-up program due to concerns raised by participants; and
- develop and implement a communication plan with the public and interested parties to inform them of the proposed mitigation measures to ensure the well-being of residents in the vicinity of the project.

20.12. Economic components

The Impact Statement must describe the mitigation and enhancement measures that will be implemented for all potential effects on economic conditions, including:

- identify opportunities for enhancing positive effects, such as creation of local employment and Indigenous employment, including:
  - describe education, training and hiring practices that encourage employment of local people;
  - describe actions taken to increase access to education and training opportunities for different groups (e.g., provision of transportation, flexible hours);
  - provide a summary of commitments made with respect to employment, training and trade, including any impact and benefit agreement or specific cooperation agreement with Indigenous communities and peoples;
  - describe the training, education, and scholarship programs that the proponent plans to support in order to improve employment opportunities, including participation in and contribution to local training networks. Specify the types of employment targeted by these programs, as well as the targeted clientele, such as local residents, Indigenous peoples, and various relevant subgroups (e.g., Indigenous women);
  - describe cultural competency training plans for non-Indigenous employees to ensure a respectful working relationship with Indigenous contractors;
  - describe all cultural awareness training plans for non-Indigenous employees to promote a safe work environment that fosters the well-being of Indigenous employees;
- describe plans, programs and policies to encourage contracting and procurement opportunities for local and regional businesses and Indigenous peoples;
  - describe supplier network development initiatives, including the identification of potential local suppliers, and plans to provide them with information on technical, commercial and other requirements, and to debrief unsuccessful bidders;

  - describe technology transfer and research and development programs that will facilitate the use of local suppliers of goods and services and local employees, and that will develop new capabilities related to project requirements;
  - elaborate on the potential of the project to benefit community members in relevant subgroups;
- where appropriate, provide details regarding financial liability and compensation in place as required by regulation or the proponent's commitments in relation to decommissioning or abandonment;
- describe and justify the need for compensation plans to mitigate potential effects on social and economic VCs related to Indigenous peoples;
- propose differentiated mitigation measures, if applicable, so that adverse effects do not fall disproportionately on Indigenous peoples and vulnerable subgroups, and they are not disadvantaged in sharing any positive effect resulting from the project. These mitigation measures should be developed in collaboration with the potentially affected communities and subgroups;
- describe plans to encourage the recruitment, development, retention and advancement of women and local workers more generally (i.e., establish employment targets for specific subgroups, such as setting targets for the number of women in management positions and on boards of directors); and
- describe how the GBA+ results on disproportionate effects have been used to inform mitigation and enhancement measures.

20.13. Indigenous Peoples

The Impact Statement must describe the mitigation and enhancement measures that will be implemented for all potential effects on Indigenous peoples, as well as on potential impacts to the rights of Indigenous peoples. This includes, but is not limited to:

- describe all mitigation and enhancement measures proposed for potential effects as described in the previous sections that will also apply to effects on Indigenous peoples and impacts on their rights, and elaborate on how these measures may vary for each Indigenous community;
- demonstrate how the timing of Indigenous activities on the land was considered when establishing the schedule for project activities;
- provide an intervention plan pertaining to heritage resources and structures, sites, and things of historical, archaeological, paleontological, or architectural significance, if there is a possibility of discovery during construction or development activities. This plan must include, at a minimum, the person to be contacted, intervention measures and the conditions that would lead to a shutdown and resumption of work;
- provide copies of correspondence from provincial or territorial heritage resource authorities containing their comments on the heritage resource assessment and proposed mitigation measures;
- describe the measures that will be implemented by the proponent for the potential impacts of the project on the exercise of rights, including how the measures directly address the possible impacts of the project on the exercise of rights and the scope of the measures;

- describe the measures that would enhance or support the exercise or practice of rights in the project area (e.g., employment, procurement and monitoring measures);
- describe how the proponent has addressed the suggestions and recommendations made by potentially affected Indigenous peoples;
- propose differentiated mitigation measures, if applicable, so that adverse effects do not fall disproportionately on Indigenous peoples and vulnerable subgroups, and they are not disadvantaged in sharing any positive effect resulting from the project. These mitigation measures should be developed in collaboration with the potentially affected communities and subgroups; and
- describe how the GBA+ results on disproportionate effects have been used to inform mitigation and enhancement measures.

21. Residual Effects

After considering the consequences of technically and economically feasible mitigation measures, the Impact Statement must describe any residual environmental, health, social or economic effects of the project and whether those effects would occur in the local or regional study area. The Impact Statement must consider both positive and negative effects of the project and input received from the public, Indigenous peoples, lifecycle regulators, jurisdictions, federal authorities and other stakeholders. If an Indigenous community identifies that there are residual effects to its rights, those effects should be carried through for residual effects analysis. Where appropriate, information regarding residual effects should be broken down by sex, age and other community relevant identity factors to identify disproportionate residual effects for subgroups representing diversity as per the GBA+.

The proponent must describe the extent to which residual effects are significant. Where relevant, or where best practice or evidence-based thresholds exist, effects should be described using criteria allowing to quantify the significance of the effects. The criteria must allow to determine the intensity, the geographical extent, timing, frequency, duration and reversibility of the effects, taking into account any important contextual factors. Where the potential for human health effects is related to exposure to a particular contaminant at any level (e.g., non-threshold air pollutants), including, but not limited to, particulate matter and nitrogen dioxide, and water pollutants such as, but not limited to, arsenic and lead, mitigation measures should aim to reduce residual effects to as low a level as reasonably achievable.

The description of the effect can be either qualitative or quantitative. For certain effects, it may be appropriate to use criteria such as the nature of the effects, direction, causation and probability.

Effects may affect the communities and stakeholders in different ways. Characterizing them should be based largely on the level of concern expressed through engaging with Indigenous peoples and the affected community members. There are tools that may assist with assessing the significance of the effects, including multi-criterion analysis, risk assessment and modelling, in addition to expert and stakeholder input.

The Impact Statement must:

- characterize the residual effects using appropriate criteria;
- where applicable, consider the following criteria for residual effects:
  - **Magnitude:** The degree of change in the concentration of indicator compounds (e.g., airborne particulate matter, combustion by-products and metals in air) with respect to applicable standards;
  - **Geographic extent:** The spatial area over which the effect occurs, categorized in relation to the study areas established for the VC (e.g., local study area, regional study area, beyond the regional study area);
  - **Timing:** The periods over which the effect extends (e.g., spawning period);
  - **Duration:** The length of time the effect is present (e.g., the entire construction phase);
  - **Frequency:** The rate at which the residual adverse environmental effect occurs over a given period of time;
  - **Reversibility:** Whether the effect may fade or will last; and
  - The ecological, health, social and economic context within which potential effects may occur must be taken into account when considering the criteria mentioned above;
- describe the extent to which the adverse effects within federal jurisdiction and the adverse direct or indirect effects are significant;
- justify the choice of criteria used to determine the extent to which the expected effects are adverse. The information provided must be clear and sufficient to allow an external reader to review the proponent's effects analysis;
- take into account the views of Indigenous peoples and the public in establishing the criteria to be used and the characterization of effects; and
- specify the likelihood of, or potential for, this effect occurring, and describe the level of scientific uncertainty associated with the data and methods used in this analysis.

The Agency prepared a Technical guidance document for Determining whether a designated project is likely to cause significant adverse effects under the *Canadian Environmental Assessment Act, 2012*. The best practices described in this document could also apply to the characterization of residual effects in the context of the IAA.

Other sources of best practices may complement the technical guidance from the Agency and be used by the proponent as reference. For example, regarding species at risk and their habitat, the report NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk is a reference to evaluate criteria against applicable thresholds.

22. Cumulative Effects Assessment

The proponent must assess the project's cumulative effects using the approach described in the Agency's technical guidance called Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act* (2012). The best practices described in this document also apply to the assessment of cumulative effects under the IAA.

Cumulative effects are defined as changes to the environment, health, social and economic conditions, after consideration of mitigation measures (residual effects), combined with the effects of past, existing and reasonably foreseeable projects and physical activities.

Cumulative effects may result if:

- the implementation of the project may cause residual adverse effects on the VCs; and
- the same VCs have been affected or can be affected by other past, existing and future projects and physical activities.

A cumulative effect on an environmental, health, social or economic component may be significant even if the project's effects to this component by themselves are minor. Activities from the project itself that generate multiple emissions and discharges (e.g., simultaneous operations) may also need to be considered in the cumulative effects analysis to understand synergistic, compensatory, masking or additive effects.

The Impact Statement must include:

- the VCs that will be subject to the cumulative effects assessment considering:
  - VCs for which the proponent anticipates residual effects;
  - VCs that are most likely to be affected by the project in combination with other past, existing or future projects and physical activities, as well as VCs targeted as being of particular concern in the context of cumulative effects by the public and by Indigenous peoples;
  - appropriate boundaries for cumulative effects assessment informed by consultations with the public, Indigenous peoples, jurisdictions, federal authorities and other participants;
  - the Abitibi and Moose River watersheds and the Temiskaming watershed since the project is located on both sides of the continental divide. Indigenous peoples downstream of both watersheds must be consulted to determine potential sources of cumulative effects;
- include a rationale if VCs are excluded from the cumulative effects assessment;
- identify and justify the spatial and temporal boundaries of the cumulative effects assessment for each selected VC. Please consider the following:
  - The boundaries of cumulative effects assessments may differ for each VC and must not be limited by administrative boundaries;

- Spatial and temporal boundaries for cumulative effects will generally be larger than boundaries for the effects of the project alone;
- Temporal boundaries must be based on appropriate baseline conditions (example: initial pre-project conditions) and should account for all potential effects over the life cycle of the project, including decommissioning and closure (e.g., prediction by numerical modelling);
- Spatial and temporal boundaries for VCs related to effects and impacts on Indigenous peoples must be defined in collaboration with the Indigenous peoples concerned; and
- The methodology used to determine spatial and temporal boundaries must be described;

- identify sources of potential cumulative effects. Specify which other projects or activities that have been or will be carried out that could have resulted or could result in effects on the selected VCs within the defined boundaries and whether those effects could interact with the residual effects of the project. Identify these projects in collaboration with Indigenous peoples. Clearly explain and justify the rationale for selecting past, existing or future projects or activities to include in the cumulative effects assessment. Projects to be considered include, but are not limited to, the following:
  - Potential expansion of the mine, if reasonably foreseeable;
  - Past, existing and future mine projects;
  - Past, existing and future infrastructure projects; and
  - Past, existing and future projects and physical activities contributing to the fragmentation of the territory, including agriculture, forestry activities, power transmission lines and other linear projects;
- consider the results of any relevant regional studies;
- take into account the results of Indigenous peoples' cumulative effects assessments, if any;
- assess the cumulative effects for each VC:
  - The analysis must include the effects of past and future projects and physical activities in combination with the residual effects of the project, taking into account how the effects may interact (additive, synergistic, compensatory, and masking effects);
  - The analysis of the effects of future projects and physical activities may include a comparison of possible future scenarios with and without the project, but must reflect the full range of cumulative effects and not just the project’s contribution;
  - The effects of past and existing projects and physical activities can be used to put the current state of the VC into context, but must be included in the cumulative effects analysis; and
  - Cumulative effects for the same VC may need to be assessed using a hierarchy, e.g., effects on local populations of certain species and on the larger populations;
- describe technically and economically feasible mitigation measures related to cumulative effects on the environment, health, social and economic conditions, as well as the potential impacts on the rights of Indigenous peoples, including:
  - describe and assess the effectiveness of the measures applied to mitigate cumulative effects;
  - in cases where the mitigation measures for these effects are beyond the proponent's control, identify stakeholders with the power to act on these measures. In such cases, the Impact Statement must

summarize any commitments made by the other parties in relation to implementing the necessary measures and any related communication plan;

- describe mitigation measures that are technically feasible and the reasons why they are not economically viable;

- assess the regional implications of applying project-specific mitigation and enhancement measures, taking into account any reasonably foreseeable development in the area;
- describe and, where appropriate, quantify the level and severity of adverse cumulative effects, taking into account applicable tolerance levels, including those identified by Indigenous peoples and other participants; and
- develop a follow-up program to verify the accuracy of the assessment and the effectiveness of mitigation measures for applicable cumulative effects.

The cumulative effects assessment must include consideration of cumulative effects to the rights of Indigenous peoples and their cultures. Both the content and means of presenting this information is to be developed in consultation with each Indigenous community potentially impacted by the project. The proponent is encouraged to collaborate with communities in the cumulative effects assessment. The Impact Statement must demonstrate how communities were involved in the cumulative effects assessment and in the design of appropriate mitigation measures and follow-up programs. If communities do not wish to participate in the cumulative effects assessment with the proponent, the proponent must share with them a preliminary draft of the cumulative effects assessment on their rights and their culture in order to receive feedback prior to submitting the Impact Statement to the Agency.

The proponent must consider the following cumulative effects raised during the Planning Phase in the cumulative effects assessment, or justify their exclusion, where appropriate:

- Cumulative effects related to fragmentation, including habitat disturbance and loss, barriers to movement, and direct and indirect mortality of wildlife species, including species of interest, species of special concern and species at risk (e.g., furbearers important to Indigenous peoples, fish);
- Effects at the watershed scale on water quantity and quality (e.g., on fish and fish habitat, and on human health), including eskers;
- Effects on migratory birds and their habitats;
- Interactions with effects from other mining projects and activities, including on groundwater flow dynamics, its quality and the preservation of aquifer storage capacity;
- Interactions with the effects of mining projects and activities on noise and air quality, including particulate matter;
- Greenhouse gas emissions and how climate change will interact with project effects, notably on biodiversity and ecosystems;
- Erosion and sedimentation of waterways within the project's right-of-way;
- Direct and indirect effects related to changes in migratory routes for wildlife species;
- Effects of increased access to the territory on the current use of the territory by Indigenous peoples;

- Effects on the practice of current traditional activities and areas of interest (e.g., medicinal plants, wild berries, and other non-timber forest products);
- Effects on the social conditions and culture of Indigenous peoples;
- Effects on community well-being;
- Effects on the sustainable development of the territory; and
- Impacts on the rights of Indigenous peoples, as well their ability to exercise these rights.

23. Other Effects to Consider

23.1.Effects of Potential Accidents and Malfunctions

Any accident and failure of project components or activities, caused either by technological failure, human error or malevolent act, or by natural phenomena (e.g., floods, earthquakes, landslides, forest fires) could have major consequences. The proponent must therefore identify hazards, assess the risk of accidents and malfunctions for each phase of the project, determine the potential effects, and then present the following:

- Emergency response measures;
- Measures to reduce risks; and
- The emergency management system and associated response capabilities.

23.1.1. Risk Analysis

In order to carry out the analysis of the risks of accidents and malfunctions, the basic requirements are the following:

- Identify risks for each project phase that could lead to accidents and malfunctions;
- Conduct an analysis of the risk of each hazard/adverse event (including its likelihood and its consequences). If certain events are expected to occur (e.g., minor spills, road accidents), they should be included as expected effects in the previous sections;
- Provide a description and consideration of plausible scenarios, including worst-case scenarios, and justify their selection;
- Determine potential effects, including environmental, health, social and economic effects, including effects on Indigenous peoples;
- Describe the measures to reduce the likelihood and mitigate consequences of the events; and
- Present emergency measures to respond to such events, including identifying associated response systems and capabilities.

Taking into account the above minimum requirements, the Impact Statement must:

- for determining risks of accidents and malfunctions related to the project, consider the lifespan of different project components as well as complicating factors (weather or external events), including the potential for vandalism or sabotage, including an explanation of how these potential events were identified, the possible consequences (including environmental, health, social and economic effects), plausible worst-case scenarios for each type of incident, and the unmitigated effects of these scenarios;
- provide an explanation of how these events were identified (e.g., information sources, recognized risk assessment methodology, professional expertise, similar projects, participants input, etc.);
- take into account available data and information relevant to the project, such as those from the Transportation Safety Board of Canada's website;
- for all plausible scenarios and worst-case scenarios, describe the magnitude and extent of those, including a description of the quantity, development, rate, form and characteristics of contaminants, greenhouse gases and other materials likely to be released or discharged into the environment and any effects on the environmental, health, social and economic effects and effects on Indigenous peoples;
- describe and quantify the potential short- and long-term risks to human health from accidents and malfunctions (spills, leaks, etc.) in the receiving environment (including surface water, air, traditional foods and any other relevant media);
- analyze the risk of explosion from the project;
- assess the risk of accidental fuel spills (whether minor or major), loss of containment of dangerous goods (such as reactive agents like sodium cyanide or hydrochloric acid) or accidental spills of ammonium nitrate during blasting operations or in the explosives storage area and in permanent or temporary facilities during construction and operation, or during maintenance operations;
- provide an analysis of the potential environmental, health, social and economic effects of these spills or releases on the aquatic and terrestrial environments and on human health within the spatial boundaries described for the study area;
- identify any critical infrastructure such as drinking water treatment plants or facilities and describe their capacity to treat water sources affected by an accidental release from the project during all phases of the project;
- identify private drinking water sources (e.g., individual drinking water wells);
- consider sustainable groundwater management, protection against: depletion (e.g. overexploitation), contamination (e.g. leakage of a contaminant), ecosystem viability (e.g. stream water levels), economic and social well-being (e.g. agriculture, Indigenous activities) and good governance (e.g. education and transparency);

23.1.2. Effects Assessment

- define and justify spatial and temporal boundaries for the assessment of effects associated with accidents and malfunctions. These boundaries are generally larger than those for the effects of the project alone;

- for the effects assessment and the development of mitigation measures, take into account the local and regional particularities, in particular in terms of topography (e.g., difficult access for interventions) and weather conditions such as snow and ice cover;
- for the effects assessment, take into account sensitive periods (e.g., migration or nesting period, hunting season, tourist season, etc.) and receptors:
  - include environmental sensitivity mapping that indicates site-specific conditions and receptors located in proximity to project activities, including banks, streams and wetlands frequented by fish and/or migratory birds, local residents in the emergency planning zone, potable water wells, and likely access routes to them;
  - identify receptors that may be affected based on plausible accident and malfunction scenarios;
  - consider, especially for worst-case scenarios, timing that coincides with (1) migration periods involving high concentrations of migratory birds, (2) migratory bird nesting periods, (3) fish spawning periods, (4) the presence of sensitive wildlife species and/or important seasonal habitat; and
  - describe the expected effectiveness of measures and response systems;

23.1.3. Planning and Prevention

- Describe the preventive and protective measures (including design choices) that would be established to protect against such events and the emergency response procedures that would be in place in the event of an accident or malfunction;
- describe the proposed emergency preparedness and response mechanisms, including plans for coordination with qualified organizations involved in a gold mine emergency within the spatial boundaries associated with the project
- describe plans for exercising and training for emergency response;
- describe awareness plans for communities that may be affected by the consequences of an accident or malfunction;
- describe emergency communication plans to provide instructions to surrounding communities, including Indigenous communities, and how their development will be informed by input from the public and Indigenous peoples. The proponent should consider including:
  - immediate and urgent actions, such as public notification of safety concerns and instructions for shelter-in-place, evacuation procedures and routes;
  - longer-term actions, such as the establishment of a general website, hotlines, incident updates and reporting of injured animals;
- describe plans for liaison and ongoing training in relation to emergency prevention and preparedness for surrounding communities, including Indigenous communities, that may be affected by the consequences of an accident or malfunction.
- detail how accidents and malfunctions will be communicated to the affected surrounding communities;
- specify the time frame within which the surrounding communities will be notified;

- describe the exercise and training programs for all types of emergency responders, including participation and training agreements with Indigenous communities;
- explain how the proponent has made and will continue to make an outreach effort to ensure public and Indigenous peoples' understanding of the risks associated with this type of project (e.g., include an outreach report);
- describe the proponent's role in the event of accidents and malfunctions associated with the project;
- describe how the proponent plans to coordinate its emergency response, both internally and externally with response partners, and describe how they will be consulted in emergency planning;
- document a complete inventory of spill response equipment, including its strategic locations in relation to likely accident and malfunction sites and/or likely pathways to sensitive environmental receptors such as aquatic environments and waters frequented by fish and migratory birds. Spill response strategies for each type of spill scenario are also recommended;
- consider resort areas in contingency planning and the particularities of these areas (e.g., varying numbers of residents seasonally, sometimes high numbers of non-familiar individuals with the area, more limited means of communication in remote areas and with temporary residents);
- provide details of the financial responsibility and compensation measures in place according to the regulations or the company's commitment;
- describe mutual aid arrangements in the event that the response to an accident or failure is beyond the company's resources and how to access these resources;

23.1.4. Mitigation Measures and Monitoring

- describe the long-term monitoring and recovery measures that would be considered for managing the adverse environmental, health, social and economic effects of accidents and malfunctions; including those to clean up land and water;
- describe the mitigation measures and safeguards that would be in place to avoid and prevent accidents and malfunctions, including design choices;
- describe the mitigation measures applicable for the potential adverse environmental, health, social and economic effects in the event of an accident or malfunction, such as the emergency response and repair procedures that would be put in place; and
- describe the long-term monitoring and recovery measures that would be taken to remediate lands and waters affected by an accident and malfunction.

23.2.Effects of the Environment on the Project

The Impact Statement must consider and describe how environmental conditions, including natural hazards such as severe and/or extreme weather conditions and external events (e.g., earthquake, flooding, drought, ice jam, landslide, erosion, subsidence, fire, flow conditions, freeze-thaw cycles effects), could adversely affect the project and how this in turn could result in effects on environment, health, society and economy.

These events are to be considered in different probability patterns (e.g., 5-year flood vs. 100-year flood) taking into account how these could change under a range of climate scenarios. The focus should be on credible external events that have a reasonable probability of occurrence and for which the resulting environmental effects could be major without careful management. The Impact Statement should also consider how effects of the environment on the project could have positive effects to the environment, health, social and economic conditions.

The Impact Statement must:

- provide details of planning, design and construction strategies intended to minimize the potential adverse environmental effects of the environment on the project;
- identify any areas of potential wind or water erosion;
- assess the potential effects of seismic events on facilities and specify the soil movement parameters that will be used with the probability of occurrence (e.g., 2% in 50 years) and the best practice codes and guides that are or will be used in the seismic effects analysis (e.g., National Building Code of Canada 2015, CAN/CSA-Z662 standard);
- describe mitigation measures that can be implemented in anticipation of or in preparation for the effects of the environment on the project;
- describe possible mitigation measures to address adverse environmental, health, social and economic effects resulting from the effects of the environment on the project;
- identify the project's sensitivity/vulnerability to climate change (under both average and extreme conditions);
- describe the project’s and its associated infrastructure’s climate resilience and how climate change impacts have been integrated into the project design and planning throughout the life of the project, and describe the climate data, projections and related information used to assess risks over the life of the project;
- describe all known and relevant trends in meteorological events, weather patterns or physical changes in the environment that are expected to result from climate change, and incorporate this information into a risk assessment as contributing or complicating factors for accidents and malfunctions (e.g., increased risk of forest fires). Provide mitigation measures (both passive and active) that the proponent is prepared to take to minimize the frequency, severity and consequences of these projected effects; and
- describe measures to enhance the positive environmental, health, social and economic effects resulting from the effects of the environment on the project.

Further guidance on how to conduct a climate change resilience assessment can be found in the Strategic Assessment of Climate Change developed by ECCC.

24. Canada's Ability to Meet Its Environmental Obligations and Its Climate Change Commitments

In accordance with paragraph 22(1)(i) of the *Impact Assessment Act*, the Impact Statement should describe the effects of the project in the context of Canada's environmental obligations and of its climate change commitments. It should also outline any mitigation, follow-up or complementary measures that would assist the Government of Canada in meeting its obligations and commitments in this regard.

The proponent should consult the Agency's guidance documents on this subject.

Federal environmental obligations relevant to this project include the following:

1. The Convention on Biological Diversity and Canada's supporting national framework (e.g., the Canadian Biodiversity Strategy, Canada's Biodiversity Outcomes Framework and the current biodiversity goals and objectives in Canada), and legislation that supports the implementation of Canada's biodiversity commitments, including SARA and the *Canada Wildlife Act (1985)*, as well as supporting policies and guidance documents.
    a) Recovery strategies and action plans developed under SARA for all species at risk potentially affected by the project.
2. The Convention for the Protection of Migratory Birds in the United States and Canada, as implemented in part under the *Migratory Birds Convention Act (1994)*, and supporting guidance documents on conservation objectives and strategies specific to bird conservation regions.

The Impact Statement must:

- describe the extent to which the effects of the project could contribute to or hinder Canada's ability to meet its obligations;
- describe the proponent's plans and commitments to ensure that positive contributions are respected, where the project may enable Canada to meet its obligations; and
- describe where the project may adversely affect Canada's ability to meet its obligations, the mitigation measures and follow-up programs related to those effects.

The Impact Statement must also indicate how community and Indigenous knowledge has been incorporated into the assessment of potential effects of the project on Canada's ability to meet its obligations.

The proponent must refer to the Agency's guidance documents on this topic, including the document Policy Context: Considering Environmental Obligations and Commitments in Respect of Climate Change under the *Impact Assessment Act*.

25. Description of the Project's Contribution to Sustainability

The Impact Statement must characterize a project's contribution to sustainability. The Impact Statement should describe the context of a particular project, including the issues that are important to participants, the diversity of views expressed and the selection of VCs. The Impact Statement must also describe the project's contribution to sustainability as defined by Indigenous peoples. For example, according to the principle of the Seven Generations, or in terms of health and overall impact on the rights of youth to life and safety, including environmental safety.

Once the analysis of the potential effects of a project has been conducted, the principles of sustainability should be applied in order to:

- consider the interconnectedness and interdependence of human and ecological systems;
- consider the well-being of present and future generations;
- consider positive benefits and minimize adverse effects of the project; and
- apply the precautionary principle by considering uncertainty and risk of irreversible harm.

The Impact Statement must describe how these sustainability principles were applied and identify conclusions drawn from this analysis. The summary should be qualitative in nature, but may draw on quantitative data as necessary.

In addition, the Impact Statement must:

- indicate how the planning and design of the project consider, in all phases, the sustainability principles;
- describe how the alternative means and alternatives to the project were selected and how the sustainability principles were considered;
- indicate how monitoring, management and information systems consider the sustainability principles and attempt to ensure continuous progress towards sustainability;
- describe the ecological, health, social and economic benefits of the project to local communities within the study area, potentially affected Indigenous peoples, regional, provincial, territorial and/or federal governments; and
- describe the proponent's engagement to potentially affected Indigenous peoples and describe measures and commitments to ensuring the sustainability of Indigenous livelihood, traditional use, culture and well-being.

The proponent must refer to Agency guidance on this topic: Interim Guidance: Considering the Extent to which a Project Contributes to Sustainability and Interim Framework: Implementation of the Sustainability Guidance.

26. Follow-Up and Monotoring Programs

A follow-up program verifies the accuracy of the effects assessment and evaluates the effectiveness of mitigation measures, while explaining and considering the uncertainties related to this assessment. The information obtained through the follow-up program may be used to determine whether additional actions are needed (adaptive management) to address unanticipated situations (e.g. deviations from predicted effects, effectiveness of mitigation measures, including timing considerations). The follow-up program described in the Impact Statement must explain how the need for corrective action will be detected, the anticipated effectiveness of that detection, the range of potential corrective actions that could be applied based on deviations from expected effects, the general circumstances under which each such action would be applied, and the expected success of each such action based on previous experience. Although adaptive management is considered a best practice in environmental management, it is not, in and of itself, considered a mitigation measure.

Potentially impacted Indigenous peoples must be consulted regarding follow-up programs that may affect them, including on the development of the plans and participation in follow-up measures, such as monitoring and data gathering throughout the project life.

Follow-up programs are an opportunity to continue to involve potentially affected Indigenous peoples. If undertaken collaboratively, they can support solution-based adaptive management, i.e., allowing for the rapid identification of problems in follow-up programs and the development of appropriate solutions that take Indigenous knowledge into account (e.g., by establishing criteria and thresholds to trigger the implementation of adaptive management measures).

If a regional assessment is underway or has been completed in the project area, the proponent should use the resulting information to inform the factors to be considered in their follow-up program.

Factors to be considered in developing a follow-up program include, but are not limited to, the following:

- VCs for which residual adverse effects are expected or potential;
- The accuracy of the predictions;
- An assessment of the effectiveness of mitigation measures;
- The level of uncertainty regarding the effectiveness of proposed mitigation measures;
- The efficiency of new or unproven techniques and technologies;
- The concerns raised and suggestions made by participants, including Indigenous peoples, including those issued during meetings of the Follow-up Committee, citizens' meetings and complaints submitted to the proponent;
- Suggestions from Indigenous peoples and local communities on follow-up and monitoring programs and their participation in such programs;

- The integration of Indigenous and community knowledge, if available;
- Disproportionate effects highlighted by the GBA+;
- The nature of cumulative effects;
- The nature, extent and complexity of the program;
- Any technically and economically feasible measures to manage the effects in the event that the mitigation measures applied do not work as intended;
- The uncertainty induced by the presence of effect-limited scientific knowledge;
- The parties that will be involved in implementing the follow-up program and reviewing its results;
- Where applicable, programs, procedures, and plans that provide relevant standardized or established follow-up and monitoring methods, such as from municipal, provincial, federal, or other appropriate centres of expertise;
- The duration of the follow-up program, which may vary depending on the VCs assessed;
- The application of guidelines and methodologies similar to those used for reference conditions;
- An assessment of the effectiveness of measures implemented to avoid or mitigate effects on species at risk, including species assessed by COSEWIC (SARA requires monitoring of species listed on Schedule 1 of SARA);
- Any existing follow-up programs relevant to the project, and lessons that can be learned from their results;
- The commitments made by the proponent when the project was assessed;
- The compensation programs that will be proposed to offset residual effects;
- How the results of the follow-up program will be communicated to interested parties;
- Triggers for adaptive management of any unacceptable or unexpected outcomes; and
- All relevant suggestions and concerns raised during the meetings of the Follow-up Committee and the citizens' meetings.

A monitoring program aims to ensure that the proposed mitigation measures are properly implemented during the different phases of the project. Monitoring is an essential component of effective follow-up programs. Monitoring can determine the potential for environmental, health, social or economic degradation at any stage of the project. Monitoring can also assist in developing action plans and emergency response procedures considering the protection of the environment, health, socio-economic conditions and human safety.

26.1.Follow-Up Program Framework

The duration of the follow-up program must be as long as necessary to verify the accuracy of effects predicted during the impact assessment and to evaluate the effectiveness of the mitigation measures. For the components of the biophysical environment, the follow-up results are normally compared to the reference conditions of the natural environment defined before the project was implemented.

The Impact Statement must present a follow-up program that includes the following:

- The objectives of the program and the targeted VCs;
- The list of elements requiring follow-up;
- The main characteristics of each of the recommended follow-up elements, including, but not limited to:
  - the objectives to be achieved (general and specific);
  - a list of the parameters to be measured, including the recommended methodology for each parameter; and
  - the proposed timelines, including the time period(s) involved (e.g., spring flood period, fish migration period), frequency and overall time frame;
- The response mechanism used in the event of unanticipated effects would occur;
- The mechanism for disseminating the results of the follow-ups (deliverables) to stakeholders;
- The accessibility and sharing of data for the general public;
- The involvement of Indigenous peoples in the design and implementation of the follow-up program, the assessment of follow-up results and any updates, including communication mechanisms between Indigenous communities and the proponent to ensure regular and frequent communication about the results of the follow-up program;
- For air quality, following the implementation of planned follow-up:
  a) Verify emission forecasts (e.g., the model may require validation, depending on the confidence in the emission forecasts or the scientific validity of the model provided during the assessment process);
  b) Validate effects predictions (ambient temperature follow-up may be required, depending on how close the ambient concentration predictions are to levels of concern); and
  c) Identify the adaptive management strategy;
- A description of the groundwater and surface water follow-up programs during construction, operation and closure periods, including the selection and location of sampling points, the parameters to be measured, the duration and frequency of follow-up, the sampling protocol and analysis protocol, and quality assurance and quality control measures. Where applicable, the parameters measured should include a comparison of the measured parameters with the CCME Canadian Environmental Quality Guidelines criteria. For drinking water sources, compare follow-up results with the most current version of the Canadian Drinking Water Guidelines. Include a description of the measures that will be implemented if the criteria are exceeded.

To accompany the description of the follow-up program, sticky tables may be presented showing:

- the main characteristics for each of the recommended follow-up programs (objectives, parameters, timelines). ; and
- all of the stages of achievement for each of the follow-ups, including all deliverables (e.g., baseline status pre-construction, post construction follow-up, follow-up protocol, work and follow-up reports, etc.).

Regarding migratory birds, wetlands, and species at risk, a post-construction follow-up plan should be planned in order to verify the project's effects and assess the effectiveness of the mitigation measures applied during construction.

Regarding wetlands specifically, the follow-up program should plan to follow-up on all seedings biannually (i.e., late spring and fall) in subsequent years and undertake additional seeding, if necessary, until vegetation is established and continues to grow without further intervention. A follow-up program to monitor wetland functions should be developed so that the type and quantity of each wetland function are considered individually to determine the success of restoration, and each wetland function is reduced to the same type and quantity as observed during the baseline period.

26.2.Monitoring Program

The Impact Statement must provide an overview of the environmental, health, social and economic monitoring program, which includes the following:

- The activities that pose risks to the environment, health, social and economic conditions or VCs, and the measures and means to protect them;
- A description of any monitoring program planned during the various phases of the project, including a description of the methods for verifying the implementation of mitigation measures;
- The regulatory instruments that include a monitoring requirement for VCs;
- The definition of positions responsible for monitoring and compliance, including for inspections, and confirmation that they are independent of the contractor carrying out the work;
- Inspection procedures, responsibilities as well as its place in the hierarchical structure for inspectors. Describe the minimum qualifications and experience required for these roles, including training requirements;
- A description of the monitoring methodology and documentation of environmental, health, social and economic issues, taking into account guidelines and methodologies used to establish reference conditions;
- A description of the methodology and mechanism for monitoring the effectiveness of mitigation and restoration measures;

- A description of the characteristics of monitoring, where foreseeable (e.g., location of interventions, planned protocols, list of measured parameters, analytical methods employed, schedule, human and financial resources required);
- A description of the proponent's intervention mechanisms in the event of non-compliance with the legal and environmental requirements or with the contractual obligations imposed on contractors, including a description of the thresholds that must trigger corrective actions;
- The procedures surrounding production of monitoring reports (number, content, frequency, date, format, duration, geographical scope) to be transmitted to the authorities concerned;
- The plans, including funding options, to engage Indigenous peoples and local communities in monitoring, where appropriate; and
- Quality assurance and quality control measures to be applied to monitoring programs.

Regarding the monitoring of air pollutants that do not have established thresholds for health effects, the Impact Statement must describe how monitoring results will be used to trigger the proponent's response mechanisms (e.g., CAAQS for common air pollutants such as fine particles and nitrogen dioxide, and to follow the recommendation of Health Canada that concentrations of arsenic and lead in drinking water be as low as is reasonably possible).

Appendices

Appendix 1 : Resources and Guidance Documents

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Appendix 2: Environment and Climate Change Canada's Suggested Approaches to Standardized Design and Development of a Songbird Survey Plan

The following approach is suggested at the project area and LSA scales for the standardized design and development of a songbird survey plan.

General considerations

Study Area

It must be adapted to the extent of the project's apprehended impacts and the assessment of the project's cumulative effect at the regional level. It is possible to modulate the sampling effect in the regional study area if existing and recent data is available to model a realistic and credible picture of the regional avifauna for the purposes of comparison with the local study area. In addition, the extent of the study area in relation to the project area can be modulated according to the documented or apprehended level of the impacts if this data varies according to the project's different land use planning elements. For example, between a tailings storage facility and an access road.

Sampling Plan

It must be designed so that the sampling effort in the field in the context of the impact assessment is sufficient to describe and assess all the possible effects on birds with adequate precision and accuracy. This invariably includes the necessity to assess the scope of the impacts on the density, distribution and relative abundance of the species in general and the priority species due their status or sensitivity. This involves adapting the sampling plan and the data acquisition and analysis methods to the real and apprehended issues in order to obtain relevant, precise and unbiased data.

Selection of the Primary Sampling Units

For the purposes of establishing a general portrait of the avifauna, the inventory sites in the study area should be selected by a ranked random draw to ensure the results are well distributed spatially and according to its component habitats. For example, the random draw may be conducted according to different areas and types of land use (primary sampling level) to ensure an adequate distribution of the inventory areas (secondary sampling area) throughout the study area considered and the bird habitats. The draw should be designed to oversample the sensitive and rare habitats (e.g., wetlands and agricultural land). In these settings, the number of inventory sites will be greater than the number determined only on the basis of their presence in the setting. However, it is appropriate to eliminate lakes and other types of land use or vegetation from the hierarchical structure when the size of the patches is smaller than the survey radius of a listening station or when they are not natural settings associated with a natural assemblage of bird species (e.g., the built environment, dry barrens, restored mine sites and gravel pits). However, these settings must be considered for specific surveys if they are frequented by one or more priority species. For example, the built

environment may accommodate barn swallow nests, while common nighthawk nests can be found in dry barrens and restored mine sites and a gravel pit may be the site of a sand martin colony.

Selection of the Secondary Sampling Units

A point grid applied to the entire study area can determine a set of points to be used in a random draw. The spacing between the points of the grid depends on the shape and size of the patches of the different land use or vegetation classes. Usually, a grid spaced every 300 meters allows sufficient distancing from the bird survey sites. However, in the event the study area is linear or composed of elements of reduced size, it is possible to establish a grid of points spaced every 100 m. In this case, it is appropriate to consider valid only the selected survey sites located more than 300 m from each other. The 300-metre distance ensures independence of the bird data between the listening stations.

Sampling Effort

In the LSA and/or RSA, the sampling effort must be statistically adequate to allow an inference for the entire region studied. The objective is to determine, based on a sufficient sample size and level of precision and accuracy, whether significant differences exist in terms of diversity, distribution or abundance of the species between the local study area and the regional study area. The sampling effort of the general surveys and the specific sampling effort must also make it possible to establish the occurrence of the priority species and their level of use of the territory. Finally, the sampling effort must provide a sufficiently detailed picture of the pre-project situation of the avifauna in general and the priority species in particular, so that a credible follow-up comparison can be made before and after the project and to guide restoration of the site at the end of the activities. In this regard, see Underwood and Chapman (2003) and Loos et al. (2015) concerning robust sampling approaches.

A preliminary analysis indicates that the geographic extent, including the infrastructure area, the road and the tailings storage facility (including the two alternative sites) covers a small area generally corresponding to a square 8 km by 7 km, smaller than a 10 km by 10 km patch of the Breeding Bird Atlas. A simulation indicates that a sampling effort corresponding to 5% of the possible inventory sites derived from a grid of points spaced every 100 m allows sampling of all the habitats and is representative of the entire study area. A smaller sampling effort should be justified by a statistical power analysis to determine the number of inventory sites adequate to each hierarchical level of the sampling plan. In this regard, see the work of Guillera-Arroita and Lahoz-Monfort (2012), Johnson et al. (2015), Green and MacLeod (2016), and Weiser et al. (2019) for advice on statistical power analyses.

Priority Species

In the case of priority species, it is indicated to map the potential habitat in the study area, develop a survey plan and plan additional field surveys in case the general survey conducted with listening stations does not allow precise estimating of species occurrence and land use. For example, the general forest survey sites should allow adequate coverage of the variety of types of stands, whether softwood, mixed or hardwood. However, additional sites should be added in the hardwood and mixed forest for a precise evaluation of the use and frequenting of the survey area by hardwood or mixed forest species (PIES). Moreover, when the

understanding of the distribution and abundance of a priority species arouses specific interest (e.g., in the case of species at risk), multiple visits (or the use of a sound level meter to extend the monitoring range) may be required to ensure a sampling effort adapted to the probability of detection of the species.

Bird Sampling by Sound Level Meter

It is recommended that bird surveys be a combination of in-person surveys (conducted by ornithologists in the field) and offline surveys (conducted with sound level meters and listened to subsequently in the lab by an ornithologist). Sound level meters are used for a better estimate of birds in the survey area on various dates (and in various seasons) and at different times of day (e.g., dawn, morning, dusk, night). Because sound level meters are capable of collecting bird data over a wide range of dates and times, sampling with these instruments can be conducted at a subset of about 40% of the survey sites. A different proportion of survey sites involving sound level meters may be suitable, but it must be justified. The sound level meter sites should be well distributed between the study areas and the habitats. The sound level meters should be installed in habitats that can accommodate birds with a lower probability of detection due to a particularly early or late nesting phenology compared to the birds' general nesting period (in this regard, see Rousseu and Drolet, 2017), twilight or nocturnal habits, or their rarity or low vocalization frequency. The sound level meter sites should be at least 600 m apart to make their use viable in relation to the coverage of the study area. For example, the sound level meters are particularly effective in monitoring the common nighthawk, the short-eared owl and the yellow rail due to their twilight and/or nocturnal habits.

During each sampling year, sound level meters should be deployed as long as possible at the same site (for several weeks) to cover spring migration, the nesting period of birds likely to nest in the study area, fall migration and the winter period. These periods should be determined on the basis of the species and the part of the study area according to recent scientific literature. It is important to maximize battery and memory card capacity during deployments. A subset of at least 50% of the meter sites should have sound level meters installed during the periods when the sites are used by birds during fall migration and in the winter (collectively, fall/winter recordings). A habitat representativeness analysis must be used to ensure that the subset of sites covered by winter surveys is an unbiased sample of the population of the meter sites. Sound level meter deployments for recording breeding should be set to record daily or every other day in stereo mode, with a morning and evening schedule. Recording should be done in two phases to avoid single recordings stretching over two days. Phase 1 starts at 00:00 (HH:MM), with 3 minutes of recording followed by a 12-minute break until five hours after sunrise (i.e., SR + 5 hrs). Phase 2 begins 30 minutes before sunset, with 3 minutes of recording followed by a 12-minute break until 23:56 (HH:MM). The AARs should be programmed to record using a sampling frequency of 44.1 kHz.

Bird Sampling by Ornithologists

Each site should be sampled by an experienced ornithologist using the listening station technique during a standard 10-minute point count. To ensure that comparisons can be made between observer counts and recordings, observers must also record their visit using a high-quality portable recording device (i.e., with 360-degree recording in WAV format, selectable sampling frequency and adjustable microphone gain) mounted on a tripod (to facilitate installation of the recorder on a branch, for example). Observers must be

proficient in identifying birds by sight and sound and must use one-minute intervals within the 10-minute point count period, so that each individual bird is recorded within the first one-minute interval after it is detected, or alternatively according to time intervals of 0 to 3 min, 3 to 5 min and 6 to 10 min. The estimated distances between the observers and each bird should be noted as follows: 0-50 m, 50-100 and over 100 m. The sites visited by ornithologists should give priority to targeting the settings where a target species is more likely to be detected visually than audibly (e.g., a possible site of occurrence of the short-eared owl or the peregrine falcon. The presence in the field of an ornithologist also allows completion of avifauna sampling by compilation of all the mentions of species detected within the study area during trips between listening stations. Judicious planning of ornithologists' trips within the study area increases the sampling effort and therefore the precision of the bird surveys. Once within the study area, the ornithologists should take note of their movements based on short-term (maximum one hour) and short-distance (maximum 8 km) segments. This type of survey is particularly effective for detecting species that have a large home range, such as common nighthawks, swallows or falcons.

Habitat Data

The habitat will be sampled as follows: 13 photos must be taken: at each cardinal point (N, E, S, W), take one shoulder-high photo with the arm and the camera parallel to the ground, one photo with the arm pointing down at a 45-degree angle from the body, and one photo with the arm pointing up at a 135-degree angle from the body. Then take a photo with the arm extended upward (vertically). The photos must be interpreted by qualified individuals as accurately as possible based on habitat data derived from the "Land Use" layer provided by the MELCC (Bissonnette, Demers and Lavoie, 2016). During the development of the inventory plan (Planning Phase), a 100-metre buffer zone should be applied to the centroid of all the points of the grid used for the random draw of survey sites. The percentage coverage of each class of land cover should be determined. These values are used as inputs for the purposes of distribution of the inventory sites according to a ranked approach that takes habitat diversity into account.

Analysis of the files and the acoustic data from the recording of the birds:

- The acoustic files must be analyzed by interpreters skilled in identifying birds by sound and familiar with the bird communities in the sampled area. The acoustic data may be interpreted using the Wildtrax interface (https://www.wildtrax.ca/home). Each individual detected is recorded as a data point and referenced at the first minute of the detection interval. Before interpretation, the acoustic files suitable for analysis must be reviewed to verify the sound level of the background noises other than the birds. The quality of the files can be validated by viewing the spectrometric representation of the recorded sounds and listening to a short segment of the file. The files containing noises that could reduce the probability of detection of the birds, such as significant wind, rain or other noises (e.g., frogs) must be excluded.
- All of the files suitable for a bird survey during the nesting period must be under-sampled, so as to distribute the analyzed files according to the dates (within the nesting period) and the recording hours (within a 24-hour period). The scientific data shows that it is necessary to listen to at least 6 recordings for an average of 3 minutes during the nesting period of the birds in the morning (1 h before to 5 h after local sunset) to establish the occurrence of the birds adequately (Bayne et al., 2017) However, this

sampling target must be adapted and enhanced in the case of species with very low detectability (e.g., yellow rail, grouse, woodpeckers, finches and other nomadic species). Moreover, for each week of recording, at least one 3-minute recording should be listened to at dusk (30 minutes before to 2 h after local sunset), as well as at least one 3-minute recording during the night (from midnight to 1 h before sunrise).

- From the set of appropriate fall/winter recording files, select (on a random day of the week and at a random time in the recording period) three 3-minute recordings per week recorded in the morning.

Analyses

The methods used to analyze the data must be clearly described and transparent (e.g., annotated), and they must extract the maximum amount of information from the data and be appropriate for the data and the protocols. Generalized linear mixed models or appropriate alternatives (e.g., simulated regression trees, generalized additive models, or models developed using a Bayesian approach) may be suitable for analyzing the data obtained from the proposed survey plan to permit interpolation across the study area. Analysis of the sound level meter data and the observer counts must take into account differences in survey methods (e.g., detection capability, timing and frequency of visits/sampling). Corrective measures may be used to help control for variation in detection capability. It is important to consider expert advice on the appropriate use of these corrective measures in a modelling context. Detection rates are unlikely to remain constant from visit to visit; therefore, if occupancy modelling is used, proper justification should be provided.

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