Value Chain Solutions – Heartland Complex Expansion Project

DRAFT TAILORED IMPACT STATEMENT GUIDELINES PURSUANT TO THE *IMPACT ASSESSMENT ACT*

April 16, 2021

DRAFT FOR PUBLIC COMMENT

Contents

List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
AAQO	Alberta Ambient Air Quality Objectives and Standards
The Act	*Impact Assessment Act*
AB TOR	Alberta Terms of Reference
Agency	Impact Assessment Agency of Canada
BCRs	Bird Conservation Regions
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Declaration	United Nations Declaration on the Rights of Indigenous Peoples
ECCC	Environment and Climate Change Canada
GBA+	Gender Based Analysis Plus
GHG	Greenhouse gas
GIS	Geographic Information Systems
HIA	Health Impact Assessment
IVOC	Intermediate volatile organic compounds
LSA	Local Study Area
Minister	Minister of Environment and Climate Change
Internet Site	Impact Assessment Agency of Canada's website
NAAQO	National Ambient Air Quality Objectives
NOC	National Occupational Classification
OCAP	Ownership, Control, Access and Possession
OHWM	Ordinary high water mark
PACs	Polycyclic aromatic compounds
Project	Value Chain Solutions – Heartland Complex Expansion Project
Registry	Canadian Impact Assessment Registry

RSA	Regional Study Area
SACC	Strategic Assessment of Climate Change
SARA	Species at Risk Act
SOAs	Secondary Organic Aerosols
SVOCs	Semi-volatile organic compounds
Guidelines	Tailored Impact Statement Guidelines
VC	Valued component (including environmental, health, social, economic and potentially other elements of the natural and human environment)
VOCs	Volatile organic compounds

1. Introduction

The federal impact assessment process serves as a planning tool that considers a broad range of potential environmental, health, social, and economic effects of designated projects identified by regulation. Decisions within the federal impact assessment process are based on whether the potential adverse effects in areas of federal jurisdiction are in the public interest. The public interest determination by the Minister is guided by the factors set out in the *Impact Assessment Act* (the Act) in section 63:

- the extent to which the project contributes to sustainability;
- the extent to which the adverse effects within federal jurisdiction and the adverse direct or incidental effects that are indicated in the Impact Assessment Report in respect of the project are significant;
- the implementation of the mitigation measures that the Minister or the Governor in Council, as the case may be, considers appropriate;
- the impact that the project may have on any Indigenous peoples and any adverse impact that the designated project may have on the rights of the Indigenous peoples[1] of Canada recognized and affirmed by section 35 of the *Constitution Act, 1982*; and the United Nations Declaration on Rights of Indigenous People (UNDRIP);
- the extent to which the effects of the project may hinder or contribute to the Government of Canada's ability to meet its environmental obligations and its commitments in respect of climate change.

A key element for the federal impact assessment process is the introduction of Tailored Impact Statement Guidelines (Guidelines)[2], which will provide the proponent with direction and requirements for the preparation of an Impact Statement. The tailoring is based on the nature, complexity, and context of the project, and is informed and guided by consultation and engagement that occurs with the public, Indigenous groups, jurisdictions, federal authorities, and other interested parties during the Planning phase of the impact assessment process. These draft Guidelines have been specifically tailored for the Value Chain Solutions – Heartland Complex Expansion Project (the Project), by the Impact Assessment Agency of Canada (the Agency).

To support the Government of Canada's objective of "one project, one assessment", the Guidelines have also been tailored to identify where the federal and provincial assessment processes have shared information needs. While the information requirements may be shared, the impact assessment will respect the jurisdiction of each governing body. The final version of Alberta's Terms of Reference (AB TOR) for the Project is included as *Annex I – Final Terms of Reference* in the Guidelines.

1 These guidelines use the term "Indigenous peoples" to represent the "Aboriginal peoples of Canada" which includes Indian, Inuit, and Métis peoples as defined in subsection 35(2) of the *Constitution Act, 1982*, and "rights of Indigenous peoples" is used to reflect the full scope of Aboriginal and Treaty rights recognized and affirmed by section 35 of the *Constitution Act, 1982*.

2 As set out in paragraph 18(1)(b) of the *Impact Assessment Act.*

The Guidelines will be finalized following a comment period on this draft version of the Guidelines, which will take place from April 15 to May 17, 2021.

The Proponent, Value Chain Solutions Inc., may present the information in the Impact Statement in the manner it deems most appropriate. While the Guidelines do not prescribe a preferred structure for the Impact Statement, it is recommended to follow a structure similar to the Guidelines to facilitate the review of the Impact Statement and participation in the process.

Irrespective of the preferred structure for the Impact Statement, it is essential that the Impact Statement address all requirements outlined in the Guidelines. Where the Proponent believes information is not required, they should contact the Agency to discuss the rationale for not including it prior to submitting the Impact Statement. If the Proponent does not submit the information required in the Guidelines, it should include an explanation justifying the exclusion. To facilitate the review of the Impact Statement, the Proponent must provide a table of concordance that indicates where each requirement of the Guidelines is addressed.

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

1.1. Factors to be considered in the impact assessment

The Guidelines correspond to factors listed in subsection 22(1) of the Act and prescribe that the impact assessment of a designated project must take into account:

(a) the changes to the environment or to health, social or economic conditions and the positive and negative consequences of these changes that are likely to be caused by the carrying out of the designated project, including:

  (i) the effects of malfunctions or accidents that may occur in connection with the designated project;

  (ii) any cumulative effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out; and

  (iii) the result of any interaction between those effects;

(b) mitigation measures that are technically and economically feasible and that would mitigate any adverse effects of the designated project;

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

(d) the purpose of and need for the designated project;

(e) alternative means of carrying out the designated 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 designated project that are technically and economically feasible and are directly related to the designated project;

(g) Indigenous knowledge provided with respect to the designated project;

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

(i) the extent to which the effects of the designated project hinder or contribute to the Government of Canada's ability to meet its environmental obligations and its commitments in respect of climate change;

(j) any change to the designated project that may be caused by the environment;

(k) the requirements of the follow-up program in respect of the designated project;

(l) considerations related to Indigenous cultures with respect to the designated project;

(m) community knowledge provided with respect to the designated project;

(n) comments received from the public;

(o) comments from a jurisdiction that are received in the course of consultations conducted under section 21 of the Act*;*

(p) any relevant assessment referred to in sections 92, 93 or 95 of the Act*;*

(q) any assessment of the effects of the designated project that is conducted by or on behalf of an Indigenous governing body and that is provided with respect to the designated project;

(r) any study or plan that is conducted or prepared by a jurisdiction – or an Indigenous governing body not referred to in paragraph (f) or (g) of the definition *jurisdiction* in section 2 of the Act – that is in respect of a region related to the designated project and that has been provided with respect to the Project;

(s) the intersection of sex and gender with other identity factors; and

(t) any other matter relevant to the IA that the Agency requires to be taken into account.

The impact assessment of the Project may be referred to an independent review panel by the Minister. In accordance with paragraph 22(1)(t) of the Act, should the Project be referred to an independent review panel, any other matter relevant to the impact assessment that the Agency would require to be taken into account would be detailed in the Terms of Reference for the review panel.

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

2. Proponent information

2.1. The Proponent

The Impact Statement must:

- provide contact information for proponent representatives for the Project (e.g. name, address, phone, fax, email);
- identify the Proponent(s) and, where applicable, the name of the legal entity(ies) that would develop, manage and operate the Project;
- describe 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. Qualifications of individuals preparing the Impact Statement

The Proponent must:

- provide information on the individuals who prepared the sections within the Impact Statement; and
- demonstrate that qualified individuals have prepared the information or studies provided. Where possible, the Proponent should use 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 overview

The Impact Statement must:

- describe the Project, key project components and activities, scheduling details, the timing of each phase of the Project and other key features.

As the expansion project represents an approximate 4-fold increase in production capacity to ~~is part of a larger~~ an existing project, Value Chain Solutions – Heartland Project 1, which, while approved, is only in a partial state of completeness, the Impact Statement must outline the larger context and integration with, or leverage of, existing components. The Impact Statement must make clear where existing project components and activities are being used or transferred from the existing project (e.g. existing activities and components described in Section 9 of the Proponent's Detailed Project Description), and would be captured within the current baseline, versus where components and activities are new or additional. In cases where the existing project components and activities have been approved but not constructed or completed, the Proponent must clearly differentiate between the proposed components and activities that are associated with the Project and those associated with the existing Value Chain Solutions – Heartland Project 1. While it is important to understand the scale and scope of the proposed project components and activities, this clarity is required to ensure that approved and operating components are not inadvertently subject to reassessment.

Commented [DS1]: The application will seek to increase the approved dilbit input capacity by a factor of four from 188,000 bbl/day to 750,000 bbl/day. This expansion is therefore substantially larger than the existing project both in terms of input capacity and project footprint as illustrated in Figure 2 of the Detailed Project Description document.

3.2. Project location

The Impact Statement must describe the geographical setting and socio-ecological context 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 potential environmental, health, social and economic effects and impacts of the Project.

The following information must be included and, where appropriate, located on map(s):

- geographic coordinates (i.e. longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the main project site;
- current land uses in the area;
- project footprint;
- the surface areas, location and spacing of the Project components;
- services and infrastructure and current land and aquatic uses in the area including:
  - roads;
  - municipalities and administrative regions;
  - resource development projects already underway in the study area (e.g. other industrial facilities and upgraders); and
  - local businesses and industries, and any other relevant uses;
- distance of the Project components to any federal lands and the location of any federal lands within the regional study area, including lands in a reserve within the meaning of subsection 2(1) of the *Indian Act*;
- all permanent and temporary waterbodies and watersheds potentially affected by the Project;
- navigable waterways;
- environmentally sensitive areas potentially affected by the Project, such as national, provincial, and regional parks, other protected areas, and ecological reserves;

- ecological classification of the landscape according to provincial and federal systems (e.g. ecosites, ecoregions, ecodistricts and ecozones)[3];
- lands subject to conservation agreements;
- Indigenous harvesting regions (with permission of Indigenous groups), Métis settlements and communities; and
- culturally important features of the landscape.

Maps are to be provided to the Agency as electronic geospatial data file(s) compliant with requirements set out in section 21.5 *Geospatial data requirements*.

3.3. Regulatory framework

The Impact Statement must identify:

- 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, including those denoted in the Permitting Plan;
- legislation and other regulatory approvals that are applicable to the Project at the federal, provincial, regional and municipal levels, including those denoted in the Permitting Plan;
- a list of federal or provincial greenhouse gas (GHG) legislation, policies, or regulations that will apply to the Project;
- government policies, resource management plans and frameworks, planning or study initiatives relevant to the Project and 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 groups that are pertinent to the Project and the impact assessment;
- existing Indigenous governance systems and Indigenous laws relevant to the Project or the impact assessment, as identified by Indigenous groups;
- any relevant land use plans, land zoning, regional growth plans, or community plans; and
- municipal, regional, provincial and/or national criteria, objectives, standards, directives, regulations or guidelines, by-laws, or ordinances that have been used by the Proponent to assist in the evaluation of any predicted environmental, health, social or economic effects or impacts.

3.4. Project components and activities

The Impact Statement must:

Commented [DS2]: KEY CONSIDERATION:

The Alberta Industrial Heartland falls within the boundary of the Edmonton Metropolitan Region Growth Plan. This Plan highlights policies around economic grown, natural living systems, housing, land use and infrastructure integration, transportation, and agriculture, as well as key performance indicators in in these policy areas. These policies and key performance indicators should be considered in the project application. As this Plan positions the Region for substantial growth in the coming decades and population is anticipated to double to 2.2 million by 2044. Urban and industrial growth should be included in the assessment of cumulative effects. Specific request regarding including as an assessment scenario is discussed in Section 7.3.1.

Commented [DS3]: In Alberta some environmental requirements are in the form of directives and criteria e.g. Alberta's Air Monitoring Directive and associated air monitoring siting criteria.

[3] See: *Introduction to the Ecological Land Classification (ELC)*. 2017. available at: https://www.statcan.gc.ca/eng/subjects/standard/environment/elc/2017-1 and *Canadian Council on Ecological Areas. Ecozones Introduction*. available at: http://www.ccea.org/ecozones-introduction/

- describe project components, associated and ancillary works, and other characteristics to assist in understanding the potential environmental, health, social and economic effects, and impacts on Indigenous peoples and their rights, as identified by the Indigenous groups. Include descriptions of the components and activities identified in sections 2.1, 2.4 of the AB TOR (Annex I);
- describe project activities to be carried out during each project phase (site preparation, construction, operation, decommissioning and reclamation) and each project development stage. Project activities that should be considered in this description are outlined in section 21.1 *List of project activities*;
- include a summary of any change made to the Project as originally proposed in the Detailed Project Description, including the reasons for these changes;
- provide sufficient detail to support analysis regarding the Project's impacts in the context of potential interaction between valued components (VCs);
- include the location, magnitude and scale of each project activity, and a schedule including, as applicable, the activity's expected start date, duration, time of year, time of day (e.g. night operations), and frequency, for all project stages;
- highlight activities that involve periods of increased disturbance to environmental, health, social and economic conditions or impacts on Indigenous peoples; and
- include maps of key project components, boundaries of the proposed site with geographic coordinates, major existing infrastructure, proponent lands, adjacent property boundaries (i.e. privately owned and/or leased), adjacent land uses and any important environmental features.

Maps are to be provided to the Agency as electronic geospatial data file(s) compliant with requirements set out in section 21.5 *Geospatial data requirements*.

Several requirements included in section 2 of the AB TOR (Annex I) are relevant to subsequent sections of these Guidelines. The Impact Statement could include the information requirements stated in the AB TOR (Annex I) for:

- benefits of the Project and adaptive management (section 2.1 [H] and [I], AB TOR (Annex I));
- criteria to identify constraints and how the Project has been designed to accommodate those constraints, such as Indigenous traditional land and water use, known traplines, cumulative environmental and social impacts in the region (section 2.2 [A], AB TOR (Annex I));
- involvement in regional and cooperative efforts and opportunities for sharing infrastructure and coordinating reclamation plans (section 2.3 [A] and [B], AB TOR (Annex I));
- infrastructure alternatives (section 2.4, AB TOR (Annex I));
- air emissions management (section 2.5, AB TOR (Annex I));
- water management information (section 2.6, AB TOR (Annex I)), including for water supply (section 2.6.1, AB TOR (Annex I)), surface water (section 2.6.2, AB TOR (Annex I)), and wastewater management (section 2.6.3, AB TOR (Annex I));
- waste management information (section 2.7, AB TOR (Annex I));
- conservation and reclamation (section 2.8, AB TOR (Annex I)); and
- environmental management systems (section 2.9, AB TOR (Annex I)).

Commented [DS4]: The VCS-H Complex expansion will be implemented in 3 stages. The proponent should describe in detail what Projects 2, 3, 4 (following the approved VCS-H Project 1) entails, dilbit input capacity, and whether the development will be in modular fashion (i.e. same equipment configuration and processing capacity added with each phase).

3.5. Workforce requirements

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

- 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;
- continued employment opportunities for employees of the existing Value Chain Solutions **–** Heartland Project 1, if applicable;
- anticipated workforce region of origin (i.e. local, regional, out-of-province or international employees);
- the skill and education levels required for the positions;
- investment in training opportunities;
- 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);**
- 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.

Workforce requirements must take Gender Based Analysis Plus (GBA+)[4] into consideration (see also section 21.4 *Application of GBA+*). The information must be presented in sufficient detail to analyse how vulnerable or underrepresented groups will be taken into account, including Indigenous groups and other relevant community subgroups (e.g., women, youth, seniors).

[4] Gender Based Analysis Plus (GBA+) provides a framework to describe the full scope of potential adverse and positive effects under the Act. 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 document *Gender-Based Analysis Plus in Impact Assessment* provides guiding principles to allow proponents to use this analytical framework in their Impact Statement.

4. Project purpose, need and alternatives considered

The Proponent must identify the purpose of and need for the Project, the alternative means of carrying out the Project, and the alternatives to the Project in its Impact Statement. The Proponent should consult Agency guidance documents, particularly the documents *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. The Impact Statement must broadly classify the Project (e.g. bitumen storage and processing) and indicate the target market (e.g. international, domestic, local, etc.), where applicable. The *purpose of* statement must include any objectives the Proponent has in carrying out the Project.

The Proponent is encouraged to consider the perspectives of participants (i.e. public, Indigenous groups, governments) in establishing objectives that relate to the intended effect of the Project on society.

4.2. Need for the Project

The Impact Statement must describe the underlying opportunity or issue that the Project intends to seize or solve and should be described from the perspective of the Proponent. In many cases, the need for the Project can be described in terms of the demand for a resource. The Proponent should provide supporting information that demonstrates the need for the Project.

The Proponent should report the comments or views of Indigenous peoples, the public and other participants on the Proponent's need statement.

The Impact Statement must provide the following information:

- an assessment of the need for, and viability of, the Project in relation to the demand for bitumen and bitumen products, including an evaluation of the national and global demand for these products during the operating years of the Project;
- an evaluation of the need for the Project that must:
  - consider the current climate context;
  - account for the potential for local and international markets to significantly reduce their demand for bitumen and bitumen products in the coming years; and
  - take into account the possibility of a decline of renewable energy prices.

4.3. Alternatives to the Project

Under section 22(f) of the Act, the Agency or a review panel must consider any alternatives to the Project that are economically and technically feasible and are directly related to the designated project. The Proponent's Detailed Project Description identifies that alternatives to the Project to support the purpose of the Project to "increase the capacity to upgrade and refine Alberta Oil Sands diluted bitumen into clean crudes and high-quality fuel products in an economically and environmentally sustainable way" (p.13), include:

- a newly built or revamped coastal refinery to refine customized crude streams from the Value Chain Solutions - Heartland Complex;
- an upgrader/specialty refinery closer to the bitumen producers in the Athabasca, (Alberta) region; and
- an upgrader/specialty refinery at another logistic hub, i.e. Hardisty (Table 4).

4.4. 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 describe:

- the criteria to determine technical and economic feasibility of possible alternative means;
- the best available technologies considered and applied in determining alternative means for each project phase, and justification for selection;
- those alternative means that are technically and economically feasible, presented in sufficient and appropriate detail; and
- the particularities of each alternative mean and their potential adverse and positive environmental (including GHG emissions), health, social and economic effects, and their impacts on the rights and interests of Indigenous peoples, as identified by Indigenous peoples.

The Impact Statement must then describe:

- the alternative means of carrying out the Project that were considered ~~and selected~~ as part of the previous application to develop the VCS-H Project 1, the rationale for selected approach for Project 1, and any additional alternative means ~~or emerging technologies~~ that have since become available based on emerging technologies and/or economics of scale considerations;
- the preferred alternative means of carrying out the Project based on the consideration of environmental, health, social and economic effects, the impacts on the rights and interests of Indigenous peoples, technical and economic feasibility, and the use of best available technologies; and
- the methodology and criteria that were used to compare the alternative means, to determine the preferred means of carrying out the Project, and to justify the exclusions of other solutions, based on the trade-offs associated with the preferred and other alternative means.

Commented [DS5]: VCS indicates in the Detailed Project Description that operation of the proposed Expansion and approved Project 1 will be similar with the exception of production transportation (Expansion will maximize the use of pipeline and rail). The expectation, however, is that the design and planning of the Expansion re-consider alternatives and best available technologies for emissions management, rather than defaulting to assessment that was undertaken for Project 1 for several reasons:
1. new and emerging technologies may have become available or more economically feasible;
2. the substantial increase in processing capacity may necessitate more stringent emission control;
3. the substantial increase in processing capacity may enable better economy of scales in terms of investment into emission control.

Further recommended changes and comments specific to mitigation measures are included in sections 7.5 and 8.4.1.3.

The application of GBA+ to the analysis of alternative means of carrying out the Project is necessary to inform how effects may vary for various subgroups (e.g. by gender, age, ethnicity, socio-economic status, health status, etc.). The Proponent must also indicate how the views and information provided by

Indigenous peoples, the public and other participants were considered in establishing and applying the criteria for comparing the Project's alternative means.

In its alternative means analysis, the Proponent must address the following project elements and components:

- project site location;
- access to the Project site;
- location of key project components, including a list of facilities and infrastructures for which locations may only be determined later (see also section 2.2, AB TOR (Annex I));
- route for any linear or other infrastructure development or modification, including means for transportation of bitumen to the Project (see also section 2. 4, AB TOR (Annex I))
- facility design;
- processing facilities location and design; drilling methods for water disposal wells;
- construction alternatives;
- suspension, abandonment, decommissioning and reclamation options;
- thermal energy and/or electric power sources for the Project site, and other stationary sources to provide heat or steam to the Project (see section 2.2, AB TOR (Annex I));
- waste disposal and management, including waste management (see section 2.7, AB TOR (Annex I));
- crossing and diversion of watercourses and waterbodies, including wetlands;
- management of water supply and wastewater, including location of the final effluent discharge points and water treatment technologies and techniques to control effluent quality (see sections 2.6.1 and 2.6.3, AB TOR (Annex I));
- best available control technologies economically and technologically achievable and/or best management practices to minimize air emission and ensure air quality management (see section 2.5, AB TOR (Annex I)) of area and point sources, as well as sources of fugitive air emissions;
- effects associated with risks from accidents and malfunctions, the best practices measures and actions to minimize accidents and malfunctions;
- any component or activity that has an effect on critical habitat of a species listed under the *Species at Risk Act;* and
- the timing options for various components and phases of the Project.

The information provided to satisfy the requirements of section 2.2 of the AB TOR (Annex I) may be referenced as relevant to meet the requirements above, as applicable to the assessment of alternative means for process and infrastructure, including for waste management.

The following information sources may inform the assessment of alternative means of carrying out the Project:

- any regional or strategic assessment;
- any study or plan that is conducted or prepared by a jurisdiction or an Indigenous governing body related to the area affected by the Project and provided with respect to 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 by the public, and comments received from jurisdictions; and
- other studies or assessments realized by other proponents.

Should potential impacts to critical habitat be predicted, potential risks to critical habitat must be considered for each alternative, including a description of how avoidance of effects was considered and how it may be achieved through alternate means of carrying out the Project or alternatives to the Project.

5. Description of public participation and views

5.1. Summary of public engagement activities

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 the methods used; where the consultation was held; the persons, organizations and diverse groups consulted; the views expressed; any other information relevant to public engagement activities, and the extent to which this information was incorporated in the design of the Project and the Impact Statement.

Engagement activities must be inclusive and ensure that interested members of the public have an opportunity to share their views. They must also consider the language needs of the people being engaged.

The Proponent should consult Agency guidance documents on this topic, particularly: *Interim Framework: Public Participation Under the Impact Assessment Act*, and *Interim Guidance: Public Participation under the Impact Assessment Act.*

5.2. Analysis and response to questions, comments and issues raised

The Impact Statement must:

- provide a summary of key issues related to the Project, including those identified through engagement with the public, and the potential environmental, health, social and economic effects, including disproportionate effects for diverse subgroups within the population;
- describe any questions and comments raised by the public and how they influenced the design, construction or planned operation of the Project;

- identify the alternative means, mitigation measures, or the monitoring and follow-up programs identified to address uncertainties raised by the public;
- identify public concerns that have not been addressed, if any, and provide the reasons why they have not been; and
- describe plans to maintain the public engagement if the Project were to be approved and proceed, to ensure that the public will have an appropriate forum for expressing their views on the ongoing development, operation, and reclamation of the Project, and be involved in follow-up and monitoring programs (see also AB TOR section 1; Annex I).

6. Description of engagement with Indigenous groups

The proponent must engage with Indigenous groups and, with their guidance, utilize Indigenous knowledge to understand the potential impacts of the project on Indigenous peoples and Section 35 rights and to inform the impact assessment. ~~The Proponent must engage with Indigenous groups in order to identify and understand the potential impacts of the Project on Indigenous peoples, and to incorporate Indigenous knowledge into the impact assessment.~~ Engagement with Indigenous groups is required to inform the impact assessment, assess impacts on section 35 rights and to identify measures to avoid or minimize potential impacts on Indigenous peoples from the Project. This engagement may also identify potential positive outcomes, including measures that could improve 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.

Engagement with Indigenous groups must involve ongoing information sharing and collaboration between the Proponent and Indigenous groups to ~~contribute to~~develop and validate ~~validation of~~ conclusions and assessment findings. The results of any engagement with each Indigenous group must be presented in the Impact Statement, and, as best as possible, convey the perspective of the Indigenous peoples.

To the extent possible, to the extent possible, the process of developing conclusions and assessment findings should be done separately for each and information should be presented separately for each Indigenous group involved in the assessment, and describe contextual information about the members within an Indigenous group (e.g. women, men, elders, and youth). The Impact Statement may also consider presenting information at different scales but must include a justification, such as in the case where groups have expressed a preference in that regard for certain VCs (e.g. use of a regional scale vs. community-specific).

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 working together in good faith on decisions that impact Indigenous peoples, with the intention to achieve 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 strive to collaborate or partner with potentially affected Indigenous groups in completing its Impact Statement, including through adequate capacity funding. The Agency notes that not all Indigenous groups may be willing to collaborate with the Proponent, therefore the Proponent must demonstrate they have made best efforts at collaboration, including capacity funding, and provide the Agency with an explanation regarding circumstances where collaboration was not possible. The Proponent should continue sharing information and analyses with the Indigenous groups, to use publicly available sources of information to support the assessment, and to document their efforts in that respect.

The Proponent must consult the Agency's guidance documents on Indigenous participation and engagement listed under heading **Error! Reference source not found.** in section **Error! Reference source not found.** ***Error! Reference source not found.***.

6.1. Indigenous knowledge considerations

Indigenous knowledge is holistic and in impact assessment, it can provide insights related to knowledge of the biophysical environment, social, cultural, economic, and health aspects, Indigenous governance and resource use. It is important that Indigenous knowledge, where available to the Proponent, be brought together on equitable footing with scientific or technical aspects to inform the impact assessment for all of these aspects in the impact assessment including the environmental, health, social, economic and rights assessments and best practices and mitigation~~included for all of these aspects in the impact assessment~~, not only to look at potential impacts of the Project on Indigenous groups. It is also important to capture the context in which Indigenous groups provide their Indigenous knowledge and to convey it in a culturally appropriate manner.

Indigenous knowledge that is not already publicly available should not be included without written consent from the Indigenous group, 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. Appropriate, culturally-based Indigenous methodology for integrating Indigenous knowledge and community input into the impact assessment is necessary to appropriately and ethically assess potential effects and significance of those effects from an Indigenous perspective.

The Proponent must also refer to the Agency's guidance document *Indigenous Knowledge under the Impact Assessment Act: Procedures for Working with Indigenous Communities*.

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 group with respect to the Project. This record of engagement is to include all engagement activities undertaken prior to the submission of the Impact Statement.

At a minimum, the Proponent must engage with the Indigenous groups identified[5] by the Crown in the *Indigenous Engagement and Partnership Plan* issued along with the Notice of Commencement for the Project. The purpose of this engagement is to gain an understanding of the issues and concerns of potentially affected Indigenous groups, and to inform an assessment of the potential adverse impacts of the Project on Indigenous peoples and their rights.

The record of engagement must include:

- the Proponent's Indigenous engagement policy, as well as established policies and stated principles related to the collection of traditional knowledge, and traditional land use information;
- the list of Indigenous groups engaged by the Proponent, including those that the Proponent was unsuccessful in engaging;
- the engagement activities undertaken with each Indigenous group, including the date, means and results of engagement;
- a description of the outcomes of conversations with each Indigenous group about how they wish to be consulted by the Proponent;
- the results of any engagement and the perspectives of the Indigenous peoples involved;
- the list of the consultation protocols adopted by Indigenous groups, if applicable. A copy of the consultation protocols when available in writing;
- any agreements pertaining to engagement that are finalized or in progress, with anticipated timelines to complete;
- an explanation for cases where engagement efforts have proven unsuccessful;
- a description of how project information is frequently and transparently shared with Indigenous peoples;
- a description of the preferred methods for sharing information, including alternative solutions implemented for people and locations where technological resources are limited or language barriers exist (e.g. translation of documents, provision of summaries in Indigenous languages);
- a description of how Indigenous expertise will be sought to assist with the carrying out of the Project,;
- future planned engagement activities, and if none are planned, rationale for not undertaking future engagement activities;
- a description of efforts to engage diverse segments of each Indigenous group 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 groups were provided an opportunity to evaluate the Project's potential positive and negative effects on

[5] The list of Indigenous groups identified during the Planning phase may change as knowledge of the effects and potential impacts of the Project is gained, or if the Project or its components are modified during the impact assessment. The Agency reserves the right to modify the list in the Indigenous Engagement and Partnership Plan based on additional information gathered during the impact assessment.

their members, communities, and activities, and impacts to rights, as identified by the Indigenous group(s). This could include activities aimed at providing appropriate capacity funding to support the creation and operation of community-driven communication mechanisms that facilitate the flow of information and the advancement of project efforts in each affected Indigenous community;
・ how the proponent has obtained or tried to obtain the free, prior and informed consent from the Indigenous groups consulted on the project, regarding the sufficiency oft information presented in the Impact Statement, as well as the project itself; and and

- sufficient information to demonstrate that the capacity needs of Indigenous groups were taken into account, and that timelines were adequately communicated for the review of information in the Impact Statement, including,
- where applicable, specific procedures for drafting sections of the Impact Statement.

It is expected that the engagement activities for the preparation of the Impact Statement should 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 groups and committed to producing mutually beneficial outcomes.

6.3. Analysis and response to questions, comments, and issues raised

The Impact Statement must provide an analysis of any potential effects and impacts to Indigenous peoples and of all input received from Indigenous groups with respect to the Project. This analysis is to include all input received by Indigenous groups prior to, and since commencing, the impact assessment process. This analysis should serve to inform the identification of potential effects and impacts on any applicable VCs, impacts on Indigenous peoples and their rights, and proposed measures to mitigate or accommodate for adverse impacts, enhance or optimize positive effects.

The analysis may be summarized in the relevant section on effects to a VC. The location and level of detail of the information in the Impact Statement will depend on its importance to the selected VCs.

It is recommended that the Proponent organize and analyze information relevant to Indigenous groups in separate sections for each one potentially affected by the Project, either by nation, community, or other grouping based on the preference expressed by those people. In all cases, ethical guidelines and culturally appropriate protocols governing research, data collection and confidentiality must be followed.

The Impact Statement must:

- provide a summary of key issues related to the project and that were identified through engagement with each Indigenous group, as well as the potential spiritual, cultural, environmental, health, social and economic impacts;
- include a statement by each Indigenous group that the summary of key issues is an accurate representation of concerns shared during engagement activities.
- describe how the key issues and any other questions and comments raised by each Indigenous group influenced the design, construction or operation of the project;
- identify the alternative means, mitigation measures, or the monitoring and follow-up programs identified to address key issues, questions and comments raised by each Indigenous group;

- identify key issues, questions and comments that have not been addressed, if any, and provide the reasons why they have not been;
- describe the potential effects and impacts to environmental, health, social, cultural and economic conditions of each Indigenous group, informed by the Indigenous group(s) involved in the assessment and must include both adverse and positive effects;
- describe the rights or interests of each Indigenous group, including those that the groups themselves have identified, that may be impacted by the Project;
- provide an analysis of the extent of the potential effects on each Indigenous group, and the views of Indigenous groups regarding the extent of impact on the exercise of rights;
- describe the potential effects and impacts to lands in a reserve within the meaning of subsection 2(1) of the *Indian Act*. Note that section 2 of the Act defines federal lands as including “reserves,

surrendered lands and any other lands that are set apart for the use and benefit of a band and that are subject to the *Indian Act*, and all waters on and airspace above those reserves or lands";

- describe the type of information received from Indigenous groups (observations, questions, issues, comments, knowledge, expertise or other);
- identify the sources of information used to inform the analyses of potential effects and impacts to rights;
- identify the sources of information used in the analyses of potential impacts to rights;
- append any specific studies provided by Indigenous groups, if permission has been obtained from the Indigenous group concerned to publish them;
- describe how the information gathered during the Planning phase of the impact assessment was considered and incorporated into the analysis, including the documents uploaded to the Registry by Indigenous groups during that phase of the impact assessment;
- identify the sources of information used in the analyses of potential impacts to rights;
- detail the main issues, questions and comments raised during the engagement activities by each Indigenous group and the Proponent's responses, including how matters have been addressed in the Impact Statement or will be addressed in the future;
- incorporate of the perspectives of Indigenous youth, women, and elders where provided;
- indicate where and how the information received was integrated into or contributed to decisions regarding the Project or its impact assessment, including in:
  - scoping of assessment factors, such as spatial and temporal study boundaries;
  - selection of VCs;
  - development and collection of baseline information;
  - effects pathwards and analysis;
  - project design and activities planning;
  - the construction, operation, closure and reclamation plans;
  - the evaluation of alternative means of carrying out the Project;
  - characterization of the potential environmental, health, social, cultural and economic effects of the Project for each Indigenous group and potential mitigation or accommodation measures; and
  - Indigenous participation in follow-up and monitoring activities should the Project proceed;
- describe how Indigenous expertise and knowledge would be considered in carrying out the Project, should the Project be approved; and
- provide, where potential impacts on the rights of Indigenous peoples are identified, a description of how each impact would be avoided, mitigated, managed, or otherwise accommodated, for each Indigenous group separately.

7. Assessment methodology

The Proponent should review the applicable guidance documents listed in section 20 *Appendix 1 – Reference* documents and conform to requirements outlined in section 21 *Appendix 2 – Additional guidance*. Summary tables are recommended to convey key information (see section 21.11 *Summary Tables*).

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7.1. Baseline methodology

The Impact Statement must provide a description of the environmental, health, social and economic setting directly and incidentally related to the Project. This should include the existing environmental, health, social and economic components, interrelations and interactions, and the variability in these components, processes and interactions over time scales and spatial boundaries appropriate to the Project, taking account of variability due to potential future climate change. Meaningful dialogue with communities and Indigenous groups provides input that may describe how these components and processes are interrelated, and can allow the establishment of a common understanding of the Indigenous knowledge perspective on the Project's potential effects and impacts.

The Impact Statement must:

- include baseline data collected in a way that makes analyses, extrapolations and reliable predictions possible. The collated 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 assessment areas;
- provide detailed descriptions of data sources and data collection methods including sampling, survey and research protocols, modeling methods, error estimates, and any assumptions or biases;
- provide a description of the information sources used to determine baseline conditions, including sources of all available information and a justification of, or rationale for, the information source selected for use in baseline condition analysis and their adequacy. Include in the justification any limitations or uncertainty pertaining to the source selected in comparison to the other information sources available;
- where applicable, describe modelling methods and 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 study areas (LSA) and regional study areas (RSA);
- where applicable, show how the baseline data are representative of the site conditions if surrogate data from reference sites are used rather than specific measurements at the Project site;
- identify baseline data gaps and steps taken or needed to address the gaps;
- indicate if and how the baseline data gaps identified could be addressed through additional future research, monitoring, and/or field studies, whether through the proponent's efforts as part of project operations or as strategic regional initiatives involving industry, government, and NGOs;
- describe where and how Indigenous knowledge and input were considered in determining baseline conditions; and
- apply GBA+ as described in section 21.4 *Application of GBA+* and related guidance documents in section 20 *Appendix 1 – Reference* documents.

Relevant sources of baseline information are listed in section 21.2 *Sources of baseline information*. Further guidance is provided in sections 21.3 *Ecosystem approach*, 21.5 *Geospatial data requirements*, and 21.6 *Reference documents requirements*.

7.2. Selection of valued components

The Impact Statement must describe valued components (VCs), processes, and interactions that are identified 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, Indigenous groups) and the

reasons why, such as environmental, cultural, spiritual, historical, health, social, economic, recreational, and aesthetic considerations. The value of a component not only relates to its role in the ecosystem, but also to the value people place on it.

The Impact Statement must provide the rationale for selecting specific VCs and for excluding others. The priority in selecting 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 VCs to be included, consider the following factors:

- VC presence in the study area;
- the extent to which the effects of the designated project and related activities have the potential to interact with the VC;
- the extent to which the VC may be under stress from other past, existing or future undertakings in combination with other human activities and natural processes;
- the extent to which the VC is linked to Indigenous interests or rights of Indigenous peoples and whether an Indigenous group has requested the VC;
- the extent to which the VC is linked to a federal, provincial, territorial or municipal government priorities;
- information from any ongoing or completed regional assessment processes;
- the possibility that an adverse or positive effect on the VC would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and
- whether the potential effects of the Project on the VC can be measured and/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 environmental, health, social and economic effects and impacts, including to Indigenous groups, arising from the designated project activities.

As part of the Planning phase of the impact assessment, potential VCs have been identified from:

- the Proponent's Detailed Project Description. Appendix IV identifies the proposed approach and scope of assessments to support preparation of an integrated Environmental Impact Assessment and Impact Statement;
- comments from Indigenous groups. As of the date of issuance of these draft Guidelines comments from Indigenous groups indicate that the following components should be treated as VCs:
  - species of Indigenous importance: white sucker, trout, ungulate species, ducks, and geese;
  - current and future land and resource use;
  - sites important for current use of and resources for traditional purposes (hunting, trapping, fishing, and gathering);
  - landscapes of interest; and
  - sacred and archaeological sites; and

The following VCs must be considered in the Impact Statement:

- fish and fish habitat (including trout and white sucker) (see section 3.5, AB TOR (Annex I));
- vegetation (including wetlands, traditional plant habitat, and key habitats associated with species at risk) (see section 3.6, AB TOR (Annex I));
- species at risk and their habitat - each species at risk that the Project interacts with must be considered separately within the broader VC (see section 3.7, AB TOR (Annex I));;
- migratory birds and birds of Indigenous importance (including ducks and geese) (see section 3.7, AB TOR (Annex I));
- wildlife and wildlife habitat (including moose, ungulates, aquatic mammals such as beaver, muskrat and mink, amphibians such as frogs and toads) (see 3.7, AB TOR section (Annex I));
- wildlife health (see section 3.7.2 [A] , AB TOR (Annex I));
- human health (including separate consideration of Indigenous health) (see section 6, AB TOR (Annex I));
- cultural and heritage resources (see sections 5 [C] and 7.2 [A], AB TOR (Annex I));
- Indigenous land and resource use (including navigation for traditional purposes) (see section 7.2 [A], AB TOR (Annex I));
- other land and resource use (including compliance with land use planning objectives, and recreational and commercial activities) (see section 7.2 [A], AB TOR (Annex I));
- economic opportunities (see section 7.2 [C], AB TOR (Annex I));
- social conditions; and
- community well-being (including both Indigenous and non-Indigenous communities).

The following components may either be considered as VCs or as important intermediate components to support the evaluation and understanding of impacts to other VCs.

- air quality, odour, dust, and climate (see section 3.1, AB TOR (Annex I));
- noise and light (see section 3.1.2 [C], AB TOR (Annex I));
- hydrogeology, including groundwater quality (see section 3.2, AB TOR (Annex I));
- hydrology (see section 3.3, AB TOR (Annex I));
- surface water quality (see section 2.6.2, AB TOR (Annex I)); and
- terrain and soils (see section 3.9, AB TOR (Annex I)).

The list of VCs to include in the Impact Statement will be finalized in the final version of the Guidelines at the end of the Planning phase and will be informed through engagement with the public, Indigenous groups, jurisdictions, federal authorities, and other participants.

7.3. 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 Proponent must engage with Indigenous groups when defining spatial and temporal boundaries for VCs that are identified by, or relate directly to, Indigenous groups.

The Impact Statement must explain how the Proponent considered the information received by Indigenous peoples in its definition of spatial and temporal boundaries, particularly for VCs related to effects on Indigenous peoples.

7.3.1. Temporal Boundaries

The Proponent has identified four typical development scenarios in the Detailed Project Description, Appendix IV ~~for the air quality assessment~~, as follows:

(a) Project-Only Case, which includes assessment of the effects associated with the Project only;

(b) Baseline Case, which includes existing conditions, and existing and approved projects or activities;

~~(b)~~(c) For the Indigenous rights assessment, a pre-development case and before Crown's effective control of the area, scenario that existed prior to the establishment of any industrial development and before Crown control;

~~(c)~~(d) Application Case, which includes the Baseline Case with the Project-Only Case added; and

~~(d)~~(e) Planned Development Case, which includes the Application Case plus all known planned developments that are not yet approved.

The Proponent must also assess:

a) Current Case, which considers the current conditions and existing project or activities; and

b) Pre-Commissioning Case, which considers the Application Case and projected regional industrial and urban growth in 2029 when the first stage of VCS-H Complex expansion is expected to start operation.

In addition to assessing the five development scenarios under normal operating conditions, t~~T~~he Proponent ~~may~~ must also identify and assess additional scenarios associated with operating conditions that results in maximum emissions, such as~~including~~ routine and non-routine process upset scenarios, and should consider all ~~four~~ five scenarios for individual valued components.

In defining the assessment scenarios, the Impact Statement must:

- define temporal boundaries for baseline conditions by taking into account past conditions. Past conditions will help establish a historical context and reveal temporal patterns or trends for VCs within the adequate spatial boundaries. Information on past conditions will also inform whether present-day conditions are representative, and how the Project may affect them. This should be considered in the proposed *baseline case* and how they relate to other scenarios.

Commented [DS6]: KEY CONSIDERATION:

The Current Case assessment outcome (modelled results) will establish existing conditions for comparison against the "baseline" information (based on real world information/data). The four typical development scenarios listed above are "future" scenarios which makes their predictions difficult to validate. A "current case" therefore allows model predictions of actual emission data to be compared to actual environmental quality data, this in turn allows for a more informed interpretation of the predictions for the four "typical" scenarios.

In Section 8.4.1.1 a current case modelling is required: "·provide dispersion modelling of a base case for existing pollutant sources and to determine the spatial distribution of pollutants in all study areas". This requirement should be formalized as a "case" so that the assessment required that it be compared to the other scenarios.

Commented [DS7]: KEY CONSIDERATION:
The Edmonton Metropolitan Region is positioned to undergo substantial growth over the coming decades. It is anticipated that the regional population will double by 2044 (Edmonton Metropolitan Region Growth Plan, Amended January 12, 2020). Air emissions, particularly SO_2, and NO_x emissions associated with industrial activities and urban transportation, should be considered in an intermediate scenario between the Application and Planned Development Cases. The Pre-Commissioning Case should capture increase in regional emissions (i.e. cumulative effects) from sources that are not otherwise addressed in the Planned Development Case.

Commented [DS8]: KEY CONSIDERATION:

Both routine and non-routine process upsets are inevitable during the life of the facility. In addition to understanding how the project may impact air quality under normal operating conditions, it is also important to understand how such events may impact air quality in the local area and in the region. Specific requests are outlined as tracked changes in Section 8.4.1.2.

- For biophysical VCs, temporal boundaries used to establish the baseline conditions must be defined to allow for the detection of all species using the study areas throughout the year and from one year to another, to reflect and take into account temporal use patterns and variability;

- define temporal boundaries according to the planned schedule for all phases of the Project in order to understand potential effects according to key timelines and milestones for project components and activities. If potential effects are predicted after project closure and reclamation, this should be taken into consideration in defining specific boundaries. This should be considered in the proposed *application case* and how it relates to the other scenarios; and
- clearly identify and describe effects from the Project for all VCs, such that effects discussed in a current case, a *project-only case,* an application case, *a planned development,* or ~~an application~~a pre-commissioning *case* due to the Project and presented in a meaningful context that can easily be understood, and not only expressed relative to the *baseline case*.

See the document *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* for more information on establishing temporal boundaries.

7.3.2. Spatial Boundaries

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;
  - the physical location of potential receptors, including, where applicable, the movement patterns of potential receptors;
  - the relationships between VCs (e.g. interaction between wildlife and vegetation);
  - 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;
  - 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 regional study areas.

The Proponent should consider additional guidance for assigning appropriate study areas or boundaries provided in section 21.7 *Establishing spatial boundaries*.

The Proponent is required to present the study area boundaries in maps and in a geospatial format (see section 21.5 *Geospatial data requirements*).

7.4. Effects assessment methodology

The environmental, health, social or economic effects are described in terms of the context, magnitude, geographic extent, timing, duration and frequency, and whether effects are reversible or irreversible.

The description of the effect can use either qualitative or quantitative criteria, taking into account any important contextual factors. In the case of quantitative predictions derived from models, 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 the probability or likelihood of that effect occurring and describe the degree of scientific uncertainty related to the data, information, and methods used. The degree of confidence must be discussed in the analyses.

The Impact Statement must:

- describe in detail the Project's potential direct and indirect adverse and positive effects in relation to each phase of the Project (construction, operation, decommissioning, and reclamation) including how baseline data was used to inform this analysis;
- provide a rationale for the absence of details if they cannot be provided (e.g. for future events such as upon closure and reclamation), and a more general description of the expected activities and effects;
- include clearly stated assumptions for all predictions and clearly describe how each assumption has been tested;
- consider and describe the interactions between the environmental, health, social and economic effects and the interaction and interconnectedness of selected VCs while taking into account community values and a systems approach that considers interactions between VCs and with other environmental, health, social and economic factors;
- identify the analytical methods used to compare predicted effects and actual effects, by including details about the model inputs, assumptions and uncertainties, the use of baseline data and statistical testing of the model outputs. In terms of model inputs, for each major air, wastewater and stormwater release sources used in the modelling, provide a description of the source of the input, how it was measured, determined and/or estimated, the uncertainties associated with the input and how that uncertainty was considered in the assessment;
- take into account the tolerance thresholds regarding the potential negative effects that Indigenous peoples have identified;
- describe where and how Indigenous knowledge and input were incorporated into the impact assessment ~~considered~~; and
- include GBA+ as described in section 21.4 *Application of GBA+* and guidance documents (see section 20 *Appendix 1 – Reference* documents).

7.5. Mitigation and enhancement measures

Every impact assessment conducted under the Act must identify measures that are technically and economically feasible that would mitigate the Project's adverse environmental, health, social and economic effects. Conversely, the Proponent can identify enhancement measures to increase positive effects for example, local and regional training efforts, investment in infrastructure and services, projects to rehabilitate degraded environments, etc. Mitigation and enhancement measures that will be 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.

A description of how the Agency describes the hierarchy of mitigation measures is captured in section 21.9 *Mitigation hierarchy*.

The Impact Statement must:

- describe the mitigation practices applied to the design and planning of the approved VCS-H Project 1;

Commented [DS9]: KEY CONSIDERATION:

The VCS-Heartland Expansion is an expansion of an already approved project that is not yet in operation. VCS indicates in the Detailed Project Description that the earliest Expansion will be in operation in 2029 and each sub-Project stage will commence 3-4 years after the previous stage.

Request should be made that VCS:
1. conduct a meaningful evaluation of all options available in the selection of best practices and best available technology economically achievable (BATEA) for air emission mitigation and management; and
2. clearly articulate how and when best practices and BATEA would be applied and monitored for their effectiveness; and
3. due to the progressive nature of this project's development, precede the development of each sub-Project stage by re-evaluating best available mitigation measures to include considerations for policy updates, developments in technologies and best practices, as well as lessons learned from previous sub-Projects.

- describe the standard mitigation practices, policies, and commitments that constitute proven technically and economically feasible mitigation measures and that are to be applied as part of standard practice within the Project design, ~~and~~ whether such practices differ from those applied to the design and planning of the approved VCS-H Project 1 and why the proposed mitigation measured are considered to represent best practices;

- describe how the mitigation practices, policies, and commitments will be re-evaluated prior to the design and construction of each additional Project phase ~~to~~based on new understanding and possible advances in mitigation measures and technologies;

- specify the interventions, work, ecological footprint reduction techniques, existing best technology, best environmental practices, corrective actions 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 new or innovative mitigation measures being proposed including technological innovations, and provide detailed information on the nature of these measures, their implementation and anticipated effectiveness, management and related requirements of the follow-up program;
- provide an assessment of the anticipated effectiveness of the technically and economically feasible mitigation measures and describe all relevant uncertainties. The assessment must:
  - provide the reasons for determining if the mitigation measure will reduce the extent to which the adverse effects are significant;
  - to the extent possible, provide relevant technical and scientific data and information from analogous projects; and
  - if there is little experience or some question as to the effectiveness of any measures, describe the potential risks and effects should those measures not be effective or malfunction;
- write mitigation measures as specific commitments that clearly describe how and when the Proponent intends to implement them and their desired outcomes. Measures are to be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation and implementation. Where appropriate, an implementation methodology and associated timelines should be linked to each mitigation measure and initiative;
- 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 through a systematic and data driven decision making process that shows the rationale for the selection of the preferred technically and economically feasible mitigation measures;
- describe how the effectiveness of the chosen mitigation measures will be measured, monitored, and if possible, improved over the course of the project life;
- describe the approach that would be taken if a mitigation measure is no longer feasible while the Project is carried out, or does not perform as expected;
- describe how the effectiveness of the chosen mitigation measures in the earlier project phases will be considered and applied as "lessons learned" to the design and planning of subsequent phases of the VCS-H Complex development as part of continuous improvement for the VCS-H Complex's environmental performance;
- 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;
- provide guidelines that will be followed in the event of accidental spills of fuels, hydrocarbons, chemicals, and waste products;
- discuss the mechanisms the Proponent would use to require its contractors and sub-contractors to comply with these commitments and policies and with auditing and enforcement programs;
- describe how, throughout the Project's duration, the lessons learned through follow-up programs will be used to continually improve mitigation measures (see also section 8, AB TOR (Annex I));
- include a mitigation and decommissioning plan for all temporary components of the Project;

- identify the party and/or operational area responsible for the implementation and monitoring of mitigation measures and the system of accountability; and
- explain how mitigation and enhancement measures were developed with communities and Indigenous peoples, and federal, provincial, and municipal authorities, and how these parties will be informed of the implementation progress, effectiveness, and outcome of these measures.

Effects from the Project that remain after other mitigation measures are applied may need to be offset by implementing compensatory measures. Where compensatory measures are proposed as measures to mitigate remaining effects on species at risk and their critical habitats, fish and fish habitat, or wetland

functions, the Impact Statement must include offsetting or compensation plans for consideration during the impact assessment process. Guidance on the preparation of compensation plans is outlined in section 21 *Appendix 2 – Additional guidance* and within section **Error! Reference source not found.** ***Error! Reference source not found.***.

8. Biophysical environment

Although the requirements set out in these Guidelines are separated by biophysical, health, social or economic conditions and elements, the Impact Statement must consider and describe the interactions between the environmental, health, social and economic effects and the interaction and interconnectedness of selected VCs while taking into account community values.

8.1. Meteorological environment

8.1.1. Baseline conditions

The Impact Statement must:

- describe the local and regional climate, including historical records of relevant meteorological information (e.g. total precipitation (rain and snow)) in sufficient detail to highlight weather variations and characteristics of the region affected by project activities and components;
- provide mean, maximum and minimum temperatures;
- provide typical wind speed and direction;
- identify the potential for extreme weather events such as, wind, precipitation and temperature extremes;
- provide a summary of, and reference to, the data sources and unique weather station identifiers for hourly meteorological data (wind speed and direction, air temperature, dew point temperature or humidity, air pressure and precipitation data) gathered from a minimum of one year of study to support dispersion modelling in order to capture the normal variability of meteorological conditions; and
- consider the influence of climate change in the description of the local and regional climate and in the risks of extreme weather events.

8.2. Geology, geochemistry and geological hazards

8.2.1. Baseline conditions

The Impact Statement must:

- describe the geology of surficial deposits at an appropriate scale. Include a table of geologic descriptions, including alteration styles, geological maps and cross-sections of appropriate scale. Geospatial data files must also be included;
- describe the geomorphology, topography and geotechnical characteristics of areas proposed for construction of major project components;
- provide a characterization of the geochemical composition of the materials expected to be excavated;
- describe baseline concentrations of contaminants of concern (these may include selenium, sulphate, cadmium, nitrate and calcite, heavy metals) within the local, regional and downstream receiving environments; and
- describe the presence and location of landforms associated with important wildlife habitat features (see 21.12 *Additional guidance for biophysical components* for a list of habitat features).

8.3. Topography, soil and sediment

8.3.1. Baseline conditions

The Impact Statement must:

- describe the landforms, terrain, soils and sediments within the LSA and RSA, including sediment stratigraphy. Provide surficial geology maps and cross-sections of appropriate scale;
- provide a description and location of any erosion-sensitive soils (see also section 3.9, AB TOR (Annex I)) and areas of ground instability;
- provide maps depicting soil depth by horizon and soil order within the Project area to support soil salvage and reclamation efforts;
- describe the suitability and availability of reclamation material (topsoil and other soil) (see also section 3.9, AB TOR (Annex I));
- identify soils within the LSA and RSA susceptible to potential acidification (by soil type) (see also section 3.9, AB TOR (Annex I));
- describe the historical land use and the potential for contamination of soils and sediments;
- describe any known or suspected soil contamination within the study area that could be re-suspended, released or otherwise disturbed as a result of the Project; and
- identify ecosystems that are sensitive or vulnerable to acidification resulting from the deposition of atmospheric contaminants.

8.4. Atmospheric, acoustic, and visual environment

8.4.1. Atmospheric environment

The Proponent should consult the additional guidance for requirements pertaining to the atmospheric environment provided in section 21.12 *Additional guidance for biophysical components*.

8.4.1.1. Baseline conditions

The Impact Statement must:

- provide an assessment of the ambient air quality in the Project, LSA and RSA, including for Elk Island National Park, and identify existing emissions and contaminant sources;
- provide the results of a baseline survey of ambient air quality, in particular near key receptors by identifying and quantifying emission sources for the following contaminants:
  - total suspended particulates;
  - fine particulates smaller than 2.5 microns ($PM_{2.5}$);
  - respirable particulates of less than 10 microns (PM_{10});
  - carbon monoxide (CO);
  - Ozone;
  - sulphur dioxides (~~SOx~~SO_2);
  - nitrogen oxides (NOx);
  - volatile organic compounds (VOCs);
  - hydrogen sulphide (H_2S) and other reduced sulphur compounds;
  - polycyclic aromatic compounds (PACs), including polycyclic aromatic hydrocarbons (PAHs), alkylated PAHs, PAH transformation products, including nitro and oxy-PAHs, and dibenzothiophenes (DBTs);
  - metals, including aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, vanadium and zinc,
  - ammonia; and
  - any other toxic air pollutants (mobile, stationary and fugitive sources);

- include information on the baseline dust levels[6] in areas that could potentially be affected by project activities;
- compare ambient air quality results with applicable regional, provincial and federal standards, as well as relevant regional air management thresholds. For air pollutants with standards, the Proponent must use the averaging period and the statistical format associated with each numerical value.
  - Standards include the Canadian Ambient Air Quality Standards (CAAQS), National Ambient Air Quality Objectives (NAAQO), the Alberta Ambient Air Quality Objectives and Standards (AAQO). The Proponent must refer to the new CAAQS established by the Canadian Council of Ministers of the Environment (CCME) for $PM_{2.5}$, ozone, SO_2 and NO_2 to take effect in 2020 and 2025;
  - Relevant regional air management thresholds include triggers and limits for $PM_{2.5}$, ozone, SO_2 and NO_2 as outlined in the *Capital Region Air Quality Management Framework (AESRD, 2012);*
- identify and address issues pertaining to the quality of the monitoring data, including seasonal variability in the baseline survey, and determine ambient contaminant concentrations using complete, exhaustive, and representative monitoring data, collected over an appropriate duration (multi-year) and geographic scope. Data validation, quality control methods, and any assumptions made must also be described;
- provide dispersion modelling of a base case for existing pollutant sources and to determine the spatial distribution of pollutants in all study areas;
- describe past ~~and~~, existing, and planned routine and non-routine ~~-~~flaring activities, including number of hours of flaring per year; and
- provide, in the dispersion modelling of a base case for existing pollutant sources a ~~a~~ dispersion modelling of ~~baseline assessment of~~ odours at key receptor points, including Bruderheim and Fort Saskatchewan.

8.4.1.2. Changes to the atmospheric environment

The Impact Statement must:

- provide a detailed description and a quantitative assessment of all emission sources of air pollutants from the Project listed under 8.4.1.1 *Baseline conditions*, including all point sources, area sources, and mobile and road sources and identify if these emissions differ from components or activities associated with the existing Value Chain Solutions – Heartland Project 1;
- provide a detailed methodology and assumptions used to estimate emissions of air pollutants at all project phases as well as a discussion of the limitations of the methodologies and assumptions used;
- provide details of the frequency, duration, and nature of the occurrence of routine and non-routine flaring and associated assumptions. Describe the gas composition~~-~~, source, volume, and net heating value under both normal and upset flaring conditions and how flare emission composition estimates were made. Describe the control and variability of operating parameters of flaring, such as continuous and/or intermittent gas flow rate, combustion temperature, flare tip exit velocity, and how such variability, in combination with variability in meteorology (i.e. wind speed and wind direction), would affect flare gas combustion efficiency and the resulting ambient air quality and/or odour levels at and near the project facility, as well as at receptor locations;
- estimate the deposition of dust and other contaminants on sensitive receptors (e.g. from the communities of Bruderheim and Fort Saskatchewan, and Elk Island National Park) and describe the

effects of dust on communities from project activities (e.g. earth moving, land clearing, transportation) or worker vehicles;

[6] The potential for the Project to generate dust and particulate matter at a noticeable level in the Project area and surrounding areas was noted as a concern in early comments on the Initial Project Description.

- provide a description of the odours potentially associated with the Project including extent and frequency;
- for the project only and baseline, application and planned development cases, provide an air dispersion modelling assessment of odours at key receptor points, including in the communities of Bruderheim and Fort Saskatchewan. The assessment should be comprehensive and considers the full range of odorous compounds emitted by the project, their respective odour thresholds, the additive nature of odorous compounds, as well as the typical magnitude and duration of odour events that may be experienced at key receptor points;
- predict the fate of emissions resulting from all project sources for all emissions listed under 8.4.1.1 *Baseline conditions*, by using atmospheric dispersion modelling;
- predict ground-level pollutant concentrations, and plot predicted concentrations using appropriately scaled contour maps and pollutant averaging periods;
- provide rationale for the choice of air quality model, including the type and magnitude of emissions, the complexity of sources, terrain and meteorology;
- provide emission rates for all project and regional sources within the LSA and RSA, including emission factors and all related assumptions and related parameters that would enable calculations to be reproduced. Include details on methodology, uncertainty assessment and references, and provide sample calculations;
- provide detailed information on emission estimation methodologies for all project phases, including details on the configuration of the atmospheric dispersion models used (e.g. meteorology, land use, modelling domain, receptor grid density, land users, default options and chemical and physical transformation parameters, where applicable);
- assess the uncertainty in the modeled air pollutant concentrations using relevant range of model inputs. All sources of uncertainty should be taken into account, including:
  - model uncertainty, including a consideration for how uncertainty in modelled predictions may vary spatially and temporally;
  - uncertainty in baseline concentration estimates;
  - uncertainty in the estimates of meteorological inputs; and
  - uncertainty in estimates of source emissions (from sources attributable to the Project, and externally). Uncertainty in source estimates should take into account any published studies which have shown apparent discrepancies between reported and observed emissions[7];
- provide maps of isopleths illustrating the predicted ~~emissions~~ ground level concentrations for the modelling scenarios, using an appropriate scale to visualize the extent of dispersion to sensitive receptors[8];
- using a photochemical model determine whether the formation of secondary pollutants resulting from the Project has the potential to raise concentrations above baseline levels – if so, identify and characterize these pollutants;
- compare the predicted air quality results with applicable regional, provincial and federal standards for ambient air quality, federal and regional air quality management triggers or limits, and community-based air quality and odour guidelines.

[7] Example: Li et al., 2017. Reference Li, S.-M., et al. *Differences between measured and reported volatile organic compound emissions from oil sands facilities in Alberta, Canada*. (2017) Proceedings of the National Academy of Sciences of the United States of America, 114 (19), pp. E3756-E3765

[8] Sensitive receptors include residential, urban, or other inhabitated areas, agricultural areas, and natural or park land.

- The assessment against CAAQS should be based on the principles of “keeping clean areas clean” and “continuous” improvement and in the context of air sheds and air zones with the Air Quality Management System;
- The predicted air quality impacts ~~assessment against CAAQS~~ should be compared against the CAAQS ~~the~~ yellow, orange, and red management thresholds, along with maps of isopleths illustrating the areas with predicted ground level concentrations exceeding each respective management thresholds;

- conduct a source contribution analysis to assess the relative contributions of project and non-project emission sources on pollutant concentrations at key receptors. The source contribution analysis should be conducted for all pollutants that exceed 10 % of the relevant guidance or standard value. Emission sources should be grouped into appropriate categories, such as project-related vehicles and equipment, access roads, material handling, material and product storage areas, process stacks, flares, fugitive emissions, rail loading and unloading, etc.; and
- describe any positive changes.

Secondary organic compounds

The Impact Statement must quantify secondary organic compounds as a result of the Project, by using the following approach:

- quantify the emissions of gas-phase precursor compounds of secondary organic aerosols (SOA) for each relevant source;
- identify the individual chemical compounds considered as SOA precursor emissions (VOCs, IVOCs and SVOCs). In addition, group total organic gas-phase emissions on the basis of volatility for each source, to use in the estimation of SOAs; and
- estimate the concentration of SOAs (as $PM_{2.5}$) with an appropriate model using the quantified SOA precursor emissions for the current, base case, project-only, ~~and~~ application, and pre-commissioning-case scenarios. SOA precursor emissions from other facilities in the region may be approximated by scaling measured emissions from these facilities to production levels. The model should provide an accurate estimation of SOA formation that will be included with primary $PM_{2.5}$ emissions to arrive at a total $PM_{2.5}$ burden.

Acid deposition

The Impact Statement must assess the potential for the Project’s emissions of acidifying pollutants to contribute to acid deposition for the terrestrial and aquatic ecosystems at the regional scale, including Elk Island National Park, by using the following approach:

- conduct model simulations to predict acidifying deposition using emissions of NO_x and SO_2 from processing facilities on the Project site;
- ~~conduct model simulations to predict acidifying deposition using emissions of NO_x and SO_2 from processing facilities on the Project site~~compare acidifying deposition predictions on terrestrial and aquatic ecosystems for the project to those associated with development scenarios listed in *Section **Error! Reference source not found.**~~7.3.1~~ Temporal Boundaries*~~~~;
- using modeled acidifying deposition rates, assess the potential for the Project to contribute to ecosystem damage by estimating exceedances of critical loads (an effective measure of ecosystem sensitivity) in the region. Critical loads must be estimated using methods consistent with the

internationally recognized UN-Economic Comission of Europe Convention on Long-Range Transboundary Air Pollution (CLRTAP, 2017)[9]; and

- compare potential effects with critical thresholds, considering current and historical loadings, buffering capacity, and critical loads.

The Proponent shall refer to Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality* to ensure that it provides the information and analysis considered necessary to assess the Project's impacts on human health in relation to changes to air quality. It is requested that the Proponent complete the checklists provided in this guide (Appendix A in the air quality guide) to assist participants in verifying that the main elements of an air quality impact assessment have been completed and in identifying the location of this information in the Impact Statement. These checklists will facilitate the review of the Impact Statement and will be particularly useful if analyses on these aspects are found in several sections of the Impact Statement.

It is recommended that the Proponent engage with experts at Environment and Climate Change Canada (ECCC) to inform the choice of program to model acidifying deposition rates.

8.4.1.3. Mitigation and enhancement measures

The Impact Statement must:

- provide a description of the methods and practices to be deployed to reduce and control emissions, including options to minimize SO_2 and NO_X emissions from combustion-related sources, minimize fugitive emissions, reduce flaring (e.g. control equipment, heat or gas recovery system), and optimize flare combustion efficiency. If the best available technologies or best practices are not selected in the Project design, the Proponent must provide a rationale to justify the technologies selected;
- document and justify how the contaminant emission reduction efficiencies were applied in the calculation of emission rates, including details of all assumptions associated with these mitigation measures and their feasibility;
- provide a description of methodology to measure and verify efficiency of the selected contaminant emission reduction measures;
- provide an assessment of and compare the available combustion-related emission control technologies that would enable emission sources from the VCS-H Complex projects to meet:
  - CCME *National Emission Guidelines for Commercial/Industrial Boilers and Heaters* (1998) and the Federal *Multi-sector Air Pollutants Regulations* (2016); and
  - Compliance limits and performance targets outlined in *Emission Guidelines for Oxides of Nitrogen (NO_X) for New Boilers, Heaters and Turbines Using Gaseous Fuels Based on a Review of Best Available Technology Economically Achievable (BATEA) (Alberta Government, 2007)*;
  - The USEPA 40 CFR Part 60 Standards of Performance for Petroleum Refineries; Final Rule Standards of Performance for Petroleum Refineries (https://www.epa.gov/stationary-sources-air-pollution/petroleum-refineries-new-source-performance-standards-nsps-40-cfr) which covers standards for fluid catalytic cracking units, fluid coking units, delayed coking units, fuel gas combustion devices, and sulfur recovery plants;
- provide a description of existing and planned measures to reduce odours and dust, including a description of improvements to existing infrastructure, equipment, and operational practices as applicable;

- provide a description of existing and planned measures to conduct leak detection and repairs and manage fugitive emissions from processing, storage, and loading/unloading areas of the facility and how the planned measures will ensure compliance with the ECCC "*Reduction in the Release of Volatile Organic Compounds Regulations (Petroleum Sector)*" (SOR/2020-231). Consult and consider best management practices outlined in *Directive 084 Requirements for Hydrocarbon Emission Controls and Gas Conservation in the Peace River Area*;
- consult and consider best management practices presented in the document *Good Practices Guide for Odour Management in Alberta*;
- provide a description of efforts that the proponent will undertake to work with railroad operator to minimize air emissions associated with rail locomotive engine combustion;
- provide a description of participation in national or regional air emissions tracking and reporting programs (e.g. National Pollutant Release Inventory) or provide rationale why participation is not required;
- develop and implement strategies compliant with regional and national commitments, such as the CCME's commitment regarding pollution prevention; and
- consult and consider best management practices presented in the document *Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities.*

[9] CLRTAP 2017. *Manual on methodologies and criteria for modelling and mapping critical loads and levels and air pollution effects, risks and trends.*

8.4.2. Acoustic environment

8.4.2.1. Baseline conditions

The Impact Statement must:

- provide current ambient noise levels at key receptor points (e.g. nearby communities, residences, Indigenous land users, locations of traditional land use, wildlife), including the results of a baseline ambient noise survey and permissible noise levels for each receptor. The information on typical noise sources (natural and anthropogenic), their geographic extent and 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 10:00 p.m. to 7:00 a.m.); and
  - degree of baseline annoyance attributable to existing noise sources (e.g. vehicle traffic, aircraft, other industrial noise);
- justify the selection of and provide information on all noise-sensitive receptors in the LSA and RSA, including any foreseeable future receptors, and distances of receptors from the Project; and
- describe engagement with Indigenous communities to identify receptor locations.

8.4.2.2. Changes to the acoustic environment

The Impact Statement must:

- describe changes in ambient vibration and sound levels resulting from project activities (e.g. machinery use, increased traffic, drilling of water disposal wells, etc.);
- quantify sound levels at appropriate distances from any project facilities and/or activities and describe for each sound source the timing, frequency, and duration of sound events and their characteristics, including the frequency spectrum;
- describe the locations and characteristics of the most sensitive receptors, including species at risk, nearby communities, and areas favoured by Indigenous groups for the practice of traditional activities; identify and justify the approach to characterize sound effects resulting from the Project that may be adverse. Take into account:
  - the distribution of the reference night-time sound events relative to the individual sound events expected at night at the location of each receptor; and
  - 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);
- describe consultation with regulators, stakeholders, community groups, landowners and Indigenous groups about potential effects to the acoustic environment;

- describe potential effects to receptors due to changes in sound levels resulting from project activities;
- where there is public concern associated with an increase in sound levels during construction, provide a vibration and sound impact assessment including an overview of concerns and an assessment of the change in percent highly annoyed (see Health Canada's Guidance for *Evaluating Human Health Impacts in Environmental Assessment: Noise*); and
- describe any positive changes.

8.4.2.3. Mitigation and enhancement measures

The Impact Statement must:

- identify current and proposed noise mitigation measures and their effectiveness, including design, construction and operational factors referenced in AER's *Directive 38: Noise Control* (see also section 3.1, AB TOR (Annex I));
- explain how a complaint-response protocol may be implemented and reported on to document any complaints and associated mitigation measures undertaken to resolve the complaints, including the nature of the noise produced (e.g. tonal, impulsive, highly impulsive, and the timing of the noise event); and,
- explain how a community engagement plan may be implemented and reported on to proactively inform community members and Indigenous groups who may be affected by project-related noise, such as anticipated changes in noise levels.

The Proponent shall refer to Health Canada's Guidance for *Evaluating Human Health Impacts in Environmental Assessment: Noise* to ensure that it provides the information and analysis considered necessary to assess the Project's impacts on human health in relation to changes to the sound environment. It is requested that the Proponent complete the checklists provided in this guide (Appendix B in the above-referenced Health Canada Guidance on noise) to assist participants in verifying that the main elements of a noise impact assessment have been completed and in identifying the location of this information in the Impact Statement. These checklists will facilitate the review of the Impact Statement and will be particularly useful if analyses on these aspects are found in several sections of the Impact Statement.

8.4.3. Visual environment

8.4.3.1. Baseline conditions

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 a map.

8.4.3.2. Changes to the visual environment

The Impact Statement must:

- describe any changes in night-time light levels as a result of the Project;
  - quantify light levels at appropriate distances from any project facilities, including the timing (e.g. night hours), frequency, duration, distribution and character of light emissions;
  - describe the locations and characteristics of the most sensitive receptors, including species at risk, nearby communities, and areas favoured by Indigenous groups for the practice of traditional activities;
  - describe consultations and, where appropriate, provide a record of engagement with regulators, stakeholders, community groups, landowners and Indigenous groups regarding potential effects on the visual environment;
- describe any changes to the visual environment that would consist of aesthetic disruptions to the cultural landscape (e.g. from deforestation, changes to topography, additional presence of humans). This assessment should focus on land users and people traveling along the North Saskatchewan River; and
- describe any positive changes.

8.4.3.3. Mitigation and enhancement measures

The Impact Statement must describe existing and proposed mitigation measures for anticipated changes to the visual environment.

8.5. Groundwater and surface water

8.5.1. Baseline conditions

The Impact Statement must:

- provide complete hydrometeorological (temperature, precipitation, evapotranspiration) information based on data from nearby weather stations or from a weather station on site;
- provide and illustrate the delineation of drainage basins, at appropriate scales (water bodies and watercourses), including intermittent streams, flood risk areas and wetlands, boundaries of the watershed and sub-watersheds, in relation to key project components;
- indicate the type of watercourse impacted (e.g. lotic or lentic system, lake, river, pond, temporary or permanent stream), the size of the water bodies and watercourses, by linear length or area, and the width at the ordinary high water mark (OHWM) based on the following classes: large stream (over 20 metres in width), medium stream (between 5 and 20 metres in width), small permanent and intermittent streams less than 5 metres in width);

- include the North Saskatchewan River, Beaverhill Creek, and Astotin Creek in the full range of seasonal and inter-annual variations, and seasonal baseflow . The hydrographs may be based on data from nearby gauging stations or from gauging stations on site;
- provide stage hydrographs for nearby wetlands, ponds, and lakes showing the full range of seasonal and inter-annual water level 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 whether their consumption has Indigenous cultural importance;
- describe the surface water quality baseline characterization program, including sampling site selection, monitoring duration and frequency, sampling protocol, and analytical protocol, including quality assurance and quality control
- provide baseline surface water quality data for physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, turbidity) and relevant chemical constituents (major and minor ions, trace metals, radionuclides, nutrients, and organic compounds, including those of potential concern) in relation to applicable water quality guidelines. Water sample collection and analysis should use appropriately sensitive detection limits. Include additional data, as appropriate, to illustrate the seasonal and inter-annual variability in baseline surface water quality, including possible changes due to groundwater–surface water interactions;
- Identify all domestic, communal, or municipal water wells within the local and regional study areas, including their screened hydrostratigraphic unit and piezometric level. Describe their current use, potential for future use, and whether their consumption has any Indigenous cultural importance;
- identify all groundwater monitoring wells within the project area, including their location, completion details (diameter, screen depth), geological log, screened hydrostratigraphic unit, piezometric level, and monitoring frequency;
- provide monitoring well hydrographs showing the full range of seasonal and inter-annual water level variations;
- describe the hydrostratigraphic units (aquifers, aquitards, aquicludes) of the affected hydrogeological environment;
- describe the structural geology of the affected hydrogeological environment, including any major faults, fracture density and orientation, with respect to groundwater flow directions;
- describe the groundwater flow boundaries of the hydrogeological environment for the purposes of the Impact Statement;
- provide the hydraulic properties of the hydrostratigraphic units, including data on hydraulic conductivity, specific storage, transmissivity, storativity, saturated thickness, porosity, and specific yield, as applicable;
- provide hydrogeological maps and cross-sections of the study area showing water table elevations, potentiometric contours, interpreted groundwater flow directions, groundwater divides and areas of recharge and discharge; and
- present a conceptual model of the hydrogeological environment, including a discussion of geomorphic, hydrostratigraphic, hydrologic, climatic, and anthropogenic controls on groundwater flow;

8.5.2. Changes to ground water and surface water

The Impact Statement must:

- provide a project-specific water use assessment for all phases of the project that includes:
  - the quantity (flow rates, annual volumes, etc.) and quality of water resources withdrawn from the environment or potentially affected by the project;
  - conditions under which waste waters would be released to the receiving environment; and
  - treatment carried out on these waters (e.g. addition of a tracer)
- estimate key project fluxes, changes to surface water and groundwater quantity and availability, including effects on baseflow in rivers and streams, effects on wetlands, effects on recharge and discharge, effects on potable supplies, and effects on natural flow divide;
- provide an assessment for off-site migration pathways for impacted groundwater, and an analysis of contaminant attenuation capacities within the hydrogeological units of the Project study area;
- present estimates of surface water runoff and overland flow rates for major project components;
- present an integrated site water balance model incorporating surface and groundwater fluxes to or from all major project components, for the operations and post-closure periods;
- describe the quantity and quality of all potential effluent streams released from the site to the receiving environment;
- describe potential changes to surface water and groundwater quality with specific reference to the following factors:
  - effluents and surface water runoff from the Project;
  - acidifying emissions and/or aerial deposition of fugitive dust and particulate matter containing contaminants;
  - project-derived erosion and sedimentation;
  - deep well injection disposal;
  - removal or diversion of watercourses;
    - this analysis must include changes to physicochemical parameters (temperature, pH, salinity, dissolved oxygen) and chemical constituents (major and minor ions, trace metals, radionuclides, nutrients, organic compounds);
- discuss potential for changes due to flow alterations downstream of the Project, including potential for increased flooding due to lack of attenuation of flow in wetlands; and
- describe any possible circumstances in which deep well injection disposal could affect shallow groundwater and surface water quality;

The Proponent shall refer to Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Drinking and Recreational Water Quality* to ensure that it provides the information and analysis considered necessary to assess the Project's effects on human health in relation to changes to water quality. It is requested that the Proponent complete the checklist provided in this guide (Appendix A in the above-referenced Health Canada Guidance on drinking and recreational water quality) to assist participants in verifying that the main elements of a water quality impact

assessment have been completed and in identifying the location of this information in the Impact Statement. This checklist will facilitate the review of the Impact Statement and will be particularly useful if analyses on this aspect are found in several sections of the Impact Statement.

8.5.3. Mitigation and enhancement measures

The Impact Statement must:

- describe the mitigation measures for the possible effects on the quantity and quality of surface water and groundwater, including potentially affected water supply wells, and provide a rationale that explains the effectiveness of proposed measures;
- describe any applicable water quality treatment measures and provide evidence supporting the effectiveness of these measures;
- describe any applicable water quality treatment measures and provide evidence supporting the effectiveness of these measures;
- provide any water management plan applicable to waterbodies and watercourses likely to be affected by any phase of the Project;
- describe how connectivity of surface water and groundwater within the Project site with the regional landscape will be considered and maintained on the closure landscape;
- describe and justify water takings for project works during construction and operations (e.g. dewatering, hydrostatic tests).
  - If the final details have not been confirmed yet, the Proponent nonetheless must specify the expected requirements, the options available and the criteria it intends to apply to assure protection of water resources;
- describe any groundwater and surface water monitoring programs, including the selection and location of sampling points, the parameters that will be measured, the duration and frequency of monitoring, the sampling protocol and analysis protocol and the quality assurance and quality control measures, and how monitoring data will be made available. Where applicable, the parameters measured should also include a comparison of the measured parameters with the criteria in the *Canadian Council of Minister's of the Environment Canadian Environmental Quality Guidelines*. Include the description of the measures that will be implemented if the criteria are exceeded; and
- describe any specific monitoring program planned during construction, including assessment of effects before and after construction activities in order to optimize or adapt mitigation measures at the time of their application.

8.6. Vegetation and riparian, wetland and terrestrial environments

The Proponent should consult the additional guidance for requirements pertaining to wetlands provided in section 21.12 *Additional guidance for biophysical components*.

8.6.1. Baseline conditions

8.6.1.1. Vegetation and communities of importance

The Impact Statement must:

- provide a description of the biodiversity, relative abundance and distribution of vegetation species and communities of ecological, economic or human importance within the local study area of the Project, including:
  - rare plant communities and communities of limited distribution (see section 3.6.1 [A], AB TOR (Annex I));
  - species listed as at risk, may be at risk, and sensitive in the *General Status of Alberta Wild Species* (see section 3.6.1 [A], AB TOR (Annex I));
  - species listed in Schedule 1 of the *Species at Risk Act* (see section 3.6.1 [A], AB TOR (Annex I));
  - species assessed by the Committee on the Status of Endangered Wildlife in Canada (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 species posted on its website (see section 3.6.1 [A], AB TOR (Annex I)); and
  - species of importance to Indigenous peoples, including for traditional, medicinal, and cultural purposes (see section 3.6.1 [C], AB TOR (Annex I));
- identify the biodiversity metrics, and biotic and abiotic indicators that are used to characterize the baseline vegetation biodiversity and discuss the rationale for their selection (see section 3.8.1, AB TOR (Annex I));
- provide maps, at an appropriate scale, of the vegetation species and communities of importance within the local study area (see section 3.6.2,AB TOR (Annex I));
- discuss the potential of each ecosite phase within the study areas to support the species and communities listed above and their importance for local and regional habitat, sustained forest growth, rare plant habitat and the hydrologic regime (see section 3.6.1, AB TOR (Annex I));
- provide pre-project characterization of the shoreline, banks, current and future flood risk areas, and wetland catchment boundaries;
- describe the natural disturbance regimes in the LSA and RSA and their sources, including context on how past projects and activities have affected those regimes (e.g. fire, floods, droughts, diseases, insects and other pests, etc.) (see also section 2.8 [B], AB TOR (Annex I));
- describe and quantify the extent of any weed species, other invasive species, and introduced species of concern within the Project study areas (see also section 3.6.2 [J], AB TOR (Annex I));
- describe the current levels of anthropogenic and natural disturbance affecting vegetation and other ecological communities, including a description and quantification of the current extent of habitat fragmentation, the extent of human access and use; and past and current fire suppression (see also sections 2.8 [B}, 3.6.1, AB TOR (Annex I));
- identify ecosystems that are sensitive or vulnerable to disturbance, such as acidification resulting from the deposition of atmospheric contaminants (see also section 3.6.2, AB TOR (Annex I));

- describe the amount, merchantability and location of any merchantable timber to be removed during project construction within the LSA, including timber productivity ratings (see also section 3.6.1, AB TOR (Annex I)); and
- describe the current use of site vegetation for construction materials, medicinal purposes, and as a source of country foods (traditional foods) and indicate whether its consumption has any Indigenous cultural importance. These include:
  - fruits and vegetables harvested from the wild (e.g. berries, seeds, leaves, roots, mushrooms and lichen), and
  - plant tissue (e.g.
  - roots, bark, leaves, and seeds) ingested for medicinal or other uses (e.g. teas).

8.6.1.2. Wetlands

The Impact Statement must:

- quantify, describe, and map wetlands (marshes, ephemeral wetlands, etc.) potentially affected by the Project in the context of:
  - wetland class, ecological community type and conservation status (including the use of the *Alberta Wetland Classification System* (see also section 3.6.1 [A], AB TOR (Annex I));
  - biodiversity[10];
  - abundance[11] at local, regional and provincial scales;
  - distribution; and
  - current level of disturbance;
- identify and map wetlands on federal lands potentially directly or indirectly affected by the Project and within the scope of federal permits, authorizations, or other approvals. Provide information adequate to determine if the Federal Policy on Wetland Conservation applies;
- provide a wetland functions assessment in accordance with the guiding principles of *Wetland Ecological Functions Assessment: An Overview of Approaches* or any subsequently approved guidelines by which to determine the most appropriate functions assessment methodology to use (see section 21.12 for additional guidance on the assessment of *Wetlands*); and
- determine whether the wetlands identified are within a geographic area of Canada where wetland loss or degradation has reached critical levels, or whether they are considered ecologically, socially or economically important to a region.

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10 Biodiversity is defined as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (Convention on Biological Diversity). Additional resources on biodiversity are available at https://biodivcanada.chm-cbd.net/what-biodiversity.

11 Abundance is defined as "The number of individuals per species and the evenness of distribution of individuals among species in a community."

8.6.2. Changes to vegetation and riparian, wetland, and terrestrial environments

The Impact Statement must describe all the interactions between the Project and vegetation and the riparian, wetland and terrestrial environments, including:

- a description and rationale for the key indicators used to assess project effects and the sensitivity of vegetation communities, wetlands, and riparian and terrestrial environments to disturbance (see also section 3.6.2, AB TOR (Annex I));
- provide an overall description of temporary and permanent changes related to landscape disturbance including habitat fragmentation, alteration of riparian areas, including buffers and setbacks, and project effects on areas of ground instability (see also section 3.6.2, AB TOR (Annex I));
- quantify the area of vegetation communities and riparian, wetland, and terrestrial environments, that may be cleared or otherwise disturbed during all project phases and from both temporary and permanent project components, including a description of the type of disturbance (see also section 3.6.2, AB TOR (Annex I));
- describe, in a regional context, effects associated with changes to or loss of any ecosite phase (see also section 3.6.2, AB TOR (Annex I));
- describe the potential effects of the Project on rare plant species and plant species at risk (see also section 3.6.2, AB TOR (Annex I));
- describe any hydrological or water flow changes, either permanent or temporary, that may alter moisture regimes or drainage conditions, and describe the effects on vegetation and wetland areas, including impacts on fish and fish habitat where applicable;
- describe any changes to or loss of wetland function as a result of the Project, including consideration of the ecological (e.g. hydrological, water quality, biogeochemical cycling, habitat, and climate functions) and socio-economic functions of wetlands. Describe and justify the methodology used to identify impacts;
- describe methods for clearing and maintaining the Project area and other project components and the potential effects on the quality of drinking water sources, species, biodiversity and species of (cultural, traditional, or other) importance to Indigenous peoples;
- describe potential changes to soils and sediments of trenching, drilling, underground infrastructure burial and compaction; stream and water body crossings; and dewatering, diversions, and water withdrawals (e.g. hydrostatic testing). This includes changes in topography, erosion, altered bank slopes and re-suspension of sediment;
- describe any changes in soil quality, compaction, erosion, and soil loss that could result in a loss of soil productivity;
- describe any contaminants of concern potentially associated with the Project that may affect vegetation, soil, sediment or water;
- describe the risk of soil and sediment contamination taking into account historical land use and the potential for loss of soil fertility;

- describe potential effects to the biodiversity of riparian, wetland and terrestrial environments, including effects from fragmentation, and changes to regional biodiversity;
- describe potential effects from project emissions that may result in contamination and acidification of nearby land and waterbodies, including consideration of the sensitivity of vegetation communities, wetlands, and riparian and terrestrial environments to disturbance (see also section 3.6.2, AB TOR (Annex I)); and
- describe any positive changes (e.g. from offsets that result in re-vegetation, new wetlands, etc.).

8.6.3. Mitigation and enhancement measures

The Impact Statement must describe the mitigation measures for the potential effects of the Project on riparian, wetland and terrestrial environments, including:

- describe any reclamation and revegetation procedures to be implemented as part of the Project or as additional mitigation measures, including:
  - techniques that will be used to ensure geotechnical stability of the closure landscape;
  - revegetation techniques and the locations where they would be implemented;
  - the selection of plant species to be maintained and planted to promote return to a natural ecosystem, including consideration for Indigenous use, during operation and upon reclamation, and integration of the reclaimed landscape with the regional landscape;
  - seed mixes to be used, application rates and location of application. Native and Indigenous species adapted to the local conditions should be used when the purpose of revegetation is to naturalize or regenerate the area;
  - fertilizers to be used, application rates and locations, and criteria for determining these specifications;
  - the planting and seeding plans that include a description of species to be replanted, the locations for replanting and criteria for determining these specifications;
  - the expected timelines, from an ecological perspective, for establishment and recovery of vegetation communities and the expected differences in community composition and structure (see also section 3.6.2, AB TOR (Annex I));
  - how reclaimed areas and vegetation communities on the Project site will integrate with local and regional vegetation communities and landscape features (see also section 3.6.2, AB TOR (Annex I));
  - any uncertainty with respect to the anticipated effectiveness of reclamation; and
  - reclamation standards to be used to evaluate ecological equivalency of post-operation reclaimed landscapes; describe and justify the ways of avoiding or reducing the temporary or permanent adverse effects on wetlands and riparian habitats;
- 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, if applicable (see section 21.10 *Compensation and offset plans* for relevant guidance);

- 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 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 to be implemented during all project phases (see also section 3.6.2, AB TOR (Annex I)). Describe any integrated vegetation management programs, including:
  - the criteria and circumstances of application of chemical, biological or mechanical control methods, and relevant regulations and potential adverse effects associated with control methods; and
  - methods used to identify 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 any high density areas;
- 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 including the proposed width, 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 pre-existing soil or sediment contamination, the mitigation and monitoring measures that will be undertaken in this regard, and the applicable regulatory restoration measures; and
- describe and justify the biosafety measures that will be employed to identify biological risks and eliminate their propagation, such as diseases in the soil or the roots.

8.7. Fish and fish habitat

8.7.1. Baseline conditions

The Impact Statement must:

- provide a list of waterbodies and watercourses (permanent and intermittent) that may be directly or indirectly affected by the Project. Group waterbodies and watercourses by sub-watershed using the following criteria:

- the type of watercourse (e.g. lotic or lentic system, lake, river, pond, temporary or permanent stream); and
- the size of the waterbodies and watercourses, the width at the OHWM linear length, and area;

- for each waterbody or watercourse, provide a more detailed assessment using satellite imagery overlaid with the pertinent information (e.g. sampling reaches, barriers to passage, notable habitat features, species assemblage summaries, etc), tables, and text description as required. The specific data that is collected for each waterbody or watercourse may vary depending on the predicted impacts, because the baseline data should support the ability to validate predictions;
- For watercourses or waterbodies predicted to have impacts to the physical habitat, a representative number of transects or quadrants within the potential zone of influence of the impact should have physical features characterized, including: width/area at the ordinary high water mark, depth, flow types and characteristics (velocity, turbidity, peak and low flows, etc.), substrate type, water quality (temperature and dissolved oxygen profile, turbidity, transparency, pH), aquatic and riparian vegetation, natural barriers (e.g. significant vertical drop, waterfalls, subsurface flow over large distances, beaver dams, etc.), and anthropogenic barriers (existing stream crossing structures, etc.) that impede or obstruct free passage of fish;
- provide a description of potentially affected fish species and populations (as defined in subsection 2(1) of the *Fisheries Act*) and other aquatic species (e.g. aquatic and benthic invertebrates) based on field surveys 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, including information on the surveys carried out (description of gear and catch methods, location of sampling stations, catch methods, date of catches, date of surveys, species surveyed, size and life cycle stage, catch per unit effort, etc.). It is recommended that the information be presented in the form of tables;
- provide a characterization of potentially affected fish and other aquatic species, on the basis of relevant parameters including: life history, food web interactions, population dynamics, movements and migratory patterns, seasonal and annual trends in abundance, sensitive habitats and periods in relation to the study areas, and predator-prey interactions, which are critical to identifying potential effects to population persistence and ecological processes;
- provide the location and area of potential and confirmed fish habitat in or near the Project area and describe how they are used by fish in terms of habitat function (species abundance and composition, spawning, nursery, growth, foraging, migration, cover habitat, 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;
- characterize the baseline biodiversity for fish and include rationale for the selection of biodiversity metrics and biotic and abiotic indicators, such as relative abundance of fish species in each habitat type, species richness and evenness from each habitat type, and biodiversity potential of each habitat type (see also section 3.5, AB TOR (Annex I));
- provide a list of aquatic species at risk (provincial and federal) likely to be present in nearby waterbodies and provide the location, and a description of suitable or potential habitat for these species (residence and critical habitat) at or near the Project area. Include:

- species listed as at risk, may be at risk and sensitive in the *General Status of Alberta Wild Species* (see also section 3.5.1 [B], AB TOR (Annex I));
- species identified by the *Alberta Wildlife Act* as endangered, threatened, or species of special concern (see also section 3.5.1 [B], AB TOR (Annex I));
- species listed in Schedule 1 of the federal *Species at Risk Act* (see also section 3.5.1 [B], AB TOR (Annex I)); and
- listed as at risk by COSEWIC (see also section 3.5.1 [B], AB TOR (Annex I)); and

- describe the use of fish and/or aquatic species as country foods[12] or for other traditional purposes, including a description of the particular species of importance, and whether its consumption has cultural importance for Indigenous peoples, including medicinal uses (see also section 3.5.1 [D], AB TOR (Annex I)). 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 (e.g. marshes) 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.

8.7.2. Effects to fish and fish habitat

The Impact Statement must describe the potential effects on fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act* (see also section 3.5, AB TOR (Annex I)). Consider any effects whether they are adverse or positive, direct or indirect, and temporary or permanent, for each phase of the Project, and for each developmental stage of fish.

For each waterbody and watercourse potentially affected by the Project, the following must be documented and considered in the determination of effects:

- the geomorphological changes and their effects to hydrodynamic conditions and fish habitats (e.g. modification of substrates, dynamic imbalance, silting of spawning beds);
- the modifications of hydrological and hydrometric conditions on fish habitat and on the fish species' life cycle activities (e.g. reproduction, rearing, feeding and growth, movement and migration, winter refuge);

[12] Country foods, or traditional foods, are defined as all foods sourced outside of commercial food systems. They include any food that is trapped, fished, hunted, harvested, or grown for subsistence or medicinal purposes, outside of the commercial food chain, including aquatic and terrestrial wildlife that is fished, trapped, hunted or harvested for domestic consumption; fruits and vegetables harvested from the wild; plant tissue ingested for medicinal or other uses; agricultural products grown in gardens and/or home orchards, and aquatic and terrestrial wildlife produced exclusively for domestic consumption.

- potential effects to riparian areas that could affect aquatic biological resources and productivity taking into account any anticipated modifications to fish habitat (e.g. structure, cover) (see also section 3.5.1, AB TOR Annex I);
- potential fish mortality associated with noise caused by project activities in or near the aquatic environment;
- effects of water withdrawal and/or water drawdown in waterbodies, including impacts on the ability of fish to utilize habitat for life processes and fish mortality due to entrapment or entrainment at intakes during water pumping or withdrawal activities (e.g. hydrostatic testing) (see also section 3.5.2, AB TOR (Annex I));
- potential changes in light and noise levels that could result in increased stress, and chronic or acute effects to fish health (see also section 3.5.1, AB TOR (Annex I));
- the potential for introduction of deleterious substances (e.g. sediments, project-related contaminants) and aquatic invasive species into the aquatic environment frequented by fish;
- changes to water quality and quantity (e.g. flow, temperature, acidification and eutrophication), both at the discharge point and in the receiving environment. Consideration should also be given to changes to surface water conditions resulting from changes to groundwater quality and quantity;
- effects that may be caused by erosion and sedimentation in waterbodies (see also AB TOR section 3.5.1, Annex I);
- potential direct and indirect effects from habitat fragmentation (see also AB TOR section 3.5.2, Annex I);
- potential alteration of fish habitat and changes in fish use of habitat, including the ability to access the habitat;
- contaminant levels in harvested species and their prey, with a focus on traditional foods harvested by Indigenous peoples; and
- any other changes resulting from the Project that may affect fish and fish habitat.

The Impact Statement must:

- take into account and include an examination of the correlation between construction periods and sensitive periods for fish (e.g. reproduction), and any potential effects due to overlapping periods;
- evaluate, where applicable, 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 to fisheries productivity, species at risk, etc.) and significance (e.g. magnitude, intensity and persistence). Habitat losses must be clearly located and described. It is recommended that the information be collected in the form of a map at appropriate scales and in the form of a table;
- characterize how potential chronic and acute effects to fish populations relates to population density and resilience;
- describe potential effects to fish from contaminants, including in fish downstream of the Project. Include a comparison of predicted water quality for all project phases at all key locations in the receiving environment to applicable water quality guidelines, site-specific objectives or benchmarks,

and relevant toxicity test results (either site-specific or published), or other applicable methods. Describe potential effects from contamination on fish behaviour, distribution, abundance, and migration patterns;

- describe how the Project's effects on aquatic biodiversity may contribute to changes in regional biodiversity and effects on local and regional ecosystems (see also section 3.8.2, AB TOR (Annex I));
- provide an assessment of potential effects to fish populations in the North Saskatchewan River, Beaverhill Creek, and Astotin Creek;
- take into account the tolerance thresholds for potential adverse effects that Indigenous peoples have identified;
- provide a quantification of any positive effects to fish and fish habitat, if applicable, such as area of habitat creation and number of fish in re-stocking activities; and
- describe any need for a *Fisheries Act* authorization or a permit under the *Species at Risk Act* and describe any review of Fisheries and Oceans Canada guidance documents.

8.7.3. Mitigation and enhancement measures

The Impact Statement must describe the proposed avoidance and mitigation measures for fish, fish habitat and aquatic resources applicable for each phase of the Project (design, construction, operations, decommissioning, and reclamation) (see also section 3.5.2, AB TOR (Annex I)), including:

- how project planning included attempts to avoid impacts to fish and fish habitat, including by avoiding destroying a section of Astotin Creek;
- measures proposed to restore aquatic environments, including the criteria used to assess successful restoration;
- measures to mitigate effects from harmful, destructive or disruptive activities during sensitive periods and in sensitive locations (e.g. spawning and migration areas) for fish in water or places frequented by fish;
- measures to mitigate sensory disturbance and functional fish habitat loss that may result from project components and activities;
- measures to avoid fish mortality as a result of fish entrainment during pumping and water withdrawal operations (e.g. during construction of temporary structures and hydrostatic tests);
- measures to prevent the deposit of harmful substances to fish in the water or in zones frequented by fish;
- measures to prevent the introduction and intrusion of invasive aquatic species during work in or near the aquatic environment; and
- standard measures, policies and commitments regarding mitigation that constitute technical and economically feasible proven mitigation measures and that will be applied in common practice, regardless of the location, and any new or innovative mitigation measures proposed.

The Impact Statement must also:

- describe measures and plans to offset or compensate for any loss in productivity of fish populations and fish habitat, and any monitoring programs using scientifically defensible methods that will be put in

place to verify the results of offsetting, as a result of the Project (see section 21.10 *Compensation and offset plans*); and

- describe how environmental protection plans will address any applicable federal and provincial policies with respect to fish habitat (see also section 3.5.2, AB TOR (Annex I)).

8.8. Birds, migratory birds and their habitat

The Proponent should consult the additional guidance for requirements pertaining to birds provided in section 21.12 *Additional guidance for biophysical components*.

8.8.1. Baseline conditions

The Impact Statement must:

- identify any applicable Bird Conservation Regions (BCRs) and BCR strategies[13] applicable to the local and regional study areas;
- describe the biodiversity of bird species and their types of associated habitats that are found or are likely to be found in the study areas, noting all avian species at risk and species of Indigenous importance or use;

o species listed in Schedule 1 of the federal SARA. A preliminary list of species at risk likely to use the Project area is provided in section 21.12 Additional guidance for biophysical components. Each of these species must be discussed separately;

o species listed as at risk, may be at risk and sensitive in the General Status of Alberta Wild Species or under any other applicable provincial legislation;

o 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;

o species of importance to Indigenous peoples, notably pertaining to the practice of rights, considering traditional knowledge; and

- o species of other ecological, economic or human importance;

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- identify the biodiversity measures (i.e. biotic and abiotic indicators) used to characterize the baseline avifauna biodiversity conditions and discuss the rationale for their selection; Describe and quantify the existing bird biodiversity in the study areas and compare this to other areas in the boreal forest with similar habitat types and across a range of development levels;
- provide quantitative estimates of the abundance and distribution, and information on the life history of migratory and non-migratory birds (e.g. waterfowl, raptors, shorebirds, forest birds, and other land birds) in the study areas;
- provide maps showing areas of highest concentrations of species and identify areas of concentration of migratory birds, including sites used for migration, staging, breeding, feeding and resting. Maps must comply with requirements set out in section 21.5 *Geospatial data requirements*;
- describe food webs and trophic linkages to summarize biotic interactions. Ensure described food webs or interactions are relevant to the study areas since these can vary geographically and by ecosystem;
- provide a characterization of potential habitat and habitat features found in the Project area that are associated with the presence of those bird species that are likely to be affected, based on the best

available existing information (e.g. land cover types, vegetation, aquatic elements, fragmentation, disturbance). Provide maps showing the location of identified habitat and habitat features associated with the presence of those bird species that are likely to be affected. This information can refer to the habitat description required in section 8.6 *Vegetation and riparian, wetland and terrestrial environments*;

- provide an estimate of year-round bird use of the area (e.g. winter, spring migration, breeding season, fall migration), based on data from existing sources and surveys to provide current field data if required to generate reliable estimates. In each portion of the year, survey effort must account for differences in

[13] See: Bird Conservation Regions and strategies

species movements including: winter usage of highly habitat reliant species and highly mobile species that will accurately characterize the use of a site;

- identify all federal species at risk and identify and map critical habitat in the study areas, sites that are likely to be sensitive locations and habitat for birds, and environmentally significant areas. These include national parks, Areas of Natural or Scientific Interest, Migratory Bird Sanctuaries, Important Bird Areas or other priority areas or sanctuaries for birds, National Wildlife Areas, World Biosphere Reserves and provincially or territorially designated areas, such as wildlife areas. This information can supplement the requirements in section 3.2 *Project location*; and
- describe the use (magnitude, timing) of migratory and non-migratory birds as a source of country foods (traditional foods) and where use has Indigenous cultural importance.

Relevant information sources are provided in section 21.2 *Sources of baseline information*. The Proponent should consult the *Framework for the Scientific Assessment of Potential Project Impacts on Birds* for examples of project types and recommended techniques for assessing effects on migratory birds.

8.8.2. Effects to birds, migratory birds, and their habitat

The Impact Statement must:

- describe the interaction between the Project and birds, migratory birds, and their habitat;
- describe predicted positive or negative direct, indirect, incidental and cumulative effects of the Project, including all project components and activities during each phase, to migratory and non-migratory birds and their habitat, including species at risk, and their eggs and nests, including:
  - population level effects, including relative abundance, distribution, and mortality rates that could be caused by project effects, particularly in the vicinity of wetland, lake and riparian habitats;
  - the potential destruction of nests;
  - effects to migration, movement, habitat usage patterns, and behaviour, including potential displacement of migratory birds and bird species at risk;
  - the surface area, biophysical attributes, and location of habitat, including critical habitat that may be affected;
  - short term and long term changes to habitats and food sources of migratory and non-migratory birds (in terms of types, quality, quantity, availability, distribution and function), including habitat loss, fragmentation and structural change;
    - consider important habitats, including: forests, riparian zones, wetlands, and other similar geological formations, and open waters; and
    - if there is displacement of breeding birds, the reference data should provide evidence that there is a significant number of equivalent habitats in which the birds can move and that the vegetation removed is not unique to the Project area;
  - effects associated with habitat and vegetation removal, particularly of habitats important for nesting, foraging, staging, overwintering, and movement corridors between habitat (e.g wetland), such as loss and fragmentation of forest cover and other habitat types, including effects to habitat quantity,

diversity, spatial and temporal habitat availability, and habitat effectiveness (i.e. types, quality, and distribution) considering edge effects;

- changes to bird-habitat relationships caused by increased sensory disturbance (e.g. sound, artificial light, presence of workers), such as relative abundance movements, diversity, density, avoidance of habitats adjacent to the Project, and disorientation or attraction to the Project area, considering the critical periods for birds, including breeding, migration and overwintering. Particular attention must be paid to the change in detection before and after the Project is carried out.
  - 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;
- changes to habitat quantity or quality due to changes to the aquatic flow regime and sediment load;
- changes in mortality risk, including as a result of increased access by hunters to the Project area due to new roads and access corridors, including poaching, collisions of migratory and non-migratory birds with flaring gas, lit structures or their vertical supports, vehicles or equipment, transmission and distribution lines, and any other project infrastructure, and as a result of indirect effects such as an increase in the ease of movement of predators;
- effects to bird health or changes in mortality resulting from the deposit of harmful substances, including accidental spills, in waters that are frequented by migratory birds and changes to the atmospheric, acoustic, and visual environment. Consideration must be given to the direct effects of contaminants and bioaccumulation of contaminants on resident and migratory birds, and bird species at risk, including those that may be consumed by Indigenous peoples; and
- effects related to contact of migratory birds and bird species at risk with wastewater ponds, stormwater ponds, or other ponds containing process liquids or substances harmful to birds; and any project activities that may occur during critical periods and/or restricted activity periods for migratory and non-migratory bird species, including species at risk;

- analyze the predicted effects of the Project to identified migratory and non-migratory birds, plus each species at risk and priority BCR species.

- describe potential adverse and positive effects of the project on bird species noted as important to Indigenous groups and local communities, such as effects resulting from changes to important habitat areas, including grouse, ducks, and geese, and their eggs and nests that are not currently listed under the Species at Risk Act or provincial statutes. This must include a discussion of the availability of species for traditional use, considering potential habitat loss, habitat avoidance, increased mortality (e.g. due to vehicle collisions, increased non-Indigenous hunting pressure), and other project-related effects (see also AB TOR section 3.7.2; Annex I);

- describe concerns and issues expressed by Indigenous communities and the actions taken to address those concerns and issues, including how Indigenous community input was incorporated into the Project design, effects assessment, mitigation, monitoring, and reclamation plan. Discuss how issues, concerns, or traditional ecological knowledge from Indigenous communities were used in the significance determination of potential impacts of the proposed Project to migratory and non-migratory birds, including species at risk.

- take into account the tolerance thresholds for potential adverse effects that Indigenous peoples have identified;

In describing activities that may result in direct, incidental and cumulative positive and/or adverse effects to migratory birds and non-migratory birds, the Proponent must describe the amount, duration, frequency, and timing of disturbances. The Proponent should refer to the Government of Canada's guidance on this topic, including *Avoiding harm to migratory birds*.

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8.8.3. Mitigation and enhancement measures

The Impact Statement must:

- describe measures that will be implemented to mitigate any direct, incidental and cumulative adverse effects identified above to migratory birds and non-migratory birds, including species at risk, their eggs and nests, or through effects to their habitats;
  - include a description of measures applied during sensitive periods and in sensitive locations, such as avoiding lights at night during key migration periods and avoiding activities that cause excessive loud noises or vibrations during the breeding season;

- describe the deterrent systems that will be used to mitigate impacts on migratory and non-migratory birds due to for instance, attraction to wastewater and stormwater ponds, or other areas with open water on the Project site (see also section 3.7.2, AB TOR (Annex I)));
- describe the anticipated effectiveness of the measures proposed to mitigate effects to birds, including deterrents;
- describe measures to mitigate sensory disturbance and the functional habitat loss it may cause;
- describe technologies and approaches to minimize the impacts of stormwater and other ponds on migratory birds that maybe come into contact with process affected waters;
- describe measures for preventing the deposit of substances harmful to migratory birds in areas frequented by migratory birds;
- demonstrate how the Proponent considered the timing of vegetation removal and construction to be outside the main breeding season or other critical periods for birds; and
- provide a waterfowl protection plan which addresses how bird use of the Project area will be monitored consistently across the Project area and during project activities, including a description of how monitoring thresholds and exceedances of these thresholds will be managed.

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 periods 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.

8.9. Wildlife and their habitat

The Proponent should consult the additional guidance for requirements pertaining to wildlife provided in section 21.12 *Additional guidance for biophysical components*.

8.9.1. Baseline conditions

The Impact Statement must:

- describe and map the wildlife resources (amphibians, reptiles, terrestrial and aquatic mammals) within the study area that are likely to be directly or indirectly affected by the Project, including:
  - species listed in Schedule 1 of the federal *Species at Risk Act*. A preliminary list of species at risk likely to use the Project area is provided in section 21.12 *Additional guidance for biophysical components* under the heading *Species at Risk*. Each of these species must be discussed separately;
  - species listed as at risk, may be at risk and sensitive in the *General Status of Alberta Wild Species* or under any other applicable provincial legislation (see section 3.7.1 [A], AB TOR (Annex I));

- 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 (see section 3.7.1 [A], AB TOR (Annex I));
- species of importance to Indigenous peoples, notably pertaining to the practice of rights, considering traditional knowledge (see section 3.7.1 [A], AB TOR (Annex I)); and
- species of other ecological, economic or human importance.

- for these species, describe and map as appropriate (see also section 3.7.1, AB TOR (Annex I)):
  - species composition, abundance (including relative abundance in each habitat type), population status, distribution (including across survey sites), general life history;
  - the location and quantity of habitat, including residences, seasonal movements and ranges, movement and migration corridors, habitat features, requirements, key habitat areas, and species use and potential use of habitats;
  - their regional importance, including ecological, economic, and human importance (e.g. traditional use, wetlands, etc.);
  - sensitive periods (e.g. seasonal, diurnal and nocturnal) and sensitive locations, including critical timing windows (e.g. denning, rutting, spawning, calving, breeding, roosting), setback distances from sensitive areas, or other restrictions related to wildlife species and species at risk;
  - a map showing the highest concentrations or areas of use by species; and
  - locations of identified or proposed critical habitat and/or recovery
  - habitat and ranges for species at risk, with information and locations differentiated between federal and non-federal lands;
- identify the metrics and biotic and abiotic indicators that are used to characterize the baseline conditions (e.g. population size, recruitment rates, etc.) and discuss the rationale for their selection;
- describe the use of each wildlife species as a source of country foods (traditional foods) and whether its consumption and use has Indigenous cultural importance, including for medicinal purposes;
- describe the use and harvesting of fur-bearing species and whether its harvesting has Indigenous cultural or economic importance;
- describe concerns and issues expressed by Indigenous communities and the actions taken to address those concerns and issues, including how Indigenous community input was incorporated into the Project design, effects assessment, mitigation, monitoring and reclamation plan. Discuss how issues, concerns or traditional ecological knowledge from Indigenous communities were used in the significance determination of potential impacts of the proposed Project to wildlife and wildlife habitat and key indicators.
- take into account the species identified as being of importance or sensitive from an ecological, economic or human perspective, which may include, among others, insects and arthropods (e.g. the reference conditions of certain insect larvae in aquatic environments can serve as relevant indicators for the subsequent development of a biodiversity monitoring program);
- describe and quantify wildlife habitat, including function, location, suitability, structure, diversity, relative use, natural inter-annual and seasonal variability, and abundance (see also sections 3.7.1 and 3.8.1, AB TOR (Annex I));
- describe the levels of disturbance currently affecting wildlife and wildlife habitat, such as habitat fragmentation and the extent of human access and use;

- describe the natural disturbance regimes and their sources in the LSA and RSA, including context on how past projects and activities have affected those regimes (e.g. fire, floods, droughts, diseases, insects and other pests, etc.) (see also section 2.8 [B], AB TOR (Annex I));

- list and depict on a map wildlife management areas and established or proposed sanctuaries; and
- provide the information required in section 3.8.1 [A] of the AB TOR (Annex I) for terrestrial and aquatic biodiversity to inform characterization of the existing ecosystem, impacts, and assessment of the proposed reclaimed landscape. Identify biodiversity metrics used to characterize the baseline biodiversity for terrestrial wildlife and discuss the rationale for their selection.

The Proponent should consult the Species at Risk Public Registry to obtain information on the list of species at risk and their protection status, and available recovery documents. Information on species and habitat attributes, threats, population and distribution objectives, critical habitat, and residences must be considered and incorporated in the Impact Statement. The Impact Statement must specify the references 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 current.

8.9.2. Effects to wildlife and their habitat

The Impact Statement must:

- describe the potential direct and incidental, positive or negative effects of the Project during all phases to wildlife and species at risk and their habitat and critical habitat (including its extent, availability and presence of biophysical attributes), and wetlands including:
  - population level effects, including relative abundance, distribution, and mortality rates (see also section 3.7.2, AB TOR (Annex I)) that could be caused by project effects, particularly in the vicinity of wetland, lake and riparian habitats and on migratory corridors;
  - effects to migration, movement, habitat usage patterns, wildlife behaviour, including potential displacement of wildlife species and species at risk;
  - the potential destruction of residences of species of risk;
  - the surface area, biophysical attributes, and location of habitat, including critical habitat that may be affected;
  - effects associated with habitat and vegetation removal such as loss and fragmentation of forest cover and other habitat types, including effects to habitat quantity, diversity, spatial and temporal habitat availability, and habitat effectiveness (i.e. types, quality, and distribution) considering edge effects, particularly mixedwood forest habitat, riparian areas, wetland (e.g. marsh) areas, and sensitive habitat locations (see also AB TOR section 3.7.2, Annex I);
  - effects to species should project activities occur during critical timing windows or during other sensitive periods; and
  - effects that may result from:
    - introduction and intrusion of invasive species;
    - altered predator-prey relationships, such as increased wildlife predation;
    - increased access by hunters to the Project area due to new roads and access corridors, including poaching; and
    - noise, artificial light, and vibrations;

- provide an evaluation of the effects of the Project, including any new road access, pipeline, powerline, water supply line or other rights of way, on wildlife and species at risk mortality risk and movement patterns;
- describe the potential for an increase in the spread and prevalence of disease as a result of project activities, including for species at risk;
- describe the potential direct effects to wildlife and species at risk, including acute and chronic effects to wildlife health, of changes to air and water quality and/or contaminants, including effluents, atmospheric emissions and dust deposition, and bioaccumulation of contaminants in wildlife (see also section 3.7.2, AB TOR (Annex I));
- describe potential adverse and positive effects of the Project on species noted as important to Indigenous groups and local communities, including for the current use of lands and resources for traditional purposes by Indigenous peoples, such as effects resulting from changes to important habitat areas, that are not currently listed under the *Species at Risk Act* or provincial statutes. This must include a discussion of the availability of species for traditional use, considering potential habitat loss, habitat avoidance, increased wildlife mortality (e.g. due to vehicle collisions, increased non-Indigenous hunting pressure, etc.), and other project-related effects (see also section 3.7.2, AB TOR (Annex I));
- take into account the tolerance thresholds for potential adverse effects that Indigenous peoples have identified;
- describe and assess the resilience and recovery capabilities of wildlife populations and habitats to disturbance, including the anticipated potential for the Project area to be returned to its existing state with respect to wildlife populations and their habitat following operations (see also section 3.7.2, AB TOR (Annex I));
- identify provincial, territorial or federal permits or authorizations that may be required in relation to species at risk and describe discussions with the appropriate authority regarding these permits or authorizations; and
- describe effects to wildlife biodiversity, considering biodiversity metrics and the biotic and abiotic indicators selected, including changes to regional biodiversity and local and regional ecosystems (see also section 3.8.2, AB TOR (Annex I)).

Resources from the Government of Alberta should be considered as a source of information on appropriate methodologies for predicting effects on wildlife and vegetation (see section 21.2 *Sources of baseline information*).

8.9.3. Mitigation and enhancement measures

The Impact Statement must describe the measures for mitigating potential effects on wildlife and species at risk and their habitat, including:

- describe measures that will be implemented to avoid or lessen potential adverse effects to wildlife and species at risk and their habitat, including critical habitat. Include a description of the effectiveness of each measure in avoiding negative effects;The anticipated effectiveness of mitigation measures, including deterrent systems, must be supported with scientific evidence or tested through study and monitoring within the Project area as the project proceeds.;
- justify how the Project and mitigation measures are consistent with any applicable recovery strategies, action plans, or management plans for species at risk based on scientific data;

- 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;
- take into account species of interest to Indigenous peoples in the identification of mitigation measures for potential effects on species and ecological communities (see also section 3.7.1 [A,], AB TOR (Annex 1));
    - take into account species of interest to Indigenous peoples in the identification of mitigation measures for potential effects on species and ecological communities. Provide evidence of mitigation effectiveness corresponding to the identified issues and concerns from Indigenous communities.
-
- describe the deterrent systems that will be used to mitigate impacts to wildlife and species at risk due to, for instance, attraction to the Project site and/or components and activities associated with the Project (see also section 3.7.2, AB TOR (Annex I));
- describe and explain when and how temporary construction areas will be restored or maintained following construction, and explain the mitigation measures considered including possible revegetation, obstruction of the sightline, restoration of wildlife and species at risk 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 Project area and new access roads to access areas that were previously difficult to reach, including by wildlife and species at risk predators, hunters, off-roading recreationalists, and other users;
- describe measures to prevent the release of harmful substances into waters or areas frequented or occupied by wildlife or species at risk;
- provide details of any compensation or offsetting plans proposed following guidance in section 21.10 *Compensation and offset plans* and available guidance documents, if effects cannot be otherwise avoided or mitigated; and
- describe how baseline biodiversity metrics are considered in the reclamation plan.

8.10. Climate change

8.10.1. Baseline

Refer to the requirements provided under *Baseline conditions* in sections 8.1 *Meteorological environment* and 8.4 *Atmospheric, acoustic, and visual environment* .

8.10.2. Effects to climate change

The following requirements are based on the Strategic Assessment of Climate Change (SACC[14]) document developed by ECCC. The SACC provides guidance on climate change information requirements

14 Strategic Assessment of Climate Change. October 2020 version available at:

https://www.canada.ca/en/services/environment/conservation/assessments/strategic-assessments/climate-change.html

throughout the impact assessment process. For more details the Proponent should refer to future technical guidance on the SACC developed by ECCC.

The Impact Statement must:

- provide annual estimates of net GHG emissions for each phase of the Project based on the Project's additional throughput or capacity (refer to section 3.1.1 of the SACC).
  - Include a description of each of the Project's main GHG emission sources and their estimated annual GHG emissions over the lifetime of the project;
- provide each term of Equation 115 per year for each phase of the Project (refer to section 3.1.1 of the SACC);
- provide methodology, data, emission factors and assumptions used to quantify each element of the net GHG emissions, including for avoided emissions (refer to section 3.1.1 of the SACC);
- provide emission intensity (Equation 216) for each year of the operation phase of the Project (refer to section 3.1.2 of the SACC);
- provide the quantity and a description of the "units produced" (barrels of diluted bitumen upgraded or other as appropriate) used in Equation 2 for each year of the operation phase of the Project (refer to section 3.1.2 of the SACC);
- provide a discussion on the development of emissions estimates and uncertainty assessment (refer to section 3.3 of the SACC);
- provide a discussion on the level of uncertainty associated with GHG sources and emission factors, and how these uncertainties would affect the degree of confidence in the assessment outcome;
- describe large sources of GHG emissions that may be the consequence of accidents or malfunctions.
- provide a qualitative and quantitative description of the Project's positive or negative impact on carbon sinks. The proponent can refer to the upcoming draft technical guide for information on quantifying impacts on carbon sinks. This information must include:
  - a description of project activities in relation to significant landscape features such as topography, hydrology and regionally dominant ecosystems;
  - quantification and types of 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, including immediate emissions, delayed emissions (timeframe), and storage (e.g. in wood products); and
  - ~~anticipated land cover on~~ the impacted land areas after the Project is in place.

[15] Equation 1: Net GHG emissions = Direct GHG emissions + Acquired energy GHG emissions - CO_2 captured and stored - Avoided domestic GHG emissions - Offset credits

[16] Equation 2: Emission intensity = Net GHG emissions / Units produced

In terms of upstream GHG emissions assessment, the Proponent must provide an assessment of the upstream GHG emissions of the Project, as described in Section 3.2 of the SACC. Additional guidance can also be found in the upcoming draft technical guide. The assessment includes the following components:

- Part A: the upstream assessment should quantify the range of GHG emissions released as a result of upstream activities associated with the project:
  - aggregate GHG emissions into MT CO2e per year;
  - calculate the estimate of upstream GHG emissions over the duration of the operational lifetime of the Project, on an annual basis;
  - base GHG emissions on the maximum additional capacity that the Project could produce;
  - include all process upstream of the Project in the estimate of the upstream GHG emissions, including production, processing and transport of the Project's diluted bitumen supply, including emissions related to the production of diluents, if any;
  - use recent, verifiable emission intensities that are pertinent to the region and provide a rationale for selecting those emission intensities; and
  - state and justify all assumptions for the estimate.
- Part B: the second part of the upstream assessment should discuss the conditions under which the Canadian upstream GHG emissions estimated in Part A could be expected to occur even if the Project were not built:
  - draw on technical and economic information to assess upstream bitumen production for various market and infrastructure assumptions;
  - explore the potential impact of upstream GHG emissions associated with the Project on overall Canadian GHG emissions and how incremental bitumen production could affect global GHG emissions;
  - include an examination of scenarios comparing various outcomes that depend on whether the Project is built. For example, compare the upstream production outcomes in a scenario in which the Project is not built to at least one scenario where the Project is built; and
  - Consider the relationship between production and domestic GHG emissions including how proposed and existing GHG policies could influence upstream GHG emissions intensity over time. For global GHG emissions impacts, the impact of incremental Canadian upstream production would be some combination of displacing production and associated GHG emissions from elsewhere and increasing the total quantity of production supplied.

With regard to federal emissions reduction efforts and on global GHG emissions, the Impact Statement must provide:

- an explanation of how the Project may impact Canada's efforts to reduce GHG emissions, if applicable, including how the project could result in GHG emission reductions in Canada(e.g. by replacing higher emitting activities) (section 5.1.3 of the SACC);
- a discussion on how the Project could impact global GHG emissions, if applicable (section 5.1.3 of the SACC). This could include, for example,

- if there is a risk of carbon leakage if the Project is not built in Canada, the Impact Statement could include an explanation of the likelihood and possible magnitude of carbon leakage if the Project is not approved; and
- if the Project may displace emissions internationally, the Impact Statement could describe how the Project is likely to result in global emission reductions. For example, a project that enables the displacement of high-emitting energy abroad with lower emitting energy produced in Canada could be considered as having a positive impact.

Additional information is available at www.strategicassessmentclimatechange.ca.

8.10.3. Mitigation and enhancement measures

The Impact Statement must, include a credible plan that describes the mitigation measures in section 5.1.4 of the SACC that will be taken to minimize GHG emissions throughout all phases of the Project and achieve net-zero emissions by 2050 (Section 5.3 of the SACC). The plan must demonstrate how the net GHG emission equation (refer to Equation 1 in the SACC) will equal 0 kt CO2 eq/year by 2050 and thereafter for the remainder of the lifetime of the project. Emphasis should be placed on minimizing net GHG emissions as early as possible. The credible plan must include at a minimum the following information:

- the conclusions of the Best Available Technologies and Best Environmental Practices (BAT/BEP) Determination process to identify and select the technically and economically feasible technologies, techniques, or practices, including emerging technologies, to minimize GHG emissions throughout all phases of the Project. This must include:
  - the list of selected technologies and practices and rationale that would support the conclusions of the BAT/BEP determination process;
  - the potential reduction in GHG emissions associated with each selected technologies/practices over the Project's lifetime;
  - the emerging technologies with their respective technology readiness level that could be considered for future implementation to further reduce GHG emissions, as well as the planning process, timing and circumstances for that consideration. This could include a discussion on technical challenges, risks, infrastructure requirements and any other relevant considerations, and how the Proponent could overcome them; and
  - subject to the public availability of information, include a comparison of the Project's projected GHG emission intensity to the emission intensity of similar high-performing, energy-efficient project types in Canada and internationally. If applicable, the comparison should explain why the emission intensity of the Project is different.
- any additional mitigation measures and offset credits that will be taken to mitigate remaining GHG emissions and achieve net-zero by 2050. This can include an explanation of the impact of the actions the company will take to achieve net-zero emissions on Canada's net-zero goal, and related avoided emissions assigned to the Project. This explanation can refer to the Pproponent's corporate net-zero emission plan, if applicable;

- the implementation schedule of the mitigation measures identified, describing when the technologies or practices and other mitigation measures will be implemented and considering equipment replacement. It does not need to describe every technology or practice the Project will implement over time to achieve net-zero emissions. The Proponent must describe the process they will follow in order to make the decisions and investment needed to achieve net-zero emission by 2050;
- the emissions reductions at specified intervals, every five years or as determined by the Proponent as appropriate for the Project, up to 2050. Explain how net GHG emissions reductions are maximized in the earlier years of the Project's lifespan;
- a description of measures taken to mitigate the Project's impact on carbon sinks, including measures to restore disturbed carbon sinks; and
- any other relevant information such as supportive actions that the Proponent would need in order to be able to achieve net-zero emissions.

ECCC is developing additional guidance related to the SACC.

9. Human health conditions

9.1. Baseline conditions

Baseline information is required on existing human health conditions to prepare the community health profiles. This information must include the current state of physical, mental and social well-being and incorporate a determinants of health approach to move beyond biophysical health considerations. Additional guidance is provided in section 21 *Appendix 2 – Additional guidance* under the *Human health baseline* heading. The Proponent must justify any omission or deviation from the recommended baseline characterization approaches and methods, including the guidelines from Health Canada.

The Impact Statement must:

- provide information that is sufficiently detailed to describe the pathways by which the Project's influence on the determinants of health may affect health outcomes. This will help understand how these determinants have been taken into account and why certain indicators or information are presented when analyzing expected effects;
- identify each community (indigenous and non-indigenous) which may be affected by project related activities.
- identify baseline health condition for historical and current prevalence, incidence and trends for physical, mental and social determinants in Indigenous and non-indigenous sub-groups in the Wood Buffalo Health Region and Alberta by:
- identifying data sources
- provincial (including regional) health statistics reports and data
- Indigenous community knowledge
- providing a summary of identified data;
- proposing methods for statistical analysis of available data
- identifying uncertainties and limitations of proposed methods and available data

- where possible, identify increased or decreased prevalence, incidence and trends for physical, mental and social determinants in Indigenous peoples which are correlated with historical and/ or oil sands sector development in the Wood Buffalo Region.
- identify any vulnerable groups or susceptable populations in the local and regional study areas;
-
- provide a comparison of data at the provincial, regional or national level, if possible, to better interpret baseline health and social conditions; and
- identify the social area of influence of the Project.

To understand the context and to develop the baseline health profiles of local and Indigenous communities, the Proponent must:

- develop community health profiles that reflect the overall health of each community, including birth rates, death rates, sexually transmitted infections, injuries, chronic disease rates, mental health status and other community-relevant health information. Profiles must:

- describe baseline health conditions and existing health inequalities using disaggregated data include information on health VCs corresponding to health behaviours and human biology; and
- use, where known, secondary information sources (e.g. Public Health Agency of Canada, Statistics Canada, provincial health authorities);

- 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 and intergenerational trauma;
- describe the determinants of health selected specifically for Indigenous communities, including for subgroups within them (e.g. Indigenous women);
- 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);
- provide the approximate location and distance on a map of likely human receptors, including foreseeable future receptors, which could be affected by changes in air, water, country food quality, and noise and light levels. Include communities' gathering, hunting, trapping and fishing areas, including for Indigenous peoples, permanent residences, temporary residences (e.g. Indigenous cottages and camps identified in collaboration with Indigenous peoples) and sensitive receptors (e.g. schools, hospitals, community centres, retirement complexes, health care centres, Elk Island Nation Park) near the Project;
- describe and characterize the existing health services and programs, including health care provider capacity;
- describe drinking water sources, both surface or groundwater (permanent, seasonal, periodic or temporary), including approximate catchment areas at wellheads and their distance from project activities (see also the section on groundwater and surface water);
- describe the location of drinking water treatment facilities, including their distance from project activities;
- provide baseline concentrations of contaminants in ambient air, drinking water and tissues of country foods (traditional foods) consumed by Indigenous peoples and local communities. For game, the Proponent should work with local Indigenous peoples to collect tissue samples where appropriate;
    - propose indicators of traditional food and water use and security, which are measurable and actionable, and will be assessed;
-
- describe the consumption of country foods (traditional foods) as a health-related behaviour, including what species are used, quantities, frequency, harvesting locations and how the data were collected (e.g. site-specific consumption surveys, community-led assessments on impacts to treaty and harvesting rights);
- describe the level of food security and food sovereignty within local and Indigenous communities. Refer to the Public Health Agency of Canada's website on food security for more information;
- 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; and

- identify and describe the baseline information for social determinants of health that may be relevant to the Project, including social and economic conditions as outlined in sections 10 and 11 respectively.

9.2. Effects to human health

The Proponent must assess the adverse and positive effects of the Project on human health. Interconnections between human health determinants (e.g. between behavioural factors such as healthy eating and biological factors such as chronic stress or exposure to contaminants) and other VCs must be described, and the interactions between effects, especially when the Proponent foresees a potential indirect effect.This section needs to incorporate Indigenous understandings of what "health" comprises, not focus solely on the medical approach. That requires an appreciation of different world views about health

Applying a determinants of health approach in the assessment of human health effects is recommended to support the identification of linkages and effect pathways between VCs and of disproportionate effects across subgroups.

A dedicated Health Impact Assessment, supported by a Human Health Risk Assessment (HHRA[17]), should show an understanding of the Project's health and social impacts on Indigenous peoples and will play a role in understanding the Project's impacts on rights and culture.

The Impact Statement must:

- present data separately for each Indigenous group, and should be broken down by community;
- describe any potential project-related effects on the community health profile (e.g. changes in existing community activities) and the availability of health-related resources; and
- indicate the potential health effects, short-term or long-term, resulting from changes on biophysical and social determinants of health during the construction phase, and determine whether those effects would change again during the operation phase, at closure, and during reclamation;
- describe how community and Indigenous knowledge was used in assessing human health effects; and
- apply GBA+ across all health effects and document how potential effects or changes to human health conditions could be different for diverse subgroups, including Indigenous peoples or other community relevant subgroups (e.g. women, youth, elders).

9.2.1. Biophysical determinants of health

With regard to the biophysical determinants of health, the Impact Statement must:

- provide an assessment of adverse and positive effects on human health taking into consideration potential changes(see also section 6.1, AB TOR (Annex I)) in:
  - air quality;

17 HHRA: assessment of the effects on the health of persons exposed to biophysical stressors, particularly increased concentrations of chemical substances present in the environment and linked to various phases of a project (construction, operation, decommissioning and post-abandonment, as the case may be).

- noise exposure and effects of vibration;
- quality of ecological receptors used by Indigenous peoples and public for;
- traditional foods,
- medicine,
- ceremonies (spiritual and cultural)
- indicators of health and well being
- recreation
-
- access to health services (i.e. increased demands on community services due to an influx of workers);
- light levels;
- current and future availability and access to (including contamination/quality) of country foods (traditional foods); and
- current and future availability and access to (including contamination/quality) of water for drinking, recreational and cultural uses, applying the strictest guideline values for the *Guidelines for Canadian Drinking Water Quality (GCDWQ)*;
  - identify any vulnerable groups or susceptable populations in the local and regional study areas, based on results of the baseline health condition assessment nd describe how this affected assessment methods and results.

- describe how contaminants (e.g. arsenic, cadmium, lead, mercury) related to the Project and that can potentially end up in water, air or soil can be absorbed in country foods (i.e. foods that are trapped, fished, hunted, harvested or grown for subsistence, cultural or medicinal purposes);
- identify all the potential routes of exposure to contaminants;
- provide a justification for every contaminant of potential concern (COPC[18]) or exposure route that would be excluded and/or eliminated from the assessment of the human health risks;
- apply a Human Health Impact Assessment approach, including consideration of Indigenous determinants of health;
- conduct an HHRA using best practices (see Health Canada, 2019. *Guidance for Assessing Human Health Impacts in Environmental Assessments: Human Health Risk Assessment*). Include consideration of synergistic and additive effects of various COPCs, and all exposure pathways for COPCs 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;
- describe and quantify, if possible, specific thresholds used for the health effects assessment and indicate if different thresholds have been considered for vulnerable populations, including thresholds based on sex and age. Provide a justification if any applicable threshold was not used;
- document and take into account tolerance thresholds for potential adverse effects on health identified by Indigenous peoples;
- in situations where project-related air, water, 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 are to be addressed;
- 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:

[18] COPC: Any chemical substance for which the concentration in an environmental medium is likely to be high due to the Project's activities may first be considered as a COPC. However, if it is established that the sum of the modelled concentrations and the background concentrations is below the guidelines, standards or criteria - based on health protection - for the affected area, the statement of the problem stage of the risk assessment may conclude that it is unnecessary to treat this chemical substance as a COPC in a quantitative risk assessment.

- 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 includes three different elements to ensure transparency:
  - identification 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;
  - acknowledgement that diesel emissions have been labelled a human carcinogen by international authorities such as Health Canada, WHO's International Agency for Research on Cancer, the U.S. Environmental Protection Agency 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;

- describe 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;
- identify possibilities of avoidance of certain country food (traditional food) sources or drinking or recreational water sources by the Indigenous peoples due to the perception of contamination;
- describe and quantify potential effects to mental and social well-being (e.g. stress, depression, anxiety, sense of safety);
- describe any project-related changes that could result in a positive health effect (e.g. remediation projects); and
- assess any resultant effects of air quality changes or deposition of air contaminants on land or waterbodies to human health.

9.2.2. Social determinants of health

With respect to the determinants of health other than biophysical ones, the Impact Statement must:

- consider the negative and positive health effects (i.e. general well-being) arising from the effects on social and economic VCs, and their respective indicators, reflecting the input of the affected communities; and
- identify and describe the impacts to social determinants of health that may be relevant to the Project.

Consider any effects to social conditions, including services and infrastructure, land and resource use, navigation, and community well-being.

The Proponent should refer to the Agency guidance on *Analyzing Health, Social and Economic Effects under the Impact Assessment Act*.

9.3. Mitigation and enhancement measures

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

- describe the mitigation and enhancement measures proposed separately for non-Indigenous and Indigenous peoples and for each Indigenous community;
- 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 any project-related change that could lead to positive health effects (e.g. resulting from improved economic opportunities or increased access to services);
- 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; and
- identify mitigation and enhancement measures presented in other sections that are also applicable to health and well-being effects.

The Proponent is encouraged to 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*.

10. Social conditions

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

In preparing a baseline for the social context, the Proponent must identify the social area of influence of the Project and prepare a community profile.

The information provided must:

- describe the demographic information for the region, including descriptive statistics (age, ethnicity, sex and gender, language); and
- provide a comparison of data at the provincial, regional or national level, if possible, to better interpret baseline health and 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 adverse and positive effects of the Project on social conditions. Interconnections between social VCs and other VCs and interactions between effects must be described. The degree of confidence must be discussed in the analyses.

In consideration of effects, the Impact Statement must document and take into account tolerance thresholds for potential adverse effects identified by Indigenous groups.

10.1. Services and infrastructure

10.1.1. Baseline conditions

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

- capacity (currently available or planned) of institutions to deliver public services and infrastructure;
- water supplies,water lots, and water sources and intakes for agricultural operations, industries, residents and municipalities;
- accommodation and lodging (e.g. affordability, availability, suitability, home value, home ownership), including camping facilities;
- availability of green space, recreation and parks;
- educational services, facilities and daycare;
- elder care and services;
- **existing health services and programs, including health providers'** capacity;
- emergency services;
- social services; and
- all other potentially affected services.

10.1.2. Effects to services and infrastructure

The Impact Statement must:

- describe the predicted effects to the local and regional infrastructure facilities and services, including access to these infrastructure and services, in the study area, including adverse and positive effects to:
  - accommodation and lodging (e.g. affordability, availability, appropriateness, home value and home ownership), including camping facilities;
  - access to green space, recreation and parks;

- road infrastructure and traffic safety;
- emergency, health and social services, including the increased use of health services and related social services in the relevant communities;
- educational services, facilities and day care; and
- utilities; and

- describe any need for government and/or proponent expenditures for new or expanded services, facilities or infrastructure, arising out of project-related effects.

10.2. Land and resource use

10.2.1. Baseline conditions

The Impact Statement must describe baseline conditions for land and resource use, including:

- the general patterns of human occupancy and resource use based on the spatial and temporal boundaries selected (include maps where available), including seasonal cabins;
- sites or areas that are used by local populations and Indigenous peoples either for permanent residences or on a seasonal or temporary basis and the number of people who use each site or area identified (include a map, where possible), including any potentially impacted transportation routes;
- identify and take into account relevant local, regional, or provincial land use or resource development plans;
- general information about local populations and diverse subgroups (e.g. women, gender-diverse people, youth, elders, people with disabilities) and their roles and responsibilities in the communities; and
- parks and recreational use areas, including fishing areas.

10.2.2. Effects to land and resource use

The Impact Statement must:

- describe the potential interactions of the Project with local and regional land use and resource use activities (see also section 3.6.2, AB TOR (Annex I)), including adverse and positive effects to:
  - residential land use;
  - water supplies, water lots, and water sources and intakes for agricultural operations, industries, residents and municipalities; and
  - other land uses;
- describe predicted effects to recreation (e.g. hunting, fishing, hiking, wildlife viewing, aesthetic enjoyment) by the community and Indigenous groups (see also section 3.6.2 [E], AB TOR (Annex I)), including effects to:

- access to, and quality and quantity of resources, including terrestrial, riparian, and wetland areas (see also section 3.6.2, AB TOR (Annex I)); and
- overall experience when undertaking recreational activities, including effects of noise, viewscapes and artificial light;

- describe the land use losses associated with the security buffer zones applicable to the Project;
- describe how potential avoidance of land near project components by Indigenous peoples due to perceived changes in environmental quality and tranquillity was considered in assessing potential effects to Indigenous groups (including on diet and health);
- describe how changes to or loss of wetlands and other waterbodies may affect land use, including use by Indigenous groups (see also section 3.6.2, AB TOR (Annex I)); and
- identify predicted effects of the Project on the quality and quantity of surface water and implications for recreational uses.

10.3. Navigation

10.3.1. Baseline conditions

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

- identify and describe existing navigable waterways and all their uses;
- provide a list of potentially affected waterway users, including Indigenous groups, and existing concerns regarding waterway use and access;
- provide information on existing water intake infrastructure to be used including, location, construction date, project methodology, Navigation Protection Program/Transport Canada file number;
- provide information on existing approvals and structures within the regional study area; and
- include information pertaining to the North Saskatchewan River (see also sections **Error! Reference source not found.** and **Error! Reference source not found.** as they relate to navigation).

10.3.2. Effects to navigation

The Impact Statement must:

- describe ancillary project components that will be constructed in, on, under, over, through or across navigable waterways to support the Project;
- describe how potentially affected waterway users have been consulted, including Indigenous groups, regarding navigational use and the issues that were raised and how they were addressed;
- describe project effects to navigation and navigation safety from project components and activities, including potential effects from changes to water levels and flow in the North Saskatchewan River; and
- consider available Indigenous navigational indices or thresholds for affected waterways.

10.4. Community well-being

10.4.1. Baseline conditions

To understand the community context, the Impact Statement must describe:

- 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 ethnicity- and gender-based violence, etc.), including indicators proposed by Indigenous groups;
- access, ownership and use of resources (e.g. land tenure, food, water, social infrastructure);
- food security, access to country foods (traditional foods) and baseline perceived quality;
- community cohesion, including factors such as community or neighbourhood engagement, support, and social networks and other social activities;
- the psychosocial environment and its influence on community well-being;
- factors supporting mental health and community well-being (including perceived stress, feelings of isolation, of remoteness, of concern for future generations, and other factors that have been identified in the wake of youth suicide in rural and remote communities);
- the socio-cultural environment, identifying Indigenous peoples and predominant cultural communities;
- demographic characteristics and major socio-cultural concerns of the population;
- safety of Indigenous and non-Indigenous women and girls, identified LGBTQ and two-spirited people;
- relevant historical community background and historical recognition of rights and ability to express themselves as collective indigenous identity; and
- community leadership and governance structure.

10.4.2. Effects on 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 in the section "*Social determinants of health*";
- describe the effects of in-and out-migration and the influx of transient workers or temporary work camps, including changes in social and cultural make-up of affected communities, changes in populations, and the potential for increased risks to local communities (e.g. greater spread of sexually transmitted infections, harassment, racism, and ethnicity- and gender-based violence) and vulnerable groups who may be disproportionately affected by these risks;
- describe, at the community level, the expected interactions between the Project's construction, operation and maintenance workforce and local communities, businesses and residents;
- identify whether social divisions might be intensified as a result of a project;
- evaluate potential social effects associated with increased disposable income, including potential cost-of-living effects, adverse and positive lifestyle changes, distribution of benefits among affected people;

- describe impacts to mental health and community well-being (including perceived stress, feelings of isolation, of remoteness, of concern for future generations, and other factors that have been identified in the wake of youth suicide in rural and remote communities);
- describe any changes to safety of Indigenous and non-Indigenous women and girls, identified LGBTQ and two-spirited people;
- describe effects on food security, access to country foods (traditional foods) and baseline perceived quality;
- describe any anticipated effects to language;
- describe any emotional or stress factor that may result from the Project including disturbance of normal daily activities (e.g. changes to viewscapes, noise, traffic) and concerns regarding public safety;
- consider the potential for stresses on community, family and household cohesion, alcohol and substance abuse, or illegal or other potentially disruptive activities;
- identify and consider the barriers that impede taking advantage of the positive effects on social conditions and how they are accentuated across diverse subgroups;
- identify changes to, or interaction with, community leadership and governance structure; 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. This is particularly important in the case of information gathered and studies conducted with vulnerable subgroups (e.g. analysis of gender-based violence).

10.5. Mitigation and enhancement measures

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

- explore and discuss opportunities by which benefits to local communities can be enhanced, such as improving infrastructure;
- describe the goals of local or regional land use plans or local or regional development plans where applicable mitigation or enhancement measures are proposed and the extent to which the Project is aligned with such plans to avoid or enhance social effects;
- 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 how tolerance thresholds for potential adverse effects identified by Indigenous groups were considered;

- describe how the GBA+ results on disproportionate effects have been used to inform mitigation and enhancement measures, including measures to prevent sexual harassment and gender-based violence;
- identify measures that will be implemented to prevent sexual harassment and violence in the workplace, such as programs to support the safety and security of people and codes of conduct; and
- describe any plans for cultural sensitivity or awareness training for non-Indigenous employees to promote a safe work environment that supports the well-being of Indigenous employees.

11. Economic conditions

11.1. Baseline conditions

The economic baseline must document the local and regional economic conditions and trends based on the spatial and temporal boundaries selected.

The Impact Statement must:

- describe the main economic activities in the study area;
- provide an overview of current labour market statistics, including jobs likely to be in demand over the life of the Project;
- describe the workforce, including the availability of skilled and unskilled workers, education level, existing working conditions, wages and average salary range, full-time and part-time employment and training, and gender gaps such as for skilled trades in wages and qualifications. If the labour force is anticipated to draw beyond the regional labour force, describe this information as well;
- describe the demographic features of the local and regional population and any prevalent economic concerns and economic aspirations of residents, families and workers in the study area, and for each Indigenous group;
- describe changes in socio-economic conditions and trends for the population as a result of oil sands development, including Indigenous community-level changes (e.g. subsistence lifestyle to a wage-based economy, population growth);
- provide an overview of the existing employment rates and economic well-being in the study area and impacted communities including average income and wage inequality;
- describe the current use of land and water bodies in the study area, including a description of hunting, trapping, outdoor recreation, use of seasonal cabins, and institutions. Consider baseline(s) described under social conditions, as it relates to economic conditions;
- describe any Indigenous and non-Indigenous commercial fisheries and their fishing areas, including species fished (along with catch rates and fishing days), number of licences, value of fisheries and breakdown between domestic vs. international fisheries, where applicable;
- identify industrial and commercial sectors;

- identify monitored or administered forest areas (including forests under agreement and areas designated for timber sales); and
- identify registered or recognized hunting, trapping or guiding areas.

11.2. Effects to economic conditions

Within the context of the predicted changes to the biophysical environment, and health and social conditions, the Proponent must assess the adverse and positive effects of the Project on the economic VCs and the distribution of any adverse or positive effects. The assessment of economic effects should take into consideration the temporal scale for construction, operation and beyond, to assess the potential for, and avoidance of, boom-and-bust cycles potentially associated with the Project.

11.2.1. 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, including opportunities; and
- describe local and regional workforce development and training plans including those specific for Indigenous peoples.

11.2.2. Employment

The Impact Statement must:

- describe the potential changes in employment including:
  - an estimate of the number of workers affected at each phase of the Project. A clear distinction must be made between creation of new jobs and transfer or extension of jobs from the existing Value Chain Solutions – Heartland Project 1 due to the Project;
  - a description of the employment resulting from the Project in each phase and the Project requirements in terms of skilled and unskilled labour;
  - an estimate of the availability of local workers to occupy these jobs, including by women, men, diverse subgroups of people, and Indigenous peoples;
  - an analysis of the potential for labour shortages in certain sectors within communities affected by the Project; and
  - if applicable, a description of the plans and the justification for hiring temporary workers to make up for the shortage of labour and skills;
- a description of the situations where the Project may 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 in terms of long term careers and quality employment (e.g. full time versus precarious part time, temporary or permanent, skilled or unskilled) for the life of the Project;
- analyze the potential for increasing employment for women and other subgroups and local workers more generally;
- provide an estimate of the anticipated levels of economic 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;
- describe the Project's diversity and inclusion workforce plans, policies and practices including gender-neutral signage and appropriate safety equipment and apparel;
- a description of the impact to employment;
- estimate of government revenues, including federal and provincial tax payments; and
- describe the assumptions and methodologies used to derive estimates of economic benefits, including price forecasts for oil and products of bitumen upgrading.

11.2.3. 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 including procurement contracts;
- provide construction procurement and contract values;
- describe how the Proponent anticipates it 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;
- describe plans to encourage procurement and contracting opportunities for Indigenous peoples and communities, including underrepresented groups;
- summarize business commitments made, if the Proponent has prepared an economic benefits plan or has entered into specific cooperation agreements with communities or Indigenous peoples;
- provide an estimate of the anticipated levels of local and regional economic participation in the Project in comparison to the total project requirements (e.g. total dollar value of contracts), as well as for Indigenous peoples; and
- describe situations when the Project may directly or indirectly create economic hardships or the displacement of businesses.

11.2.4. Economics

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; provide the estimated total project cost and indicate the percentage of expenditures expected to occur in the region, Alberta, Canada outside of Alberta, and outside of Canada;
- describe any new technology, process or other intellectual property that will be developed as part of this Project, and their potential economic benefits;
- 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 would result if the Project is allowed to proceed;
- describe the potential effects of changes to economic conditions in affected communities, including Indigenous communities, for example, to:
  - forestry and logging operations, including the recovery of wood cut during the construction phase;
  - the loss of hunting, fishing, trapping, and gathering opportunities; and
  - commercial outfitters, recreation and tourism;
- consider the indirect effects on the economy resulting from changes in land use (e.g. potentially increased use of recreational vehicles, and restrictions related to the presence of the Project);
- describe the potential effects on economies based on trade, namely for Indigenous peoples;
- 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, including water lots (see social conditions baseline);
- 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 loss of subsistence and the potential loss of related jobs; and
- provide an analysis of potential changes to property values and to the cost of living as a result of the Project.

11.3. Mitigation and enhancement measures

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 may be provided to encourage employment of local people;
  - describe actions that will be 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 economic benefit plans or specific cooperation agreements 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, and 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 employees, businesses and contractors; and
  - describe all cultural awareness training plans for non-Indigenous employees to promote a safe work environment that fosters the well-being of Indigenous employees and contractors;
- describe plans, programs and policies to encourage contracting and procurement opportunities for local and regional businesses, including Indigenous-owned 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; and
  - 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 groups;
- propose differentiated mitigation measures, if applicable, so that adverse effects do not fall disproportionately on Indigenous groups 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, under-represented groups in the sector, 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.

12. Indigenous peoples

The Impact Statement must provide information on how the Project may affect Indigenous peoples, as informed by the Indigenous group(s) involved in the assessment. The Proponent should apply Agency guidance on engaging with Indigenous groups and appropriate methodologies for assessing potential 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 lands 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.

The Proponent must:

- engage with Indigenous groups in developing baseline conditions and identification and understanding of the potential impacts of the Project on Indigenous peoples, and work collaboratively to identify preferred means to mitigate impacts;
- incorporate Indigenous knowledge into the impact assessment and view this knowledge ~~as complementary and influential alongside~~with equal footing to western science;
- partner and collaborate ~~provide a reasonable opportunity for~~with Indigenous groups to ~~review the information prior to submission of the~~contribute to the preparation Impact Statement, including through providing capacity funding including in cases where information was obtained from public sources;
- take into account the capacity of Indigenous groups to collect information on all aspects identified in relation to the current use of lands and resources for traditional purposes;
- 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 demonstrate interest in this regard; and
- indicate where input from Indigenous peoples has been incorporated and been used to inform the impact assessment. To the extent possible, information should be specific to the individual Indigenous group(s) involved in the assessment, and describe contextual information about the members within an Indigenous group (e.g. women, men, elders and youth).

The baseline conditions should be validated by Indigenous peoples. Where not publicly available, the Proponent should obtain the approval of Indigenous groups to integrate current use baseline information into the Impact Statement or explain, as applicable, why the information was not validated or approved.

The Proponent is also encouraged to work with Indigenous groups who demonstrate an interest in drafting sections of the Impact Statement that concern them, including sections describing Indigenous knowledge,

on the subject of current use of lands and resources for traditional purposes, on potential impacts to the rights of Indigenous peoples, and for the identification of mitigation or enhancement measures. Where applicable, sections of the Impact Statement prepared by Indigenous groups must be clearly identified.

12.1. Indigenous physical and cultural heritage and structures, sites or things of significance

12.1.1. Baseline conditions

The Impact Statement must include a description of the baseline conditions associated with physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance for Indigenous peoples. This description should give consideration to understanding the historical (pre-development and pre-Crown control) baseline conditions associated with ability to transmit culture, including through language, ceremonies, harvesting, teaching of sacred laws, traditional laws, stewardship laws, and traditional knowledge.

The AB TOR requirements that relate to historic resources captured under the provincial *Historical Resources Act* are detailed in section 4 of the AB TOR (Annex I) and may be referenced to inform baseline conditions. These address only Alberta's legal requirements under the Historical Resources Act, and are a subordinate component of the requirements of the IAA. All work conducted in compliance with Alberta's Requirements must also meet the requirements of the current TISG, particularly in regards to the involvement of Indigenous peoples and effects on Indigenous peoples and their Rights.

The Impact Statement must:

- provide the location of physical and cultural heritage features on maps and access routes to those features including overland and water-based options including entry and exit / landing sites for watercraft, camp locations and water sources for potable uses, if it has been shared by an Indigenous peoples with the Proponent and if the Indigenous group has authorized its release;
- describe how input from potentially impacted Indigenous groups was sought and considered in the identification of these locations and features, including opportunities provided to participate in or lead historic resources studies (including field studies);
- describe best practices that will be employed for field studies, as screening of all shovel tests and archaeological excavations with maximum 6 mm mesh size, systematic site assessment at maximum 5 m spacing, radiocarbon dating of a sample of any recovered organic materials, and recording all field data with sub-meter precision GPS;the use osuch as the use of 6 mm mesh size for screening;
- describe the outcomes of engagement and consultation activities with Indigenous groups 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 indigenous knowledge informed studies, including survey strategies, site interpretation and site evaluation;
-
- include components of the environment identified by Indigneous groups as having heritage value to reflect that natural and cultural heritage is a multidimensional concept which is not limited to particular sites or objects; and

- describe how Proponent will work with interested Indigenous groups on surveying known sites containing archaeological artifacts in order to protect and repatriate artifacts.

Information on heritage and structures, sites, and things of historical, archaeological, paleontological or architectural significance for Indigenous groups can include:

- burial sites;
- spiritual sites, including rivers and watercourses;

- oral histories;
  - Access, trails and travel corridors
-
- cultural landscapes;
- teaching areas used to transfer knowledge between generations;
- cultural values and experiences of being 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;
- sites with archaeological potential and/or known artifact sites; and
- sites occupied historically.

The Proponent should consult the *Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing* on the Agency's Website.

12.1.2. Effects to Indigenous physical and cultural heritage

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 groups, including:
  - the potential for loss or destruction of physical and cultural heritage;
  - changes to access to the site(s) of 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 things, including languages, stories and traditions;
    - changes to the relationship between sites of physical and cultural heritage and their surrounding environment; and
  - and
  - changes to visual aesthetics over the life of the Project and after reclamation, abandonment or decommissioning of the Project;
    - take into account effects on social and economic conditions, including culture transmission, mental health and community well-being, resulting from effects to physical and cultural heritage and to structures, sites or things of historical, archaeological, paleontological or architectural significance, and effects on historical connection to land
- take into account potential effects on physical and cultural heritage when assessing the effects on social and economic conditions; and
- describe how Indigenous groups will be notified of findings of historical resources;
- present contingency plans and field interventions that will be applied should heritage resources be discovered during construction and operation; and

- in the event that project activities disturb the soil (surface or underground) on provincial Crown lands, conduct an archaeological potential study for the Crown territory affected. Based on the recommendations of this study, field work (visual inspection without snow cover, archaeological inventory, or other) could be necessary. Depending on the findings, this expertise could lead to mitigation measures related to the findings obtained, which can take the form, for example, of intensive digs at a given site or a proposal for modification of the anticipated route.

12.2. Current use of lands and resources for traditional purposes

12.2.1. Baseline conditions

The Impact Statement must include information on the current use of lands and resources for traditional purposes. The Proponent must refer to the *Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under CEAA, 2012*, on the Agency's website.

The information requirements of section 5 of the AB TOR, Traditional Ecological Knowledge and Land Use (Annex I), may be referenced as appropriate to address the information requirements below.

The Impact Statement must identify and describe:

- Indigenous governance systems and Indigenous laws associated with the current land and resources for traditional purposes;
- traditional activities presently or historically practiced (e.g. hunting, fishing, trapping, gathering of plants or medicines);
- location of traditional use areas such as hunting, trapping, and fishing camps, cabins and gathering or teaching areas;
- resources important for traditional and cultural purposes such as fish, wildlife, birds, plants or other natural resources and describe places where these resources are harvested. Identify those being species at risk and describe their traditional and cultural significance;
- country foods (traditional foods);
- quality and quantity of resources (e.g. preferred species and perception of quality);
- rotational harvesting practices and how they vary in time, such as berry and tea harvesting, bait harvesting and fishing, big game hunting and trapping of fur-bearing animals;
- access and travel routes for conducting traditional practices (e.g. physical access to harvest specific species, culturally important harvesting locations, timing, seasonality, distance from community);
- all uses of banks, waterways and water bodies navigable by Indigenous groups, such as for travel and recreation (e.g. canoe route and portage trails); , entry and exit / landing sites for watercraft
- waterways and water bodies used as drinking water sources, including springs, wetlands, and shallow groundwater used as drinking water sources and aesthetic properties (taste, colour, clarity, temperature, odour) of those waters;~~;~~
- the current use of lands and water bodies in the study area, including for food, social and ceremonial purposes, including as defined by Aboriginal and Treaty rights,
- the frequency, duration or timing of traditional practices;
- efforts by Indigenous groups to restore traditional practices, where applicable;
- important features for the experience of the practice (e.g. connection to the landscape without artificial noise and sensory disturbances, privacy, safety, air quality, visual landscape, perceived or real contamination, etc.);
- other current uses recognized by Indigenous groups; and.

- the use of the Project area by non-Indigenous harvesters.

12.2.2. Effects to 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 (see AB TOR section 5 [C], Annex I), including to:
  - current and future availability, distribution, and quality of country food and resources (traditional foods),
  - quality, quantity, and distribution 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 project activities, increase in artificial light at permanent and temporary sites, fragmentation of traditional territory, visual aesthetics);
  - the use of travel routes, navigable waterways and water bodies;
  - sites of interest to communities including for 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 culturally important harvesting areas, resources of importance and traditional territory;
  - non-site specific effects to current use of lands and resources for traditional purposes, e.g., need to travel further, increased costs associated with traveling further, Increased time needed to use the land for traditional purposes etc.
  -
- describe potential effects on the transmission of traditional knowledge, language, community institutions such as sharing, and community cohesion linked to activities potentially affected by the Project;
- take into account expectations pertaining to the preservation of landscapes, including night-time landscapes and, if applicable, regulatory requirements in place concerning light pollution;
- describe the methods used to collect information on traditional use of lands and resources by Indigenous groups; and
- describe how Indigenous groups 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 effects to current use of lands and resources for traditional purposes.

12.3. Health, social and economic conditions of Indigenous peoples

12.3.1. Baseline conditions

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

The baseline conditions established for Indigenous groups must take into account Indigenous governance regimes and Indigenous laws associated with health and socio-economic conditions. The baseline conditions should provide community-specific social and economic conditions on a disaggregated basis (without identifying individuals).

12.3.2. Effects on Indigenous health, social and economic conditions

The Impact Statement must meet the requirements set out in the sections 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. Some of the above-described requirements are reiterated here.

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 effect on the cost of living, food security, and mental health at the community level or on vulnerable subgroups.

The Impact Statement must:

- describe the health, social and economic effects that the Project may have on Indigenous peoples;
- consideration of how economic boom and bust cycles in remote communities impact social and cultural wellbeing;
- include a Health Impact Assessment including Indigenous determinants of health and HHRA (see also section 9 *Human health conditions*);
- describe potential long-term health effects to Indigenous peoples due to project activities;
- describe and quantify potential effects to mental and social well-being of Indigenous peoples (e.g. stress, depression, anxiety, sense of safety);
- describe and quantify specific thresholds and document if different thresholds were considered for vulnerable Indigenous peoples, including by sex and age; provide rationale and justification if specific thresholds are not used;
- identify predicted effects of the Project on the quality and quantity of ground or surface water used by Indigenous peoples;
- describe effects to the availability, use and consumption of country foods (traditional foods), including from the release of contaminants and other emissions from the Project, and potential health impacts of any changes to availability, use, consumption patterns, and quality;
- provide a rationale if a determination is made that an assessment of the potential for contamination of country foods (or other exposure pathways, such as inhalation) is not required or if some contaminants are excluded from the assessment;
- describe how community and Indigenous knowledge was used in assessing potential effects to Indigenous health, social and economic conditions;

- apply GBA+ across all health, social and economic effects and document how potential effects or changes to health, social or economic conditions could be different for diverse subgroups, including community relevant subgroups (e.g. women, youth, elders); and
- describe effects on reserve lands and peoples on reserve (e.g. visual, light, dust, noise, air quality, odours, water sources and accidents/malfunctions).

12.4. Rights of Indigenous peoples

12.4.1. Baseline conditions

The Impact Statement must:

- identify and describe the Treaty and Aboriginal rights of Indigenous peoples potentially affected by the Project, including historic, regional, and community context. The description should include maps, when available, to illustrate the location of treaties, traditional territories and Métis harvesting zones;
- document the nature and extent of the exercise of these rights by the Indigenous groups who are potentially impacted by the Project, as identified by the Indigenous group(s). Indigenous groups may also provide their perspective through consultations with the Agency. Indigenous groups should be involved in the choice for the scoping and assessment of the nature and extent of the exercise of rights of Indigenous peoples; and
- consider how the information requirements related to physical and cultural heritage, current use, Indigenous health, social, and economic conditions are applicable to the nature and extent of the exercise of rights.

Further information related to rights may include:

- **landscape, cultural, social and spiritual conditions that support the Indigenous group's exercise of rights (e.g. large, intact and** diverse landscapes; areas of solitude; connection to landscape, sense of place, knowledge, language etc.);
- the Indigenous governance systems and Indigenous laws associated with the exercise of rights;
- information about members within an Indigenous group, and their role in the exercise of rights (e.g. women, men, elders, youth, people with disabilities);
- **how the Indigenous group's cultural traditions, laws and governance systems inform t**he manner in which they exercise the rights (the 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 of rights*;*
- maps and relevant data sets (e.g. overlaying the Project footprint, places of cultural and spiritual significance, traditional territories, fish catch numbers); and
- pre-existing impacts and cumulative effects that are already interfering with the ability to exercise rights or to transmit Indigenous cultures and cultural practices (e.g. language, ceremonies, Indigenous knowledge), particularly in the Alberta Industrial Heartland area.

12.4.2. Impacts on rights of Indigenous peoples

The Impact Statement must describe the level of engagement with Indigenous groups 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 groups 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 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 and interests, including the hypotheses put forward on the potential effects.

Where an Indigenous group 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 or the review panel, the Proponent must provide a rationale for the approach taken. The Proponent should discuss with Indigenous groups their views on how best to reflect the assessment of impacts on rights in the Impact Statement. Impacts on rights may be assessed using a methodology identified by Indigenous groups, including community-led assessments[19]. This may include supporting Indigenous-led studies that are to be provided publicly and to the Government of Canada.

The Proponent must work together with Indigenous groups 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; and
- describe the impact on the rights of Indigenous peoples, taking into account the concept of the link between resources, access and experience, sustainability and cultural continuity.

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 the *Guidance: Assessment of Potential Impacts on the Rights of Indigenous Peoples*.

The Proponent and Indigenous groups may consider the following:

- how the Project may contribute cumulatively to any existing impacts on the exercise of rights, as identified by the Indigenous group(s);
- effects of the Project on the quality and quantity of resources available for the exercise of rights;

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19 See for example the *Methodology for Assessing Potential Impacts on the exercise of Aboriginal and Treaty Rights of the Proposed Frontier Oil Sands Mine Project* (CEAA and MCFN, 2018). CEAR #394 on the Registry for the Frontier Oil Sands Mine Project.

- effects to fish harvesting rights in the North Saskatchewan River from accidental release of deleterious substances;
- how the Project may affect the ability of Indigenous groups to travel freely in their territory;
- effects of the Project on access to areas important for the exercise of rights;
- effects of the Project on the experience associated with the exercise of rights including the ability of Indigenous groups to exercise their rights in a peaceful manner;
- effects 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 groups to derive future economic benefits from the land or water or to maintain an ongoing relationship with the land or water;
- the way that the Project is aligned with the values, political direction and/or objectives of Indigenous groups in the fight against climate change;
- the manner in which the Project and its impacts weaken or strengthen the authority of Indigenous groups on their territory;
- how the Project affects all other components of significance identified by Indigenous groups; and
- the severity of the impacts on the exercise of rights, as identified by the Indigenous groups.

12.5. Mitigation and enhancement measures

The Impact Statement must:

- describe the proposed mitigation and enhancement measures for all potential effects on Indigenous groups, as well as on potential impacts to the rights of Indigenous peoples, and identify if these are measures for which the Proponent or other parties would be responsible;
- identify the mitigation and enhancement measures proposed for potential effects as described in the previous sections that will also apply to effects on Indigenous groups and impacts on their rights, and elaborate on how these measures may vary for each Indigenous group and community;
- describe if and how proposed mitigation measures will be integrated into the Project design, if applicable;
- include perspectives of the potentially impacted Indigenous groups on the effectiveness of particular mitigation measures on such impacts;
- describe cooperation with Indigenous peoples to identify preferred mitigation measures for potential adverse impacts on Indigenous groups or their rights, as well as to optimize the Project's benefits for their communities;
- demonstrate how the timing of Indigenous activities on the land was considered when establishing the schedule for project activities;
- provide intervention and communication plans, as applicable, pertaining to heritage resources and structures, sites, and things of historical, archaeological, paleontological, or architectural significance to

Indigenous groups, 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;

- describe the mitigation 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;
- describe how the Proponent has addressed the suggestions and recommendations made by potentially affected Indigenous groups;
- propose differentiated mitigation measures, if applicable, so that adverse effects do not fall disproportionately on Indigenous groups 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.

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 Indigenous groups.

13. Other effects

13.1. Potential accidents or malfunctions

The failure of certain works caused by malfunctions, human error or malicious act, or natural events (e.g. flooding, earthquake, landslide, forest fire) could cause major effects. If certain events are expected to occur (e.g. minor spills, railroad accidents), they should be included as expected effects in the previous sections.

13.1.1. Risk Assessment

The Impact Statement must:

- identify hazards for each project phase that could lead to events of accidents and malfunctions and provide an explanation of how these events were identified (e.g. information sources, recognised risk assessment methodology, professional expertise, similar project, participants' input, etc.);
- take into account the lifespan of different project components;
- conduct an analysis of the risk of each hazard/adverse event (including likelihood and consequences) including:
  - risk of explosion linked to the Project;

- risk of accidental leaks or failure of pipelines, or wastewater facilities;
- risk of an accidental fuel spill, whether minor or major; and
- loss of containment of dangerous goods at permanent or temporary facilities during construction and operation, or during maintenance activities;

- describe the plausible worst-case scenarios, including:
  - the magnitude and extent of effects, including a description of the quantity, mechanism, rate, form and characteristics of contaminants, GHGs and other materials likely to be released or discharged into the environment;
  - consideration of the influence of local and regional particularities of the terrain, in particular in terms of topography (e.g. difficult access for interventions) and weather conditions such as snow and ice cover;
  - modelling for any contaminants spilled into water or on terrestrial environments;
  - potential environmental, health, social and economic effects, including effects on Indigenous peoples. With respect to human health specifically, consideration should be given to potential pathways of effect associated with surface water, ground water, air, country foods (traditional foods), and other relevant media, including short-term and long-term risks to human health;
  - relative locations of sensitive receptors (e.g. humans, fish and/or wildlife and their habitat, waterways, private drinking water wells);
  - consideration of timing related to sensitive receptors (e.g. hunting season, tourist season, migration or nesting period); and
  - any critical infrastructure, such as local drinking water treatment plants or facilities that can treat water sources affected by the Project, as well as the ability and capacity of the drinking water treatment plants or facilities to treat water sources affected by accidental releases from the Project during all project phases;
- justify spatial and temporal boundaries for the assessment of effects associated with accidents and malfunctions. The spatial boundaries established for the effects resulting from possible accidents and malfunctions will generally be larger than the boundaries for effects of the Project alone; and
- describe incidents that have occurred at the existing Value Chain Solutions – Heartland Project 1 site, lessons learned and how they have been integrated into preventing future accidents or malfunctions for the proposed project.

13.1.2. Avoidance and Mitigation Measures

The Impact Statement must:

- describe the mitigation measures and safeguards that would be in place to avoid and prevent accidents and malfunctions, including project design choices and operational considerations;
- describe the proposed security measures to reduce the potential for vandalism or other malicious acts that could lead to accidents or malfunctions;

- 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 emergency response and repair procedures that would be put in place;
- describe long-term monitoring and recovery measures that would be implemented to manage effects to the environment and health, social and environment conditions from accidents and malfunctions, including those to remediate affected lands and waters;
- provide details of financial liability and compensation in place pursuant to regulations or the Proponent's commitment; and
- describe mutual aid arrangements in the event that the incident exceeds proponent resources and how to access these resources.

13.1.3. Emergency Management

An emergency response plan is required by the AB TOR section 6.2 (Annex I). In addition to, or as a part of this plan, the Impact Statement must:

- identify emergency planning and emergency response zones (see section 7.5.1 *Mitigation and enhancement measures*);
- present preliminary emergency measures to respond to such events, including identifying associated response systems and capabilities;
- take into account evacuation areas in the planning of emergency measures as well as the particularities linked to these areas (e.g. number of residents varying with the seasons, possible high number of individuals unfamiliar with the region, limited communication means in remote areas and with temporary residents);
- describe emergency response training and exercise programs, including a description of the participation and training agreements with Indigenous communities that could be impacted by accidents or malfunctions;
- document spill response strategies for each type of spill scenario, including strategic locations of spill response equipment relative to likely accident and malfunction sites and/or likely pathways to sensitive environmental receptors;
- describe or provide a waste management plan as it pertains to waste generated during an emergency response;
- describe emergency communication plans that would provide emergency instructions to surrounding communities, including Indigenous groups, and how these will be informed by the public and Indigenous groups. The Proponent should consider including:
  - immediate urgent actions, such as notifying the public of security and safety concerns, instructions for on-site shelter or shelter-in-place procedures and evacuation routes; and
  - longer-term actions, such as a general website and telephone helplines, updates on the status of incidents, injured animal reports, etc.;

- describe liaison and continuous education plans linked to emergency preparedness for surrounding communities that may be affected by the consequences of a significant incident, including for Indigenous groups; and
- explain how the Proponent has made and will continue to make an outreach effort to ensure public and Indigenous groups' understanding of the risks associated with this type of project (e.g. include a non-technical report).

13.2. 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. earthquakes, flooding, drought, ice jams, landslides, erosion, subsidence, fire, etc.), could adversely affect the Project and how this in turn could result in effects to the environment, health, social and economic conditions. The focus should be on credible external events that have a reasonable probability of occurrence and for which the resulting environmental effects could be significant without careful management.

The Impact Statement must:

- provide details of planning, design and construction strategies intended to minimize the potential adverse effects of the environment on the Project. This includes details related to any planning for upgrades or Best Available Technology (Economically Achievable) improvements to existing infrastructure or equipment;
- provide information in accordance with section 5.1.5 of the *Strategic Assessment on Climate Change* (October 2020) on how the Project is resilient to and at risk from current and future impacts of a changing climate. This information will include descriptions of:
  - the scope and timescale of the climate change resilience assessment and of the methods used to identify, evaluate and manage the climate risks that could affect the Project itself and thereby the surrounding environment; and
  - the Project's vulnerabilities to climate change both in mean conditions and extremes over the full project lifetime from project construction to decommissioning. This could include the impacts of extreme weather events on project infrastructure, impacts to water quality and availability, etc.; and
- describe measures to mitigate adverse environmental, health, social and economic effects resulting from effects of the environment on the Project and enhance positive effects.

The resilience assessment should consider multiple scenarios and different probability patterns (e.g. 5-year flood vs. 100-year flood), and should discuss the assumptions and data sources used and the confidence or uncertainty in the results. Where in-house models or forecasts are developed to support a specific assessment, the modeling methodology, assumptions, statistical certainty and data sources should be provided.

14. 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.

The Impact Statement must:

- characterize the residual effects, even if deemed small or negligible, using criteria and language most appropriate for the effect. If an Indigenous group identifies that there are residual effects to rights, those effects should be carried through for residual effects analysis;
- consider using the following criteria for residual effects, as appropriate:
  - magnitude;
  - geographic extent;
  - timing;
  - duration;
  - frequency;
  - reversibility; and
  - the ecological, health, social and economic context within which potential effects may occur. Context should be described and applied as part of the key criteria above, for example:
    - the sensitivity and importance of affected aquatic and terrestrial species, including species at risk and species of importance for Indigenous peoples;
    - the sensitivity and importance of affected habitats and their functions for wildlife;
    - the potential for disproportionate residual effects for diverse subgroups as per the GBA+; and
    - the existence of standards, guidelines and other sources of information to assess effects;
- describe the extent to which the adverse effects within federal jurisdiction and the adverse direct or incidental effects are significant;
- justify the choice of criteria used to determine the extent to which these effects are significant. The information provided must be clear and sufficient to allow the Agency, the review panel, regulatory bodies, Indigenous groups and other participants to review the effects analysis;
- identify and explain relevant sources of information that were used to characterize the extent to which those effects are significant, including views of the public, Indigenous groups, jurisdictions, federal authorities and other participants; and
- where applicable, specify the likelihood of, or potential for, residual effects 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 also apply to the extent of signifcance of adverse effects and the assessment of residual effects under the Act.

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.

15. Cumulative effects assessment

The Proponent must assess the Project's cumulative effects using the approach described in the Agency's guidance documents related to cumulative effects, including *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* to complete its analysis. The best practices described in this document also apply to the assessment of cumulative effects under the Act.

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 direct residual adverse effects to the VC, taking into account the application of technically and economically feasible mitigation measures; and
- the same VC may be affected by other past, present and future physical activities.

A cumulative effect on an environmental, health, social or economic component may be important 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:

- identify the VCs that will be subject to the cumulative effects assessment;
  - VCs for which the Proponent anticipates residual effects from the Project must be considered in the cumulative effects assessment;
  - the Proponent can refine its analysis by taking into account selected 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 those identified as being of particular concern in the context of cumulative effects by the public and by Indigenous groups (see list below); and
  - finalization of the selection of appropriate VCs and boundaries for cumulative effects assessment should be informed by consultations with the public, Indigenous groups, other jurisdictions, federal authorities and other participants;
- 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. Take into account that:
  - the boundaries of cumulative effects assessments may differ for each selected VC and should 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, and may extend beyond the jurisdictional boundaries of Canada;
- temporal boundaries must be based on appropriate baseline conditions and should account for all potential effects over the life cycle of the Project, including decommissioning and reclamation (see requirements in section 7.3.1 *Temporal Boundaries)*; and
- spatial and temporal boundaries for VCs related to effects and impacts on Indigenous groups must be defined in collaboration with the Indigenous groups concerned;

- identify sources of potential cumulative effects. Specify 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, including potential induced effects, and whether those effects could interact with the residual effects of the Project. Clearly explain and justify the rationale for selecting other past, existing or future projects or activities to include in the cumulative effects assessment. Projects to be considered include:
  - past, existing and future oil refinery and upgrader projects;
  - past, existing and future infrastructure projects;
  - past, existing and future growth in urbanization and transportation in the Edmonton Metropolitan Region, and
  - past, existing and future projects and physical activities contributing to the fragmentation of the territory;
- take into account the results of any relevant regional studies;
- assess the cumulative effects for each VC, taking into account the following:
  - the analysis must include the effects of past and future projects and physical activities in combination with the residual effects of the Project, including how the effects may interact (additive, synergistic, compensatory, and masking effects);
  - the analysis of the effects of future projects and physical activities must 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;
  - 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; and
  - cumulative effects to Indigenous peoples, and the resources they rely upon both locally and regionally;
- describe technically and economically feasible mitigation measures proposed for cumulative effects on the environment, health, social and economic conditions, as well as 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 all parties with the power to act on these measures. In such cases, the Impact Statement shall summarize the commitments of the other parties in relation to implementing the necessary measures and any related communication plan;

- assess the regional implications of applying project-specific mitigation and enhancement measures, taking into account any reasonably foreseeable development in the area;
- describe, where appropriate, the extent to which the adverse cumulative effects are significant, taking into account applicable tolerance levels, including those identified by Indigenous groups and other participants; and
- develop a follow-up program, including reporting schedules, to verify the accuracy of the assessment and the effectiveness of mitigation measures for applicable cumulative effects. The anticipated effectiveness of mitigation measures must be supported with scientific evidence or tested through study and monitoring as the project proceeds.

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 group potentially impacted by the Project. Proponents are encouraged to collaborate with Indigenous groups in the cumulative effects assessment. The Impact Statement must demonstrate how Indigenous groups were involved in the cumulative effects assessment and in the design of appropriate mitigation measures and follow-up programs. If Indigenous groups do not wish to participate in the cumulative effects assessment with the Proponent, the Proponent must share a preliminary draft of the cumulative effects assessment on the Indigenous groups' rights and culture with them 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:

- effects to access and fragmentation of wildlife habitat areas;
- effects to water quantity and quality in the North Saskatchewan River and Astotin Creek (e.g. fish and fish habitat);
- effects at the watershed scale on water quality;
- effects at the air zone scale on air quality;
- effects on migratory birds and their habitats;
- interactions with effects from other projects, past and present, and activities in the Alberta Industrial Heartland;
- effects from changes in atmospheric conditions;
- effects on species of interest, species of special concern and species at risk;
- effects to natural areas (e.g. Northwest of Bruderheim Natural Area)
- effects the current use of lands and resources for traditional purposes by Indigenous peoples;
- effects on the practice of current traditional activities and areas and resources of interest);
- effects to experience of being on the land and cultural landscape (e.g. North Saskatchewan River valley);
- effects on community well-being;
    - cumulative effects of loss of trails, waterways and cultural landscapes supporting opportunities to exercise constitutionally protected rights to hunt, trap and fish
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- effects on the area surrounding the Alberta Industrial Heartland and relevant protection measures to support continued and future use by Indigenous groups; and

- impacts on the rights of Indigenous peoples, as well as the loss of opportunities to exercise these rights.

16. Follow-up programs

A follow-up program verifies the accuracy of the effects assessment and evaluates the effectiveness of mitigation measures. The information obtained through the follow-up program may be used to determine whether additional actions are needed to address unanticipated outcomes.

Follow-up programs are an opportunity to continue to consult affected Indigenous groups and, if undertaken collaboratively, can support solution-oriented approaches to adaptive management[20] through early identification of problems in follow-up programs and appropriate solutions that take Indigenous knowledge into account.

The factors to be considered in developing a follow-up program include:

- VCs for which residual adverse effects are expected or uncertain;
- methods to assess 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 nature of concerns raised by participants, including Indigenous groups, about the Project;
- suggestions from Indigenous groups and local communities on the design of and participation in follow-up and monitoring 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 if the mitigation measures applied do not work as intended;
- whether scientific knowledge pertaining to effects is limited or emerging;
- the parties that will be involved in implementing the follow-up program and reviewing its results;
- existing programs, procedures, and plans that provide relevant standardised or established follow-up and monitoring methods, such as from municipal, provincial, federal, or other appropriate centres of expertise;
- the duration of follow-up program activities, which may vary depending on the VCs assessed;
- 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 reviewed;

[20] Although adaptive management is considered a best practice in environmental management, it is not, in and of itself, considered a mitigation measure.

- any compensation programs proposed to offset residual effects;
- how the results of the follow-up program will be communicated to interested parties; and
- triggers for adaptive management of any unacceptable or unexpected outcomes.

16.1. Follow-up program framework

The duration of the follow-up program must be as long as necessary to verify the accuracy of environmental, health, social and economic effects predicted during the impact assessment and to evaluate the effectiveness of the mitigation measures.

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

- how the need for corrective action will be detected and the anticipated effectiveness of that detection;
- the range of potential corrective actions that could be applied and the general circumstances under which each such action would be applied, and the expected success of each such action based on previous experience;
- how Indigenous groups will be involved in decision-making processes and activities related to the Project throughout the lifecycle of the Project;
- the objectives of the follow-up program and the VCs targeted by the program;
- the list of elements requiring follow-up;
- the main characteristics of each of the recommended follow-up elements, including:
  - 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;
- how potentially impacted Indigenous groups have been, and will continue to 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;
- the response mechanism used in the event of unanticipated environmental effects or impacts on rights and cultures of Indigenous peoples;
- the mechanism for disseminating the results of the follow-up programs (deliverables) to relevant stakeholders and, per section 1 of the AB TOR (Annex I), plans to maintain the public and Indigenous group engagement to ensure that the public and Indigenous groups will have an appropriate forum for expressing their views on the ongoing development, operation and reclamation of the Project; and
- the accessibility and sharing of data for the general public.

As also required by AB TOR section 2.11[B] (Annex I), describe adaptive management plans that aim to minimize the impact of the Project. Describe the flexibility built into the Project to accommodate future modifications required as a result of:

- any change in environmental standards, limits and guidelines (including the approach to potential future effluent release plans should regulations come into force); and
- findings from project-specific regional monitoring programs.

To accompany the description of the follow-up programs, it is recommended that a table be presented showing the main characteristics for each of the recommended follow-up programs (objectives, parameters, timelines). It is recommended that an overall schedule be presented in the form of a table compiling 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.).

16.2. Follow-up program monitoring

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 project development. Monitoring can also assist in developing clearly defined action plans and emergency response procedures to address the protection of the environment, health, social and -economic conditions and human safety.

Monitoring is a component within an adaptive management program and should not be relied on as an acceptable mitigation activity or strategy to minimize the predicted adverse effects and impacts from the project related activities and phases.

The Impact Statement must provide an overview of the preliminary environmental, health, social, cultural and economic monitoring program, including:

information on the participation of Indigenous groups in existing monitoring activities with respect to project planning, or for projects adjacent to the proposed project (where available);

- the identification and monitoring activities that pose risks to the environment, health, social and economic conditions or VCs, and the measures and means to protect these conditions;
- the identification of 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;
- inspection procedures, as well as the accountability and reporting structure for inspectors. Describe the minimum qualifications and experience required for these roles, including training requirements for individuals who will be undertaking inspection and monitoring responsibilities;
- a description of the follow-up methodology and documentation of environmental, health, social and economic issues (including Indigenous 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 reclamation measures including how Indigenous groups will be notified and incorporated into programming;

- To the extent possible, the IS should present data that may be used for a baseline or benchmark in setting targets, thereby providing the foundation needed in the future to demonstrate the effectiveness of mitigation measures.

- Where such data for bench marks and targets is not presented, a schedule and a process by which such data will be provided and used in the development of follow-up and monitoring targets should be provided. The targets are to be used in defining the expected success of mitigation. As not all

indicators or data are conducive to measurement using targets, the IS should clearly indicate where qualitative and quantitative goals are used in place of targets.

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- 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 the observation of non-compliance with the legal and environmental requirements or with the obligations imposed on

contractors by the provisions of their contracts, including a description of the quantitative thresholds that will trigger the need for corrective action;

- procedures for the production of monitoring reports (number, content, frequency, date, format, duration, geographical scope) to be transmitted to the authorities and Indigenous groups involved;
- plans, including funding options, to engage Indigenous groups and local communities in monitoring, where appropriate; and
- quality assurance and quality control measures to be applied to monitoring and reclamation programs.

As also required by section 2.11[C], AB TOR (Annex I), describe Value Chain Solutions Ltd.'s current and proposed monitoring programs with respect to:

- point and area source air emissions, including fugitive emissions;
- ambient air quality at the facility fenceline and at a regional level. Specifically, the proponent must discuss how it intends to establish continuous fenceline air quality monitoring and contribute to both continuous and passive air quality monitoring in the region;
- wastewater treatment and release; and
- hazardous and non-hazardous waste treatment and storage.

Regarding the monitoring of air pollutants that do not have established thresholds for health effects, the Impact Statement must include a description of how monitoring results will be used to trigger the Proponent's response mechanisms (e.g. CAAQS for common air pollutants such as fine particulates 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).

17. Canada's ability to meet its environmental obligations and its climate change commitments

The Government of Canada, through the Act, recognizes that impact assessment contributes to Canada's understanding and ability to meet, first, its environmental obligations, and second, its commitments in respect of climate change.

In accordance with paragraph 22(1)(i) of the Act, the Impact Statement should describe the effects of the Project in the context of environmental obligations and commitments in respect of climate change, with a focus on Government of Canada obligations and commitments relevant to decision-making.

Federal environmental obligations relevant to this project include the following:

- 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[21];

- recovery strategies and action plans developed under SARA for all species at risk potentially affected by the Project;
- the *Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)*, as implemented in part under the *Federal Policy on Wetland Conservation* and supporting guidance documents such as the *North American Waterfowl Management Plan*; and
- 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 derived from bird conservation regions and strategies

Through a partnership between the Government of Canada, the Government of Alberta, and the Royal Astronomical Society of Canada (RASC), Elk Isand National Park is designated as part of the Beaver Hills Dark-Sky Preserve under the Dark-Sky Preserve program .The Proponent should ensure the Project will not contrevene the requirements set in the *Canadian Guidelines for Outdoor Lighting (Low-Impact Lighting) for RASC Dark-Sky Protection Programs* for Elk Island National Park and the surrounding area.

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 where the Project may enable Canada to meet its obligations, and the Proponent's plans and commitments to ensure that positive contributions are respected; and
- describe where the Project may adversely affect Canada's ability to meet its obligations, and 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 with respect to the potential positive or negative effects of the Project on Canada's ability to meet its obligations.

The Proponent should 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*, as well as section 8.10 *Climate change* of the Guidelines in reference to climate change commitments.

21 The Proponent is encouraged to consult the publications and resources available on the biodivcanada website

18. Description of the Project's contributions to sustainability

The Impact Statement must characterize a project's contribution to sustainability, as defined in section 2 of the Act. The Impact Statement should describe the context of a particular project, including the issues of importance 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 groups.

Once the analysis on potential effects of a project is conducted, the sustainability principles should be applied:

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

The Impact Statement must describe how sustainability principles were applied and identify conclusions drawn from this analysis. This 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, in all phases, considers the sustainability principles;
- describe the process in selecting the preferred alternative means and alternatives to the Project and how the sustainability principles were considered;
- indicate how monitoring, management and reporting 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 groups, regional, provincial, territorial and/or federal governments; and
- describe engagement with potentially affected Indigenous groups and describe measures and commitments to ensuring the sustainability of Indigenous livelihood, traditional use, culture and well-being and (include perspectives of the potentially impacted Indigenous groups on the effectiveness of particular mitigation measures on such impacts).

The Proponent should refer to Agency guidance on this topic: the *Guidance: Considering the Extent to which a Project Contributes to Sustainability* and the *Framework: Implementation of the Sustainability Guidance*.

19. Assessment summary

The Proponent must prepare a stand-alone 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.

The Assessment Summary provides an opportunity for the Proponent to demonstrate correspondence between issues raised during the planning phase and issues addressed in the assessment. The summary should be presented by VC, which allows the Proponent to demonstrate the completeness of the assessment and provide the results of the analysis. The summary must include key maps or figures illustrating the Project location and key project components.

The Impact Statement should also include a series of tables as outlined in 21.11 *Summary Tables*.

20. Appendix 1 – Reference documents

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Note: Key Agency guidance documents are provided from the ***Practitioner's Guide to Federal Impact*** *Assessments under the Impact Assessment Act*

21. Appendix 2 - Additional guidance

21.1. List of project activities

Focus the list of project activities, as required in section 3.4 *Project components and activities*, on activities with the greatest potential to have environmental, health, social and economic effects, or impacts on Indigenous peoples and their rights. Sufficient information must be included to adequately predict adverse and positive effects, the interaction between those effects and any disproportionate effects for diverse subgroups within communities.

Project activities may include the following elements:

Preparation and clearing

- construction staging, including surveying of work areas;
- excavation and salvage of topsoil and soil;
- clearing, grubbing, and grading of site, including tree and vegetation removal, timber salvage and mulching; and
- clearing of transmission corridor for powerlines.

Construction

- new construction or changes to existing infrastructure including pipelines, powerlines, substations and other connections to the electrical grid, railway lines and connections, rail yards and loading facilities, and access roads;
- installation of site fencing;
- construction of temporary and permanent facilities, including construction camps, administrative buildings, maintenance facilities, control room buildings, and other ancillary facilities; construction of the tank farm for storage of diluted bitumen and other products;construction of temporary and permanent areas for stockpiling and storing materials, including topsoil; and
- construction of facilities for managing and disposing of waste materials.

Transportation

- operation of light duty, heavy-duty and mobile off-road equipment (type, quantity);
- transportation and management of borrow material (source and quantity);
- transportation of construction materials, equipment and related infrastructure;
- transportation of employees;
- acquisition and deployment on site of various mobile equipment; and
- use and maintenance of access and haul roads.

Activities related to water management or effects

- construction of water management infrastructure to divert, control, collect and discharge surface drainage to the receiving environment, (e.g. stormwater pond(s) and pump and pipeline systems)**;**
- work related to waterbody or watercourse crossings, temporary or permanent (bridge or culvert);water management activities, including information on their location, methods, and timing, such as:
  - water diversions or deposition activities;
  - site drainage and runoff management;
  - sediment and erosion control;
  - water treatment and recycling and effluent treatment, including information on quantity, treatment requirements, and release point(s);
  - wastewater treatment;
  - water use requirements (e.g. drinking water, water intakes, water tanks); and
- any other activity, including temporary structures, that may affect the terrestrial, riparian and aquatic environment, including those carried out in intermittent streams and flood prone areas.

Emergency Services

- general maintenance and emergency services.

Hazardous Materials and Waste Management

- storage, handling, recycling and disposal of reagents, petroleum products, chemical products, fuel, hazardous materials and residual materials, including information on types, methods, quantity;
- waste management (disposal and recycling);
- removal of contamination from facilities and equipment, and mangement of residual contamination; and
- transfer of fuel, hazardous materials and waste to off-site locations upon

closure. **Operation**

- bitumen receiving, transportation, processing, refining, and upgrading;
- storage, handling and transport of materials;
- maintenance and, where appropriate, upgrading of aboveground infrastructure and buildings housing them;
- environmental monitoring; and
- workforce management, including transportation, work schedules and lodging.

Reclamation and Closure

- site restoration (works, stockpiling, storage and other affected areas during construction work), including, where appropriate, reconnection of drainage systems impacted by construction work;
- activities associated with reclamation, including salvage, stockpiling, and placement of reclamation material, development of surface drainage channels, and revegetation;

- development, monitoring and maintenance of closure landforms;
- the ownership, transfer and control of the different project components;
- final site reclamation and/or restoration plan;
- ongoing management of waste materials, including transportation, treatment, and disposal;
- dismantling and removal of equipment and systems;
- removal of buildings, plants, linear infrastructure, water management systems and ancillary structures;
- long term care, monitoring and maintaining the integrity of the site (including site drainage and water management) and any remaining structures, including emergency services; and
- abandonment or decommissioning of temporary or permanent facilities.

21.2. 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;
- resources from the government of Alberta (i.e. Alberta Energy Regulator, Alberta Environment and Parks, Alberta Consultation Office, etc.), for example:
  - Alberta species at risk guides and resources,
  - Alberta historic resources guides and resources, and
  - Alberta Natural Heritage Information Centre;
- Bird Conservation Region plans (BCR) and strategies;
- universities;
- field studies, including site-specific survey methods;
- database searches, including federal, provincial, territorial, municipal and local data banks, namely:
  - the Atlas of Breeding Birds of Alberta (2007);
  - other monitoring program databases such as, eBird, Breeding Bird Survey, Christmas bird count, Birds Canada**'s Canadian Migration Monitoring Network**, NatureCounts, and iNaturalist;
  - **Birds Canada's Nesting Calendar Query Tool**;
  - Species at risk public registry;
  - 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);
  - Information available under Community and Health System Characteristics (Canadian Institute for Health Information); and

- First Nations Regional Health Survey reports and associated online data (First Nations Information Governance);

- protected areas, watershed, or national or provincial park management plans;
- assessments and studies that may be made available through work undertaken to advance the achievement of the Action Plan for Wood Buffalo National Park;
- assessments and studies that may be made available through oil sands research or monitoring initiatives;
- 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);
- land cover data including terrestrial ecosystem mapping products, forest cover maps, and remote sensing information;
- published literature, including specialized publications;
- environmental assessment documentation, including monitoring reports, from prior projects in the area and similar projects outside the area;
- regional studies, project assessments and strategic assessments;
- renewable harvest data;
- Indigenous knowledge, including oral histories;
- expert, community, public and Indigenous engagement and consultation activities, including workshops, meetings, open houses, and surveys;
- participant comments submitted during the Planning phase (posted on the Registry) that may 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;
- human health risk assessments (HHRA);
- human health impact assessments (HHIA);
- studies on community well-being and other social and economic studies;
- community and regional economic profiles; and
- statistical surveys, as applicable.

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

The Proponent should consult with federal, provincial or local government authorities to determine whether additional data sources and survey methods may be appropriate.

21.3. Ecosystem approach

Use an ecosystem approach to describe the biophysical environment, in the Impact Statement. The ecosystem approach must 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, as applicable. The Impact Statement must provide a description of the indicators and measures used to determine ecosystem health and integrity, as reflected in this Guidelines document. The presence of endangered ecosystems, and rare, limited and/or significant habitat (e.g., federal[22], provincial, or Indigenous protected areas, wildlife sensitivity maps[23], RAMSAR sites[24], and identified or proposed critical habitat in recovery strategies or action plans) potentially affected by the Project should be included the description of the biophysical baseline conditions.

The 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. Indicate if baseline data gaps exist and additional steps taken to address gaps in information. Considerations include: configurations and connectivity of habitat patches; continuation of key natural disturbance regimes; structural complexity; hydrogeological patterns; nutrient cycling; interactions of biotic components with each other and with abiotic components; population dynamics and genetic diversity; Indigenous knowledge relevant for the conservation; and sustainable use of relevant species populations, communities and associated habitats.

21.4. Application of GBA+

Methodologies as described in the following two sections shoud be used to understand potential effects to diverse subgroups within the community including women, youth, and elders.

To support GBA+, the information provided in the Impact Statement must:

- be sufficiently disaggregated to support the analysis of disproportionate effects as per the GBA+ . As much as possible, without resulting in the identification of individuals, the data must be sub-divided by sex, age and ethnicity and presented distinctly for each Indigenous group and all subgroups forming their communities, including information such as social, economic and health impacts, gender and poverty, division of labour, consideration of key indicators, subgroups within the population.
- be sufficient to provide a comprehensive understanding of the current state of health, social, and economic conditions, including trends relevant to GBA+;

[22] *Canadian Protected and Conserved Areas Database*, available at https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/protected-conserved-areas-database.html

[23] *Wildlife sensitivity maps* available at https://www.alberta.ca/wildlife-sensitivity-maps.aspx

[24] *Canada – Ramsar* site, available at https://www.ramsar.org/wetland/canada

- describe how community and Indigenous knowledge from affected populations, including input from diverse subgroups, was used in establishing baseline conditions and informing effects assessments for these subgroups;
- consider that subgroups have different access to resources, opportunities, and services;
- consider how the potential effects of the Project and industry sector could particularly affect different subgroups, and how they may respond differently;
- indicate and explain where baseline data gaps exist and steps taken to addressthem;
- take into account the circumstances in which diverse subgroups could, due to their special situation, suffer more severe adverse effects of the Project than others, or not benefit from future economic benefits; and
- include any plans to monitor impacts of the Project on specific populations to reveal inequalities and desing mitigation strategies.

In the preparation of the Impact Statement, the Proponent must adhere to relevant ethical guidelines and cultural protocols governing research, data collection and confidentiality. This is particularly important in the case of information gathered and studies conducted with vulnerable subgroups. Namely, 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 standards adopted by an Indigenous people).

The application of GBA+ should not be limited to simple descriptions of differences but should include an explanation of the underlying causes of these inequalities. Quantitative information, including gender sensitive data, should also be complemented by qualitative insights from studies or consultations, and other sources. Characterizing effects should be based largely on the level of concern expressed through engaging with the affected Indigenous groups and community members. The Proponent is encouraged to refer to the Agency's guidance document *Gender-Based Analysis Plus in Impact Assessment.*

21.5. Geospatial data requirements

Where information is required in a map format, the Proponent must also provide the Agency with the corresponding electronic geospatial data file(s). The Agency will make the geospatial data files available to the public under the terms of the Open Government License – Canada.

Metadata included in geospatial files must be compliant with the ISO 19115 standard and, at a minimum, provide:

- title;
- abstract or summary of what is contained in the data file;
- source of the data;
- date of creation for the data;
- the point of contact and originator; and
- must confirm there are no restrictions or limitations on sharing the data.

The Proponent should review the Agency's *Guidance on submitting geospatial data* for more information.

21.6. Reference documents requirements

The impact assessment must be based on information that is publicly accessible. Therefore, the Proponent must provide a summary for the documents that served as key references in the Impact Statement that are not otherwise publicly accessible, or consider appending them to the Impact Statement. The Impact Statement must include a bibliography of all documents and sources of information consulted.

21.7. Establishing spatial boundaries

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:

- areas potentially impacted by changes to water quality and quantity or changes in flow in the watershed and hydrologically connected waters, including any interprovincial or territorial borders that that require a transboundary assessment;
- areas potentially impacted by airborne emissions or odours including any regional, interprovincial or territorial borders that that require a transboundary assessment across jurisdictional or airshed boundaries;
- air zone(s) that are affected – based on consideration of CAAQS, AQMS/Airshed management system[25];
  - air zone CAAQS achievement status, as well as the associated management levels as outlined in the Guidance Document on Air Zone Management (following removal of transboundary flows and exceptional events per the ~~Guidance~~ Document on Transboundary Flows and Exceptional Events
- existing local major emissions;
- areas within the range of vision, light and sound;
- the locations and characteristics of the key and most sensitive receptors[26];
- terrestrial and aquatic species habitat areas likely to be affected directly or indirectly, usage timing and species migratory patterns;

[25] See http://airquality-qualitedelair.ccme.ca/en/

[26] Key receptors include sensitive receptors and other current and reasonably foreseeable receptors that may be affected by project activities. The most sensitive receptors may include, but not be limited to, residences, health and social services institutions (hospitals, long-term care facilities, seniors' residences, etc.), educational institutions (schools, daycare centres, early childhood centres, etc.), tourism establishments (tourism information offices, museums, ski areas, summer camps, outdoor recreation areas, camp sites, etc.), recreational areas (recreational land, urban parks, parks and conservation areas, etc.), and important areas of wildlife use.

- emergency planning and emergency response zones;
- the geographic extent of local and regional services;
- any affected communities;
- areas of importance to people, such as recreational areas;
- all potentially affected Indigenous peoples;
- areas of known current use of Indigenous land, cultural, spiritual and resource use; and
- 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;
- the Local Study Area (LSA): defined for each VC; and
- the Regional Study Area (RSA): defined for each VC.

The terminology chosen to refer to the Project area, LSA and 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, LSA and RSA for the biophysical VCs should be defined using an ecosystem-centered approach (i.e. the components of the natural areas such as wetlands, birds, species at risk, etc.) and consider habitat functions. For VCs that are defined on the basis of habitat, the Proponent should conduct a land cover analysis to determine appropriate ecological boundaries and buffer distances around the Project area.

The spatial boundaries for the biophysical VCs should allow the following objectives to be met:

- the diversity of land cover types included in the LSA and RSA is representative of the land cover types found within the LSA and RSA;
    - the spatial pattern of land cover types is even or well distributed within the RSA boundary. Spatial boundaries of the RSA should be changed if one or more land cover types are concentrated in a sub-area and are uncommon in other parts of the region; and
- the land cover patterns within the RSA boundary being drawn show a low to moderate rate of change with increasing distance from the Project area.

See the document *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* for more information on establishing spatial boundaries.

21.8. Human health baseline

Baseline information is required on existing human health conditions to prepare the community health profiles. This information must include the current state of physical, mental and social well-being and incorporate a determinants of health approach to move beyond biophysical health considerations. In line with the World Health Organization's (WHO)[27] expanded definition of health in the context of the social determinants of health, a determinants of health approach recognizes that health is more than the absence of disease but rather a state of general well-being, which is influenced by a variety of factors (i.e. determinants). The structural and inequality factors of the socio-economic context would influence the conditions in which people are born, develop, live, work and age. Acting as intermediary factors, these same conditions would in-turn influence individual factors (called behavioural and biological factors), which directly affect physical and mental health. This approach recognizes the interdependence of environmental, health, social and economic VCs. The selection of determinants can guided by the following references:

- 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.

The following references contain best practices for health impact assessment methods, which the Proponent is encouraged to consult:

- *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; and
- *Health impact assessment. A guide for the oil and gas industry* by the International Association of Oil and Gas Producers (IPIECA).

[27] PHAC, 2018. Key Health Inequalities in Canada, Introduction Chapter.

21.9. Mitigation hierarchy

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.

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.

21.10. Compensation and offset plans

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 groups were involved in the development of the compensation plans. The Proponent must demonstrate how the information received from Indigenous groups has been taken into account, including the choice of compensation ratios, if applicable. The Proponent must also elaborate on how Indigenous groups 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*.

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 3:1 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).

With regard to offsetting plans for **fish and fish habitat**, each offsetting plan should include:

- 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.);
- exact locations for the proposed offsetting measures (latitude and longitude, lot number, municipality, regional municipality county, etc.) and property rights;
- 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.

21.11. Summary Tables

The Impact Statement must 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 in relation to potential effects and impacts;
- a 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 incidental effects[28] and the extent to which they are significant. According to the Act, effects that fall under federal jurisdiction are as follows:

[28] **According to the Act, direct or incidental 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.

- change to the following components of the environment that are within the legislative authority of Parliament:
  - fish and fish habitat, as defined in subsection 2(1) of the *Fisheries Act*;
  - aquatic species, as defined in subsection 2(1) of the *Species at Risk Act*; and
  - migratory birds, as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*.
- a change to the environment that would occur:
  - on federal lands,
  - in a province other than the one where the physical activity or the designated project is being carried out, or
  - outside Canada;
- with respect to the Indigenous peoples of Canada, an impact — occurring in Canada and resulting from any change to the environment — on:
  - physical and cultural heritage,
  - the current use of lands and resources for traditional purposes, or
  - any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and
- any change occurring in Canada to the health, social or economic conditions of the Indigenous peoples of Canada.

21.12. Additional guidance for biophysical components

Atmospheric environment

The following guidance should be consulted in conjunction with section 8.4.1 *Atmospheric environment*.

- project sources of air pollutant emissions include the following types of sources:
  - point sources: include power generation equipment (i.e. gensets), fire pump stacks, turbines, compressor engines, incinerators, exhaust vents and stacks from processing facilities, ventilation vents, boilers and other heating equipment, flares, idling transport vehicles and rail locomotives, fugitive emissions from storage tanks and leaks from gas pipes and other equipment. Where applicable, emissions from start-up and shut-down should be taken into account;
  - area sources: include material handling and transport, wind erosion of material piles, and fugitive emissions from ~~process~~ process, storage, and loading/unloading areas; and
  - mobile and road sources: include tailpipe emissions and fugitive dust emissions. Fugitive dust emission factors (e.g. road dust) and assumed mitigation (control efficiency) should be described and should be justifiable based on what is practicable. Tailpipe emission factors should be estimated using established methods. Include all off-road and on-road fleet vehicles used in the Project;

- when providing detailed methodology and assumptions used to estimate emissions, all relevant emissions factors should be provided and referenced. For all applicable emission sources, include the assumed Tier of emission standard for each emission factor applied.
  - For vehicles or equipment to be used on the Project site: include the vehicle descriptions for all vehicles and equipment and assumptions with activity data.
  - For material piles (fugitive emissions): provide the type and location of the material piles and the surface of each area.
  - For flaring: provide details of the occurrence of flaring and associated assumptions. Describe the anticipated frequency and duration of routine and non-routine flaring events. Describe the gas composition and volume under both normal and upset flaring conditions;
- for requirements pertaining to the use of atmospheric dispersion modelling, the Proponent should:
  - conduct modelling for a 5-year period, to account for variability in meteorology and baseline conditions;
  - conduct modelling for all relevant temporal scenarios (see section 7.3.1 *Temporal Boundaries*), including~~:~~ : the current case (i.e. current emission sources only), the base case (i.e. all existing emission sources plus projects already approved and under construction), a project-alone scenario (recommended in order to represent emissions from the Project only), the application case, the pre-commissioning case (i.e. application case plus projected industrial and urbanization growth by 2029 when the first stage of VCS-H Complex expansion is expected to start operation) and the planned development case; and
  - ensure appropriate domain boundaries. At a minimum, the modelling domain should enclose concentrations that are 10% of relevant air quality criteria;
- photochemical modelling may be necessary to model long range transport, as well as transformation processes that are beyond the capabilities of standard models, particularly for secondary organic aerosols (SOA) and acid deposition;
- the assessment of the Project's emissions of acidifying pollutants, and potential to adversely affect terrestrial and aquatic ecosystems in the region, should include Eastern and Central Alberta and Western Saskatchewan;
- for requirements pertaining to the use of modelling for acidifying deposition, the Proponent should consider the following technical requirements:
  - model simulations should be for a minimum of 1 year and should be conducted at minimum for the current case, base case and the application case;
  - the model's horizontal resolution should comprise a horizontal grid cell size equal to or less than 12 kilometres within the region modelled;
  - the model chosen should be capable of a rigorous representation of gas and particle chemistry and physics and long range transport, to provide an estimate of acidifying deposition, and must include the explicit treatment of the following key processes:
    - chemical mechanism similar in complexity to the following mechanisms: Carbon-Bond4, Carbon-Bond5, SAPRC07, SAPRC11, RACM2, ADOMII,
    - gas dry deposition,
    - size-resolved particle dry deposition,
    - cloud (aqueous) chemistry, particle uptake into and formation from clouds and rain drops,

- wet deposition from clouds to the surface,

- size-resolved particle microphysics (particle nucleation, condensation, coagulation as a function of particle size),
- inorganic particle heterogeneous chemistry, and
- SOA formation; and

○ key chemical species the model must include are: size resolved chemically speciated particles (particle sulphate, nitrate, ammonium, base cations, water soluble iron and manganese, primary organics, secondary organics, sea-salt, black carbon, crustal material), gases (including to NO, NO_2, SO_2, H_2O_2, speciated volatile organic compounds, ozone, NH_3, HNO_3, PAN, HONO, HNO_4, one or more organic nitrates, N_2O_5), and ions within precipitation (SO_4^{2-}, HSO_3^-, NH_4^+, base cations). The model must include the dry (gases, particles) and wet (ions in solution) deposition fluxes of these species.

Wetlands

The following guidance should be consulted in conjunction with section 8.6 *Vegetation and riparian, wetland and terrestrial environments*.

With regards to the wetlands functions assessment, the Proponent should:

- complete the assessment for a representative selection of wetlands that the Project would directly impact and for a representative selection of wetland(s) that are hydrologically connected. In conducting this assessment, the Proponent should ensure that wetlands are considered in the context of:
  - the larger watersheds of which they are a part;
  - adjacent land use with a focus on hydrological and other functions;
  - landscape and/or watershed considering topography, soil types and hydrological linkages; and
  - the global significance of peatlands across the RSA;
- collect data from representative wetlands in a manner that enables reliable extrapolations in space (i.e. at minimum to the Project area, LSA and RSA) and in time (i.e. across years), including:
  - design surveys so that they represent the spatial and temporal targets of modeling and extrapolations, and to produce scientifically defensible predictions of effects and estimates of mitigation effectiveness.
    - Survey designs should be sensitive enough to detect and quantify the effects at the appropriate spatial and temporal scales, any departures from predictions, and the effectiveness of mitigations. Justify the selection of modeling techniques based on current and recent scientific literature;
  - plan survey protocol for representative wetlands to include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options.
    - Sample size must be planned to support evaluation of the Project study area within the context of the LSA and RSA. Appropriate design of surveys will need to consider multiple survey locations in order to represent the wetland heterogeneity of the RSA, and to yield multiple survey locations per wetland type, without requiring aggregation of habitat classes post-hoc;

- provide this assessment in a quantitative form and include the collection of site-specific baseline information on wetland functions, including:
  - surveys to assess for the presence, abundance, density, and distribution of migratory birds and federally listed species at risk, provincially listed species at risk, and species assessed by COSEWIC as at-risk in relation to potentially affected wetlands and associated riparian areas. Surveys should meet appropriate standards, be species or bird group specific as appropriate, and be conducted during the appropriate times of the year as specified in the following section for *Birds and their habitat*. Surveys for species at risk should assess species individually where possible (typically an indicator approach is not appropriate for species at risk). Surveys should not be limited to species or groups of species that are wetland-obligate, but rather should include any species known to use wetland habitats as part of its lifecycle. Data should be sufficiently robust to identify which wetland classes are important to which species (and for how many);
  - the location and a description of the biological characteristics of each potentially affected wetland and the ecological services and functions (hydrology, biochemical cycling, habitat, climate) they provide. The functions assessment should be as specific as possible to the biological characteristics of the wetland and to the ecological services and functions it provides; and
  - a supporting rationale and detailed description of the methods used in completing the wetland functions assessment, including sampling design;
- submit complete data sets from any survey sites, including GIS files, compliant with the requirements outlined in section 21.5 *Geospatial data requirements*; and
- contact the relevant provincial and local government authorities to determine if other wetland conservation policies, regulations or wetland compensation guidelines apply. See also resources available from The Wetland Network.

Birds and their habitat

The following guidance should be consulted in conjunction with section 8.8 *Birds, migratory birds and their habitat*:

- the proponent should consider and assess the following groups of migratory and non-migratory birds separately: waterfowl, water birds (other than waterfowl), songbirds, shorebirds, each bird species at risk and their habitat;
- in order to establish adequate baseline conditions for birds, the Proponent should take into account the following technical recommendations:
  - collect bird data to adequately represent the following temporal sources of variation: among years, within and among seasons (e.g., spring migration, breeding, fall migration, overwintering), and within the 24-hour daily cycle;
  - collect and include explanatory data (i.e. covariates) necessary for modeling in such a way as to adequately represent the following sources of variation: land cover composition, soil type, geomorphology, hydrological processes, and variation in climatic conditions, inter- and intra-annually;

- collect data in a manner that enables reliable extrapolations in space (i.e. at minimum to the Project area, LSA and RSA) and in time (i.e., across years);
- design surveys so that they represent the spatial and temporal targets of modeling and extrapolations, and to produce scientifically defensible predictions of impacts and estimates of the effectiveness of mitigation measures. Survey designs should be sensitive enough to detect and quantify: the impacts at the spatial and temporal scales identified above (i.e. project area, LSA, RSA), any departures from predictions, and the effectiveness of mitigation measures. Justify the selection of modeling techniques based on current and recent scientific literature;
- survey protocol planning should include modeling and simulations to estimate sampling requirements and analysis to evaluate resulting survey options. It is recommended to:
  - collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability;
  - plan sample size to support evaluation of the Project study area within the context of the local study area and regional study area. Appropriate design of surveys will need to consider multiple survey locations in order to represent the habitat heterogeneity of the RSA, and to yield multiple survey locations per land cover or habitat class, without requiring aggregation of habitat classes post-hoc;
  - design sampling effort per unit area - field survey effort to be most intensive within the Project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the LSA, but should be scaled to the likelihood that project effects will effect birds within that zone. Efforts outside the Project study area should be carefully designed to ensure that estimates comparing within and across the Project area, LSA, and RSA are unbiased and as precise as possible; and
  - sse simulation modelling to assess bias and precision between project area, LSA, and RSA to ensure the estimates are useful for comparison;

- when selecting metrics to characterize avifauna biodiversity, it is recommended that:
  - biodiversity metrics should include the following: distribution in space, frequency of occurrence, occurrence and abundance trends in time, abundance and density, as well as the types of associated habitats and the strength of the associations; and
  - 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;

- when estimating for the abundance and distribution of migratory and non-migratory birds, the Proponent should:
  - base estimates on existing information, or additional surveys, as appropriate, to provide current data sufficient for reliable estimates. At minimum, the combined information from existing data and field surveys needs to be detailed enough to describe the distribution and abundance of all bird species in relation to the study areas;

- generate measures of abundance and distribution using spatially balanced, randomly selected sample locations. Sampling should include edges and transitions between habitat types and should not be focused exclusively within homogeneous patches of a given habitat type.
  - Use simulation modelling prior to sampling to ensure coverage is broad enough to estimate and account for detection error as well as provide unbiased estimates of abundance and distributions.
  - 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 for all estimates of abundance and distribution. Define estimates by providing, for example, mean across years, mean across sites, and modeled prediction. If appropriate, define confidence or other intervals such as 95% confidence intervals or other credible intervals. The use of hypothesis testing p-values is generally not appropriate in this context and their use should be justified;
- whenever estimating densities for species, consider observer-induced detection error for comparisons among counts to be valid (e.g. between, before and after surveys, or between affected and unaffected sites). When accounting for detection error the method used should account for variable detection between land cover types, observers, weather, time of year, species, as well as random variation between visits. Simulation methods can help determine if a specific method is appropriate for a given survey design and analysis. Care should be taken to avoid affecting the reliability of abundance estimates[29];
- use a spatially dispersed stratified random sampling approach to maximize efficiency. Sample sites should be selected with a randomization procedure that accounts for the Project design footprint. To select specific sampling sites, care should be taken to ensure sites are spatially distributed across the area of interest and coverage is obtained across habitat types. Site locations should be randomly selected using an approach that avoids implicit bias in site selection;
- provide a justification on the approach chosen and include all criteria used to choose plot locations. If necessary to constrain or adjust site selection based on access limitations, simulation modelling should provide evidence that this sampling strategy has not resulted in the introduction of bias; and
- survey vegetation features of concern in a manner that is not disproportionate to other types. Avoid bias in estimates of abundance and impair extrapolation and statistical inference;

- the following must be considered when identifying areas of concentration of migratory birds:
  - migratory bird concentrations can vary within a year and between years. It is therefore important to survey across the Project study area, LSA, and RSA both temporally and spatially; and
  - migratory bird counts are dependent on length of stay as well as presence. Attempt to estimate abundances across a migratory period should incorporate an estimate of inter and intra-annual trends and estimates of lengths of stay. Irruptive species may act in ways similar to migrants in

[29] see Barker et al. 2018 Biometrics: https://onlinelibrary.wiley.com/doi/full/10.1111/biom.12734

terms of abundance. They may be absent from an area until conditions change (such as a mast event), during which time the habitat becomes vital to these species;

- to quantify trophic linkages in the Project area and the LSA, the Proponent should consider using Structural Equation Models;
- in the baseline description for bird habitats, the Proponent should include at a minimum, characterization of biophysical conditions with regard to ecoregion and BCR, and include local aerial and on-site photos. Habitat surveys need to be detailed enough within the LSA and RSA to provide context for local and regional habitat availability and quality.
  - For example, mixed wood forest land cover and other upland vegetation types may be particularly important for many forest associated birds, supporting birds during migration, breeding and through the winter. Wetlands including marshes are ecologically important elements of the landscape. River riparian corridors with adjacent mixed wood forest are another relatively uncommon feature.
  - Should there be anticipated displacement of nesting birds, baseline data should provide evidence that there is enough equivalent habitat for birds to be displaced to and that the habitat being removed is not unique to the Project area or region. This information may serve to inform reclamation planning; and
- the Proponent should curate survey data and analyses in such a way that it may be made available to participants for review upon request. It is recommended that the Proponent be prepared to:
  - provide raw survey data and analysis results for 1) all birds, 2) each VC, and 3) BCR priority species showing the species ranked according to: frequency of occurrence[30], abundance, abundance in each habitat type;
  - data sets from all survey sites should be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation/visit information and with observations and measurements in un-summarized form;
  - provide documentation and digital files for all results of analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation); and
  - the analysis of predicted effects on birds should:
    - 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;
    - explore, wherever possible, non-linear, indirect and synergistic responses to the Project; and
    - justify any assumptions regarding relocation or temporary displacement during construction and operation of the Project by using scientific references.

30 Frequency of occurrence: % frequency for Species A = (# sampling locations in which Species A detected / total # sampling locations) * 100

Wildlife

The following guidance should be consulted in conjunction with section 8.9 *Wildlife and their habitat*

For wildlife surveys, the Proponent should:

- collect data to represent the 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;
- rare species require more survey effort to detect than common species, and this needs to be accounted for in survey design by increasing the number and duration of surveys; and
- the Proponent should curate survey data and analyses in such a way that it may be made available to participants for review upon request. It is recommended that the Proponent be prepared to:
  - submit complete data sets from all survey sites. These should be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation/visit information and with observations and measurements in un-summarized form; and
  - provide documentation and digital files for all results of analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation).

Species at Risk

The following guidance should be consulted in conjunction with sections 8.8 *Birds, migratory birds and their habitat* and 8.9 *Wildlife and their habitat* :

- the preliminary list of species at risk that may use the Project study area and local study area is as follows:
  - northern leopard frog (*Lithobates pipiens*);
  - western tiger salamander (*Ambystoma mavortium*);
  - bank swallow (*Riparia riparia*);
  - evening grosbeak (*Coccothraustes vespertinus*);
  - horned grebe (*Podiceps auratus*);
  - olive-sided flycatcher (*Contopus cooperi*);
  - rusty blackbird (*Euphagus carolinus*);
  - short-eared owl (*Asio flammeus*);
  - **Sprague's pipit (***Anthus spragueii*);
  - western grebe (*Aechmophorus occidentalis*);
  - yellow rail (*Coturnicops noveboracensis*);
  - gypsy cuckoo bumble bee (*Bombus bohemicus*);

- nine-spotted lady beetle (*Coccothraustes vespertinus*[31]);
- transverse lady beetle (*Coccinella transversoguttata*[32]);
- western toad (*Anaxyrus boreas*);
- barn swallow (*Hirundo rustica*);
- Canada warbler (*Cardellina canadensis*);
- common nighthawk (*Chordeiles minor*);
- peregrine falcon (*Falco peregrinus anatum / tundrius*);
- little brown myotis (*Myotis lucifugus*);
- northern myotis (*Myotis septentrionalis*); and
- American badger (*Taxidea taxus taxus*).

- the Proponent should 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 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;
- for surveys of species at risk, the Proponent should:
  - 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:
    - collect data in order to represent sources of time variation between years, during and between seasons (e.g. spring dispersal and 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 LSAs and RSAs. Survey design will need to consider multiple number of survey locations in order to represent the habitat heterogeneity of the regional study area, and to plan the number of survey locations per land cover or habitat class so that aggregation of habitat classes post-hoc is not required. 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 LSAs, 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

[31] Nine-spotted Lady Beetle was designated Endangered by COSEWIC and is not on SARA Schedule 1 but is under consideration for status change

[32] Transverse Lady Beetle was designated Special Concern and is not on SARA Schedule 1 but is under consideration for status change.

that comparative estimates between the Project area, LSAs and RSAs 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 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;

- the Proponent should consult provincial government experts on appropriate survey methods for bats, document baseline conditions in the Project area and LSA, and provide a rationale for the methodology used. It is recommended to:
  - 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 evaluate and justify decisions regarding 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, ensure study design is statistically valid; and
    - 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;
  - include, in data or reports, 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 a 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

- take into account that when results are compared from year to year, the survey schedule, the equipment and the installation protocols must remain consistent from year to year.

- concerning the description of the effects on bats, the Proponent should:
  - consider all effects on overwintering habitat (hibernacula, such as caves, abandoned mines and wells); summering habitat (roosting and foraging habitats, including maternity roosts), swarming habitat (used in late summer and early fall for mating and socializing), and movement corridors when assessing effects on local and regional populations; and
  - identify potential resting areas, maternity roosts, hibernacula, foraging 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; and
- for the analysis of effects on species at risk, it is recommended to provide a separate analysis 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.

Habitat features

In the baseline and effects descriptions concerning habitats for wildlife, including bird and species at risk, the Proponent should identify and consider the following habitats features and important landscape characteristics:

- waterbodies, wetlands and watercourses,
- riparian habitat, stream or river banks or other eroded habitats,
- artificial water sources,
- forests, trees patches, solitary trees, decaying trees, snags,
- forest edges and rows of trees,
- ridges, caves, mines,
- talus,
- karst topography,
- buildings, bridges and other anthropogenic features, including linear features (e.g. roads, electrical transmission lines),
- sources of artificial lighting attracting insects,
- critical habitat of species at risk, and
- any other habitat feature known to be important.

22. Annex I -Final Terms of Reference for the provincial environmental assessment

[English only]

Also available at: https://open.alberta.ca/dataset/12223699-fa73-423f-b165-3e49240ba721/resource/40e20836-2bb7-42a9-a1d7-06daa084eed3/download/ftor-vcs-heartland-complex-expansion-~~project.pdf~~