



Environmental Protection Operations
Environmental Protection Branch
Pacific and Yukon
201-401 Burrard Street
Vancouver, BC V6C 3S5

August 29, 2016

ECPT: 16-0701

Quincy Leung
Project Manager
Canadian Environmental Assessment Agency
410 – 701 West Georgia Street
Vancouver, BC V7Y 1C6

Dear Mr. Leung:

**Re: Environmental Assessment of the Proposed Kitimat Clean Refinery Project –
Environment and Climate Change Canada Comments on the Draft EIS Guidelines**

Environment and Climate Change Canada (ECCC) has completed a review of the following document provided by the Canadian Environmental Assessment Agency (Agency) on July 14, 2016:

- *Draft Guidelines for the Preparation of an Environmental Impact Statement pursuant to the Canadian Environmental Assessment Act, 2012. Kitimat Clean Refinery Project. Kitimat Clean Ltd.*

Departmental comments on the draft EIS Guidelines are offered in Appendix A, as attached, and are based on the expertise available for the review period. Supplemental to these comments, please find the following appendices attached as they pertain to ECCC mandate and guidance:

- Appendix B provides an overview of the departmental mandate for migratory birds and species at risk as context for the comments offered in Appendix A.
- Appendix C, the *Federal Policy on Wetland Conservation – Guidance for Application and Implementation in Environmental Assessment*, provides context for the comments offered in relation to wetland and wetland functioning.
- To further assist the Agency in fulfilling their obligations under Section 79 of the *Species at Risk Act* (SARA), and in support of the comments provided in Appendix A for Marbled Murrelet and Western Toad, additional guidance is provided for these species in Appendices D and E.

The following general advice related to environmental emergencies is proactively offered as it may benefit the Proponent to be aware of applicable regulatory requirements when advancing project plans.

Environmental Emergencies - Regulatory Context for Consideration During Project Planning

Environmental emergencies involving spills or releases of hazardous substances have potential implications both under the *Fisheries Act*, for spills to water and the requirement to report them, and the *Environmental Emergency Regulations* (E2 Regulations) of the *Canadian Environmental Protection Act, 1999* (CEPA 1999), for spills and releases, including their reporting.

Environmental Emergencies

- i. Details of the proponent's emergency spill response training and exercise regimes for spills of hydrocarbon and marine fuels to water should be provided. The proponent should identify the long-term actions it would undertake to remediate spill-affected lands and waters.
- ii. With regard to the development and/or use of a marine shipping terminal, proponents should consider conducting shoreline classification and sensitivity mapping in strategic areas near the marine terminal and adjacent to vessel transit routes (if this information has not already been collected by other stakeholders) in order to prepare for possible vessel collisions or groundings that have the potential to release other fuel types such as marine diesel and Bunker fuel oil to the near-shore marine environment. ECCC's established characterization criteria detailed within **A Field Guide to Oil Spill Response on Marine Shorelines**¹ is a useful guide for this.
- iii. The Proponent should consider developing an Emergencies Communications Plan for the surrounding communities that would: (1) proactively educate and inform area residents to the E2 substances stored and utilized on-site as well as to the types of accidents that could occur, including likely incident response actions; and (2) provide emergency instructions to area residents (such as shelter in place and evacuation directions) during an emergency incident at the facility.

Monitoring and Environmental Management Plan

ECCC will request that commitments to the following be included in the Monitoring and Environmental Management Plan:

- i. Environmental management systems that include response plans (based on CSA Standard CAN/CSA Z731-03 current version) with proper roles and responsibilities; and
- ii. Maintaining evergreen documents with yearly testing and updating.

Environmental Emergency Plan Requirements

Although the requirements of the *Environmental Emergency Regulations* (E2 Regulations) respecting certain substances listed in the Project Description (such as propane) need not be considered during the environmental assessment phase of a new project, the following information respecting the Environmental Emergency Plan (E2 Plan) requirements is offered due to the many similarities that exist between the E2 Plan and Spill Contingency Plan content.

Some of the refinery products (such as gasoline, propane and butane) are listed in Schedule 1 of the E2 Regulations. The E2 Regulations apply to any person who owns or has the charge, management or control of a listed substance that:

¹ Environment Canada. *A Field Guide to Oil Spill Response on Marine Shorelines*, 2010.
<http://publications.gc.ca/site/eng/9.651914/publication.html>

- Is at or above the quantity set out in column 3 of Schedule 1 of the E2 Regulations at any time during a calendar year; or,
- Is at a quantity greater than zero and is stored in a container that has a maximum capacity equal to or exceeding the threshold quantity for that substance (see subsection 3(1) of the E2 Regulations).

Proponents must prepare, implement and test an Environmental Emergencies Plan if:

1. A facility has a substance listed in column 1 of Schedule 1 of the E2 Regulations (except for substances in paragraph 4(1) (b) of the E2 Regulations) and:
 - the total quantity of the substance on site equals or exceeds the threshold size (listed in column 3 of Schedule 1); and,
 - the substance is stored in a container that has a maximum capacity equal to or above the threshold stipulated;

OR

2. A facility has a substance in column 1 of Part 1 of Schedule 1 and is a component in a mixture, other than a mixture that is a substance set out in column 1 of Schedule 1, and:
 - the mixture is in a quantity that is equal to or exceeds 4.5 tonnes; and,
 - the mixture is in a storage container that has a maximum capacity equal to or exceeding 4.5 tonnes.

Thank you for the opportunity to review the draft guidelines. Please do not hesitate to contact Phil Wong (Tel: 604-666-2699) or Al Hodaly (Tel: 604-666-6568) should you have any questions or require additional information.

Yours sincerely

<Original signed by>



Al Henry Hodaly
A/Head, Environmental Assessment (PYR-South)
Environment and Climate Change Canada

Attach. (5)

APPENDIX A

ENVIRONMENT AND CLIMATE CHANGE CANADA DEPARTMENTAL COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT GUIDELINES FOR THE KITIMAT CLEAN REFINERY PROJECT

DRAFT GUIDELINES FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT

pursuant to the
Canadian Environmental Assessment Act, 2012

KITIMAT CLEAN REFINERY PROJECT
KITIMAT CLEAN LTD.

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DISCLAIMER

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

Abbreviations and Short Forms

CEAA 2012: *Canadian Environmental Assessment Act, 2012*

Agency: Canadian Environmental Assessment Agency

EA: environmental assessment

EIS: environmental impact statement

VC: valued component

Part 1 - Key Considerations

1. INTRODUCTION

The purpose of this document is to identify for the proponent the minimum information requirements for the preparation of an Environmental Impact Statement (EIS) for a designated project ^[1] to be assessed pursuant to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). This document specifies the nature, scope and extent of the information required. Part 1 of this document defines the scope of the environmental assessment (EA) and provides guidance and general instruction that must be taken into account in preparing the EIS. Part 2 outlines the information that must be included in the EIS.

Section 5 of CEAA 2012 describes the environmental effects that must be considered in an EA, including changes to the environment and effects of changes to the environment. The factors that are to be considered in an EA are described under section 19 of CEAA 2012. The Canadian Environmental Assessment Agency (the Agency) or a review panel will use the proponent's EIS and other information received during the EA process to prepare a report that will inform the issuance of a decision statement by the Minister of Environment and Climate Change. Therefore the EIS must include a full description of the changes the project will cause to the environment that may result in adverse effects on areas of federal jurisdiction (i.e. section 5 of CEAA 2012) including changes that are directly linked or necessarily incidental to any federal decisions that would permit the project to be carried out. The EIS must also include a list of key mitigation measures that the proponent proposes to undertake in order to avoid or minimize any adverse environmental effects of the project. It is the responsibility of the proponent to provide sufficient data and analysis on potential changes to the environment to ensure a thorough evaluation of the environmental effects of the project by the Agency or review panel.

2. GUIDING PRINCIPLES

2.1. Environmental assessment as a planning and decision making tool

Environmental assessment (EA) is a process to predict environmental effects of proposed projects before they are carried out. An EA:

- identifies potential adverse environmental effects;
- proposes measures to mitigate adverse environmental effects;
- predicts whether there will be significant adverse environmental effects, after mitigation measures are implemented; and
- includes a follow-up program to verify the accuracy of the EA and the effectiveness of the mitigation measures.

2.2. Public participation

One of the purposes identified in CEAA 2012 is to ensure that opportunities are provided for meaningful public participation during an EA. CEAA 2012 requires that the Agency provide the public with an opportunity to participate in the EA. For EAs led by the Agency the public has an opportunity to comment on the draft EA report. For EAs by a review panel, CEAA 2012 requires that the review panel hold a public hearing. Additional opportunities for participation may also be provided.

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

2.3. Engagement with Indigenous Groups

A key objective of CEAA 2012 is to promote communication and cooperation with Aboriginal peoples which includes First Nations, Inuit and Métis. The proponent is expected to engage with potentially affected groups, beginning as early as possible in the project planning process. The proponent shall provide potentially affected groups with opportunities to learn about the project and its potential effects and to make their concerns known about the project's potential effects and discuss measures to mitigate those effects. The proponent is strongly encouraged to work with potentially affected groups to establish an engagement approach. The proponent will make reasonable efforts to integrate Aboriginal traditional knowledge into the assessment of environmental effects. For more information on incorporating Aboriginal traditional knowledge, refer to Part 1, section 4.2.2 of these Guidelines.

In order to fulfill the Crown's constitutional obligations to consult with potentially impacted groups, the Agency integrates its legal obligation for consultation and accommodation in the EA process. The information gathered by the proponent during its engagement with groups helps to contribute to the Crown's understanding of any potential adverse impacts on potential or established Aboriginal or treaty rights protected under section 35 of the *Constitution Act, 1982*^[2] ("section 35 Aboriginal rights") including title and related interests, and the effectiveness of measures proposed to avoid or minimize those impacts.

2.4. Application of the precautionary approach

In documenting the analyses included in the EIS, the proponent will demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner in order to avoid significant adverse environmental effects.

3. SCOPE OF THE ENVIRONMENTAL ASSESSMENT^[3]

3.1. Designated Project

On May 6, 2016, Kitimat Clean Ltd. , the proponent of the Kitimat Clean Refinery Project provided a project description to the Agency. Based on this project description, the Agency has determined that an EA is required under CEAA 2012 and will include the construction, operation, decommissioning and abandonment of the following project components:

- Bitumen receiving facility
 - Rail yard off-loading facility
 - Unloading racks
 - Rail tracks
 - Stacks
- Refinery site
 - Atmospheric distillation unit
 - Vacuum distillation unit
 - Resid hydrocracker integrated with a solvent deasphalting unit (SDA)
 - Vacuum gas oil (VGO) hydrocracker
 - Distillate hydrotreater
 - Sulphur recovery unit
 - Steam methane reformer

Comment [ptw1]: While not identified in the Project Description, refineries in Canada typically have a blending facility to add ethanol (which is required under Renewable Fuels Regulations for products sold in Canada). Although refined products may not currently be intended for use in Canada, markets could change in future; as such, please indicate whether a blending facility will be a component of the Refinery Site.

- Naphtha hydrotreatment unit
- Pitch gasification unit
- Syngas sweetening
- Fischer-Tropsch with mild hydrocracker
- Air separation unit
- Flare system and associated stacks
- Tank farm
 - Bitumen storage tanks
 - Intermediate product storage tanks
 - Processed fuel storage tanks
- Non-hydrocarbon storage systems
- Other stacks throughout the refinery.
- Supporting Infrastructure:
 - Power generators
 - Emission stacks for the gas turbine generators
 - Transmission line
 - Tail gas and fuel gas system
 - Boiler feedwater (BFW) and condensate system
 - Cooling water system
 - Plant and instrument air system
 - Nitrogen system
 - Firewater system
 - Closed blowdown system
 - Groundwater wells
 - Surface water management ponds and diversion structures
 - Water treatment plant
 - Waste incinerator
 - Administration facilities, offices and parking
 - Access road and up to 6 bridge upgrades; new site roads
 - Temporary construction work camp
 - Laydown areas.
- Rail spur line connecting the CN main rail line and the rail yard
- Natural gas supply pipeline connecting the main natural gas pipeline to the refinery
- Fuel delivery pipeline corridor
 - Diesel pipeline
 - Jet fuel pipeline
 - Gasoline pipeline
- Marine terminal facility
 - Deep water vessel berth
 - loading platform with Gangway tower;
 - Breasting dolphins;
 - Mooring dolphins or shore moorings;
 - Access trestles and catwalks;
 - Mooring systems
 - Utility berth
 - Material off-loading facility
 - Temporary laydown areas
 - Dredge stockpile area

- Pipeline pig launch facility
- Surge tank facilities
- Supporting infrastructure:
 - Administration facilities, offices and parking
 - Site roads.

3.2. Factors to be considered

Scoping establishes the parameters of the EA and focuses the assessment on relevant issues and concerns. Part 2 of this document specifies the factors to be considered in the EA, including the factors listed in subsection 19(1) of CEAA 2012:

- environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other physical activities that have been or will be carried out;
- the significance of the effects referred to above;
- comments from the public;
- mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;
- the requirements of the follow-up program in respect of the project;
- the purpose of the project;
- alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- any change to the project that may be caused by the environment; and
- the results of any relevant regional study pursuant to CEAA 2012.

Under the authority of paragraph 19(1)(j) of CEAA 2012, the Agency also requires consideration of the following additional factors ^[4]:

- an estimate of upstream greenhouse gas emissions that are linked to the project. This information should be presented by individual pollutant and should be summarized in CO2 equivalent units per year; and
- the environmental effects of marine shipping associated with the Project, including the environmental effects of malfunctions or accidents and any cumulative environmental effects, the significance of those effects, suggested mitigation measures and follow-up program requirements.

3.2.1. Changes to the Environment

Environmental effects occur as interactions between actions (the carrying out of the project or decisions made by the federal government in relation to the project) and receptors in the environment, and subsequently between components of the environment (e.g., change in water quality that may affect fish).

Under CEAA 2012, an examination of environmental effects that result from changes to the environment as a result of the project being carried out or as a result of the federal government

Comment [ptw2]: Given that the Proponent is anticipated to have a tanker vetting process in place, ECCC supports consideration of marine shipping in the EA. ECCC is aware of the high level of concern Indigenous groups have expressed regarding shipping in the area and how it may impact the current use of lands and resources for traditional purposes. However, rather than consideration of marine shipping as a factor under paragraph 19(1)(j), it should be a recognized part of the project and subject to determinations of impact significance and the identification of conditions. The manner and extent to which rail transport and the electricity transmission line is to be scoped into assessment should also be clarified in this regard.

exercising any power duty or function that would allow the project to be carried out must be considered in the EIS.

In scoping the potential changes to the environment that may occur, the proponent should consider any potential changes in the physical environment such as changes to air quality, water quality and quantity, and physical disturbance of land that could reasonably be expected to occur.

3.2.2. Valued components to be examined

Valued components (VCs) refer to environmental biophysical or human features that may be impacted by a project. The value of a component not only relates to its role in the ecosystem, but also to the value people place on it. For example, it may have been identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance.

The proponent must conduct and focus its analysis on VCs as they relate to **section 5 of CEAA 2012**, including the ones identified in section 6.2 (Part 2) of these Guidelines that may be affected by changes in the environment, as well as species at risk and their critical habitat as per the requirement outlined in section 79 of the *Species at Risk Act*. Section 5 of CEAA 2012 defines environmental effects as:

- a change that may be caused to fish and fish habitat, marine plant and migratory birds;
- a change that may be caused to the environment on federal lands, in another province or outside Canada;
- with respect to aboriginal peoples, an effect of any change that may be caused to the environment on:
 - health and socio-economic conditions;
 - physical and cultural heritage;
 - the current use of lands and resources for traditional purposes; or
 - any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.
- For projects requiring a federal authority to exercise a power or perform a duty or function under another Act of Parliament:
 - a change, other than the ones mentioned above, that may be caused to the environment and that is directly linked or necessarily incidental to the exercise of the federal power or the performance of a duty or function; and
 - the effect of that change, other than the effects mentioned above, on:
 - health and socio-economic conditions;
 - physical and cultural heritage; or
 - any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

The list of VCs to be presented in the EIS will be completed according to the evolution and design of the project and reflect the knowledge acquired through public consultation and engagement with Indigenous groups. The EIS will describe what methods were used to predict and assess the adverse environmental effects of the project on these components.

The VCs will be described in sufficient detail to allow the reviewer to understand their importance and to assess the potential for environmental effects arising from the project activities. The EIS will provide a rationale for selecting specific VCs and for excluding any VCs or information specified in these Guidelines. Challenges may arise regarding particular exclusions, so it is important to document the information and the criteria used to justify the exclusion of a particular VC or piece of information. Justification may be based on, for example, primary data collection, computer modelling, literature references, public participation or engagement with Indigenous groups, or expert input or professional judgement. The EIS will identify those VCs, processes, and interactions that either were identified to be of concern during any workshops or meetings held by the proponent or that the proponent considers likely to be affected by the project. In doing so, the EIS will indicate to whom these concerns are important (i.e. the public or Indigenous groups) and the reasons why, including environmental, cultural, historical, social, economic, recreational, and aesthetic considerations, and traditional knowledge. If comments are received on a component that has not been included as a VC, these comments will be summarised and the rationale for excluding the VC will address the comments.

3.2.3. Spatial and Temporal boundaries

The spatial and temporal boundaries used in the EA may vary depending on the VC and will be considered separately for each VC, including for VCs related to the current use of lands and resources for traditional purposes by Aboriginal peoples, or other environmental effects referred to under paragraph 5(1)(c) of CEAA 2012. The proponent is encouraged to consult with the Agency, federal and provincial government departments and agencies, local government and Indigenous groups, and take into account public comments when defining the spatial and temporal boundaries used in the EIS.

The EIS will describe the spatial boundaries, including local and regional study areas, of each VC to be used in assessing the potential adverse environmental effects of the project and provide a rationale for each boundary. Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential environmental effects, community knowledge and Aboriginal traditional knowledge, current or traditional land and resource use by Indigenous groups, ecological, technical, social and cultural considerations.

The temporal boundaries of the EA will span all phases of the Project determined to be within the scope of this EA as specified under section 3.1 above. If impacts are predicted after the Project decommissioning, this should be taken into consideration in defining boundaries. Community knowledge and Aboriginal traditional knowledge should factor into decisions around defining temporal boundaries.

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

4. PREPARATION AND PRESENTATION OF THE ENVIRONMENTAL IMPACT STATEMENT

4.1. Guidance

The proponent is encouraged to consult relevant Agency policy and guidance [\[5\]](#) on topics to be addressed in the EIS, and to liaise with the Agency during the planning and development of the EIS. The proponent is also encouraged to consult relevant guidance from other federal departments.

Submission of regulatory and technical information necessary for federal authorities to make their regulatory decisions during the conduct of the EA is at the discretion of the proponent. Although that information is not necessary for the EA decision, the proponent is encouraged to submit it concurrent with the EIS. While the EIS must outline applicable federal authorizations required for the Project to proceed, the proponent must provide information relevant to the regulatory role of the federal government. It should be noted that the issuance of these other applicable federal legislative, regulatory and constitutional requirements are within the purview of the relevant federal authorities, and are subject to separate processes post EA decision.

4.2. Use of information

4.2.1. Government expert advice

Section 20 of CEAA 2012 requires that every federal authority with specialist or expert information or knowledge with respect to a project subject to an EA must make that information or knowledge available to the Agency or review panel. The Agency will advise the proponent of the availability of pertinent information or knowledge or expert and specialist knowledge received from other federal authorities or other levels of government so that it can be incorporated into the EIS.

4.2.2. Community knowledge and Aboriginal traditional knowledge

Sub-section 19(3) of CEAA 2012 states that "the environmental assessment of a designated project may take into account community knowledge and Aboriginal traditional knowledge". For the purposes of these Guidelines, community knowledge and Aboriginal traditional knowledge refers to knowledge acquired and accumulated by a local community or an Indigenous group.

The proponent will incorporate into the EIS the community knowledge and Aboriginal traditional knowledge to which it has access or that is acquired through public participation and engagement with Indigenous groups, in keeping with appropriate ethical standards and obligations of confidentiality. The proponent will integrate Aboriginal traditional knowledge into all aspects of its assessment including both methodology (e.g., establishing spatial and temporal boundaries, defining significance criteria) and analysis (e.g., baseline characterization, effects prediction, development of mitigation measures). Agreement should be obtained from Indigenous groups regarding the use, management and protection of their existing traditional knowledge information during and after the EA. For more information on how Aboriginal traditional knowledge can be obtained and incorporated in the preparation of the EIS, please refer to the Agency's reference guide entitled "Considering Aboriginal traditional knowledge in EAs conducted under the *Canadian Environmental Assessment Act, 2012*".

4.2.3. Existing information

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

4.2.4. Confidential information

In implementing CEAA 2012, the Agency is committed to promoting public participation in the EA of projects and providing access to the information on which EAs are based. All documents prepared or submitted by the proponent or any other stakeholder in relation to the EA are included in the Canadian Environmental Assessment Registry and made available to the public on request, except where non-disclosure is deemed necessary by a review panel, should the environmental assessment of the Project be referred to a review panel. For this reason, the EIS will not contain information that:

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

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

4.3. Study strategy and methodology

The proponent is expected to respect the intent of these Guidelines and to consider the effects that are likely to arise from the Project (including situations not explicitly identified in these Guidelines), the technically and economically feasible mitigation measures that will be applied, and the significance of any residual effects. Except where specified by the Agency, the proponent has the discretion to select the most appropriate methods to compile and present data, information and analysis in the EIS as long as they are justifiable and replicable.

It is possible these Guidelines may include matters which, in the judgement of the proponent, are not relevant or significant to the Project. If such matters are omitted from the EIS, the proponent will clearly indicate it, and provide a justification so the Agency, review panel, federal authorities, Indigenous groups, the public and any other interested party have an opportunity to comment on this decision. Where the Agency or review panel disagrees with the proponent's decision, it will require the proponent to provide the specified information.

The assessment will include the following general steps:

- identifying the activities and components of the project;
- predicting potential changes to the environment;
- predicting and evaluating the likely effects on identified VCs;

- identifying technically and economically feasible mitigation measures for any significant adverse environmental effects;
- determining any residual environmental effects;
- considering cumulative effects of the project in combination with other physical activities that have been or will be carried out; and
- determining the potential significance of any residual environmental effect following the implementation of mitigation measures.

For each VC, the EIS will describe the methodology used to assess Project-related effects. The EIS could include an analysis of the pathway of the effects of environmental changes on each VC. The EIS will document where and how scientific, engineering, community knowledge and Aboriginal traditional knowledge were used to reach conclusions. Assumptions will be clearly identified and justified. All data, models and studies will be documented such that the analyses are transparent and reproducible. All data collection methods will be specified. The uncertainty, reliability, sensitivity and conservativeness of models used to reach conclusions must be indicated.

The EIS will identify all significant gaps in knowledge and understanding related to key conclusions, and the steps to be taken by the proponent to address these gaps. Where the conclusions drawn from scientific, engineering and technical knowledge are inconsistent with the conclusions drawn from Aboriginal traditional knowledge, the EIS will present each perspective on the issue and a statement of the proponent's conclusions.

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

If the baseline data have been extrapolated or otherwise manipulated to depict environmental conditions in the study areas, modelling methods and equations will be described and will include calculations of margins of error and other relevant statistical information, such as confidence intervals and possible sources of error. The proponent will provide the references used in creating their approach to baseline data gathering, including identifying where appropriate, the relevant federal or provincial standards. The proponent is encouraged to discuss the timeframe and considerations for its proposed baseline data with the Agency prior to submitting its EIS.

In describing and assessing effects to the physical and biological environment, the proponent will take an ecosystem approach that considers both scientific and community knowledge and

Aboriginal traditional knowledge and perspectives regarding ecosystem health and integrity. The proponent will consider the resilience of relevant species populations, communities and their habitats. The assessment of environmental effects on Aboriginal peoples, pursuant to paragraph 5(1)(c) of CEAA 2012, will undergo the same rigour and type of assessment as any other VC (including setting of spatial and temporal boundaries, identification and analysis of effects, identification of mitigation measures, determination of residual effects, identification and a clear explanation of the methodology used for assessing the significance of residual effects and assessment of cumulative effects). The proponent will consider the use of both primary and secondary sources of information regarding baseline information, changes to the environment and the corresponding effect on health, socio-economics, physical and cultural heritage and the current use of lands and resources for traditional purposes. Primary sources of information include traditional land use studies, socio-economic studies, heritage surveys or other relevant studies conducted specifically for the Project and its EIS. Often these studies and other types of relevant information are obtained directly from Indigenous groups. Secondary sources of information include previously documented information on the area, not collected specifically for the purposes of the Project, or desk-top or literature-based information. The proponent will provide Indigenous groups the opportunity to review and provide comments on the information used for describing and assessing effects on Aboriginal peoples (further information on engaging with Indigenous groups is provided in Part 2, Section 5 of this document). Where there are discrepancies in the views of the proponent and Indigenous groups on the information to be used in the EIS, the EIS will document these discrepancies and the rationale for the proponent's selection of information.

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

4.4. Presentation and organization of the Environmental Impact Statement

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

- Project name and location;
- title of the document, including the term "environmental impact statement";
- subtitle of the document;
- name of the proponent; and
- the date of submission of the EIS.

The EIS will be written in clear, precise language. A glossary defining technical words, acronyms and abbreviations will be included. The EIS will include charts, diagrams, tables, maps

and photographs, where appropriate, to clarify the text. Perspective drawings that clearly convey the various components of the Project will also be provided. Wherever possible, maps will be presented in common scales and datum to allow for comparison and overlay of mapped features.

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

4.5. Summary of the Environmental Impact Statement

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

- a concise description of all key components of the Project and related activities;
- a summary of the engagement with Indigenous groups, the public, and government agencies, including a summary of the issues raised and the proponent's responses;
- an overview of expected changes to the environment;
- an overview of the key environmental effects of the Project, as described under section 5 of CEAA 2012, and proposed technically and economically feasible mitigation measures;
- an overview of how factors under paragraph 19(1) of CEAA 2012 were considered; and
- the proponent's conclusions on the residual environmental effects of the Project, and the significance of those effects, after taking into account the mitigation measures.

The summary is to be provided as a separate document and should be structured as follows:

1. Introduction and EA context
2. Project overview
3. Alternative means of carrying out the project
4. Public participation
5. Engagement with Indigenous Groups
6. Summary of environmental effects assessment for each valued component, including:
 1. description of the baseline;
 2. anticipated changes to the environment;
 3. anticipated effects;
 4. mitigation measures;
 5. significance of residual effects.
7. Follow-up and monitoring programs proposed

The summary will have sufficient details for the reader to understand the Project, any potential environmental effects, proposed mitigation measures, and the significance of the residual effects. The summary will include key maps illustrating the Project location and key Project components.

Part 2 – Content of the Environmental Impact Statement

1. INTRODUCTION AND OVERVIEW

1.1. The proponent

In the EIS, the proponent will:

- provide contact information (e.g. name, address, phone, fax, email);
- identify itself and the name of the legal entity(ies) that would develop, manage and operate the Project;
- describe corporate and management structures;
- 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 EIS.

1.2. Project Overview

The EIS will describe the Project, key Project components and associated activities, scheduling details, the timing of each phase of the Project and other key features. If the Project is part of a larger sequence of projects, the EIS will outline the larger context.

The overview is to identify the key components of the Project, rather than providing a detailed description, which will follow in Section 3, Part 2 of this document.

1.3. Project Location

The EIS will contain a description of the geographical setting in which the Project will take place. This description will focus on those aspects of the Project and its setting that are important in order to understand the potential environmental effects of the Project. The following information will be included:

- the Universal Transverse Mercator (UTM) projection coordinates of the main Project site;
- current land use in the area;
- distance of the Project facilities and components to any federal lands;
- the environmental significance and value of the geographical setting in which the Project will take place and the surrounding area;
- environmentally sensitive areas, such as national, provincial and regional parks, ecological reserves, wetlands, estuaries, and habitats of federally or provincially listed species at risk and other sensitive areas;
- description of local communities; and

- traditionnal territories and/or consultation areas, treaty lands, Indian Reserve lands and Métis harvesting regions and/or settlements.

1.4. Regulatory framework and the role of government

The EIS will 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 their likely geographical scopes;
- legislation and other regulatory approvals that are applicable to the Project at the federal, provincial, regional and municipal levels;
- government policies, resource management plans, planning or study initiatives pertinent to the project and/or EA and their implications;
- whether a request will be or was made to Transport Canada's Marine Safety Directorate to undertake the TERMPOL review process ^[6];
- any treaty, self-government or other agreements between federal or provincial governments and Indigenous groups that are pertinent to the Project and/or EA;
- any relevant land use plans, land zoning, or community plans; and
- regional, provincial and/or national objectives, standards or guidelines that have been used by the proponent to assist in the evaluation of any predicted environmental effects.

2. PROJECT JUSTIFICATION AND ALTERNATIVES CONSIDERED

2.1. Purpose of the project

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

The EIS will also describe the predicted environmental, economic and social benefits of the Project. This information will be considered in assessing the justifiability ^[7] of any significant adverse residual environmental effects as defined in section 5 of CEAA 2012, if such effects are identified.

2.2. Alternative means of carrying out the project

The EIS will identify and consider the environmental effects of alternative means of carrying out the project that are technically and economically feasible. The proponent will complete the assessment of alternative means in accordance with the Agency's Operational Policy Statement entitled *"Addressing "Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act, 2012"*.

In its alternative means analysis, the proponent will address, at a minimum, the following Project components:

- transportation of the following, with means and routing considered:
 - raw materials, including pure bitumen;
 - products, including diesel, jet fuel, and gasoline;
 - by-products, propane, butane, and sulphur;
- access to the Project site;
- location of key Project components, including:
 - when and how the alternative locations would be considered;
- energy sources to power the Project site;
- management of water supply and waste water;
- water management and location of the final effluent discharge points; and
- carbon capture or greenhouse gas emission reduction strategy.

The Agency recognizes that projects may be in the early planning stages when the EIS is being prepared. Where the proponent has not made final decisions concerning the placement of Project infrastructure, the technologies to be used, or that several options may exist for various Project components, it shall conduct an environmental effects analysis at the same level of detail for each of the various options available (alternative means) within the EIS.

3. PROJECT DESCRIPTION

3.1. Project components

The EIS will describe the Project, by presenting the Project components, associated and ancillary works, and detailed description and other characteristics that will assist in understanding the environmental effects. This will include:

- all Project components as indicated in Part 1, section 3.1 as well as any third party facilities in which services are used to enable production;
- maps, at an appropriate scale, of the Project location, the Project components, boundaries of the proposed site with UTM coordinates, the major existing infrastructure, adjacent land uses and any important environmental features;
- water management facilities proposed to control, collect and discharge surface drainage and groundwater seepage to the receiving environment;
- permanent and temporary linear infrastructure (road, railroad, pipelines, power supply), identifying the route of each of these linear infrastructure, the location and types of structure used for stream crossings;
- storage areas for explosives and hazardous waste;
- drinking and industrial water requirements (source, quantity required, need for water treatment);
- energy supply (source, quantity);
- waste disposal (types of waste, methods of disposal, quantity);
- port infrastructure and facilities, specifying the types of vessels that will be used, the construction methods for the wharfs (backfilling, sheet piling, pile driving), as well as the dimensions of the wharfs, berthing areas, anchorage areas at the main terminal and in the navigation channel;
- dredging work (including any maintenance dredging anticipated), specifying the nature and volume of sediment, dredging methods (type of dredge, duration, frequency, etc.), surface area

Comment [ptw3]: Suggested addition since section 1.2 indicates that detailed description to be included here.

to be dredged, sediment management (land and aquatic), specifying the sediment disposal area, if necessary; and

- navigation activities (number and frequency of trips), size and types of vessels, anticipated vessel routes and anchorages, predicted percentage of increase in vessel traffic of similar size vessels resulting from the project, icebreaking activities (time of year, frequency, duration, expected start and end dates), and ballast water management.

3.2. Project activities

The EIS will include descriptions of the construction, operation, decommissioning and abandonment associated with the proposed Project.

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

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

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

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

The information will include a description of:

3.2.1. Site preparation and construction

- site clearing and excavation;
 - construction of the refinery, fuel delivery pipeline corridor, and marine terminal;
 - construction of access roads and rail yard;
 - borrow materials requirement (source and quantity);
 - water management, including water diversions, dewatering or deposition activities required (location, methods, timing);
 - equipment requirements (type, quantity);
 - administrative buildings, garages, other ancillary facilities;
 - construction camp (location, capacity, wastewater treatment);
 - number of employees and transportation of employees; and
 - storage and management of hazardous materials, fuels and residues.
-
- **3.2.2. Operation** description of crude slate for the facility (the availability of crude feedstock and the potential change of crude slate)
 - storage, handling and transport of materials;

- water management on the Project site including storm water, process water, wastewater, water recycling and effluent treatment (quantity, treatment requirements, release point(s));
- storage and handling of reagents, petroleum products, chemical products, hazardous materials and residual materials;
- air quality management, including carbon capture, power generation and flaring;
- waste management and recycling; and
- characterization and management of workforce, including transportation, work schedules and lodging.

3.2.3. Decommissioning and abandonment

- the preliminary outline of a decommissioning and reclamation plan for any components associated with the Project;
- the ownership, transfer and control of the different Project components;
- the responsibility for monitoring and maintaining the integrity of the remaining structures; and
- for permanent facilities, a conceptual discussion on how decommissioning and abandonment could occur.

4. PUBLIC PARTICIPATION AND CONCERNS

The EIS will describe the ongoing and proposed public participation activities that the proponent will undertake or that it has already conducted on the Project. It will 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 EIS will indicate the methods used, where the consultation was held, the persons and organizations consulted, the concerns voiced and the extent to which this information was incorporated in the design of the Project as well as in the EIS. The EIS will provide a summary of key issues raised related to the Project and its potential effects to the environment as well as describe any outstanding issues and ways to address them.

5. ENGAGEMENT WITH INDIGENOUS GROUPS AND CONCERNS RAISED

For the purposes of developing the EIS, the proponent will engage with Indigenous groups that may be affected by the Project, to obtain their views on:

- effects of changes to the environment on Aboriginal peoples (health and socio-economic conditions; physical and cultural heritage, including any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and current use of lands and resources for traditional purposes) pursuant to paragraph 5(1)(c) of CEAA 2012, and
- potential adverse impacts of the Project on potential or established section 35 rights, including title and related interests, in respect of the Crown's duty to consult, and where appropriate, accommodate Aboriginal peoples.

With respect to the effects of changes to the environment on Aboriginal peoples, the assessment requirements are outlined in Part 2, sections 6.1.9 and 6.3.6 of these Guidelines. With respect to potential adverse impacts of the project on potential or established section 35 rights, including

title and related interests, the EIS will document for each group identified in section 5.1, Part 2 of these Guidelines (or in subsequent correspondence from the Agency):

- potential or established section 35 rights [\[8\]](#), including title and related interests, when this information is directly provided by a group to the proponent, the Agency, or review panel, or is available through public records, including:
 - geographical extent, nature, frequency and timing of the practice or exercise of the right, and
 - maps and data sets (e.g., fish catch numbers);
- potential adverse impacts of each of the Project components and physical activities, in all phases, on potential or established section 35 rights, including title and related interests. This assessment is to be based on a comparison of the exercise of the identified rights, title and related interests between the predicted future conditions with the Project and the predicted future conditions without the Project. Include the perspectives of potentially impacted groups where these were provided to the proponent by the groups;
- measures identified to accommodate potential adverse impacts of the Project on the potential or established section 35 rights, including title and related interests. These measures will be written as specific commitments that clearly describe how the proponent intends to implement them, and may go beyond mitigation measures that are developed to address potential adverse environmental effects;
- potential adverse impacts on potential or established section 35 rights, title and related interests that have not been fully mitigated or accommodated as part of the EA and associated engagement with Indigenous groups. The proponent will also take into account the potential adverse impacts that may result from the residual and cumulative environmental effects. Include the perspectives of potentially affected groups where these were provided to the proponent by the groups.

The information sources, methodology and findings of the assessment of paragraph 5(1)(c) effects may be used to inform the assessment of potential adverse impacts of the Project on potential or established section 35 rights, including title and related interests. However, there may be distinctions between the adverse impacts on potential or established section 35 rights, including title and related interests and paragraph 5(1)(c) effects. The proponent will carefully consider the potential distinction between these two aspects and, where there are differences, will include the relevant information in its assessment.

In terms of gathering views from potentially affected groups with respect to both environmental effects of the Project and the potential adverse impacts of the Project on potential or established section 35 rights, including title and related interests, the EIS will document:

- VCs suggested by groups for inclusion in the EIS, whether they were included, and the rationale for any exclusions;
- specific suggestions raised by each group for mitigating the effects of changes to the environment on Aboriginal peoples or accommodating potential adverse impacts of the Project on potential or established section 35 rights, including title and related interests;
- views expressed by each group on the effectiveness of the mitigation or accommodation measures;

- from the proponent's perspective, any potential cultural, social and/or economic impacts or benefits to each group identified that may arise as a result of the Project. Include the perspectives of potentially affected groups where these were provided to the proponent by the groups;
- any other comments, specific issues and concerns raised by potentially affected groups and how they were responded to or addressed;
- changes made to the Project design and implementation directly as a result of discussions with potentially affected groups;
- where and how Aboriginal traditional knowledge was incorporated into the environmental effects assessment (including methodology, baseline conditions and effects analysis for all VCs) and the consideration of potential adverse impacts on potential or established section 35 rights, including title and related interests and related mitigation measures; and
- any additional issues and concerns raised by potentially affected groups in relation to the environmental effects assessment and the potential adverse impacts of the Project on potential or established section 35 rights, including title and related interests.

A suggested format for providing some of the information above is the creation of a tracking table of key issues raised by each group, including the concerns raised related to the Project, proposed mitigation measures, and where appropriate, a reference to the proponent's analysis in the EIS. Information provided related to potential adverse impacts on potential or established Aboriginal or treaty rights will be considered by the Crown in meeting its common law duty to consult obligations as set out in the *Updated Guidelines for Federal Officials to Fulfill the Duty to Consult* (2011).

5.1. Indigenous Groups & Engagement Activities

With respect to engagement activities, the EIS will document:

- the engagement activities undertaken with each group prior to the submission of the EIS, including the date and means of engagement (e.g., meeting, mail, telephone);
- any future planned engagement activities; and
- how engagement activities by the proponent allowed groups to understand the project and evaluate its effects on their communities, activities, potential or established section 35 rights, including title and related interests.

In preparing the EIS, the proponent will ensure that groups have access to timely and relevant information on the Project and how the Project may adversely impact them. The proponent will structure its engagement activities to provide adequate time for groups to review and comment on the relevant information. Engagement activities are to be appropriate to the groups' needs, arranged through discussions with the groups and in keeping with established consultation protocols, where available. The EIS will describe all efforts, successful or not, taken to solicit the information required from groups to support the preparation of the EIS.

The proponent will ensure that views of groups are recorded and that groups are provided with opportunities to validate the interpretation of their views. The proponent will keep detailed tracking records of its engagement activities, recording all interactions with groups, the issues

raised by each group and how the proponent addressed the concerns raised. The proponent will share these records with the Agency.

For the groups expected to be most affected by the Project, the proponent is expected to strive towards developing a productive and constructive relationship based on on-going dialogue with the groups in order to support information gathering and the effects assessment. Based on current information, these groups include:

- *Kitselas First Nation;*
- *Haisla Nation;*
- *Metlakatla First Nation;*
- *Lax Kw'alaams Band;*
- *Kitsumkalum First Nation;*
- *Gitxaala Nation; and*
- *Gitga'at Nation.*

For the above groups, the proponent will strive to use primary data sources and hold face-to-face meetings to discuss concerns. The proponent will facilitate these meetings by making key EA summary documents (baseline studies, EIS, key findings, plain language summaries) accessible in advance. The proponent will ensure there are sufficient opportunities for individuals and groups to provide oral input in the language of their choice. If possible, the proponent should consider translating information for these groups into the appropriate Aboriginal languages(s) in order to facilitate engagement activities during the EA.

For groups that may also be affected by the Project, but to a lesser degree, the proponent will ensure these groups are notified about key steps in the EIS development process and of opportunities to provide comments on key EA documents and/or information to be provided regarding their community. The proponent will still ensure these groups are reflected in the baseline information and assessment of potential effects or impacts in the EIS. Based on current information, these groups include:

- *Haida Nation; and*
- *Métis Nation of British Columbia.*

The groups referenced above may change as more is understood about the environmental effects of the project and/or if the project or its components change during the EA. The Agency reserves the right to alter the list of groups that the proponent will engage as additional information is gathered during the EA.

Upon receipt of knowledge or information of potential effects or adverse impacts to a group not listed above, the proponent shall provide that information to the Agency at the earliest opportunity.

6. EFFECTS ASSESSMENT

6.1. Project setting and baseline conditions

Based on the scope of the Project described in section 3 (Part 1), the EIS will present baseline information in sufficient detail to enable the identification of how the Project could affect the VCs and an analysis of those effects. Should other VCs be identified during the conduct of the EA, the baseline condition for these components will also be described in the EIS. To determine the appropriate spatial boundaries to describe the baseline information, refer to section 3.2.3 (Part 1). As a minimum, the EIS will include a description of the following environmental components.

6.1.1. Atmospheric Environment

- ambient air quality in the project areas and, for the airshed likely to be affected by the Project, by identifying and quantifying emission sources and, in particular, the following contaminants: total suspended particulates, fine particulates smaller than 2.5 microns (PM_{2.5}), particulates less than 10 microns (PM₁₀), carbon monoxide (CO), sulphur oxides (SO_x), volatile organic compounds (VOCs) and nitrogen oxides (NO_x), hydrogen sulfide (H₂S) and all other toxic air pollutants (from mobile and stationary sources);
 - emissions of each VOC should be specified individually;
- identify and quantify existing greenhouse gas emissions ^[9] by individual pollutant measured as kilotonnes of CO₂ equivalent per year in the Project study areas;
- direct and indirect sources of air emissions;
- baseline air quality concentrations before implementing any project components at fence line and key downstream receptors.
- current provincial/territorial/federal limits for greenhouse gas emission targets;
- current ambient noise levels at key receptor points (e.g., Indigenous communities), including the results of a baseline ambient noise survey. Information on typical sound sources, geographic extent and temporal variations will be included;
- 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. The EIS will describe night-time illumination levels during different weather conditions and seasons; and
- historical records of relevant meteorological information (for example: total precipitation (rain and snow); mean, maximum and minimum temperatures; and typical wind speed and direction).

6.1.2. Geology and geochemistry

- the bedrock and host rock geology of the deposit, including a table of geologic descriptions, geological maps and cross-sections of appropriate scale;
- geomorphology, topography and geotechnical characteristics of areas proposed for construction of major project components;
- geological hazards that exist in the areas planned for the Project facilities and infrastructure, including:
 - history of seismic activity in the area;
 - isostatic rise or subsidence;
 - landslides, slope erosion and the potential for ground and rock instability, and subsidence during and following project activities;
 - history of landslide-generated tsunamis if near a shoreline; and
- baseline concentrations of contaminants of concern ^[10] within the local, regional and downstream receiving environments.

6.1.3. Topography and soil

- baseline mapping and description of landforms and soils within the local and regional Project areas;
- maps depicting soil depth by horizon and soil order within the Project area to support soil salvage and reclamation efforts, and to outline potential for soil erosion;
- suitability of topsoil and overburden for use in the rehabilitation of disturbed areas.

6.1.4. Riparian, Wetland and Terrestrial Environments

- characterization of soils in the excavation area, in terrestrial and riparian environments, with a description of past uses;
- topography, drainage, geology and hydrogeology, and the physicochemical characteristics of potential on-land sediment or soil disposal sites;
- characterization of the shoreline, banks, current and future flood risk areas, and wetlands (fens, marshes, peatlands, mudflats and eelgrass beds, etc.), including the location and extent of wetlands likely to be affected by Project activities according to their size, type (wetland class and form), the description of their function (ecological, hydrological, wildlife, socioeconomic, etc.) and species composition ^[11]. Wetlands and wetland function should be separate valued components. The assessment of impacts to wetlands and wetland function should include, but not be limited to an identification of loss or impairment of wetland ecological functioning in relation to:
 - Wildlife and wildlife habitat;
 - Water quality; hydrology;
 - Plant community;
 - Traditional use
- identification of geographic areas where continuing loss or degradation of wetlands has reached critical levels, as well as any wetlands designated as ecologically or socio-economically important to British Columbia; identification of ecosystems that are sensitive or vulnerable to acidification resulting from the deposition of atmospheric contaminants; and
- plant and animal species (abundance, distribution and diversity) and their habitats, with a focus on species at risk or with special status that are of social, economic, cultural or scientific significance, as well as invasive alien species.

Comment [ptw4]: Refer to Appendix C for detailed information on ECCC's responsibilities related to wetlands.

6.1.5. Groundwater and Surface Water

- hydrogeology, including:
 - hydrogeological context (e.g., hydrostratigraphy with aquifers and aquitards, major faults, etc.) including the delineation of key stratigraphic and hydrogeologic boundaries,
 - physical properties of the hydrogeological units (e.g., hydraulic conductivity, transmissivity, saturated thickness, storativity, porosity, specific yield),
 - groundwater flow patterns and rates,

- a discussion of the hydrogeologic, hydrologic, geomorphic, climatic and anthropogenic controls on groundwater flow,
- temporal changes in groundwater flow (e.g., seasonal and long term changes in water levels),
- a delineation and characterization of groundwater - surface water interactions including temperature and the locations of groundwater discharge to surface water and surface water recharge to groundwater,
- temperature changes in surface water as a result of groundwater-surface water interactions,
- changes to surface water quality, including seasonal changes in runoff entering watercourses;
- hydrogeological maps and cross-sections for the Project area to outline the extent of aquifers and aquitards, including bedrock fracture and fault zones, locations and depths of wells and strainers, groundwater types springs, surface waters, and project facilities. Groundwater levels, potentiometric contours, flow directions, groundwater divides and areas of recharge and discharge should be included;
- all groundwater monitoring wells, including their location, in respect to the Project area, including geologic, hydrostratigraphic, piezometric and construction data (e.g., depths of surficial rock and bedrock, bedrock quality, fracture zones, piezometric levels, hydraulic conductivity, diameter and screen depth and intercepted aquifer unit);
- monitoring protocol for collection of existing groundwater and surface water data;
- an appropriate hydrogeologic model for the Project area, which discusses the hydrostratigraphy and groundwater flow systems; a sensitivity analysis will be performed to test model sensitivity to climatic variations (e.g., recharge) and hydrogeologic parameters (e.g., hydraulic conductivity);
- groundwater quality, including lab analytical results for metals, major ions and physical parameters, including temperature, with the interpretation of results for any anomalous values and for contaminants of concern;
- graphs or tables indicating the seasonal variations in groundwater levels, flow regime, and quality;
- local and regional potable groundwater supplies, including their current use and potential for future use;
- bedrock fracture sizes and orientations in relation to groundwater flow;
- 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 subwatersheds, overlaid by key Project components;
- hydrological regimes, including monthly, seasonal and annual water flow (discharge) data;
- for each affected water body, the total surface area, bathymetry, maximum and mean depths, water level fluctuations, type of substrate (sediments);
- seasonal surface water quality, including analytical results (e.g. water temperature, turbidity, pH, dissolved oxygen profiles) and interpretation for representative tributaries and water bodies including all sites to receive Project effluents or runoff;
- any local and regional potable surface water resource; and
- sediment quality analysis for key sites likely to receive Project effluents.

6.1.6. Marine environment

- marine water quality;

- bottom sediments, including quality, thickness, grain size and mobility;
- surface and subsurface current patterns, current velocities, waves, storm surges, long shore drift processes, tidal patterns, and tide gauges levels for the site, in proximity to the site, and along the shipping routes;
- available bathymetric information for the site and along shipping routes if applicable;
- ice climate in the regional study area, including ice formation and thickness, ridging, breakup and movement;
- ice conditions along the shipping routes will also be discussed with consideration of predicted climate change and its possible effect on the timing of ice formation in the future;
- fast-ice characteristics, including its surface area and seasonal stability at the site of the proposed port and along the shipping routes;
- marine plants, including all benthic and detached algae, marine flowering plants, brown algae, red algae, green algae and phytoplankton;
- marine fauna, including benthic organisms, fish, marine mammals and sea turtles and their associated habitat; and
- federally and provincially listed marine species at risk.

6.1.7. Fish and fish habitat

For potentially affected surface waters:

- a characterization of fish populations on the basis of species and life stage, including information on the surveys carried out and the source of data available (e.g. location of sampling stations, catch methods, date of catches, species, catch-per-unit effort);
- a description of primary and secondary productivity in affected water bodies with a characterisation of season variability;
- a list of any fish or invertebrate species at risk that are known to be present;
- a description of the habitat by homogeneous section, including the length of the section, width of the channel from the high water mark (bankful width), water depths, type of substrate (sediments), aquatic and riparian vegetation, and photos;
- a description of natural obstacles (e.g. falls, beaver dams) or existing structures (e.g. water crossings) that hinder the free passage of fish;
- maps, at a suitable scale, indicating the surface area of potential or confirmed fish habitat for spawning, rearing, nursery, feeding, overwintering, migration routes, etc. Where appropriate, this information should be linked to water depths (bathymetry) to identify the extent of a water body's littoral zone; and
- the description and location of suitable habitats for fish species at risk that appear on federal and provincial lists and that are found or are likely to be found in the study area.

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

6.1.8. Migratory birds and their habitat^{[\[12\]](#)}

- birds and their habitats that are found or are likely to be found in the study area. This description may be based on existing sources, but supporting evidence is required to

demonstrate that the data used are representative of the avifauna and habitats found in the study area. The existing data must be supplemented by surveys, if required;

- abundance, distribution and life stages of migratory and non-migratory birds (including waterfowl, raptors, shorebirds, marsh birds and other land and marine birds) likely to be affected in the project area based on existing information, or surveys, as appropriate, to provide current field data; and
- year-round migratory bird use of the area (e.g., winter, spring migration, breeding season, fall migration), based on preliminary data from existing sources and surveys to provide current field data, if appropriate.
- For the scientific assessment of potential impacts on migratory birds, ECCC recommends that the EIS should follow the guiding principles as presented in: Hanson et al. 2009, *A framework for the scientific assessment of potential project impacts on birds - CWS Technical Report series No. 508*. Available online at: http://publications.gc.ca/site/archiv/ee-archived.html?url=http://publications.gc.ca/collections/collection_2010/ec/CW69-5-508-eng.pdf
- For migratory bird species (including federally-assessed and –listed Species at Risk) that the Project may impact:
 - Project effects be identified, assessed, and mitigation and monitoring plans be provided;
 - If a species is not identified, surveyed, and assessed as part of the EIS, that a clear justification be provided;
 - Migratory bird survey data be evaluated in relation to habitat use, specifically: species abundance, distribution, and density in each habitat of the Project area;
 - Migratory bird surveys be conducted following appropriate Resource Inventory Committee Standards and other available accepted protocols; and
 - The assessment includes and evaluates migratory bird use (breeding, migration, and overwintering) of the Project area.

Comment [ptw5]: Establishing an accurate baseline that reflects natural inter-annual variation is important for assessing potential project impacts, focusing mitigation and monitoring, and addressing potential cumulative impacts. It is also important to note that a key purpose of collecting baseline data is to determine the presence of any biodiversity or distribution hotspots.

6.1.9. Species at Risk

- a list of all potential or known federally listed species at risk that may be affected by the Project (fauna and flora), using existing data and literature as well as surveys to provide current field data;
- a list of all federal species designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) for listing on Schedule 1 of the *Species at Risk Act*. This will include those species in the risk categories of extirpated, endangered, threatened and special concern ^[13];
- any published studies that describe the regional importance, abundance and distribution of species at risk including recovery strategies or plans. The existing data must be supplemented by surveys if required; and
- residences, seasonal movements, movement corridors, habitat requirements, key habitat areas, identified critical habitat and/or recovery habitat (where applicable) and general life history of species at risk that may occur in the Project area, or be affected by the Project.
- In the context of SARA section 79, for all federally-listed species (i.e. SARA-listed and COSEWIC-assessed species) that the Project may impact, provide:

Comment [ptw6]: See Species at Risk heading of Appendix B for more information on ECCC's responsibilities with respect to SARA-listed species.

- A separate effects assessment for each federally-assessed and -listed species (including COSEWIC-assessed and SARA-listed) that is known or expected to occur within the Local and Regional Study Area;
- Description of the Project's potential adverse effects on the species and its critical habitat within the Local and Regional Study Areas;
- Description of measures to be taken to avoid or lessen any potential effects from the Project on each federally-listed species and its critical habitat;
- An account on how those measures are consistent with recovery document available on the Species at Risk Public Registry.
- Description of monitoring strategies to assess the anticipated effects on federally-listed species and their critical habitat to ensure that mitigation measures are effective, as well as to determine whether any unanticipated effects are occurring;
- If a species is not identified, surveyed, and assessed as part of the EIS, that a clear justification be provided;
- Species at risk and vegetation surveys be spatially integrated, so that habitat functioning for specific species can be evaluated on a habitat (vegetation community) basis. This assessment should include and evaluate species at risk seasonal use (breeding, migration, and overwintering) of the Project area.

6.1.10. Indigenous peoples

With respect to potential effects on Indigenous peoples and the related VCs, baseline information will be provided for *each group* identified in Part 2, Section 5 (and any groups identified after these Guidelines are finalized). Baseline information will describe and characterize the elements in paragraph 5(1)(c) of CEAA 2012 based on the spatial and temporal scope selected for the EA according to the factors outlined in Part 1, Section 3.3.3. Baseline information will also characterize the regional context of each of the paragraph 5(1)(c) elements to support the assessment of project related effects and cumulative effects. Baseline information will be sufficient to provide a comprehensive understanding of the current state of each VC.

Baseline information for current use of lands and resources for traditional purposes will focus on the traditional activities (e.g., hunting, fishing, trapping, plant gathering) and include a characterization of all attributes of the activity that can be affected by environmental change. This includes not only identifying species of importance but also assessing the quality and quantity of preferred traditional resources and locations, timing (e.g., seasonality, access restrictions, distance from community), ambient/sensory environment (e.g., noise, air quality, visual landscape, presence of others) and cultural environment (e.g., historical/generational connections, preferred areas). Specific aspects that will be considered include, but are not limited to:

- location of traditional territory (including maps where available);
- traditional uses currently practiced or practiced in recent history;
- location of reserves and communities;
- location of hunting camps, cabins and traditional gathering or teaching grounds;

- fish, wildlife, birds, plants or other natural resources of importance for traditional use;
- places where fish, wildlife, birds, plants or other natural resources are harvested, including places that are preferred;
- access and travel routes for conducting traditional practices;
- frequency, duration or timing of traditional practices; and
- cultural values associated with the area affected by the project and the traditional uses identified.

Baseline information for health ^[14] and socio-economic conditions will include the functioning and health of the socio-economic environment, encompassing a broad range of matters that affect communities in the study area in a way that recognizes interrelationships, system functions and vulnerabilities. Specific aspects that will be considered include, but are not limited to:

- drinking water sources (permanent, seasonal, periodic, or temporary);
- reliance on country foods (also known as traditional foods) including food that is trapped, fished, hunted, harvested or grown for subsistence or medicinal purposes, outside of the commercial food chain;
- which country foods are consumed by which groups, how frequently, and where these country foods are harvested;
- commercial activities (e.g. fishing, trapping, hunting, forestry, outfitting); and
- recreational uses.

Baseline information for physical and cultural heritage ^[15] (including any site, structure or thing of archaeological, paleontological, historical or architectural significance) will consider all elements of cultural and historical importance to groups in the area and is not restricted to artifacts considered under provincial heritage legislative requirements. Specific aspects that will be considered include, but are not limited to:

- burial sites;
- cultural landscapes;
- sacred, ceremonial or culturally important places, objects or things; and
- archaeological potential and/or artifact places.

Any other baseline information that supports the analysis of predicted effects on Indigenous peoples will be included as necessary. The EIS will also indicate how input from groups, including Aboriginal traditional knowledge, was used in establishing the baseline conditions related to health and socio-economics, physical and cultural heritage and current use of lands and resources for traditional purposes. This information includes but is not limited to the following:

- areas of concentration of migratory animals, such as breeding, denning and/or wintering areas;
- ungulates, furbearers, amphibians, small mammals, and their habitat;
- existing or proposed protected areas, special management areas, and conservation areas in the regional study area;
- key plant communities and animals that rely on wetlands; and
- submerged floating and emergent aquatic vegetation.

6.1.11. Other Changes to the Environment Arising as a Result of a Federal Decision or due to changes on federal lands, in another province or outside Canada

Should there be the potential for a change to the environment arising as a result of a federal decision(s), or on federal lands, lands in another province or lands outside Canada, the EIS will include baseline information on the environmental component likely to be affected (if this information is not already covered in other subsections of these guidelines). For example, if an authorization provided under the *Fisheries Act* was to result in the flooding of key wildlife habitat, baseline information should be provided on the wildlife species likely to be affected.

6.1.12. Human environment

- the rural and urban settings likely to be affected by the Project;
- any federal lands, lands located outside the province or Canada that may be affected by the Project;
- the current use of land in the study area, including a description of hunting, recreational and commercial fishing, trapping, gathering, outdoor recreation, use of seasonal cabins, outfitters;
- current use of all waterways and water bodies that will be directly affected by the Project, including recreational uses, where available;
- location of and proximity of any permanent, seasonal or temporary residences or camps;
- health ^[66] and socio-economic conditions, including the functioning and health of the socio-economic environment, encompassing a broad range of matters that affect communities in the study area in a way that recognizes interrelationships, system functions and vulnerabilities; and
- physical and cultural heritage, including structures, sites or things of historical, archaeological, paleontological or architectural significance.

6.2. Predicted Changes to the Physical Environment

The assessment will include a consideration of the predicted changes to the environment as a result of the Project being carried out or as a result of any powers duties or functions that are to be exercised by the federal government in relation to the Project. These predicted changes to the environment are to be considered in relation to each phase of the Project (construction, operation, decommissioning, and abandonment) and are to be described in terms of the magnitude, geographic extent, duration and frequency, and whether the environmental changes are reversible or irreversible. As changes to various parts of the physical environment, listed below, may be inter-related as part of an ecosystem, the EIS will explain and describe the connections between the changes described.

6.2.1. Changes to the Atmospheric Environment

- Identify major sources of air pollutants from all project components and provide maximum annual facility emission rates of following air pollutants from all project components: PM₁₀, PM_{2.5}, carbon monoxide CO, sulphur oxides SO_x, nitrogen oxides NO_x, hydrogen sulphide H₂S, volatile organic compounds VOC, ammonia NH₃, and Black Carbon. Maximum emission rates are the loading when refining capacity utilization is 100% and emissions reach their worst-case maximum. Project components include oil refinery, rail yard, tank farm, refined fuel delivery pipelines, marine terminal, co-

Comment [ptw7]: The fuels ships use, albeit low-sulphur in the ECA zone, result in a wider range of CACs and GHGs than described by the Proponent.

For example, in addition to emissions of NO_x, SO_x, and CO₂, VLCCs will also emit VOCs, PM, NH₃, Black Carbon, and other GHGs along the shipping route, during loading, unloading, fueling, ballasting, and anchorage, so these emissions (and activities) should be included in the description and the assessment.

Comment [ptw8]: Black Carbon is a short-lived climate pollutant and a public health concern. Canada now has a black carbon emission inventory and tracking black carbon provides valuable information for air quality management strategies.

generation facility, road, rail and marine transportation and all other components. Marine activities to be considered in the assessment include: underway, berth, maneuvering, escort tugs, anchorage, etc.

- Provide a list of routine operation events that may require flaring at flare stacks. Identify measures that will be in place to reduce the need of flaring and reduce flaring emissions.
- Identify all sources of fugitive VOC emissions from all project components (e.g., tanks, wastewater treatment plant, cooling tower, etc.)
- Identify any planned activity to implement Leak Detection and Repair (LDAR) program. This should include leak definition, frequency for testing leaks and repair schedules etc.
- Identify any planned activity to measure VOC emissions along the fenceline of the facility.
- Identify major and minor sources of GHG from all project components and provide an annual facility total of GHG emissions.
- Provide the frequency of turnarounds for major emission sources of air pollutants and GHG and maintenance frequency for control technologies of air pollutants and/or GHG. Identify measures that will be in place to minimize air emissions or GHG emissions at turnarounds and when control technologies are down for maintenance.
- Provide a list of routine maintenance plans on major sources of air pollutants and GHG. For example, spent amine regeneration quantity and frequency; sulphur recovery unit maintenance schedule; sour water stripper maintenance schedule; acid gas incinerator maintenance schedule, etc. Estimate potential effects and identify measures that will be considered to mitigate impact from these maintenance activities.
- Identify services that will be provided by third parties, and potential indirect air pollutant and greenhouse gas emissions from third party services.
- The proponent will carry out atmospheric dispersion modelling of the main contaminants in order to estimate the contaminant concentrations present in the entire area that could potentially be affected by atmospheric emissions (Part 2, Section 6.1.1) resulting from various Project-related activities (sources), including the use of heavy machinery during construction; the operation of the refinery and marine terminal; fugitive emissions from the pipelines; and road, rail and marine transportation.
- Provide air dispersion modeling concentrations at fence line and key receptors for air pollutants and GHG emissions. The application of dispersion models and modeling results shall be validated. a description of all methods and practices (e.g., control equipment, heat or gas recovery systems) that will be implemented to minimize and control atmospheric emissions throughout the project life cycle. If the best available technologies are not included in the Project design, the proponent will need to provide a rationale for the technologies selected;
- Provide current provincial/territorial/federal regulatory emission limits for air pollutants and greenhouse gases from stationary and mobile sources which will operate during the project
- Provide current provincial ambient air quality standards and objectives, Canadian Ambient Air Quality Standards, and National Ambient Air Quality Objectives for air pollutants. Compare the anticipate air quality conditions resulting from project emissions (project case), as well as projected cumulative air quality impacts (baseline plus project plus reasonably foreseeable future physical activities), against these standards and

Comment [ptw9]: See comment in Part 1, Section 3.2 regarding uncertainty of rail and marine traffic within project scope.

Comment [ptw10]: ECCC is considering regulations respecting VOC emissions from refineries, petrochemical plants and upgraders (LDAR and fenceline program).

Comment [ptw11]: Infrequent scheduled larger scale maintenance.

Comment [ptw12]: Is this correct? Section 6.1.1 is project setting and baseline conditions.

Comment [ptw13]: See comment in Part 1, Section 3.2 regarding uncertainty of rail and marine traffic within project scope.

objectives.. an estimate of the direct greenhouse gas emissions associated with all phases of the Project as well as any mitigation measures proposed to minimize greenhouse gas emissions. This information is to be presented by individual pollutant and should also be summarized in CO2 equivalent per year. The proponent must provide the following information:

- an estimate of the contribution of the Project emissions at the local, provincial and federal scale. The proponent must indicate the category into which the Project falls in terms of the relative magnitude of its contribution to greenhouse gas emissions (Project with low, medium or high emission rates);
- a greenhouse gas emissions management plan providing a description of the potential for fugitive emissions and the methods used to detect and repair leaks in the refinery and associated infrastructure;

a justification of all estimates and emission factors used in the analysis; the methods and calculations used for the analysis;

- comparison of GHG emissions from similar projects (using gasification and Fischer-Tropsch process) to other projects around the world and comparison of energy intensity of the proposed project with similar projects elsewhere;
- Include calculations and compare GHG emissions from existing upgrading technologies.
- a comparison and an assessment of the level of estimated emissions to the regional, provincial and federal emission targets;
- information related to the Project's electrical demand and sources of electrical power for facilities and equipment, i.e., the Project's main source and any other additional sources (generators, etc.), as appropriate;
- an estimate of the greenhouse gas emissions associated with the facility's bitumen supply. This should include all raw materials to be processed at the proposed refinery. This estimate should include all processes upstream of the proposed refinery. "Upstream" includes, but is not limited to, bitumen production, processing and transport. Transport to include emissions associated with transportation of bitumen via rail to the facility; The estimate should include all GHG emissions during the operational lifetime of the proposed project, on an annual basis. In cases where bitumen source has not yet been determined, the Proponent should estimate using a typical or average mix. The derivation of upstream GHG estimates should be clearly explained and all assumptions and emission intensity factors used should be disclosed and described. Emission factors for all upstream stages should be recent and pertinent to the region
- ;
- Project-related emissions should include combustion and fugitive emissions along the shipping route and railway within the air shed;
- estimation methods and method uncertainty for annual facility GHG emissions and air pollutant emissions. The emissions shall include emissions from all sources from all project components.

Comment [ptw14]: This "upstream" component is for rail transport that is not scoped in to the project. See comment in Part 1, Section 3.2.

Comment [ptw15]: GHGs from "power generation at the refinery, pipelines and marine terminal, or other on-site processes" should be captured by the proponent's assessment of direct project emissions. The remaining, added text is to ensure that the proponent uses appropriate emission factors in its calculations and that ECCC is able to evaluate the accuracy and completeness of the assessments.

Comment [ptw16]: For marine, combustion emissions increase significantly once the vessel is underway and it is currently not clear where the air quality study area's boundaries are. Also, tankers are a potential source of fugitive VOCs while underway.

- Provide information on what monitoring program is used to provide accurate air emission and GHG emission data. Provide monitoring tools adopted such as CEM, stack testing, mass balance, etc.
- Compare the monitoring data to provincial and federal requirements on petroleum refining industry and on air quality.
- changes in ambient noise levels; and
- changes in night-time light levels.

6.2.2. Changes to Groundwater and Surface Water

- changes to groundwater flow patterns, fluxes, and ditches based on the results of groundwater flow modelling that incorporates changes related to the Project;
- changes to turbidity, oxygen level, water temperature, ice regime, water quality;
- changes in surface water quality associated with any Project effluent releases or surface runoff;
- changes to the hydrological and hydrometric conditions;
- changes to groundwater recharge/discharge areas and any changes to groundwater infiltration areas; and
- changes to groundwater quality associated with storage or release of any Project effluents or drainage including surface runoff.

6.2.3. Changes to Riparian, Wetland and Terrestrial Environments

- overall description of changes related to landscape disturbance;
- changes to the habitat of migratory and non-migratory birds, with a distinction made between the two birds category, including losses, structural changes and fragmentation of riparian habitat (aquatic grassbeds, intertidal marshes) of terrestrial environments and wetlands frequented by birds (types of cover, ecological unit of the area in terms of quality, quantity, diversity, distribution and functions);
- changes to critical habitat for federally listed species at risk; and
- changes to key habitat for species important to current use of lands and resources for traditional purposes.

6.3. Predicted Effects on Valued Components

Based on the predicted changes to the environment identified in section 6.2, the proponent is to assess the environmental effects of the project on the following VCs. All interconnections between VCs and between changes to multiple VCs will be described:

6.3.1. Fish and Fish Habitat

- The identification of any potential adverse effects to fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act* including the calculations of any potential habitat loss (temporary or permanent) in terms of surface areas (e.g. spawning grounds, fry-rearing areas, feeding), and in relation to watershed availability and significance. The assessment will include a consideration of:
 - the geomorphological changes and their effects on 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, fry-rearing, movements),
 - potential effects on riparian areas that could affect aquatic biological resources and productivity taking into account any anticipated modifications to fish habitat,
 - any potential imbalances in the food web in relation to baseline,
 - effects on the primary and secondary productivity of water bodies and how Project-related effects may affect fish food sources;
- the effects of changes to the aquatic environment on fish and their habitat, including:
 - the anticipated changes in the composition and characteristics of the populations of various fish species, including shellfish and forage fish,
 - any modifications in migration or local movements (upstream and downstream migration, and lateral movements) following the construction and operation of works (physical and hydraulic barriers),
 - any reduction in fish populations as a result of potential overfishing due to increased access to the Project area,
 - any modifications and use of habitats by federally or provincially listed fish species;
- a discussion of how Project construction timing correlates to key fisheries windows for freshwater and anadromous species, and any potential effects resulting from overlapping periods; and
- a discussion of how vibration caused by blasting may affect fish behaviour, such as spawning or migrations.

6.3.2. Marine Environment

- the physical effects on the estuarine and marine environment, including changes to water quality, chemical composition, temperature, oceanographic conditions, etc.;
- the effects to the use of the marine environment, including estuarine, floodplain and marine habitats by fish, invertebrates, marine mammals, and marine birds with regard to their life cycles (e.g. migration, spawning, emergence);
- any effects resulting from overlapping periods between construction periods and key fisheries (e.g. commercial salmon fishery) windows for marine species; and
- any effects to marine organisms including marine fish, marine mammals, marine birds, sea turtles, benthic organisms, detached algae, marine flowering plants, brown algae, green algae and phytoplankton, etc.
- should disposal at sea be considered for any blasted, dredged, or excavated material:
 - provide estimate of maximum volume of materials that may be disposed at sea.
 - provide characterization of material to be disposed,
 - provide an assessment of alternative options for managing any material considered for disposal at sea,
 - provide a waste prevention audit for any material proposed for disposal at sea,
 - confirm whether drilling muds and/or lubricants will form part of any excavated or blasted material proposed for disposal at sea,
 - if drilling muds/lubricants could form part of any material proposed for disposal at sea, identify the chemical constituents and/or industry name of material to be used, and
 - describe and assess the potential environmental effects of any disposal at sea activities.

Guidance related to disposal at sea is available at: <http://www.ec.gc.ca/iem-das/default.asp?lang=En&n=3C819E48-1>

6.3.3. Marine Plants

Comment [ptw17]: The Project Description does not indicate potential for disposal at sea. Section 6.5.2 Blasted and Dredged Material states: Construction of the Material Terminal Site in-water works will require the need to blast rock benches into the channel side to accommodate the vessel and utility berths, and materials off-loading facility. A total of approximately 30,000 m³ of material (20,000 m³ rock; 10,000 m³ of overburden) will be removed from along the shoreline and stored on-land in a stockpile. Where possible, clean n-PAG material will be re-used for construction purposes. However, suggest including this bullet to make proponent aware of requirements should plans change.

- marine plants, including all benthic and detached algae, marine flowering plants, brown algae, red algae, green algae and phytoplankton.

6.3.4. Migratory Birds

- direct and indirect adverse effects on migratory birds, including population level effects that could be caused by all project activities, including but not limited to:
 - site preparation,
 - deposit of harmful substances in waters that are frequented by migratory birds (e.g., disposal at sea),
 - flaring of gas;
- collision risk of migratory birds with any project infrastructure; and
- indirect effects caused by increased disturbance (e.g. noise, light, presence of workers), relative abundance movements, and losses or changes in migratory bird habitat, considering the critical breeding and migration periods for the birds.

6.3.5. Species at Risk

- the potential effects of the project on federally listed species at risk and those species listed by the Committee on the Status of Endangered Wildlife in Canada classified as extirpated, endangered, threatened or of special concern (flora and fauna) and their critical habitat, including:
 - direct and indirect effects from increased exposure to contaminants of concern,
 - direct and indirect effects on the survival or recovery of federally listed species (list species).

6.3.6. Indigenous peoples

With respect to Indigenous peoples, a description and analysis of how changes to the environment caused by the project will affect each group's:

- current use of land and resources for traditional purposes. This assessment will characterize the effect(s) on the use or activity (e.g., hunting, fishing, trapping, plant gathering) as a result of the underlying changes to the environment (i.e., how will the activity change if the project proceeds). The underlying changes to the environment will also be described, including, but not limited to:
 - any changes to resources (fish, wildlife, birds, plants or other natural resources) used for traditional purposes (e.g. hunting, fishing, trapping, collection of medicinal plants, use of sacred sites),
 - any changes or alterations to access into the areas used for traditional purposes, including development of new roads, deactivation or reclamation of access roads and changes to waterways that affect navigation,
 - any changes to the environment that affect cultural value or importance associated with traditional uses or areas affected by the project (e.g. values or attributes of the area that make it important as a place for inter-generational teaching of language or traditional practices, communal gatherings, integrity of preferred practice areas),

- how timing of project activities (e.g. construction, blasting, discharges) have the potential to interact with the timing of traditional practices, and any potential effects resulting from overlapping periods,
 - consideration of the regional context for traditional use, and the value of the project area in that regional context, including alienation of lands from traditional use,
 - any changes to environmental quality (e.g. air, water, soil) or the sensory environment (e.g. noise, light, visual landscape, scent), or perceived disturbance of the environment (e.g. fear of contamination of water or country foods) that could detract from use of the area or lead to avoidance of the area,
 - any changes to the environment resulting from the presence of workers or increased access to the area by non-Indigenous people (e.g. noise, competition for or pressure on resources),
 - an assessment of the potential to return affected areas to pre-project conditions to support traditional practices;
- human health, focusing on effects on health outcomes or risks in consideration of, but not limited to, potential changes in air quality, quality and effects of vibration from blasting, availability of country foods, water quality (drinking, recreational and cultural uses), and noise exposure. When risks to human health due to changes in one or more of these components are predicted, a complete Human Health Risk Assessment (HHRA) examining all exposure pathways for pollutants of concern may be necessary to adequately characterize potential risks to human health. Where adverse health effects are predicted, any incidental effects such as effects on current use of lands and resources for traditional purposes will also be assessed. The proponent must provide a justification if it determines that an assessment of the potential for contamination of country foods is not required or if some contaminants are excluded from the assessment;
- socio-economic conditions, including but not limited to:
 - the use of navigable waters,
 - forestry and logging operations,
 - commercial fishing, hunting, trapping, and gathering activities,
 - commercial outfitters,
 - recreational use;
- physical and cultural heritage, and structure, site or thing of historical, archaeological, paleontological or architectural significance to groups, including, but not limited to:
 - the loss or destruction of physical and cultural heritage,
 - changes to access to physical and cultural heritage,
 - changes to the cultural value or importance associated with physical and cultural heritage.

Other effects of changes to the environment on groups should be reflected as necessary.

6.3.7. Other valued components that may be affected as a result of a federal decision or due to effects on federal lands, another province or outside Canada

The EIS will consider any changes to the environment arising as a result of a federal decision, such as an authorization under section 35 of the Fisheries Act, that have not already been addressed in other subsections of these guidelines. The EIS will describe the project components and activities for which the decision is required, and any additional VCs not already assessed.

6.4. Mitigation

Every EA conducted under CEAA 2012 will consider measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project. Under CEAA 2012, mitigation includes measures to eliminate, reduce or control the adverse environmental effects of a designated project, as well as restitution for damage to the environment through replacement, restoration, compensation or other means. Measures will be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation and implementation. Mitigation measures may be considered for inclusion as conditions in the EA decision statement and/or in other compliance and enforcement mechanisms provided by other authorities' permitting or licensing processes.

As a first step, the proponent is encouraged to use an approach based on the avoidance and reduction of the effects at the source. Such an approach may include the modification of the design of the project or relocation of project components.

The EIS will describe the standard mitigation practices, policies and commitments that constitute technically and economically feasible mitigation measures and that will be applied as part of standard practice regardless of location. The EIS will then describe the project's environmental protection plan and its environmental management system, through which the proponent will deliver this plan. The plan will provide an overall perspective on how potentially adverse effects would be minimized and managed over time. The EIS will further discuss the mechanisms the proponent would use to require its contractors and sub-contractors to comply with these commitments and policies and with auditing and enforcement programs.

The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the *Species at Risk Act*. These measures will be consistent with any applicable recovery strategy and action plans.

The EIS will specify the actions, works, minimal disturbance footprint techniques, best available technology, corrective measures or additions planned during the project's various phases to eliminate or reduce the significance of adverse effects. The EIS will also present an assessment of the effectiveness of the proposed technically and economically feasible mitigation measures. The reasons for determining if the mitigation measure reduces the significance of an adverse effect will be made explicit. The proponent is also encouraged to identify mitigation measures for effects that are adverse although not significant.

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

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

Adaptive management is not considered as a mitigation measure, but if the follow-up program (refer to section 8) indicates that corrective action is required, the proposed approach for managing the action should be identified.

6.5. Significance of residual effects

After having established the technically and economically feasible mitigation measures, the EIS will present any residual environmental effects of the project on the VCs identified in section 6.3. The residual effects, even if very small or deemed insignificant will be described.

The EIS will then provide an analysis of the significance of the residual environmental effects that are considered adverse following the implementation of mitigation measures, using guidance described in section 4 of the Agency's Operational Policy Statement, *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act, 2012*^{[171](#)}.

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

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

- magnitude;
- geographic extent;
- timing;
- duration;
- frequency;
- reversibility;
- ecological and social context (the ecological and social context within which potential environmental effects may occur should be taken into account when considering the key criteria above in relation to a particular VC, as the context may help better characterize whether adverse effects are significant.); and
- existence of environmental standards, guidelines or objectives for assessing the effect.

In assessing significance against these criteria the proponent will, where possible, use relevant existing regulatory documents, environmental standards, guidelines, or objectives such as prescribed maximum levels of emissions or discharges of specific hazardous agents into the environment. The EIS will contain a section which explains the assumptions, definitions and

limits to the criteria mentioned above in order to maintain consistency between the effects on each VC.

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

6.6. Other effects to consider

6.6.1. Effects of potential accidents or malfunctions

The failure of certain works caused by human error or exceptional natural events (e.g. flooding, earthquake, forest fire) could cause major effects. The proponent will therefore conduct an analysis of the risks of accidents and malfunctions, determine their effects and present a preliminary emergency response measures.

Taking into account the lifespan of different Project components, the proponent will identify the probability of potential accidents and malfunctions related to the Project, including an explanation of how those events were identified, potential consequences (including the environmental effects as defined in section 5 of CEAA 2012), the plausible worst case scenarios and the effects of these scenarios. The analysis should include events that may require emergency flaring.

This assessment will include an identification of the magnitude of an accident and/or malfunction, including the quantity, mechanism, rate, form and characteristics of the contaminants and other materials likely to be released into the environment during the accident and malfunction events and would potentially result in an adverse environmental effect as defined in section 5 of CEAA 2012.

The EIS will describe the safeguards that have been established to protect against such occurrences and the contingency and emergency response procedures that would be put in place if such events do occur.

Key items of this assessment should include:

- An inventory of hazardous materials (including proper segregation and compatibility);
- Identification of where spills of hazardous substances could be reasonably expected to occur, considering prevention, preparedness, response and recovery elements; and,
- Analysis of worst case scenarios (e.g. application of passive but not active mitigation techniques, penalizing weather conditions etc.) for each potential accident or malfunction type identified.

The following elements be incorporated:

- A risk assessment that includes the probability, and the environmental and human health consequences of accidents and malfunction occurrences, taking into account potential

extreme meteorological events or other external factors that could present contributing and/or complicating factors;

- The rates and types of accidents and malfunctions that have occurred in the project study area;
- The transportation of hazardous materials to and from the refinery site during site preparation, construction and operations phases;
- Potential impacts and impact radiuses for both fire and explosions;
- Preventative measures and response countermeasures to on-site spills and leaks of hazardous substances;
- On-site releases of hydrocarbons to land (loss of containment of hydrocarbons in the plant process area or storage tanks);
- Process water and surface/storm water capture and containment areas;
- Grounding scenarios for tankers, including potential releases of hydrocarbons to water and air; and,
- Collisions and allision scenarios for tankers, including potential releases of hydrocarbons to water and air.

For each potential accident or malfunction scenario, describe:

- The potential event, including both the worst-case and the alternative scenarios;
- Detailed methodology for assessing the potential risk, including categories for likelihood and consequence;
- Proposed passive mitigation measures (e.g. engineering, project siting and facility design) to reduce the likelihood of an accident or malfunction from occurring; and,
- Emergency response / active mitigation measures and plans to mitigate the effects and/or consequences.

If the Proponent's qualitative consequences assessment of a worst-case scenario indicates environmental and human health impacts are likely to occur outside of the facility boundaries, then modelling for more-probable alternative accident scenarios that would be more credible for the particular facility should be undertaken.

For projects involving the storage and handling of substances listed in the E2 Regulations (in amounts exceeding their threshold quantities), calculate the magnitude of a worst-case vapour cloud explosion scenario using modelling software that is capable of predicting a worst case impact radius as part of their qualitative consequences assessment. For subsequent E2 Plan purposes, one of the scenarios must entail the complete content release of the largest hydrocarbon storage container.

If the proposed refinery is to be situated in a topographically low-lying area, the proponent should identify and calculate the magnitude of a worst-case accident or malfunction scenario for oxygen displacement and cryogenic freezing by fugitive product in low-lying areas.

Accidents or Malfunctions Related to Marine and Rail Transportation

The proponent will describe and evaluate the potential effects to the environment caused by accidents and malfunctions resulting from marine and rail transportation associated with the Project, including effects on social, economic or cultural elements of the environment and on people's health in the vicinity of spilled contaminants.

If serious accidents or malfunctions are likely to occur and if the necessary data are available, the proponent will determine whether it is necessary to carry out an assessment of the probability that such an event occur and an assessment of its consequences, taking into account the contributing factors such as weather conditions or external events.

The proponent will also assess the potential of minor and major accidental release of fuel, or loss of dangerous goods. If necessary, the proponent will also provide an analysis of the potential environmental effects of these discharges on aquatic and terrestrial environments and on human health in spatial boundaries described in this document.

The proponent will also describe existing emergency preparedness and response systems and existing arrangements with the responsible response organizations in the marine and rail transportation spatial boundaries associated with the Project, including exercise and training plans for spill emergency response. The proponent will describe the role it will play in case of spill, collision, grounding or other accidents or malfunctions related to rail and maritime transportation associated with the Project.

6.6.2. Effects of the environment on the project

The EIS will take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events (e.g., flooding, drought, ice jams, landslides, avalanches, erosion, subsidence, fire, outflow conditions, sea level and storm surge, and seismic events), could adversely affect the project and how this in turn could result in effects to the environment (e.g., extreme environmental conditions result in malfunctions and accidental events). These events will be considered in different probability patterns (e.g., 5-year flood vs. 100-year flood) under a range of future climate states. The potential impact of climate change will be considered over the lifetime of the project and the discussion will include a description of the climate data and projections used. The EIS will provide details of planning, design and construction strategies intended to minimize the potential environmental effects and vulnerabilities on the Project.

6.6.3. Cumulative effects assessment

The proponent will identify and assess the project's cumulative effects using the approach described in the Agency's Operational Policy Statement entitled *Addressing Cumulative Environmental Effects under the Canadian EA Act, 2012* and the guide entitled *Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian EA Act, 2012*. [\[18\]](#).

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

- the implementation of the Project may cause direct residual adverse effects on 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 or future physical activities that are certain and reasonably foreseeable [\[19\]](#).

VCS that would not be affected by the Project or would be affected positively by the Project can, therefore, be omitted from the cumulative effects assessment. A cumulative effect on an environmental component may, however, be important even if the assessment of the Project's effects on this component reveals that the effects of the project are minor.

In its EIS, the proponent will:

- Identify and provide a rationale for the VCs that will constitute the focus of the cumulative effects assessment, focussing the cumulative effects assessment on the VCs most likely to be affected by the Project and other projects and activities. To this end, the proponent must consider, without limiting itself thereto, the following components likely to be affected by the Project:
 - fish and fish habitat, including salmon and other valued fish species,
 - marine plants,
 - migratory birds,
 - greenhouse gas emissions,
 - species at risk,
 - Aboriginal peoples,
 - any VCs associated with subsection 5(2) of CEAA 2012;
- Identify and justify the spatial and temporal boundaries for the cumulative effect assessment for each VC selected. The boundaries for the cumulative effects assessments will generally be different for each VC considered. These cumulative effects boundaries will also generally be larger than the boundaries for the corresponding Project effects;
- Identify the sources of potential cumulative effects. Specify other projects or activities that have been or that are likely to be carried out that could cause effects on each selected VC within the boundaries defined, and whose effects would act in combination with the residual effects of the Project. This assessment may consider the results of any relevant study conducted by a committee established under section 73 or 74 of CEAA 2012;
- Assess the cumulative effects on each VC selected by comparing the future scenario with the Project and without the Project. Effects of past activities (activities that have been carried out) will be used to contextualize the current state of the VC. In assessing the cumulative effects on current use of lands and resources for traditional purposes, the assessment will focus on the cumulative effects on the relevant activity (e.g., hunting, fishing, trapping, plant harvesting);

- Describe the mitigation measures that are technically and economically feasible. The proponent shall assess the effectiveness of the measures applied to mitigate the cumulative effects. In cases where measures exist that are beyond the scope of the proponent's responsibility that could be effectively applied to mitigate these effects, the proponent will identify these effects and the parties that have the authority to act. In such cases, the EIS will summarize the discussions that took place with the other parties in order to implement the necessary measures over the long term;
- Determine the significance of the cumulative effects; and
- Develop a follow-up program to verify the accuracy of the assessment or to dispel the uncertainty concerning the effectiveness of mitigation measures for certain cumulative effects.

The proponent is encouraged to consult with key stakeholders and Indigenous groups prior to finalizing the choice of VCs and the appropriate boundaries to assess cumulative effects.

7. SUMMARY OF ENVIRONMENTAL EFFECTS ASSESSMENT

The EIS will contain a table summarising the following key information:

- potential environmental effects on valued components;
- proposed mitigation measures to address the effects identified above; and
- potential residual effects and the significance of the residual environmental effects.

The summary table will be used in the EA Report prepared by the Agency or will be considered by the review panel. An example of a format for the key summary table is provided in Appendix 1 of this document.

In a second table, the EIS will summarize all key mitigation measures and commitments made by the proponent which will more specifically mitigate any significant adverse effects of the Project on VCs (i.e., those measures that are essential to ensure that the project will not result in significant adverse environmental effects).

8. FOLLOW-UP AND MONITORING PROGRAMS

A follow-up program is designed to verify the accuracy of the effects assessment and to determine the effectiveness of the measures implemented to mitigate the adverse effects of the Project. Considerations for developing a follow-up program include:

- whether the Project will impact environmentally sensitive areas/VCs or protected areas or areas under consideration for protection;
- the nature of public concerns raised about the Project;
- the accuracy of predictions;
- whether there is a question about the effectiveness of mitigation measures or the proponent proposes to use new or unproven techniques and technology, or if the techniques and technology have never been used in this combination or at this scale;
- the nature of cumulative environmental effects; and
- whether there was limited scientific knowledge about the effects in the EA.

The goal of a monitoring program is to ensure that proper measures and controls are in place in order to decrease the potential for environmental degradation during all phases of project development, and to provide clearly defined action plans and emergency response procedures to account for human and environmental health and safety.

8.1. Follow-up Program

The duration of the follow-up program shall be as long as required to evaluate the effectiveness of the mitigation measures.

The EIS shall present a preliminary follow-up program and shall include:

- objectives of the follow-up program and the VCs targeted by the program;
- list of elements requiring follow-up;
- number of follow-up studies planned as well as their main characteristics (list of the parameters to be measured, planned implementation timetable, etc.);
- intervention mechanism used in the event that an unexpected deterioration of the environment is observed;
- mechanism to disseminate follow-up results among the concerned populations;
- accessibility and sharing of data for the general population;
- opportunity for the proponent to include the participation of Indigenous groups and stakeholders on the affected territory, during the development and implementation of the program; and
- involvement of local and regional organizations in the design, implementation and evaluation of the follow-up results as well as any updates, including a communication mechanism between these organizations and the proponent.

8.2. Monitoring

The proponent will prepare an environmental monitoring program for all phases of the Project.

Specifically, the environmental impact statement shall present an outline of the preliminary environmental monitoring program, including the:

- identification of the interventions that pose risks to one or more of the components and the measures and means planned to protect the environment;
- identification of regulatory instruments that include a monitoring program requirement for the valued components;
- description of the characteristics of the monitoring program where foreseeable (e.g., location of interventions, planned protocols, list of measured parameters, analytical methods employed, schedule, human and financial resources required);
- 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 environmental provisions of their contracts;
- guidelines for preparing monitoring reports (number, content, frequency, format) that will be sent to the authorities concerned; and
- plans to engage Indigenous groups in monitoring, where appropriate.

Appendix 1 Example - Summary Table of Environmental Assessment

[illegible]

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

^[2] Section 35 of *Constitution Act, 1982* extracted as follows:

1. The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.
2. In this Act, aboriginal peoples of Canada includes the Indian, Inuit and Métis peoples of Canada.
3. For greater certainty, in subsection (1) "treaty rights" includes rights that now exist by way of land claims agreements or may be so acquired.
4. Notwithstanding any other provision of this Act, the aboriginal and treaty rights referred to in subsection (1) are guaranteed equally to male and female persons.

^[3] Section 19(2) of CEAA 2012 indicates that the Minister of Environment and Climate Change shall set the scope of the factors to be considered for environmental assessments by review panel. In addition to the information contained in the EIS Guidelines, the Minister may provide additional direction in the Terms of Reference for the Review Panel.

^[4] Should the environmental assessment of the project be referred to a review panel, any additional factors to be considered that the Minister of Environment and Climate Change requires to be taken into account will be included in the Terms of Reference for the Review Panel.

^[5] Visit the Canadian Environmental Assessment Agency website: www.ceaa-acee.gc.ca/default.asp?lang=En&n=F1F30EEF-1

^[6] TERMPOL Code: "Code of Recommended Standards for the Safety and Prevention of Pollution for Marine Transportation Systems and Related Assessment Procedures"

^[7] See subsection 52(2) of CEAA 2012.

^[8] The 2011 *Updated Guidelines for Federal Officials to Fulfill the Duty to Consult (the Guidelines)* defines Aboriginal rights as: practices, traditions and customs integral to the distinctive culture of the Aboriginal group claiming the right that existing prior to contact with the Europeans (Van de Peet). In the context of Métis groups, Aboriginal rights means practices, traditions, and customs integral to the distinctive culture of the Métis group that existed prior to effective European control, that is, prior to the time when Europeans effectively established political and legal control in the claimed area (*Powley*). Generally, these rights are fact and site specific. For greater certainty, the Guidelines also define Aboriginal title as an Aboriginal right. Visit the Indigenous and Northern Affairs Canada website at: <http://www.aadnc-aandc.gc.ca/eng/1100100014664/1100100014675>

^[9] Greenhouse gas emissions include: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃).

[10] Contaminants of concern include, but are not limited to, selenium, sulphate, cadmium, nitrate and calcite.

[11] The Canadian Wetland Classification System, National Wetlands Working Group, 1997, See the website http://www.gret-perg.ulaval.ca/fileadmin/fichiers/fichiersGRET/pdf/Doc_generale/WetlandsWetlands.pdf

[12] Surveys should be designed in light of the available references and recommendations in Environment and Climate Change Canada's document entitled "Guidance for the Preparation of an Environmental Impact Statement and Useful References" (2016) and in the Canadian Wildlife Service's Technical Report No. 508, A Framework for the Scientific Assessment of Potential Project Impacts on Birds (Hanson et al. 2009). Appendix 3 of the Framework provides examples of project types and recommended techniques for assessing impacts on migratory birds

[13] Proponents are encouraged to consult COSEWIC's annual report for a listing of the designated wildlife species: http://www.cosewic.gc.ca/eng/sct0/index_e.cfm#sar

[14] The proponent should refer to Health Canada's *Useful Information for Environmental Assessments* document in order to include the appropriate baseline information relevant to human health. This document can be obtained at <http://www.publications.gc.ca/site/eng/481782/publication.html>

[15] Heritage resources to be considered will include but not be limited to, physical objects (e.g. middens, culturally-modified trees, historic buildings), sites or places (e.g. burial sites, sacred sites, cultural landscapes) and attributes (e.g. language, beliefs).

[16] The proponent should refer to Health Canada's *Useful Information for Environmental Assessments* document in order to include the appropriate baseline information relevant to human health. This document can be obtained at <http://www.publications.gc.ca/site/fra/9.700511/publication.html>.

[17] Visit the Canadian Environmental Assessment Agency's website at: <http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=363DF0E1-1>

[18] Visit the Canadian Environmental Assessment Agency's website at: www.ceaa-acee.gc.ca

[19] These terms are defined in the Canadian Environmental Assessment Agency's Technical Guidance for Assessment Cumulative Environmental effects under the Canadian Environmental Assessment Act, 2012 – Draft. ([http://www.ceaa-acee.gc.ca/Content/B/8/2/B82352FF-95F5-45F4-B7E2-B4ED27D809CB/Cumulative Environmental Effects-Technical Guidance-Dec2014-eng.pdf](http://www.ceaa-acee.gc.ca/Content/B/8/2/B82352FF-95F5-45F4-B7E2-B4ED27D809CB/Cumulative%20Environmental%20Effects-Technical%20Guidance-Dec2014-eng.pdf))

[20] Indicate by a check mark which valued components can be considered "environmental effects" as defined in section 5 of CEAA 2012, and specify which subsection of this Act is relevant. For example, for the VC "Use of land and resources by Aboriginal people", the appropriate cell would indicate, section 5(1)(c)(iii).

[\[21\]](#) The ecological and social context within which potential environmental effects may occur should be taken into account when considering the key criteria above in relation to a particular VC, as the context may help better characterize whether adverse effects are significant.

APPENDIX B

OVERVIEW OF THE ENVIRONMENT AND CLIMATE CHANGE CANADA MANDATE FOR MIGRATORY BIRDS, SPECIES AT RISK AND THE FEDERAL POLICY ON WETLAND CONSERVATION

Regulatory Context

ECCC's recommendations on wildlife, migratory birds, and wetland issues for projects in the environmental assessment process are based on the departmental responsibilities under the *Migratory Birds Convention Act, 1994* (MBCA), and the *Species at Risk Act* (SARA), as well as on its lead role in providing guidance on implementation of the Federal Policy on Wetland Conservation.

Migratory Birds

Migratory Birds Convention Act, 1994 (MBCA)

The purpose of the MBCA is to implement the Migratory Birds Convention between Canada and the United States by protecting and conserving migratory birds, as populations and individuals. It is the responsibility of the Federal Government of Canada (GoC) to protect and conserve the roughly 500 species of migratory birds regularly occurring in Canada. ECCC's Canadian Wildlife Service (CWS) provides the list of bird species protected under the MBCA, which derives from Article I of the Convention. This list includes all seabirds (except cormorants and pelicans), all waterfowl, all shorebirds and most landbirds (birds with principally terrestrial life cycles).

Section 5.1 of the MBCA prohibits the deposit of a substance that is harmful to migratory birds in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area. The Act prohibits the possession of a migratory bird, nest or egg without lawful excuse. The Migratory Birds Regulations (MBR) provide for the conservation of migratory birds and for the protection of individuals, their nests and eggs. A prohibition against hunting is set out in section 5 of the MBR. The term "hunt" is given a specific definition in section 2 of the Regulations and includes attempting in any manner to kill, injure or harass migratory birds. A prohibition against the disturbance, destruction, or taking of a nest, egg or nest shelter of a migratory bird is set out in subsection 6(a) of the MBR.

Avoiding Incidental Take

Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities—including but not limited to clearing trees and other vegetation, draining or flooding land, or using fishing gear. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is known as incidental take and is prohibited under the MBCA. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different incidents. For further details, please refer to the Avoidance Guidelines at: <http://ec.gc.ca/paom-itmb/default.asp?lang=En&n=C51C415F-1>

Endangered and threatened migratory bird Species at Risk (species, subspecies, and distinct populations)

also have federal legislative protection under the Species at Risk Act (SARA).

ECCC advises that proponents should be aware that construction during the nesting period for migratory birds carries with it high risks of incidental take. Many bird nests are difficult to locate, even with highly trained observers. Proponents should be aware of the risks and take appropriate action to ensure they are in compliance with the MBCA.

Species at Risk

The purposes of the Species at Risk Act (SARA) are to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are Extirpated, Endangered or Threatened as a result of human activity, and to manage species of Special Concern to prevent them from becoming Endangered or Threatened. SARA supports the federal commitments under the 1996 Accord for the Protection of Species at Risk, which outlines commitments by federal, provincial and territorial ministers to designate Species at Risk, protect their habitats and develop recovery plans as well as complementary legislation, regulations, policies and programs, including stewardship.

Environment and Climate Change Canada (ECCC) has responsibilities for overall administration of SARA (ss. 8(1)). As well, SARA defines “competent ministers” as the Minister responsible for the Parks Canada Agency (PCA) (with respect to individuals^[1] of a wildlife species in or on federal lands administered by that Agency); the Minister of Fisheries and Oceans (with respect to aquatic species other than individuals on lands administered by the PCA); and, the Minister of the Environment and Climate Change (with respect to all other individuals of a wildlife species). Competent ministers have responsibilities regarding recovery planning, protection, permitting, and other activities identified within the legislation.

SARA sets out a process for an independent assessment of species potentially at risk and for their consideration by Governor in Council for listing on Schedule 1 of SARA as Extirpated, Endangered, Threatened, or of Special Concern. SARA requires that recovery strategies and action plans be developed by the competent minister for species listed as Extirpated, Endangered or Threatened. Management plans must be developed for species of Special Concern.

SARA also provides measures for the protection of listed threatened, endangered or extirpated species and their residences. Under section 32 and 33 of SARA, individuals and residences of aquatic species and birds protected by the MBCA are automatically protected anywhere they are found in Canada. These general prohibitions apply to all other Extirpated, Endangered or Threatened species listed on Schedule 1 of SARA when they are on federal lands in the provinces and on land under the authority of the Minister of the Environment and Climate Change or the Parks Canada agency in the territories. These prohibitions can also apply on non-federal (provincial, territorial and private) lands if the Governor in Council makes an order to that effect, based on a recommendation from the federal Minister of the Environment (SARA s. 34 and s. 35).

Based on the best available information, SARA requires an identification of critical habitat for Threatened,

^[1] As defined in SARA, “individual” means an individual of a wildlife species, whether living or dead, at any developmental stage and includes larvae, embryos, eggs, sperm, seeds, pollen, spores and asexual propagules.

Endangered, and Extirpated species to the extent possible in a recovery strategy or action plan. SARA defines the critical habitat of a species as “the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or an action plan for the species.” Once critical habitat is identified in a final recovery strategy or action plan, SARA sets out a process to evaluate existing protection mechanisms, and if necessary, to put in place additional protection under SARA. The timelines and instruments which can be used to achieve critical habitat protection vary depending on land ownership and the species involved. SARA is designed to turn first to existing laws and initiatives before contemplating using SARA prohibitions directly, looking to federal laws when critical habitat occurs on federal land and to laws of the province or territory or Acts of Parliament including SARA when critical habitat occurs on non- federal lands.

In an environmental assessment context, it is important that the decision maker is aware of critical habitat information, which is available on the SARA Registry, in the area in which a project is located.

Wetlands

Refer to ECCC-CWS_Memo01_FederalPolicyonWetlandConservationImplementationGuidance (“Federal Policy on Wetland Conservation - Guidance for Application and Implementation in Environmental Assessment”) for ECCC’s standard environmental assessment advice on wetlands.

APPENDIX C

FEDERAL POLICY ON WETLAND CONSERVATION GUIDANCE FOR APPLICATION AND IMPLEMENTATION IN ENVIRONMENTAL ASSESSMENT

Introduction

The Government of Canada plays an important role in initiatives to restore and protect wetlands¹. Canada is a signatory to the Ramsar Convention, an international treaty focusing on conservation of wetlands of international importance. A major obligation under the Convention is implementation of principles, proposed in 1987 by Canada, for the wise use of wetlands. The Convention notes the "wise use" of wetlands is defined as their "sustainable utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem". The federal government has also developed the *Federal Policy on Wetland Conservation*² (FPWC); this is a government-wide policy approved by federal Cabinet and adopted in 1991. The objective of the FPWC is to promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future.

Environment and Climate Change Canada (ECCC) provides expertise and lead role in support of FPWC implementation, which seeks to maintain the functions and values derived from wetlands throughout Canada through a primary emphasis on impact avoidance. Wetlands are a particular priority for ECCC because of their importance to the maintenance of migratory bird populations for which the Department has a responsibility under the *Migratory Birds Convention Act (MBCA)*, and for protection of species at risk for which it has a responsibility under the *Species at Risk Act*, as well as the provision of ecological services.

ECCC's advice is therefore guided by the FPWC, by its leadership role under the Ramsar Convention, and by its responsibilities under the MBCA and *Species at Risk Act* (SARA). ECCC recognizes the importance of considering cumulative effects and tailors expected outcomes for wetlands to the level of effects experienced in the area.

Technical Considerations

(A) The key policy objectives of the Federal Policy on Wetland Conservation (the Wetland Policy) relevant to federal environmental assessment can be found in Strategy 2 *Managing Wetlands on Federal Lands and Waters and in Other Federal Programs*. These include:

Commit all federal departments to the goal of no net loss of wetland functions (i) on federal lands and waters, (ii) in areas affected by the implementation of federal programs where the continuing loss or degradation of wetlands has reached critical levels, and (iii) where federal activities affect wetlands designated as ecologically or socio-economically important to a region. Due to local circumstances where wetland losses have been severe, in some areas no further loss of any remaining wetland area may be deemed essential (Government of Canada 1991).

(B) The Wetland Policy should be considered by the Government of Canada through federal departments when addressing the potential loss of wetlands and wetland functions. Projects and

¹ For guidance on wetland classification, refer to National Wetlands Working Group. 1997. *The Canadian Wetland Classification System*, 2nd ed.. Wetlands Research Centre, University Waterloo, Waterloo, Ontario. 68 p. CW66-156/1997.

² Available through the following link: <https://www.ec.gc.ca/tho-wlo/default.asp?lang=En&n=5CD88C2D-1>

activities of the Government of Canada are subject to the Policy, including those projects and activities considered under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). For projects on non-federal lands and waters, wetland and function loss are evaluated in terms of **the scope of any federal permits, licenses, authorizations and other instruments³ under federal jurisdiction applicable to the project.**

The no net loss goal of wetland functions should be considered in the context of the CEAA 2012 to the extent of the application of federal jurisdiction (as described in (B) above). In relation to section 5 of CEAA 2012, the relevant sections are 5(1)(a), 5(1) (b), and 5(2)(a).

It is important to note that although the Wetland Policy can be considered broadly to all wetlands in Canada, the Policy's no net loss of wetland functions goal should be considered specifically to wetlands linked to areas of federal jurisdiction, these being:

- Federal lands
- Federal waters
- On non-federal lands, as described above **(B)** and in **(D)** below

(C) The Wetland Policy is underpinned by a 'no net loss of wetland functions' goal , and as such, necessitates a consideration of all wetland functions potentially adversely effected. Therefore, Environment and Climate Change Canada's Canadian Wildlife Service (CWS) recommends that proponents describe the natural processes of wetlands (physical, chemical, and biological) potentially directly and indirectly impacted are described in the Environmental Impact Assessment for review during the environmental assessment process.

The wetland functions overview guidance by Hanson et al. (2008) titled '*Wetland Ecological Functions Assessment: An Overview of Approaches*' (http://publications.gc.ca/site/archivee-archived.html?url=http://publications.gc.ca/collections/collection_2010/ec/CW69-5-497-eng.pdf) should be reviewed before undertaking a wetland functions assessment. This document offers guidance on the types of wetland function assessments available (at the time of publication). It is important to be aware, however, that it is not in and of itself an approach to conducting wetland functions.

In relation to migratory birds and species at risk specifically, ECCC offers the following general guidance:

Surveys to assess for the presence, abundance, density, and distribution of migratory birds and species at risk (SARA-listed, and COSEWIC assessed) in relation to potentially impacted wetlands and associated riparian areas. Surveys should meet appropriate standards (e.g. Resource Information Standards Committee standards (RISC)), be species or bird group specific as appropriate, and be conducted during the appropriate times of the year. Surveys for species at risk should assess species individually (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

³ Some examples of federal instruments (permits, licences, authorizations, etc) include: Section 52 Certificate of Public Convenience and Necessity under the *National Energy Board Act*; Section 35(2) Authorization under the *Fisheries Act*; Section 127 Permit for Disposal at Sea under the *Canadian Environmental Protection Act, 1999*; Section 5(1) Permit under the *Navigable Waters protection Act*; and, Section 28(2) Permit under the *Indian Act*.

identify which wetland classes are important to which species (and for how many) on which to assess recovery and direct compensation.

- (D) The no net loss goal of the Wetland Policy should be considered on a regional basis to reflect current conditions. In relation to current conditions, it should be considered to natural, degraded, and artificial wetlands.

In British Columbia, the geographic areas where the documented continuing loss or degradation of wetlands has reached critical levels are defined as:

- *Lower Mainland / Fraser Valley region*
- *East Vancouver Island and Gulf Islands*
- *Okanagan Valley*

In British Columbia, wetlands designated as ecologically important to a region are defined as:

- Areas of Continental or Regional Significance to Waterfowl within the three Joint Venture planning boundaries of British Columbia
- Estuaries as identified by the Pacific Estuary Conservation Program
- All eelgrass (*Zostera* subspecies) beds
- Red- and blue-listed wetland ecological communities

With respect to the two definitions provided above, CWS can provide more detailed guidance as and when requested. It should also be noted that the Policy states that 'no further loss of any remaining wetland area' may be deemed essential in areas where wetland losses have been severe. CWS can provide guidance in relation to the aforesaid on a project-by-project basis.

For a spatial representation of the regions and wetland types described above, refer to Appendix I. For a list of the mapped units, refer to Appendix II.

- (E) The mitigation hierarchy should be used to achieve a no net loss of wetland functions for the three situations identified above. CWS recommends the hierarchy be applied in the following order, i.e. from most to least preferred:

- (1) Avoidance of impacts;***
- (2) Minimization of unavoidable impacts; and,***
- (3) Compensation for unavoidable impacts.***

Due in part to the broader wetland policy objective of promoting the conservation of Canada's wetland functions, now and in the future, and given the important role that wetlands play in sustaining populations for a variety of migratory bird and SARA-listed species, CWS recommends that avoidance of the loss of ecological wetland functions be emphasized early in the design phase of project proposals.

Consideration of the Wetland Policy is separate and distinct from a significance evaluation under CEAA 2012. The Wetland Policy is based on a no net loss of wetland functions, whereas the significance evaluation under the Act applies threshold-based criteria.

The Wetland Policy should be considered for all wetlands and wetland types in Canada, regardless of size. The no net loss goal should be considered to wetlands regardless of size in specific areas, and to specific types of wetlands throughout British Columbia, as described in (D) above. The no net loss goal should be considered in the context of all adverse effects, whether small or large, of short or long duration, and whether the effects are direct or indirect. Further, the no net loss goal should be considered to temporary losses⁴ of wetland functions.

Monitoring programs are recommended to be scientifically robust, including of sufficient duration⁵, so that the mitigation measures applied can be quantitatively assessed for overall effectiveness. Monitoring results may direct that mitigation be adjusted to ensure that compensation objectives are fully met.

(F) Whether in relation to the no net loss goal under the FPWC or a significance evaluation under CEAA 2012, CWS recommends that a Wetland Compensation Plan (WCP) be submitted with an Environmental Impact Statement for review during the environmental assessment process. The WCP should, amongst other things:

- i. Describe the baseline condition of the wetland ecological communities and functions the Project would directly and indirectly adversely affect;
- ii. Describe how the Project applied the mitigation hierarchy in €, including how efforts to avoid impacts were emphasized;
- iii. Identify and describe any residual adverse effects;
- iv. Describe the process of selecting proposed compensation site(s) and associated baseline condition(s);
- v. Describe the functions that would be gained at the compensation site(s);
- vi. Identify the compensation ratio;
- vii. Identify measurable success criteria;
- viii. List the parties and responsibilities for implementation; and
- ix. Provide the monitoring schedule, parameters, plans, and analysis.

The CWS identifies a compensation ratio of 2:1 as the general national standard. Variances from this ratio will arise in project-specific instances, and the appropriateness of these should be demonstrated by the proponent through consultation with the CWS. In order of priority, wetland restoration is preferred over enhancement and enhancement over creation. In some situations, it may be determined that protection of existing functioning wetland habitat is sufficient to address project impacts. Additional considerations in the development of a WCP (amongst others) include:

- That compensation sites be located as close to impact sites as is technically feasible
- That replacement wetlands represent the same wetlands types and functions as those at the impact sites

⁴ In the general case, CWS defines 'temporary' as equal to or less than 5 years.

⁵ In the general case, CWS defines 'duration' as the period that reflects the life of the project. Because mitigation measures to address specific impacts can vary considerably across projects, the appropriate period of monitoring will be determined on a project-by-project basis. Consistency will be sought wherever it is scientifically feasible to do so. For additional guidance on scientific methods in support environmental assessment, refer to the following document: Hanson, A., I. Goudie, A. Lang, C. Gjerdrum, R. Cotter, and G. Donaldson. 2009. A framework for the scientific assessment of potential project impacts on birds. Canadian Wildlife Technical Report Series No. 508. Atlantic Region.

- That compensation measures be incorporated to account for the time lag in availability of habitat and functions between when the adverse effects occur to when they have been fully replaced.

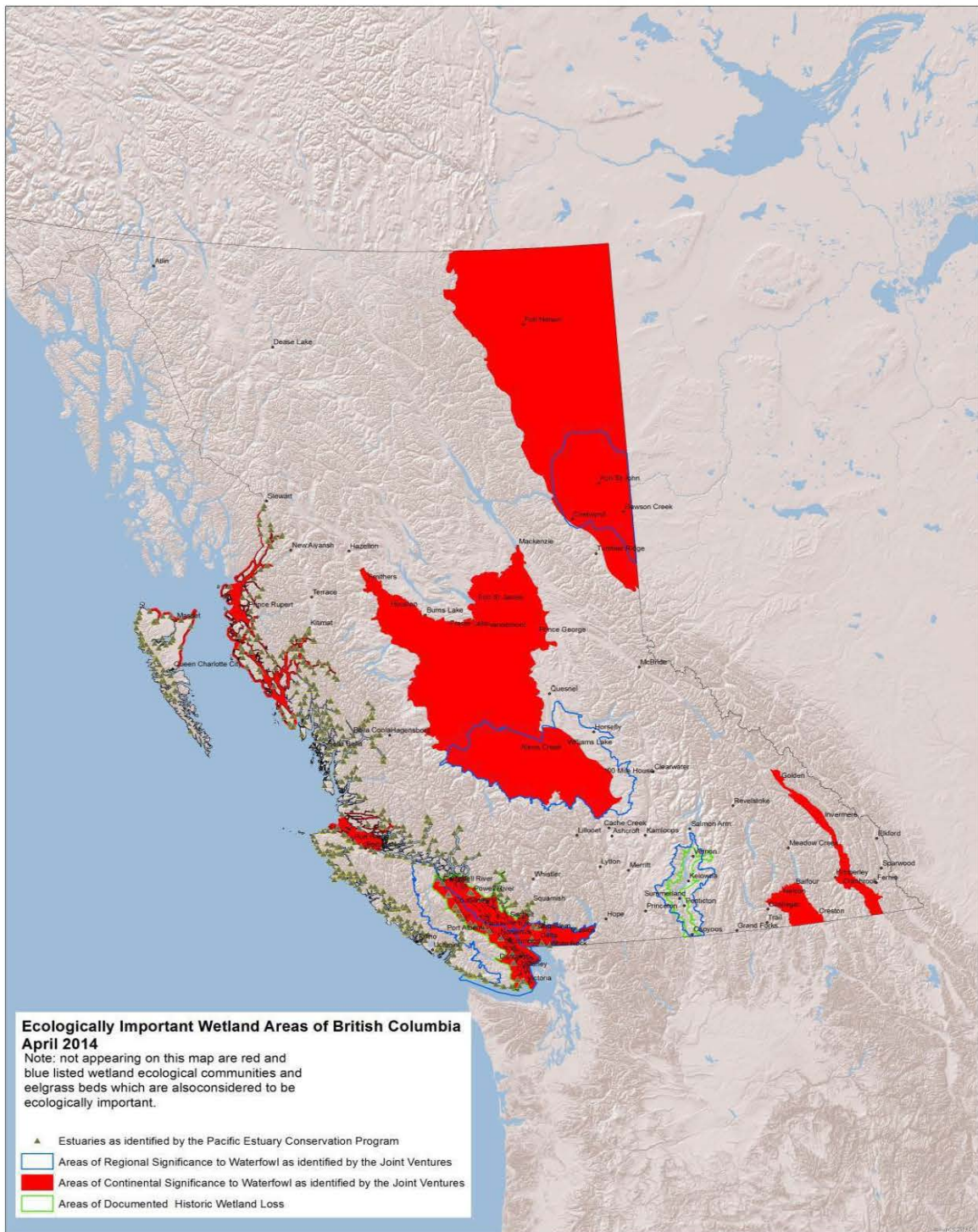
For guidance regarding wetland offsetting, proponents are referred to Environment and Climate Change Canada's *Operational Framework for Use of Conservation Allowances* (<http://www.ec.gc.ca/ee-ea/default.asp?lang=En&n=DAB7DD13-1&printfullpage=true>).

Closing

In summary, CWS advises proponents that the Wetland Policy no net loss of wetland functions goal should be considered by the Government of Canada, including therefore all federal departments and agencies, when addressing potential wetland losses. The no net loss goal is used to inform the environmental assessment process, including by CWS when providing expert advice on appropriate measures to be taken to avoid or mitigate the adverse environmental effects of a project subject to CEAA 2012, the SARA and the MBCA.

The identification and mapping of ecologically important wetlands and areas where losses of wetlands have reached critical levels is ongoing. As more data is made available and analyzed, CWS guidance will be periodically updated to ensure that the Wetland Policy is implemented in a consistent, objective, and transparent manner.

Appendix I



Appendix II

Areas of Continental Significance to Waterfowl

North American Waterfowl Management Plan. *North American Waterfowl Management Plan 2012: People Conserving Waterfowl and Wetlands*. 2012.

North Coast

Nearshore areas (to 3 km) off of the Queen Charlotte Lowland Ecoregion, including estuaries
Estuaries and waters of the Hecate Lowland Ecoregion, from the US border to Aristazabel Island out to
3 km off of the outer islands

North Island Straits Area

Estuaries and waters of the Queen Charlotte Strait Ecoregion

Georgia Basin

Nanaimo Lowland Ecoregion

Strait of Georgia Ecoregion

Fraser Lowland Ecoregion

Georgia Lowland Ecoregion

Southern Gulf Islands Ecoregion

Central Interior

Bulkley Basin Ecoregion

Nechako Lowland Ecoregion

Nazko Upland Ecoregion

Western Chilcotin Upland Ecoregion

Chilcotin Plateau Ecoregion

Fraser River Basin Ecoregion

Cariboo Basin Ecoregion

Creston

Southern Columbia Mountains Ecoregion

Kootenay

East Kootenay Trench Ecoregion

Upper Columbia Ecoregion

Peace

Northern Alberta Upland Ecoregion Hay-Slave Lowland Ecoregion

Muskwa Plateau Ecoregion Central

Alberta Upland Ecoregion Southern

Alberta Upland Ecoregion Peace

River Basin Ecoregion

Areas of Regional Significance to Waterfowl

Harrison, B. et al. *Canadian Intermountain Joint Venture Implementation Plan: Wetlands and Associated Species*. 2010. Joint Venture Technical Committee.

Harrison, B. et al. *Pacific Coast Joint Venture Implementation Plan*. (in progress). Joint Venture Technical Committee.

Cariboo-Chilcotin

Earlier version of ecosectional boundaries, including all or part of:

Chilcotin Plateau Ecosection

Cariboo Basin Ecosection

Fraser River Basin Ecosection

Cariboo Plateau Ecosection

Quesnel Lowland Ecosection

Okanagan

Okanagan watershed

East Coast Vancouver Island

Georgia Basin watershed including waters of the Strait of Georgia (to centre line), and including Port Alberni.

Fraser Delta

Western portion of Fraser Lowland Ecosection to centre line of Strait of Georgia, eastern boundary to portion of Surrey including Serpentine and Nicomekl watersheds.

Fraser Valley

Eastern portion of Fraser Lowland Ecosection including remainder of Surrey

Estuaries as identified by the Pacific Estuary Conservation Program

Ryder, J., J. Kenyon, D. Buffett, K. Moore, M. Ceh and K. Stipek. 2007. *An Integrated Biophysical Assessment of Estuarine Habitats IN British Columbia to Assist Regional Conservation Planning*. Canadian Wildlife Service Technical Report #476.

Eelgrass

Hutchinson, I., A. Campbell Prentice, and G. Bradfield. *Aquatic plant resources of the Strait of Georgia*. in *The Ecology and Status of Marine and Shoreline Birds in the Strait of Georgia*, British Columbia. Proceedings of a symposium sponsored by the Pacific Northwest Bird and Mammal Society and the Canadian Wildlife Service, Sidney, BC. 11 December 1987.

Butler, R.W. and K. Vermeer. *Overview and recommendations: Important bird habitats and the need for their preservation*. in *The Ecology and Status of Marine and Shoreline Birds in the Strait of Georgia*, British Columbia. Proceedings of a symposium sponsored by the Pacific Northwest Bird and Mammal Society and the Canadian Wildlife Service, Sidney, BC. 11 December 1987.

Wright, N. 2002. *Eelgrass Conservation for the B.C. Coast: A Discussion Paper*. Prepared for the BC Coastal Eelgrass Stewardship Project, funded in part by Environment Canada and the Bullitt Foundation.

Areas of Documented Historic Wetland Loss

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- 2) Moore, Kathleen, Peggy Ward and Katrina Roger. 2004. "Urban and Agricultural Encroachment onto Fraser Lowland Wetlands - 1989 to 1999." In T.W. Droscher and D.A. Fraser (eds). Proceedings of the 2003 Georgia Basin/Puget Sound Research Conference. CD-ROM or Online. Available: http://www.psat.wa.gov/Publications/03_proceedings/start.htm [February 2004]
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- 4) Moore, K.E. 1990. *Urbanization in the Lower Fraser Valley, 1980-1987*. Technical Report Series No. 120. Canadian Wildlife Service, Environment Canada. 12 pp.
- 5) Kistritz, R.U., K.J. Scott, C.D. Levings. 1996. *Changes in fish habitat in the Lower Fraser River analyzed by two wetland classification systems*. Pages 19-40 in C.D. Levings and D.J.H. Nishimura (eds.), Created and restored sedge marshes in the Lower Fraser River and estuary: an evaluation of their functioning as fish habitat. Canadian Technical Report of Fisheries and Aquatic Sciences 2126. Science Branch, Department of Fisheries and Oceans.
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- 7) Metro Vancouver. 2010. *Lower Fraser Wetland Loss: Wetland Loss to Human Encroachment in the Fraser Lowlands from 1999 – 2009, and Comparison to Loss from 1989 – 1999*. Metro Vancouver.
- 8) Fraser River Action Plan. 1998. *Wild, Threatened, Endangered, and Lost Streams of the Lower Fraser Valley: Summary Report*. Fisheries and Oceans Canada.
- 9) Axy's Environmental Consulting. 2005. *Redigitizing of Sensitive Ecosystems Inventory Polygons to Exclude Disturbed Areas – Summary Report*. Report prepared for the Canadian Wildlife Service.
- 10) Lea, T. 2008. Historical (pre-settlement) ecosystems of the Okanagan Valley and Lower Similkameen Valley of British Columbia – pre-European contact to the present. *Davidsonia* 19(1): 3-36.
- 11) Environment Canada. 2002. *South Okanagan-Similkameen Conservation Program: A prospectus*.
- 12) British Columbia Ministry of Environment Lands and Parks. 1998. *Habitat Atlas for Wildlife at Risk: South Okanagan and Lower Similkameen*.

Georgia Basin

Nanaimo Lowland Ecosection

Strait of Georgia Ecosection

Fraser Lowland Ecosection

Southern Gulf Islands Ecosection

Okanagan

South Okanagan Basin Ecosection

North Okanagan Basin Ecosection

APPENDIX D

Environment and Climate Change Canada Standard Guidance for Environmental Assessments

Marbled Murrelet (*Brachyramphus marmoratus*)

Purpose

This document has been developed to assist proponents of proposed developments, as well as those responsible for reviewing proposed developments, in addressing concerns related to Marbled Murrelet (*Brachyramphus marmoratus*) that may arise in environmental assessment processes in British Columbia. The document provides the context within which the species is considered: the *Migratory Birds Convention Act* (MBCA), the *Species at Risk Act* (SARA), and the recovery strategy for Marbled Murrelet developed under SARA and published on the SARA Public Registry (<https://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1>). This document also provides recommendations regarding how to address Marbled Murrelet within the stages of the environmental assessment process.

Marbled Murrelet Protection, MBCA, and SARA

Marbled Murrelet under the MBCA

Marbled Murrelet is protected under the *Migratory Birds Convention Act* (MBCA), which implements the Migratory Birds Convention between Canada and the United States and, together with the *Migratory Bird Regulations*, protects migratory birds, as populations and as individual birds.

Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities—including but not limited to clearing trees and other vegetation, draining or flooding land, or using fishing gear. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is known as incidental take and is prohibited under the MBCA. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different incidents. For further details, please refer to the guidance on how to avoid incidental take at the website: <http://ec.gc.ca/paom-itmb/default.asp?lang=En&n=C51C415F-1>

Environment and Climate Change Canada (ECCC) further advises that proponents should be aware that construction during the nesting period for migratory birds carries with it high risks of incidental take. Many bird nests are difficult to locate, even with highly trained observers. Proponents should be aware of the risks and take appropriate action to ensure they are in compliance.

Marbled Murrelet Recovery Strategy and Critical Habitat under SARA

The Marbled Murrelet is a small seabird that spends most of its time at sea within 0.5 km of shore. Marbled

Murrelets are secretive and nest as solitary pairs at low densities, typically in old-growth forests within 30 km of the sea. In Canada, Marbled Murrelets are found only on Canada's Pacific coast. The Marbled Murrelet was assessed as Threatened in 2012 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and is currently listed on Schedule 1 of SARA as Threatened.

The main threat to Marbled Murrelet is the direct loss of old-growth nesting habitat through forest harvesting, or clearing of land. These activities can also cause indirect impacts to Marbled Murrelet – clearing can create hard forest stand edges adjacent to remaining suitable habitat that increase opportunities for nest predator access (e.g., from crows and jays) into suitable nesting sites. It can also alter the microclimate (e.g., light, wind, moisture) necessary to support microhabitat attributes such as mossy platforms for nesting. Most of the microclimate effects occur within the first 50-100 m of forest adjacent to the hard edge.

Other main threats are related to the development of energy infrastructure, including collision risks and increases in predator concentrations. Marine threats include chronic and catastrophic oil spills; entanglement in fishing gear (mainly gill-nets); and current and future boat traffic and shipping which disrupt foraging and marine distributions.

Individuals and residences of migratory bird species listed on Schedule 1 of SARA as Threatened, Endangered or Extirpated have additional federal legislative protection under SARA wherever they are found. SARA requires the development of a recovery strategy document for such species. A recovery strategy provides strategic direction for recovering the species and, to the extent possible, identifies its critical habitat. The final federal recovery strategy for the Marbled Murrelet (http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=1290) was posted June 3, 2014.

Terrestrial Critical Habitat

The Marbled Murrelet Recovery Strategy includes population and distribution objectives for recovery; a partial identification of terrestrial (nesting) critical habitat; the geographical location and biophysical (ecological) attributes of that habitat; and activities likely to destroy critical habitat. Broad strategies for recovery and a schedule of studies for completing the identification of critical habitat are also included. The broad strategies captured in the Recovery Planning Table provide general approaches to achieve the population and distribution objectives (recovery) for the listed species. These measures will assist in the development of subsequent action plans to address refinement of the nesting critical habitat identification and habitat management, to better understand and mitigate marine threats, and to refine methods for tracking trends in Marbled Murrelet populations and habitat. The schedule of studies concentrates on the identification of marine critical habitat.

Critical habitat for the Marbled Murrelet is identified as that portion of the suitable habitat required for the survival and recovery of the species as specified by the population and distribution objectives in the Recovery Strategy. While Marbled Murrelets require terrestrial habitat (i.e., coniferous old-growth forest within 50 km of the ocean to support nesting) and marine habitat (0.5 to 2 km off the shore for foraging and moulting), information to identify and map suitable marine habitat was not yet available at the time of posting the Recovery Strategy in June 2014. Both habitat types, however, need to be considered in recovering and managing the species. It is important to note that marine critical habitat may be identified within a timeframe that overlaps with that of construction and operation of proposed development; ECCC recommends the Responsible Authority (RA) ensure that the Proponent seek and consider the most up-to-date information on species at risk recovery planning in the development and implementation of project activities.

The Recovery Strategy further specifies that terrestrial critical habitat is identified as a state where greater than 70% of the 2002 suitable nesting habitat (SNH) coast-wide remains. This objective should not be interpreted as an intent to manage nesting habitat down to 70% of 2002 levels; rather, the quantification of SNH and losses over

the period between the baseline year of 2002 and the present is an agreed upon starting point against which to measure progress to recovery. Based on this, and the degree of historic habitat loss, minimum retention levels for each of six conservation regions have been determined as follows:

Marbled Murrelet Conservation Region	Minimum Nesting Critical Habitat Retention Level (as a percentage of 2002 suitable nesting habitat) as described in the Marbled Murrelet Recovery Strategy
Northern Mainland Coast	68%
Haida Gwaii	68%
Central Mainland Coast	68%
West and North Vancouver Island	68%
East Vancouver Island	90%
Southern Mainland Coast	85%

Although determining Marbled Murrelet occupancy of a given area is important to avoid and lessen project impacts to the species (consistent with ss.79(2) of SARA), occupancy is not a component of the identification of Marbled Murrelet terrestrial critical habitat. Terrestrial critical habitat is identified based on habitat features within identified critical habitat polygons using the methodology described above.

Marine Critical Habitat

In the marine environment, Marbled Murrelets can be impacted by chronic and catastrophic oil spills and are also easily disturbed by the passage of boats. Proposed increases in natural resource exports via B.C. ports and increases in shipping traffic have the potential to increase risks to the species in the core of the Marbled Murrelet's range and is likely to cause Marbled Murrelets to avoid otherwise suitable foraging habitat. While marine critical habitat has not yet been identified for Marbled Murrelet, it may be identified in an amended recovery strategy or action plan within a timeframe that overlaps with that of construction and operation of development projects. It is recommended, at all project stages, that project proponents be aware of any updates regarding species at risk, including those on the Species at Risk registry: http://www.sararegistry.gc.ca/sar/index/default_e.cfm.

Environmental Assessment Considerations of Marbled Murrelet Critical Habitat Destruction

Critical habitat is defined in SARA as habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as critical habitat in a recovery document for the species.

If critical habitat is destroyed, this may affect the survival and recovery of the species in the following ways:

- reduced habitat availability and function for nesting, especially given the long time it takes for forests to develop the biophysical attributes necessary to support nesting (coniferous old-growth forests take decades to regenerate), which results in multi-generation impacts to the species;
- increased risk of predation on Marbled Murrelet and their eggs and chicks resulting from increased predator access and/or increased predator concentrations; and
- reduced reversibility of effects due to the compounding effects of long-term habitat loss, increased predation, and the biologically limiting factors of late onset of first reproduction (Marbled Murrelets do

not begin to breed until they are 2-3 years of age) and low reproductive output typical of Marbled Murrelet.

In an environmental assessment context, project activities that would adversely impact the survival or recovery of Marbled Murrelet would be considered on a case by case basis. It is possible that the adverse effect would be significant if not fully mitigated because it may jeopardize the survival or recovery of the species.

Environment and Climate Change Canada Recommendations for Marbled Murrelet

In order to assist project decision makers and project proponents, ECCC provides the following recommendations to help address potential impacts to Marbled Murrelet within the environmental assessment process.

Scoping

Recommendation 1

It should be determined if the project has the potential to impact Marbled Murrelet, either directly or indirectly. If the project has potential to impact Marbled Murrelet, this species should be included as a Valued Ecosystem Component (terrestrial and/or marine) and included as a requirement in the environmental assessment guidelines.

Recommendation 2

If the project has the potential to impact Marbled Murrelet, the local and regional study areas for baseline studies should include Marbled Murrelet habitat (terrestrial and marine, as appropriate) as part of their scope, and this should be reflected in the environmental assessment guidelines.

Baseline

Recommendation 3

Baseline studies should be conducted for Marbled Murrelet to determine the potential impacts of the project on Marbled Murrelet as part of the environmental assessment. Baseline studies should include, but not be limited to:

- a) an indication of which conservation region the project overlaps (refer to the Marbled Murrelet Recovery Strategy) and if there is overlap between the project and identified critical habitat polygons;
- b) a determination of whether suitable nesting habitat (SNH) for Marbled Murrelet is present within or near the project area. For guidance on this, refer to the draft 'Guidance and Tools to Support the Identification of Potential Marbled Murrelet Suitable Nesting Habitat' (March 30, 2015), which may be requested from ECCC. Note that identification of SNH is not dependent on Marbled Murrelet being present in the area. Identification is based on : the biophysical attributes of SNH and where potential nesting platforms occur, or where there is an indication of likely Marbled Murrelet nesting or the presence of a nest, where a nest site is confirmed; and
- c) if suitable nesting habitat is present within or near the project area, or if a nest has been identified, Marbled Murrelet surveys during the breeding season to determine whether Marbled Murrelets are likely nesting in the project area. For guidance on the type and effort of surveys that should be conducted, refer to the draft "*Guidance and Tools to Support the Identification of Potential Marbled Murrelet Suitable Nesting Habitat*" (March 30, 2015), which may be requested from ECCC.

Effects Assessment and Mitigation

Recommendation 4

The environmental assessment should identify and describe any potential direct or indirect impacts to Marbled Murrelet and its critical habitat arising from project activities. This should include, but not be limited to:

- a) A determination of whether the project has the potential to impact SNH. This should include a description of how the biophysical attributes of SNH may be directly or indirectly impacted.
- b) Where the species has been detected, or where there is evidence of breeding, the environmental assessment should identify and describe any potential direct or indirect impacts to Marbled Murrelet, its eggs, or nests.

Where no impacts are anticipated, this should be documented as part of the environmental assessment and a rationale provided.

Recommendation 5

The environmental assessment should determine whether impacts to SNH would compromise the minimum nesting critical habitat retention level (including any conservation areas identified by the province, such as Wildlife Habitat Areas (WHAs)) for the conservation region where the project occurs. In particular, the proponent should consult with, and seek evidence from the province of BC in making this determination. This determination should be documented as part of the environmental assessment and include a consultation report, as well as an explanation of how the evidence was interpreted based on the following steps (A, B and C). The following only applies to terrestrial critical habitat. ECCC will provide advice on Marbled Murrelet marine critical habitat as this information becomes available through an updated recovery strategy.

A. CRITICAL HABITAT POLYGONS

1. Does the project have the potential to impact SNH within polygons identified as containing critical habitat for MAMU?

- If the response to A.1 is YES, proceed to step B.
- If the response to A.1 is NO, the project is unlikely to compromise the minimum nesting critical habitat retention level and no further steps are required under Recommendation 5.

B. MINIMUM RETENTION LEVELS

To determine if there is evidence that confirms the minimum nesting critical habitat retention level *is compromised*:

1. Does the project impact SNH within an area which has been designated as habitat for Marbled Murrelet (such as a Wildlife Habitat Area)?
2. Is there evidence from implicated provincial or federal authorities that indicates the potential impacts from the project would compromise the minimum nesting critical habitat retention level for the Conservation Region within which the project is located?

- If the response to either B.1 or B.2 is YES, the advice from ECCC would be that destruction of critical habitat is likely. ECCC recommends the RA take a precautionary approach and avoid activities likely to destroy critical habitat, consistent with the Recovery Strategy.

In general, where project activities may impact critical habitat for species at risk, measures to offset those impacts may be considered. However, in the case of Marbled Murrelet, offsetting all impacts is likely not possible (see further discussion of offsets below, Recommendation 6). As such, avoidance of Marbled Murrelet critical habitat remains ECCC's recommendation.

Despite the limitations of offsets in addressing impacts to critical habitat for Marbled Murrelet, in the case where avoidance is not fully incorporated into the project, a commitment by the proponent to avoid or lessen any impacts to the species and its critical habitat, consistent with the Marbled Murrelet Recovery Strategy, is still appropriate to assist the RA in meeting its obligations under ss. 79(2) of SARA.

In the context of potential impacts to critical habitat, this commitment should include measures that aim to avoid any increase in the risk to the survival and recovery of the species.

To determine if there is evidence that confirms the minimum nesting critical habitat retention level is not compromised:

3. Is there evidence from the from implicated provincial or federal authorities that indicates the potentially impacted SNH would not be used to make up the minimum nesting critical habitat retention level for the Conservation Region within which the project is located? Evidence from the province should provide a clear rationale why the SNH would not be part of the minimum retention level. The rationale should be science-based and may incorporate information from modeling and land-use planning that demonstrates how the province has come to this decision.

- If the response to B.3 is YES, the advice from ECCC would be that destruction of CH is not likely. ECCC would, however, recommend to the RA that measures be taken to avoid or lessen adverse effects to Marbled Murrelet and its habitat, and monitor those effects, consistent with the Marbled Murrelet Recovery Strategy.

Early consultation with ECCC is recommended if any destruction of Marbled Murrelet critical habitat is anticipated as a result of project activities.

As indicated above, identification of critical habitat is not dependent on Marbled Murrelet being present; identification is based solely on the biophysical attributes of SNH in identified critical habitat polygons and the minimum retention levels.

Recommendation 6

The environmental assessment should identify and describe measures to avoid, minimize, or offset for each potential impact identified. With respect to this mitigation hierarchy, the environmental assessment should describe how the hierarchy was applied and provide a rationale for moving from avoidance to minimization to offset. Given the long time it takes for forests to develop the biophysical attributes necessary to support nesting (coniferous old-growth forests with appropriate microclimate conditions take decades to regenerate), it may not be possible to fully compensate for impacts to habitat of Marbled Murrelet that would compromise the minimum retention level of critical habitat. This is because of the time lag between when impacts would occur and the time when compensated habitat would become suitable for nesting.

Recommendation 7

The environmental assessment should identify and describe measures to protect and avoid harming, killing or disturbing Marbled Murrelets or destroying or taking their nests or eggs that are consistent with the MBCA and its *Regulations* as well as with the general prohibitions of SARA. Proponents should refer to ECCC's guidance to avoid Incidental Take of Migratory Birds in Canada, and in particular the section dealing with the General Nesting Periods of Migratory Birds in Canada. These advisories can be found at: <http://www.ec.gc.ca/paom-itmb>.

Recommendation 8

With respect to mitigating the impacts to SNH, a buffer should be maintained around SNH in a manner that reduces the edge/SNH area ratio to minimize effects from hard edges such as increased predation risk and microclimate effects. Where clearing of vegetation adjacent to SNH cannot be avoided, any removal or alteration of vegetation should proceed in stages to minimize hard edge effects at any given time around the SNH area as well as at the landscape level. Note that while the measures above may help to reduce impacts to SNH from hard edges, in the case where the impacted SNH is identified as critical habitat, the mitigation measures above may still lead to destruction of critical habitat. As above, ECCC recommends avoidance of activities likely to destroy critical habitat.

Recommendation 9

Measures to avoid any increase in predators in the project area should be implemented, including but not limited to waste management.

Recommendation 10

The environmental assessment should identify cumulative effects of the project and other existing and future foreseeable activities in the regional assessment area on Marbled Murrelet and its critical habitat. Where no cumulative effects are anticipated, this should be documented as part of the environmental assessment and a rationale provided.

Monitoring and Follow-up

Recommendation 11

Project monitoring should include monitoring of Marbled Murrelet and its habitat and be conducted in accordance with standardize methods, including but not limited to RISC 2001 and the '*Guidance and Tools to Support the Identification of Potential Marbled Murrelet Suitable Nesting Habitat*' (March 30, 2015).

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APPENDIX E

Environment and Climate Canada Standard Guidance for Environmental Assessments

Western Toad (*Anaxyrus boreas*)

Purpose

This document has been developed to assist proponents of proposed developments, as well as those responsible for reviewing proposed developments, in addressing concerns related to Western Toad (*Anaxyrus boreas*) that may arise in environmental assessment processes in British Columbia. The document provides the context for this species under the *Species at Risk Act* (SARA). It also provides recommendations regarding how to address Western Toad within the stages of the environmental assessment process.

Western Toad and SARA

Western Toad is listed as Special Concern on Schedule 1 of SARA and is declining over much of its range (COSEWIC 2012). One of the reasons that Western Toad was assessed as Special Concern is habitat fragmentation due to resource extraction and road networks; these factors can affect the Western Toad population over a much greater area than the actual project footprint (COSEWIC 2012).

Environment and Climate Change Canada (ECCC) notes that, while this species is SARA-listed, the Province is the lead management jurisdiction for this species. Therefore, it is recommended to consult with the province of British Columbia regarding baseline studies and effects assessment for Western Toad.

Western Toad should also be considered in the context of the application of the Federal Policy on Wetland Conservation's goal of no net loss of wetland functions. Where the goal of no net loss may be relevant to a project, wetland functions that serve the Western Toad should be included as part of the wetland functions assessment.

Western Toad Habitat

Breeding Habitat

Western Toads use aquatic habitat (ponds, stream edges, shallow margins of lakes) for breeding. They show strong breeding site fidelity, and will return to the same breeding site in successive years (Smith and Green 2005; Bull and Carey 2008). This species also uses communal breeding sites and can aggregate in large numbers at these breeding sites (COSEWIC 2012). Site fidelity and communal breeding may cause the Western Toad to only use one or a few potential breeding sites within a relatively large area (Slough 2004), emphasizing the importance of locating and protecting these breeding sites.

During the breeding season, which occurs from late April to late May depending on latitude and elevation, adult Western Toads spend only about a week at the water and this week can vary yearly within a 1 month period, depending on the weather. The egg masses are strings that can be easily overlooked. Tadpoles school together in big black masses that can be easily seen; however, these schools sink to deeper water at a certain stage of development. These schools can also be hidden in smaller, shallower sections of the wetland.

Summer Foraging and Winter Hibernation Habitat

Western Toads use a variety of terrestrial and aquatic habitats during their life cycle. Western Toads can aggregate at all life stages, including during summer foraging and during hibernation and can therefore be vulnerable to mass mortalities (COSEWIC 2012).

After breeding, Western Toads use corridors to migrate to terrestrial habitats where they use a variety of habitat types, including marshes and riparian areas surrounding breeding sites, as well as forests, meadows, shrub lands, subalpine or alpine meadows, open forest patches, and older clear cuts (10-15 years) (Bartelt et al. 2004, COSEWIC 2012). These migration corridors are important to ensure safe movement of adults between breeding and terrestrial habitats. These corridors also provide a link between habitats; Western Toads are unlikely to move over open cleared areas to reach their breeding or terrestrial habitat. Western

Toads need overhead cover, like shrubs, coarse woody debris, dense herb layers, boulders or mammal burrows, presumably to protect them from predation and desiccation (Davis 2000, Bartelt et al. 2004). Western Toads hibernate underground, below the frost line, and hibernacula include cavities under peat hummocks and spruce trees, mammal burrows and tunnels, natural crevices, under boulders, decayed root channels, Red Squirrel middens, abandoned Beaver lodges, logs, root wads, and stream or lakeshore bank cavities (Jones et al. 1998, Bull 2006, Browne and Paszkowski 2010). Most hibernation sites (68%) are communal (COSEWIC 2012).

Western Toad metamorphosis is usually complete by late July or early August. After metamorphosis, the toadlets form large post-metamorphic aggregations at the edge of the breeding sites. They also form large aggregations during their migration from the breeding sites to the terrestrial habitat (Black and Black 1969, Livo

1998, COSEWIC 2012). Identifying and protecting migration corridors are important in order to provide links between habitats and ensure safe movement of

toadlets between breeding and terrestrial habitats.

Terrestrial habitats are important habitats for feeding and overwintering and the biological interdependence between terrestrial and aquatic habitats is essential for the persistence of populations (Semlitsch and Bodie 2003). Terrestrial habitats that surround wetlands are core habitats for semiaquatic species and it is important to determine and protect these areas to ensure the maintenance of amphibians (Semlitsch and Bodie 2003). Using criteria that are focused only on protecting water resources without considering habitats that are important to wildlife species, where many species spend extended periods of their time, creates a serious gap in the protection of biodiversity (Semlitsch and Bodie 2003).

Environment and Climate Change Canada Recommendations for Western Toad

Subsection 79(2) of the SARA states that a person conducting an environmental assessment: *“must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans.”*

In order to assist the Responsible Authority in fulfilling its obligations under SARA ss. 79(2), ECCC provides the following recommendations to help address potential impacts to Western Toad within the environmental assessment process.

Scoping

Recommendation 1:

It should be determined whether the project has the potential to impact Western Toad, either directly or indirectly, in their breeding and terrestrial habitats. This information can be acquired from various sources, including but not limited to: distribution maps, Conservation Data Centre data, communications with local experts, habitat suitability mapping, and baseline studies. If the project has the potential to impact Western Toad, this species should be included as a Valued Ecosystem Component in the environmental assessment. ECCC suggests this recommendation be included as a requirement in the EIS guidelines.

Recommendation 2:

If the project has the potential to impact Western Toad, the local and regional study areas for baseline studies should include Western Toad habitat (breeding, summer foraging, and winter hibernation) as part of their scope, and this should be reflected in the EIS guidelines.

Baseline Studies

The Provincial Management Plan for Western Toad in British Columbia recommends “*maintaining as much forest habitat as possible adjacent to breeding sites to allow for hibernation, foraging, and other essential life functions*” and identifies terrestrial habitat use as a knowledge gap that needs to be addressed to determine population viability and to improve best management practices (Provincial Western Toad Working Group, 2014).

Recommendation 3 - Baseline Studies for Breeding and Terrestrial Habitat:

A. Breeding Habitat

ECCC recommends that baseline studies be conducted for Western Toad breeding habitat that follow Resources Inventory Committee Standards for pond dwelling amphibians (RIC 1998) (including timing and methods) prior to construction, and include, but not be limited to, the following:

- a) Presence/Not detected and distribution of Western Toad in the breeding habitat;
- b) identification of breeding sites;
- c) a minimum of three surveys per potential breeding site per year during the breeding season to accommodate variation in breeding timing due to weather and therefore to enhance the probability of detecting adults, egg masses and/or tadpoles;
- d) conduct surveys over multiple years to accommodate inter annual variation;
- e) identification of migration corridors used annually by adults and toadlets to move between breeding and terrestrial habitat (movement is often by a large number of individuals simultaneously); and
- f) identification of migratory timing windows; recognizing the inter-annual variability in Western Toad migratory movements

B. Terrestrial Habitat

Semlitsch and Bodie (2003) proposed stratification around breeding habitat. Stratification should include three terrestrial protection zones next to the core aquatic and wetland habitats, namely 1) an aquatic buffer 2) the core habitat and 3) a terrestrial buffer of 50 m surrounding the core habitat to protect the core habitat from edge effect (Murcia 1995). Buffers around core wetlands and aquatic resources should therefore be at least 150-290 m to ensure the protection of a large percentage of Western Toad movement (Semlitsch and Bodie 2003, Bartelt et al. 2004). These terrestrial protection zones will assist in protecting Western Toad terrestrial summer and winter habitat.

ECCC recommends that baseline studies for terrestrial habitat for Western Toads be conducted within a buffer of 150–290 m plus a 50 m buffer to protect the core habitat from edge effects, surrounding all potential breeding ponds within the LSA. To ensure the most effective baseline studies for Western Toads, ECCC recommends that the maximum range (i.e. 290 m + 50 m) be used and that the minimum range (i.e. 150 m + 50 m buffer) only be used if the habitat encompassed by the maximum range includes those where there is certainty that it will not support Western Toads during summer or hibernation or where other factors do not allow for a wider buffer.

ECCC recommends that baseline studies be conducted for Western Toad terrestrial habitat prior to construction. These studies could use methods such as habitat suitability mapping and/or telemetry and should include, but not be limited to, the following:

- a) determination of Presence/Not detected¹ and distribution of Western Toad in the terrestrial habitat;
- b) identification of summer foraging habitats; and
- c) identification of winter hibernation sites

ECCC also notes that Western Toads can travel distances beyond the proposed terrestrial protection zones and can use terrestrial habitat several kilometers from their breeding sites (Bartelt et al. 2004, Bull 2006, COSEWIC 2012).

ECCC therefore recommends, in the context of SARA ss.79(2), that, if Western Toad terrestrial habitat exists outside of the terrestrial protection zones, travel corridors be maintained to connect these zones with other terrestrial habitat.

Effects Assessment and Mitigation

Recommendation 4:

ECCC recommends that the effects assessment for terrestrial habitat for Western Toads be conducted within the LSA within a buffer of 150–290 m (depending on buffer identified during baseline) plus a 50 m buffer surrounding all breeding ponds identified during baseline studies. The effects assessment should include a description of all potential direct or indirect impacts to Western Toad arising from project activities. This description should include, but not be limited to:

¹ ECCC recommends that the precautionary principle be followed where, even if Western Toads are not observed within the terrestrial protection zones (i.e. 150-290 m + 50 m or terrestrial habitat), but are observed in the riparian/breeding habitat, the assumption is made that Western Toads occur in the terrestrial protection zones and that an effects assessment should be conducted.

- a) the types of impact (includes the components of the project from which these impacts arise; effects on amphibians in the event of an accident or malfunction within amphibian habitat should also be included);
- b) the predicted effects of these impacts on Western Toads;
- c) the measures proposed to mitigate these effects; and d) the residual effects on Western Toad.

Where no impacts are anticipated, this should be documented as part of the environmental assessment and a rationale provided.

Recommendation 5 – Use of Mitigation Hierarchy

The environmental assessment should identify and describe measures to avoid, minimize, or offset for each potential impact identified. With respect to this mitigation hierarchy, the environmental assessment should describe how the hierarchy was applied and provide a rationale for moving from avoidance to minimization to offset.

Recommendation 6 - Buffers

In order to address all life stages of Western Toad and avoid impacts to the species, ECCC recommends avoidance of those activities that could destroy, alter or fragment terrestrial protection zones. Buffers around core wetlands and aquatic resources should therefore be at least 150-290 m to ensure the protection of a large percentage of Western Toad movement (Semlitsch and Bodie 2003, Bartelt et al. 2004).

Recommendation 7 – Mitigation Measures

With respect to developing mitigation measures, ECCC recommends that:

- Appropriate mitigation measures be put in place to protect breeding and terrestrial habitat as well as migration corridors. Mitigation measures may include, but should not be limited to: setting speed limits on the road, avoidance of the area during the migration period, installation of signs to identify migration corridors, installation of wildlife crossings, fencing and access control measures;
- Mitigation measures be identified to maintain water quality, as a change in water quality can have an adverse effect on amphibian populations;
- Protocols should be followed to ensure that diseases are not spread from one pond to another. Please see: <http://www.env.gov.bc.ca/wld/frogwatch/ecology/diseases.htm>;
- Mitigation measures/protocols be developed in case of an accident or malfunction in the construction or operation phases of the proposed Project within amphibian habitat; and
- Avoid formation of ephemeral ponds and ditches in the project area as they are potential population sinks. Human-created roadside ponds as mitigation measures have been shown to potentially put populations of western toad at risk of decline (Stevens and Poszkowski 2006).

ECCC further recommends the following considerations in the development of the mitigation measures:

- Potential loss of habitat due to habitat fragmentation, barriers and/or disturbances or degradation of habitat be considered in developing mitigation measures.
- Avoid stocking western toad breeding habitats with fish as it can introduce predation where it did not exist before

Recommendation 8 - Salvage

Amphibian salvage and translocation should not be considered measures to mitigate the effects of habitat loss and mortality due to construction activities because the survival of translocated individuals is highly uncertain (Malt 2012). This can be explained, in part, by the fact that Western Toads have strong breeding site fidelity and will return to the same breeding ponds in successive years (Smith and Green 2005; Bull and Carey 2008). Western Toad also exhibits communal breeding behaviour. Communal breeding and site fidelity may cause Western Toad to select only one or a few of the potential breeding sites within a relatively large area (Slough 2004), emphasizing the importance of protecting known breeding sites. Despite the uncertain effectiveness of salvage, this technique may be appropriate in order to reduce direct impacts to the species and in situations where options for habitat mitigation are limited.

A. Selection of Relocation Sites

ECCC recommends that avoidance and minimization of impacts to Western Toad habitat be the first considerations. If salvage is carried out, ECCC recommends that suitable sites for potential relocations of Western Toad be identified prior to salvage activities. Identification of suitable sites should include surveys to determine whether potential relocation site(s) have the appropriate biophysical attributes for the Western Toad. ECCC recommends that the environmental assessment describe how relocation sites were selected and include, but not be limited to, the following:

- a) A rationale for the distance of relocation site from salvage site (travelling long distances should be avoided to the extent possible)
- b) A description of how presence of predators, such as but not limited to fish, was considered;
- c) A description of how the presence of existing amphibian populations and their respective densities (carrying capacity) were considered;
- d) A description of how protection from potential impacts (i.e., outside the area of impact) was considered; and e) A description of how the quality of habitat (equal or better habitat than salvage site) was considered.

B. Salvage Operations

Where salvage has been identified as an appropriate option and where relocation sites have been successfully identified, ECCC recommends that a salvage plan be developed as part of the environmental assessment and that this plan include, but not be limited to, the following:

- a) A description of the qualifications of the biologists who will be undertaking the salvage operations, which should include experience developing an amphibian salvage program;
- b) A description of how non-target species will be managed, which should include information on the need for an euthanization program to be put in place before the salvage operation starts in the event that a non-native species is captured;
- c) A description of the measures that will be implemented to prevent the spread of disease between wetlands;
- d) A description of the potential effects of genetic mixing between salvaged and local individuals; and
- e) A description of the monitoring measures that will be implemented post salvage to assess relocation success, which should include, but not be limited to monitoring methods and success criteria (e.g. mark-recapture at the relocation site and in the migration corridors).

Recommendation 9 – Cumulative Effects Assessment:

The environmental assessment should identify cumulative effects of the project and other existing and future foreseeable activities in the regional assessment area on Western Toad and its habitat. Where no cumulative effects are predicted, this should be documented as part of the environmental assessment and a rationale provided. ECCC recommends that identifying cumulative effects be included as a requirement in the EIS guidelines.

Monitoring

Recommendation 10 - Monitoring

ECCC recommends that Western Toad be included in a Wildlife Management and Monitoring Program as part of the EIS/application to assess the recovery of Western Toads and their habitats post-construction and the effectiveness of any mitigation measures, and to implement adaptive management where necessary. Some examples include: using remote cameras and time-lapse photography to assess amphibian use of passageways and the effectiveness of the installed fencing (Malt 2012), counting carcasses during roadkill surveys (Malt 2012), using of mark-recapture methods to assess the local and introduced (salvaged) populations (Malt 2012), and monitoring water quality.

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