SITE C CLEAN ENERGY PROJECT

ENVIRONMENTAL IMPACT STATEMENT GUIDELINES

SEPTEMBER 5, 2012

Pursuant to the British Columbia Environmental Assessment Act and the Canadian Environmental Assessment Act

BRITISH COLUMBIA

Canada

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PREFACE TO THE ENVIRONMENTAL IMPACT STATEMENT GUIDELINES

British Columbia Hydro and Power Authority (the Proponent), proposes to construct and operate the Site C Clean Energy Project (the Project[1]) as described in the Project Description Report (BC Hydro 2011 a). The Project would involve the construction and operation of a dam and hydroelectric generating station on the Peace River, in north east British Columbia, downstream of the existing Williston Reservoir and Dinosaur Reservoir, and the respective Proponent generating facilities at G.M. Shrum and Peace Canyon.

The Project would have an installed energy generating capacity of up to 1,100 megawatts, would require two new 500-kilovolt transmission lines adjacent to two existing 138-kilovolt transmission lines along approximately 77 kilometres of existing and widened right-of-way; would require a realignment of portions of Highway 29; and would involve the creation of new and the expansion of existing sand, gravel, and stone quarries. The project is reviewable under the *Environmental Assessment Act,* S.B.C. 2002, c. 43 (BCEAA), and the *Reviewable Projects Regulation*. Federal agencies have concluded under the former CEAA (*Canadian Environmental Assessment Act, 1992)* that the Project will require approvals under the *Navigable Waters Protection Act* and authorizations under the federal *Fisheries Act,* triggering an environmental assessment. The new *Canadian Environmental Assessment Act, 2012*, S.C. 2012, c. 19, s. 52 (CEAA) that came into force July 6, 2012 provides that an environmental assessment by a review panel commenced under the process established under the former CEAA is continued under the process established under CEAA.

In accordance with Section 15 of the former CEAA, the Minister of Environment of Canada determined that the scope of the Project in relation to which an environmental assessment will be conducted is the Project as proposed by the Proponent in the Project Description Report and as it may be modified from time to time.

The Minister of Environment of Canada and the Minister of Environment of British Columbia have agreed to a cooperative environmental assessment of the Project, including the establishment of a joint review panel.

The Joint Review Panel, after holding public hearings and evaluating the information included in the Environmental Impact Statement (EIS) and public hearings, will provide the Minister of Environment of Canada and the Executive Director of the Environmental Assessment Office of British Columbia with the Joint Review Panel Report which will

[1] The Project and the proposed Project are used interchangeably for the sake of brevity.

summarize the Panel's rationale, conclusions and recommendations relating to the environmental assessment of the Project. The provincial Minister of Environment and the provincial Minister of Forests, Lands and Natural Resource Operations will determine whether an Environmental Assessment Certificate should be issued. The Minister of the Environment of Canada will make an environmental assessment decision and the conditions will be included in an Environmental Assessment Decision Statement that will be issued to the proponent.

These EIS Guidelines are issued by Executive Director of the Environmental Assessment Office of British Columbia and, in accordance with Section 19 (2) of CEAA, by the Minister of Environment of Canada, in order to set out the scope of the factors to be taken into consideration in the environmental assessment of the Project.

For the purposes of the environmental assessment under CEAA and to serve as the Environmental Assessment Certificate (EAC) Application[2] for the Project, the Proponent must provide an EIS. In this document, the information which must be included in the EIS is identified.

The concerns of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. The Proponent will incorporate additional baseline information as made available based on concerns identified by Aboriginal groups.

[2] The co-operative Environmental Impact Statement (EIS) and Environmental Assessment Certificate (EAC) Application will be collectively referred to as the Environmental Impact Statement or EIS.

ACKNOWLEDGEMENTS

This section of the EIS will acknowledge the regulatory agencies and authorities, Aboriginal groups, and key stakeholders that contributed to the development of the baseline study reports and the EIS.

AUTHORSHIP

This section of the EIS will provide a list of the project team members, key personnel, contractors, and/or sub-contractors responsible for preparing the EIS and their qualifications.

TABLE OF CONCORDANCE

A Table of Concordance will be provided in the EIS. The table will identify, through cross-referencing, where information identified in these EIS Guidelines that is required in the EIS can be found in the EIS, including volume, section and page references. An example of how the Table of Concordance will be constructed is illustrated in Table 1.

Table 1 Table of concordance between the Environmental Impact Statement Guidelines and the Environmental Impact Statement

EIS Guidelines Section	Title	Summary	EIS Volume	EIS Section	Page Reference

EXECUTIVE SUMMARY

The proponent will prepare an executive summary of the EIS in both of Canada's official languages (English and French).

The EIS will include an Executive Summary that summarizes information regarding:

- The Proponent;
- The key project components and activities;
- The cooperative federal and provincial environmental assessment process;
- Consultations undertaken by the Proponent, key issues raised, responses provided and how input was considered in project planning;
- Potential effects of the Project on environment, social, economic, heritage and human health resources;
- Aboriginal groups and the potential effects of the Project on their rights and interests
- Mitigation measures;
- The proponent's conclusions on the significance of potential residual effects;
- The proponents conclusions on the significance of potential cumulative effects; and
- Conclusions.

ABBREVIATIONS AND ACRONYMS

A list of acronyms and abbreviations referred to in the text of the EIS will be provided and defined in this section.

The list below provides abbreviations and acronyms used in these EIS Guidelines.

Agency ..... Canadian Environmental Assessment Agency

BCEAA ..... British Columbia *Environmental Assessment Act*

BCEAO ..... British Columbia Environmental Assessment Office

BC Hydro ..... BC Hydro Power and Authority

BCMOE ..... British Columbia Ministry of Environment

CEAA ..... *Canadian Environmental Assessment Act, 2012*

EIS ..... Environmental Impact Statement

EMP ..... Environmental Management Plan

former CEAA ..... *Canadian Environmental Assessment Act, 1992*

GHG ..... Greenhouse Gas

LAA ..... Local Assessment Area

LiDAR ..... Light Detection and Ranging

km ..... kilometre

kV ..... kilovolt

m ..... metre

MW ..... megawatt

RAA ..... Regional Assessment Area

SARA ..... *Species at Risk Act*

VC ..... Valued Component

VLI ..... Visual Landscape Inventory

DEFINITIONS

Definitions of technical terms referred to in the text of the Environment Impact Statement (EIS) will be provided in this section. Many terms that will be relevant to the EIS have been previously defined in the Project Description Report accepted by the provincial and federal authorities in August 2011.

A list of the terms used in this EIS Guidelines is included below.

average energy	The estimate of energy that could be generated by a project over a long period of time (expressed conventionally in gigawatt hour/year).
BC Energy Plan	Energy policy documents released by the B.C. government in 2007 and 2010 that guide energy planning in the province.
dependable capacity	The amount of megawatts a plant can reliably produce when required, assuming all units are in service. Factors external to the plant affect its dependable capacity. Planned and forced outage rates are not included.
clean or renewable resources (under B.C.'s Clean Energy Act)	Biomass, biogas, geothermal heat, hydro, solar, ocean, wind or any other prescribed resources, such as biogenic waste used for electricity generation.
cofferdam	A temporary dam or barrier used to divert a river or to enclose an area during construction to enable work to be done in the dry.
discipline	Subject matter or area of knowledge or learning (e.g., wildlife).
firm energy	The energy that is available (i.e., equalled or exceeded) 100 per cent of the time, either for a given period such as 25 years, or for an analysis period such as a period covered by flow records.
generating station	The component of a hydroelectric power plant where the generators and turbines are housed and where power is produced by the action of the water acting on the turbines.
fluvial geomorphology	The scientific study of landforms and how the landforms have been shaped by fluvial processes, including the physical configuration of the river channel in relation to surrounding topography and geology.
head	Hydroelectric power comes from the potential energy of dammed water driving a water turbine and generator. The power extracted from the water depends on the volume and on the difference in height between the water source and the water's outflow. This height difference is called the head. The greater the head (i.e., the height difference), the greater the amount of energy that can be generated.

hydrology	The science of the properties, distribution and effects of water on a planet's surface, in the soil and underlying rocks, and in the atmosphere.
impact lines	Lines located to delineate the potential spatial extent of physical processes, including flood, erosion, landslides and landslide-generated waves, that could be affected by the reservoir and that could impact safety or land use.
laydown areas	Designated locations at a construction site where the components or equipment needed during the construction of a facility are offloaded and stored temporarily until required. These locations are usually large flat areas that are easily accessible by both transportation and construction equipment. Pre-assembly of some components prior to their installation or use may also be carried out at these locations.
LiDAR	LiDAR, Light Detection and Ranging, is an optical remote sensing technology that can measure the distance to, or other properties of a target, by illuminating the target with light, often using pulses from a laser.
Local Assessment Area	The area within which the potential adverse effects of the Project will be assessed.
megawatt (MW)	A unit of power, equal to one million watts or 1,000 kilowatts.
Methylmercury	Methylmercury is formed by natural processes by the actions of anaerobic bacteria living in soils and sediments of lakes, rivers, wetlands and the open ocean which convert inorganic mercury to methylmercury.
penstock	A closed conduit or pipe used to convey water under pressure from the power intakes to the turbines of a hydroelectric power plant.
Regional Assessment Area	The area within which projects and activities, the residual effects of which may be combined with residual effects of the Project, will be identified and taken into account in the cumulative effects will be assessed.
reservoir	An artificial lake used to collect and store water, such as for community water supply, irrigation or electricity generation.
spillway	A structure used to provide an efficient, controlled and safe means of releasing (spilling) surplus water inflows from a dam/reservoir.
technical study area	This is the physical extent of the data collection program, or the physical boundaries for the technical modelling program.

substation	The facility at a power plant (hydroelectric, thermal, wind, etc.) that contains the switching facilities and equipment, including transformers, needed to connect transmission lines at different voltages.
switchyard	The facility at a power plant (hydroelectric, thermal, wind, etc.) that contains the switching facilities and equipment needed to connect the power plant to the transmission system.
tailrace	The area of the river immediately downstream of the generating station into which the water from the turbines is discharged.
taxon or taxa	A taxonomic category or group, such as a kingdom, phylum, class, order, family, genus, species, or subspecies.
Terrestrial Ecosystem Mapping	Stratification of the landscape into map units according to ecological features using a combination of manual airphoto interpretation and ground sampling (definition from: http://www.env.gov.bc.ca/fia/terrecomap.htm).
Valued Component	Valued Components are those components of the environment, social, economic, heritage and health setting on which the Project may have an effect, which must be assessed in accordance with these EIS Guidelines.

VOLUME 1 – INTRODUCTION, PROJECT PLANNING, AND DESCRIPTION

1 Introduction

1.1 Guiding Principles

Environmental Assessment

Environmental Assessment (EA) is a comprehensive process to identify and evaluate the potential effects of a proposed major project and ways to avoid or mitigate adverse effects.

Public Participation

The overall objective of 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 public will be provided with opportunities to participate in the environmental assessment process.

Aboriginal Consultation

BCEAO and Canada are committed to working constructively with Aboriginal groups to ensure that the Crown fulfills its duties of consultation and accommodation. The proponent must ensure that it engages with Aboriginal groups that may be affected by the project, or that have asserted or established Aboriginal rights or treaty rights in the project area, as early as possible in the project planning process.

An environmental assessment conducted in accordance with the agreement between the Ministers of Environment of BC and Canada with respect to the environmental assessment of the Project and with these EIS Guidelines, which have been developed under that Agreement, will meet the objectives of these principles.

1.2 Purpose of the Environmental Impact Statement

This section of the Environment Impact Statement (EIS) will describe why an environmental assessment review pursuant to BCEAA and CEAA is required.

The EIS will describe the provincial triggers for the environmental assessment. Pursuant to Part 4 of the *Reviewable Projects Regulation*, an environmental assessment is required because the Proponent is proposing the following:

- Construction of a new hydroelectric power generating station with a rated nameplate capacity of greater than 50 MW;
- A new 500kV transmission line greater or equal to 40 km in length;

- A new sand and gravel pit that will have a production capacity of greater than or equal to 500,000 tonnes per year, or over a period of less than or equal to a period of 4 years of operation greater than or equal to 1,000,000 tonnes, or a modification of an existing pit if it meets the criteria above or results in an expansion of 35 per cent of the existing permitted facility; and
- A new construction stone quarry that will have a production capacity of greater than or equal to 250,000 tonnes per year, or a modification of an existing quarry of the above capacity or 750 hectares of land not previously permitted, or an area of land at least 50 per cent of the area previously permitted.

The EIS is not intended to constitute a Certificate of Public Convenience and Necessity for the Site C Project. The Site C Project is exempt from the requirement for a Certificate of Public Convenience and Necessity as per Section 7 of the B.C. Clean Energy Act.

Under the former CEAA, a federal environmental assessment was commenced because:

- Fisheries and Oceans Canada (DFO) concluded that the Project required *Fisheries Act* authorizations (Section 32 and 35) for works or undertakings associated with the Project; and
- Transport Canada concluded that it must issue approvals under the *Navigable Waters Protection Act* (Section 5).

On July 6, 2012 the new *Canadian Environmental Assessment Act 2012* (CEAA) came into force.

The Project is also subject to the Major Resource Project Initiative led by the Major Projects Management Office, which works collaboratively with federal departments and Agencies, and acts as a single window into the federal regulatory process.

On September 30th, 2011 the federal Minister of the Environment and the BC Minister of the Environment announced a cooperative environmental assessment of the Site C Clean Energy project including the establishment of a joint review panel.

This section of the EIS will also describe:

- The purpose of the cooperative EIS; and
- The relationship between these EIS Guidelines and the EIS.

In the interest of brevity, the cooperative EIS and Environmental Assessment Certificate Application (Application) are referred to collectively as the EIS. The joint terms of reference, called the EIS Guidelines-Application Information Requirements (AIR) are collectively referred to as these EIS Guidelines.

The EIS will be structured generally in the same way as these EIS Guidelines and will include: Preface; Acknowledgements; Table of Concordance; Executive Summary; Abbreviations and Acronyms; Definitions; Table of Contents; Project Overview and Description; Needs for, Alternatives to, Purpose of, and Alternative Means of Undertaking

the Project; Project Benefits; Public, Aboriginal Groups and Agency Information Distribution and Consultation; Assessment of Potential Environmental, Economic, Social, Heritage and Health Effects, Mitigation and Significance of Residual Effects; Assessment of Potential Adverse Impacts to Asserted or Established Aboriginal Rights and Treaty Rights, Aboriginal Interests and Information Requirements; Requirements for the Federal Environmental Assessment; Summary of Potential Residual Effects; Table of Conditions; and Conclusions.

The EIS that is made publicly available for comment should 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
- Information that is likely to endanger the life, liberty or security of a person through its disclosure.

1.3 Presentation and Organization of the EIS

The EIS should be written in clear, precise language. The proponent shall provide charts, diagrams, tables, maps and photographs, where appropriate, to clarify the text. Perspective drawings that clearly convey the various components of the project shall also be provided. Wherever possible, maps shall 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. The exception to this preference is the cumulative effects assessment, which should be readily identifiable in each VC section where applicable. Detailed studies (including all relevant and supporting data and methodologies) shall be provided in separate appendices and shall be referenced by appendix, section and page in the text of the main document of the EIS.

The proponent shall provide copies of the EIS for distribution, including an electronic version in an unlocked, searchable PDF format, as directed by the BCEAO and the Agency.

Section 5 of *CEAA* describes specific categories of direct and indirect environmental effects that must be considered in the EA. The EIS should contain clearly identifiable sections that summarize the effects assessment; the mitigation measures, follow-up and related commitments identified; the residual environmental effects (including cumulative environmental effects); and the significant adverse environmental effects in relation to the following categories noted below:

- Changes to components of the environment within federal jurisdiction;
- Changes to the environment that would occur on federal or transboundary lands;

- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

Scientific advice

Section 20 of CEAA requires that every federal authority with specialist or expert information or knowledge with respect to a project subject to an EA make that information or knowledge available to the Agency. The Agency will advise the proponent in a timely manner of the availability of any pertinent information or knowledge.

Community knowledge and Aboriginal traditional knowledge

Subsection 19(3) of CEAA states that "community knowledge and Aboriginal traditional knowledge may be considered in conducting an EA". For the purposes of these guidelines, community knowledge and Aboriginal traditional knowledge should be understood to refer to knowledge acquired and accumulated by a community or an Aboriginal community, through generations of living in close contact with nature.

The proponent shall incorporate into the EIS the community and Aboriginal traditional knowledge to which it has access or that is acquired through Aboriginal engagement activities, in keeping with appropriate ethical standards and without breaking obligations of confidentiality, if any. Agreement should be obtained from Aboriginal groups regarding the use, management and protection of their existing traditional knowledge information during and after the EA.

Existing information

In preparing the EIS, the proponent is encouraged to make use of existing information relevant to the project. However, when relying on existing information to meet requirements of the EIS Guidelines, the proponent must 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 must also comment generally on how the data have been applied to the project and any limitations on the inferences or conclusions that can be drawn from the existing information.

2 Proponent Description

The EIS will describe BC Hydro, and provide contact information for the project management team.

BC Hydro is a Crown corporation that is owned by the Province of British Columbia.

Name of Corporation:	BC Hydro and Power Authority
Address:	Corporate Office 333 Dunsmuir Street Vancouver, B.C. V6B 5R3
President and Chief Executive Officer:	Charles Reid
Executive Vice-President:	Susan Yurkovich
Principal Contact for the Environmental Assessment:	Danielle Melchior Director, Site C Environmental Assessment and Regulatory Phone: 604 699-7344 Fax: 604 623-4333 Email: sitec@bchydro.com
Company Website:	http://www.bchydro.com
Project Website:	http://www.bchydro.com/sitec

3 Project Overview

In accordance with Section 15 of the former CEAA, the Minister of Environment of Canada determined that the scope of the Project in relation to which an environmental assessment will be conducted is of the Project as proposed by the Proponent in the Project Description Report (BC Hydro 2011a) and as it may be modified from time to time. Descriptions of the Project and its components are set out in these EIS Guidelines for convenience only.

The EIS will describe the Proponent's project governance process for the Project. It will then describe the project location and project components and activities.

3.1 Project Governance Process

The Proponent will describe;

- The governance and multi-staged decision-making process for the Project;
- Specify the mechanism used to ensure that corporate policies will be implemented and respected for the project;
- Explain corporate and management structures, as well as insurance and liability management related to the project; and
- The name of the legal entity that would develop, manage and operate the project.

3.1.1 Scheduling

An estimated month by month construction schedule based on project planning at the time of preparation of the EIS will be incorporated into the EIS. The schedule will commence on the anticipated date of certification. The EIS will describe the anticipated scheduled maintenance activities and the potential future capital upgrades.

3.2 Project Location

The EIS should contain a concise description of the geographical setting in which the project will take place, including a map of the project's location and components at an appropriate scale. The location map should include the boundaries of the proposed site, the major existing infrastructure, adjacent land uses and any important environmental features. In addition, site plans/sketches and photographs showing project location, site features and the intended location of project components should be included.

This description should focus on those aspects of the project and its setting important for understanding the potential effects of the project. The description should address the natural and human elements of the environment in order to explain the interrelationships between the biophysical environment and people and communities. The following information must be included:

- Environmentally sensitive areas, such as national, provincial and regional parks, ecological reserves, wetlands, estuaries, and habitats of provincial or federally listed species at risk and other sensitive areas;
- Current land use in the area and the relationship of the project facilities and components with any federal lands;
- Location of nearby communities, including Aboriginal communities;
- Tenure, ownership and land management details for lands within the areas of project components;

- Traditional Aboriginal territories, treaty lands, Indian reserve lands;
- The UTM coordinates of the main project site; and
- The environmental significance and value of the geographical setting in which the project will take place and the surrounding area.

The dam and hydroelectric generating station will be located on the Peace River in northeast B.C., approximately 7 km southwest of the City of Fort St. John (**Figure 3.1**).

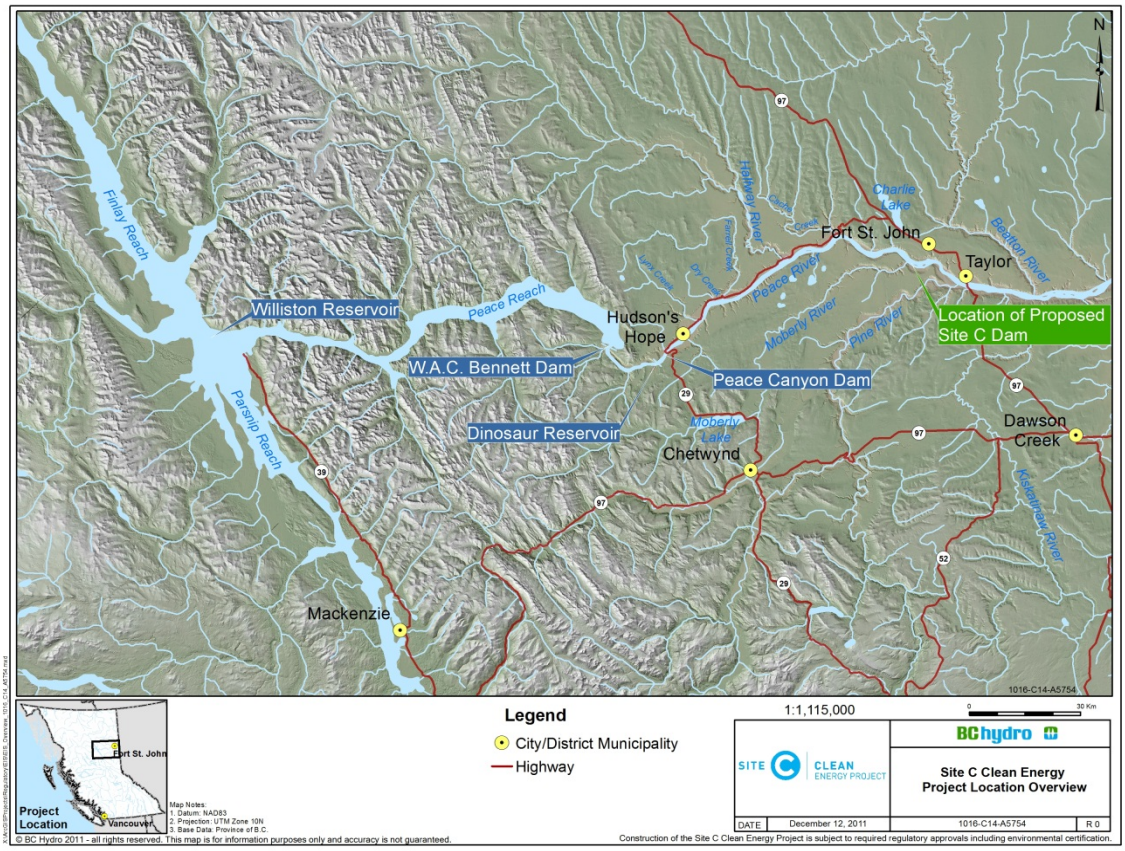

Figure 3.1 Site C project location

3.3 Project Components and Activities

The EIS will describe the project components and activities. The description of the project components and activities will be supported by:

- Maps depicting the spatial scope and local context;
- Plan and cross-section drawings; and
- Tables containing pertinent data.

If available, the EIS shall include a detailed schedule including time of year, frequency, and duration for all project activities. The temporal context of the project component and activities will be described, and the Proponent will provide a rationale in instances where all temporal phases are not considered relevant.

The description of the construction activities will be based on construction planning and assumptions at the time the EIS is submitted. Some activities may be different during implementation depending on procurement, including contractors' preferences for equipment, construction means and methods, and competitive pricing. Therefore, feasible options for some activities may be described if required to define the likely range of potential effects of the construction activities.

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

The EIS will describe the expected performance of the structures during and after major earthquakes, including the ability of earth dams and other water retaining and flow control structures to withstand earthquakes. This will include a review of lessons learned from major earthquakes that have occurred elsewhere.

The EIS will include at a minimum the following project components and activities;

3.3.1 Dam and Generating Station

3.3.1.1 Earthfill Dam

The EIS will describe:

- The principal dimensions of the earthfill dam and associated buttress;
- The characteristics and anticipated quantities of material used to construct each zone of the earthfill dam;
- Explosives use, manufacturing, and storage facilities;
- The anticipated quantities of material used to construct the buttress;
- Seepage control and drainage provisions;
- Freeboard requirements to accommodate potential flood, seiche, and wind and landslide-generated waves; and
- The specifications for the design of the earthfill dam and the testing that has been performed to determine the suitability of the materials from which the dam will be constructed.

The EIS will characterize the geotechnical parameters of the materials that will be quarried and excavated and describe their suitability for use as construction materials.

3.3.1.2 Generating Station

The EIS will describe:

- The principal dimensions of each structure that is part of the generating station , including the associated buttress;
- The approach channel that conveys water from the reservoir to the generating station and spillways;
- The type and anticipated quantities of materials used to construct each structure
- Seepage control and drainage provisions;
- The principal characteristics of the generating equipment;
- The ancillary mechanical and electrical systems; and
- The tailrace that conveys water from the powerhouse to the river downstream of the dam.

3.3.2 Spillways

The EIS will describe:

- The principal dimensions of each part of the spillway, including the associated buttress;
- The type and anticipated quantities of materials used to construct each structure;
- Seepage control and drainage provisions;
- The equipment used to operate the spillway;
- The hydraulic capacity of the spillway at the maximum normal reservoir level and the maximum flood level;
- The tailrace that conveys water from the spillways to the river downstream of the dam; and
- The energy dissipation and erosion protection provisions.

3.3.3 Reservoir

The EIS will describe the physical characteristics of the reservoir, including:

- Its normal operating range;
- Its overlap with the Peace River and its spatial extent into Peace River's tributaries;
- The surface area at the maximum normal reservoir level, with the area of each tributary arm;

- The normal operating water volume, and the volume between the maximum normal reservoir level and the minimum normal reservoir level; and
- Reservoir bathymetry.

3.3.4 Transmission Line to Peace Canyon

The EIS will describe all the facilities required to connect to the bulk transmission system, including access roads required for clearing, construction and maintenance of the transmission line.

3.3.5 Access Roads and Rail

The EIS will describe the permanent and temporary access routes required for access to the project site and other project components including a description of the temporal aspects of road use (e.g. traffic management plans, expected traffic patterns and volumes for different phases of project development, deactivation schedules). The EIS will also describe any improvements that would be required to existing roads and rail. Maps showing the access roads and rail will be provided.

3.3.6 Highway 29 Realignment

The EIS will describe alternative highway realignment options and a rationale for selection of the preferred options. The EIS will describe the proposed sections of Highway 29 that would be realigned. The description will include the approximate length of bridges and causeways at watercourse crossings, clearance between bridges and the reservoir and the factors considered in alignment selection. Drawings showing the preliminary design of the bridges and causeways for each section of Highway 29 that has to be realigned will be included in the EIS.

The EIS will identify any driveways, properties or existing crown tenures that may need entirely new access routes constructed as a result of the highway realignment.

3.3.7 Quarried and Excavated Construction Materials

The EIS will describe the sources of riprap, aggregates and till that would be required to construct the dam and generating station, for highway realignment, and for the berm at Hudson’s Hope. Maps showing the location of the proposed sources will be included with the descriptions.

3.3.8 Worker Accommodation

The EIS will describe plans for temporary worker accommodation for construction, at the dam site and other locations, as well as any plans for provision of worker accommodations in nearby communities. The projected size and use of camp facilities will be described, including any related project employment policies or restrictions.

3.3.9 Construction Phase Activities

The EIS will describe the expected construction sequence and activities for each project component. A description of the information to be provided is listed below.

The EIS will describe the following activities for construction of the dam and generating station:

- Site clearing and grubbing;
- Construction of temporary and permanent access and haul routes;
- Modifications to rail;
- Construction of a temporary access bridge over the Peace River and one over the mouth of the Moberly River, including a rationale for the choice of installation of temporary rather than permanent crossings over the Peace and Moberly rivers;
- Transportation of equipment and materials to the site;
- Set up and operation of the temporary facilities required for construction;
- Excavations to stabilize slopes and for the foundations of structures;
- Stockpiling of excavated materials for use in construction;
- Relocation of surplus excavated materials that are unsuitable for construction, including estimated quantities, locations and treatment of relocation areas;
- Construction of cofferdams to confine the river to the main channel and isolate the north and south banks of the river so that work can be performed in the dry;
- Construction of the diversion tunnels;
- Diversion of the river through the tunnels;
- Construction of cofferdams across the main river channel to isolate the foundations of the earthfill dam;
- Construction of the earthfill dam;
- Placing roller-compacted concrete in the buttress abutting the earthfill dam and supporting the generating station and spillways;
- Placing reinforced concrete for the generating station and spillways;
- Placing the impervious lining and erosion protection in the approach channel;
- Placing erosion protection in the tailrace and spillway outlet channel;
- Fabricating and erecting the steel penstocks of the generating station;
- Erection of buildings and powerhouse superstructure;
- Installation of mechanical and electrical equipment;

- Testing and commissioning the generating facility and spillways;
- Removal of temporary construction facilities, including roads and bridges;
- Disposal of construction waste; and
- Site reclamation.

The EIS will describe the following construction activities for reservoir preparation, including:

- Estimated volumes of merchantable and non-merchantable wood within the reservoir area;
- Proposed extent and locations of cleared areas;
- Clearing strategy and methods;
- Proposed access routes, including transportation of merchantable timber resources to processing facilities;
- Construction of temporary access roads;
- Construction of the shoreline protection berm at Hudson's Hope;
- Removal or treatment of existing structures or utilities including any other potential hazard to navigation at the minimum normal reservoir level;
- Reservoir filling;
- Methods for managing wood debris during construction and reservoir filling; and
- Methods for managing vessel traffic during construction and reservoir filling.

The EIS will describe the following construction activities for the connection to the transmission system:

- Clearing to widen the existing right-of-way;
- Construction of new access roads and upgrading of existing roads;
- Construction laydown areas along the transmission corridor for the storage of materials and assembly of components;
- Installation of tower foundations;
- Batching of concrete for tower foundations;
- Assembly and erection of towers and supporting structures;
- Stringing conductor wires; and
- Installation of grounding systems (i.e., counterpoise).

The EIS will describe the following construction activities for access roads and rail to the dam site:

- Construction of access roads on the north bank including connections to and, where required, upgrades of, existing municipal roads;
- Construction of an access road on the south bank connecting to the existing Jackfish Lake road and any upgrades required to the existing road;
- Traffic management during modifications to existing roads; and
- Addition of new rail sidings and associated facilities on the existing Canadian National railway.

The EIS will describe the following construction activities for each section of Highway 29 that has to be relocated or modified:

- Clearing and grubbing;
- Removal/decommissioning of existing pavement;
- Excavation and embankment construction;
- Sources of gravel fill, sub-base, base course and asphalt;
- Pavement construction;
- Bridge construction;
- Construction of connections to existing driveways and local roads;
- Construction sequence; and
- Traffic management.

The EIS will describe the following construction activities for each quarried and excavated material source:

- Development plan;
- Clearing and grubbing;
- Construction of access roads;
- Excavation and stockpiling of unsuitable material, including topsoil;
- Excavation of suitable material, including drilling, blasting, sorting and screening in rock quarries and moisture conditioning of impervious material; and
- Reclamation plan, or plan for ongoing use by others.

The EIS will describe how the construction contracts will include:

- Commitments to perform all construction activities in accordance with the Project Environmental Management Plan; and
- The process to be followed for upgrading any bridges required to meet load capacity.

3.3.10 Operations Phase Activities

A description of activities to be conducted during the operations phase will be included in this section of the EIS. Refurbishment and maintenance activities needed to prolong the operational capacity of the dam should be described in the EIS. Maintenance activities along the transmission line and access road (e.g., vegetation management and dust control) will be described in the EIS.

The Proponent proposes to operate the Project to respond to provincial electricity demand in the same manner as the Proponent's other generating facilities on the Peace River. A water management approach will be developed for the Project which will describe reservoir operations and resulting downstream flows and water levels. A draft of a Water Management Plan will be appended to the EIS. The final Water Management Plan will require approval by the BC Comptroller of Water Rights as part of the water licensing process.

The EIS will include an estimate of the magnitude, frequency, seasonality, and duration of potential spillway discharges.

The EIS will also include a list of operating plans where there would be a potential interaction with the Valued Components and provide outlines of each of those plans.

3.3.11 Decommissioning Activities

The EIS will describe

- Offsite components of the Project that are going to be retained and maintained as part of the ongoing maintenance of the Project; and
- Decommissioning of temporary construction facilities and any associated reclamation.

Once operational, the Project would be a major addition to the Proponent's hydroelectric generating assets. Such assets are operated and maintained over the long term with no future decommissioning contemplated. The EIS should state the Proponent's commitment, should a proposal be made in the future to decommission the Site C dam and generating station, to address a plan for decommissioning and restoration in accordance with applicable regulations at that time.

3.4 References

This subsection will include a list of supporting references used in this section of the EIS.

4 Need for, Purpose of, Alternatives to, and Alternative Means of Carrying Out the Project

The operational policy statement issued by the Canadian Environmental Assessment Agency “Addressing "Need for", "Purpose of" "Alternatives to" and "Alternative Means" under the Canadian Environmental Assessment Act (November 2007)” will be used to guide this portion of the assessment.

4.1 Need for and Purpose of the Project

The EIS will describe the “need for” and “purpose of” the Project.

4.1.1 Need for the Project

The EIS will provide the fundamental rationale for proceeding with the development at this time within the relevant legal and policy context. The “need for” the Project is defined as the problem or opportunity that the Project is intending to address, solve or satisfy (Agency 2007b). The “need for” establishes the fundamental justification or rationale for the Project.

4.1.2 Purpose of the Project

The EIS will present the “purpose of” the Project. The purpose of the Project is defined as what is to be achieved by carrying out the Project (Agency 2007b). The “purpose of” the Project will be established from the perspective of the Proponent, and will provide context for the consideration of alternatives to the Project in Section 4.2.

The project will be designed to achieve specific objectives and these should be described. If the objectives of the project are related to or contribute to broader private or public sector policies, plans or programs, this information should also be included.

4.2 Alternatives to the Project

The EIS will describe the functionally different ways to meet the need for the Project. The EIS will contain an analysis of technically and economically feasible alternatives to the Project.

The EIS must include an analysis of alternatives to the project; describing functionally different ways to meet the project’s need and achieve the project’s purpose from the perspective of the proponent.

The proponent will:

- Identify the alternatives to the project that were considered;
- Develop criteria to identify the major environmental, economic and technical costs and benefits of the alternatives; and

- Identify the preferred alternatives to the project based on the relative consideration of the environmental, economic and technical costs and benefits.

This analysis must be done to a level of detail which is sufficient to compare the proposed project with its alternatives.

4.3 Alternative Means of Carrying Out the Project

The EIS must identify and consider the potential environmental effects of alternative means of carrying out the project that are technically and economically feasible. The proponent will complete the following procedural steps for addressing alternative means:

Identify the alternative means to carry out the project.

- Develop criteria to determine the technical and economic feasibility of the alternative means; and
- Identify those alternative means that are technically and economically feasible, describing each alternative means in sufficient detail.

Identify the environmental effects of each alternative means.

- Identify those elements of each alternative means that could produce effects in sufficient detail to allow a comparison with the effects of the project.

Identify the preferred means.

- Identify the preferred means based on the relative consideration of environmental effects; and of technical and economic feasibility; and
- Determine criteria to examine the environmental effects of each remaining alternative means to identify the preferred means.

4.4 References

This subsection will include a list of supporting references used in this section of the EIS.

5 Project Benefits

The EIS will include a section describing the predicted environmental, economic and social benefits of the project. This information will be considered in assessing the justifiability of the significant adverse environmental effects, if necessary.

The EIS will include the extent, distribution and duration of benefits of the Project and describe the following information.

Projected financial benefits of the Project, as measured by standard financial indicators including:

- The value of the electricity generated by the Project;
- Initial capital construction cost and operating cost estimates (including taxes and grants-in lieu) and a description of the methodology for developing the cost estimates and the dollar basis;
- Annual federal, BC provincial, municipal, and regional government revenues that will accrue during the construction and operation phases of the Project; and
- Annual federal and BC provincial Gross Domestic Product that will accrue during the construction and operations phases of the Project.

Projected economic development benefits (broken down by gender if available), including:

- Estimated direct employment stated in number of person years, to be created by major job category (e.g., labour, management, business services) during construction and operations;
- Estimated indirect employment (i.e., employment in industries that supply goods and services used to produce an industry's output or to be consumed by individuals) and induced employment (i.e., employment due to the spending and re-spending of directly and indirectly generated incomes in the broader economy) during construction and operation predicted by the British Columbia Input-Output Model developed and maintained by BC Stats (BC Stats 2011a);
- Predicted locality of direct and indirect hires; and
- Contractor supply services estimates, including the value of supply of service contracts expected for the Project's construction and operations phases.

Projected economic development benefits for Aboriginal groups (broken down by gender if available), including:

- Employment;
- Contracting and business development, including small and medium sized enterprises; and
- Capacity-building initiatives.

Projected social benefits, including:

- Potential for use of local human resources that are currently not in the labour market; and
- Potential for use of existing local facilities for construction and operations activities, and an indication of their current level of use.

Provided benefits to sustainable development, including:

- The ability of the Project to integrate intermittent generation resources such as wind and small hydro; and

- The ability of the Project to generate electricity with a low amount of greenhouse gas emissions per unit of energy delivered.

All assumptions and reference sources used to develop the above information will be identified.

The EIS will include a summary of the changes that have been made to the project since proposed in the project description for this environmental assessment, including the benefits of these changes to the environment, Aboriginal groups, and the public.

5.1 References

This subsection will include a list of supporting references used in this section of the EIS.

6 Assessment Process

6.1 Provincial Agencies, Departments and Organizations

The EIS will list the provincial agencies, departments and organizations that will be involved in the Project's environmental assessment process.

A summary of the issues and concerns identified by provincial, local and regional government agencies will be provided in the EIS. Detailed agency comments and the Proponent responses will be provided in an issues tracking table to be prepared by the Proponent and posted on the Agency's and BCEAO's website.

6.2 The Federal Authorities

The EIS will include a description of the federal authorities.

A summary of the issues and concerns identified by the federal authorities will be provided in the EIS. These comments and the Proponent responses will be provided in an issues tracking table to be prepared by the Proponent and posted on the Agency's and BCEAO's website.

6.3 Co-operative Review Process

The EIS will describe the cooperative BC and Canada review process.

The EIS will describe the Proponent's preparation of the first draft of the EIS Guidelines, its review by the BCEAO, the Agency and the Working Group, preparation of the April 10, 2012 draft EIS Guidelines by the BCEAO and the Agency, the public comment period on

the draft EIS Guidelines, and its finalization by the Minister of Environment of Canada and the Executive Director of the BCEAO.

The EIS will be prepared by the Proponent according to these EIS Guidelines and will be submitted to the Agency and BCEAO.

6.4 Permitting

The EIS will list applicable federal, provincial, and municipal or regional licences, permits and approvals required for the construction and operation of the Project, and will identify:

- The activity requiring regulatory approval;
- The name of the permit or regulatory approval;
- The applicable legislation in each case; and
- The regulatory agencies responsible for each permit or approval.

A preliminary list of key licences, permits and approvals is provided in the Project Description Report accepted by the BCEAO and the Agency in August 2011.

6.5 References

This subsection will include a list of supporting references used in this section of the EIS.

7 Information Distribution and Consultation

The requirements for distribution of information to and consultation with the public, Aboriginal groups and agencies will be described in this section.

7.1 Public Information Distribution and Consultation

The EIS will describe and summarize the Proponent's information distribution and consultation activities with local government, communities, stakeholders, property owners and the public prior to and during the environmental assessment process. This section will also describe expected public and stakeholder consultation during post-certification stages.

The Proponent will report on the results of all public and stakeholder pre-consultation, project definition consultation and other consultation activities in the EIS.

This section will summarize measures identified for addressing public concerns in relation to the project. Measures should be written as specific commitments that clearly describe how the proponent intends to implement them.

7.1.1 Pre-panel Review Stage

The EIS will include a description and summary of the Proponent's information distribution and consultation activities undertaken with the public and stakeholders.

This section will include:

- A description of the public consultation program;
- A summary of the issues and interests identified by the public during the course of the Project's information distribution and consultation activities during the pre-panel stage and the means that the Proponent has used, or proposes to use, to consider them. Issues tracking tables will be provided;
- A summary of comments provided by the public with respect to these EIS Guidelines, and the Proponent's responses to those comments. Issues will be summarized by the Proponent in an issues tracking table, which will also describe how the issues will be considered, list the party or parties responsible for addressing issues, and list the status of issues;
- A summary of additional Proponent-led public consultation on project planning and completion of the environmental assessment; and
- A description of the key outstanding public concerns in relation to the project.

The EIS will describe consultation undertaken to cover both the preparation of these EIS Guidelines and the EIS.

7.1.2 Construction Communication

The EIS will describe the Proponent's approach to continuing communications with affected communities, stakeholders, property owners, leaseholders, businesses and the public in the project area during project construction. The EIS will outline a construction communication plan for the public.

7.2 Aboriginal Group Information Distribution and Consultation

In preparing the EIS, the proponent is encouraged to integrate Aboriginal consultation (e.g. information gathered and potential accommodation measures where appropriate) into the consideration and mitigation of effects.

The EIS will describe the Proponent's general approach and detailed activities to consultation with Aboriginal groups prior to and during the environmental assessment process.

The EIS will identify the Aboriginal groups potentially adversely affected by the Project identified in Section 20.1 of these EIS guidelines.

7.2.1 Pre-Panel Review Stage

The EIS will present detailed information regarding the information distribution and consultation activities undertaken with Aboriginal groups.

The EIS will also include:

- A description of how project information has been made available to potentially affected Aboriginal groups;
- A summary of the Proponent's approach to facilitating the participation of Aboriginal groups in the environmental assessment process;
- A description of the activities undertaken to notify and consult with potentially affected Aboriginal groups, during the preparation of both of these EIS Guidelines and the EIS;
- The issues, concerns and interests identified by Aboriginal groups. This will be presented in an issues tracking table, prepared by the Proponent for posting on the BCEAO and Agency's websites;
- The activities undertaken (or proposed to be undertaken) by the Proponent to address any issues, concerns and interests identified by Aboriginal groups, including the degree to which Aboriginal issues have been taken into account, resolved and addressed; and
- The methods and processes to resolve any outstanding issues.

The Proponent will provide a description of consultations with Aboriginal groups to cover both the preparation of these EIS Guidelines and the EIS.

7.2.2 Construction Communication

The EIS will describe the Proponent's proposed approach to consulting with Aboriginal groups potentially affected by the Project during project construction and issuances of permits and authorizations. The EIS will also describe a proposed process for tracking and reporting regulatory issues and concerns raised by potentially-affected Aboriginal groups during project construction and operations.

7.3 Government Agency Information Distribution and Consultation

The EIS will describe and summarize the Proponent's information distribution and consultation activities undertaken with federal, provincial, territorial and local governments prior to and during the environmental assessment process. This section will also comment on what would be expected with respect to government agency consultation during post-certification stages.

7.3.1 Pre-Panel Review Stage

The EIS will describe the consultation and information sharing with the government agencies that occurred prior to entering the environmental assessment process and during the pre-panel review stage (development of the EIS Guidelines and EIS). This section will identify issues raised during these consultations, and describe the Proponent's response or suggested solutions.

In the EIS, the Proponent will summarize issues raised prior to entering the environmental assessment process, primarily through the Proponent's Technical Advisory Committees process.

The EIS will summarize engagement with government agencies that occurred with working groups, topic-specific engagement with appropriate government agencies with the Proponent, and issues raised during these meetings.

Issues identified during consultation with government agencies will be provided in an issues tracking table prepared by the Proponent for posting to the BCEAO and Agency's websites.

7.3.2 Construction Communication

The EIS will describe the Proponent's approach to engaging with federal and provincial regulatory agencies and local governments during project construction. The EIS will describe the methods to be used to document and report the status of project compliance with respect to requirements and conditions to the Agency, federal authorities, BCEAO and provincial ministries. The EIS will also describe a proposed process for tracking and reporting regulatory issues and concerns raised during project construction and operations.

7.4 References

This subsection will include a list of supporting references used in this section of the EIS.

VOLUME 2 – ASSESSMENT METHODOLOGY AND ENVIRONMENTAL EFFECTS ASSESSMENT

8 Effects Assessment Methodology

8.1 Overview

The Proponent will describe its overall approach to preparing the EIS, including how it used scientific engineering, Aboriginal traditional and community knowledge. Hypotheses and assumptions shall be clearly identified and justified. Data collection methods, models and studies shall be documented so that the analyses are transparent and reproducible. The degree of uncertainty, reliability and sensitivity of models used to reach conclusions shall be indicated.

All significant gaps in knowledge and understanding related to key conclusions presented in the EIS should be identified. The steps to be taken by the Proponent to address these significant gaps should also be identified. Where the conclusions drawn from scientific and technical knowledge are inconsistent with the conclusions drawn from traditional knowledge, the EIS will contain a balanced presentation of the issues and the Proponent's conclusions.

The Proponent proposes to identify the potential adverse effects of the Project using the environmental assessment methodology outlined in Figure 8.1 and described in the sections below.

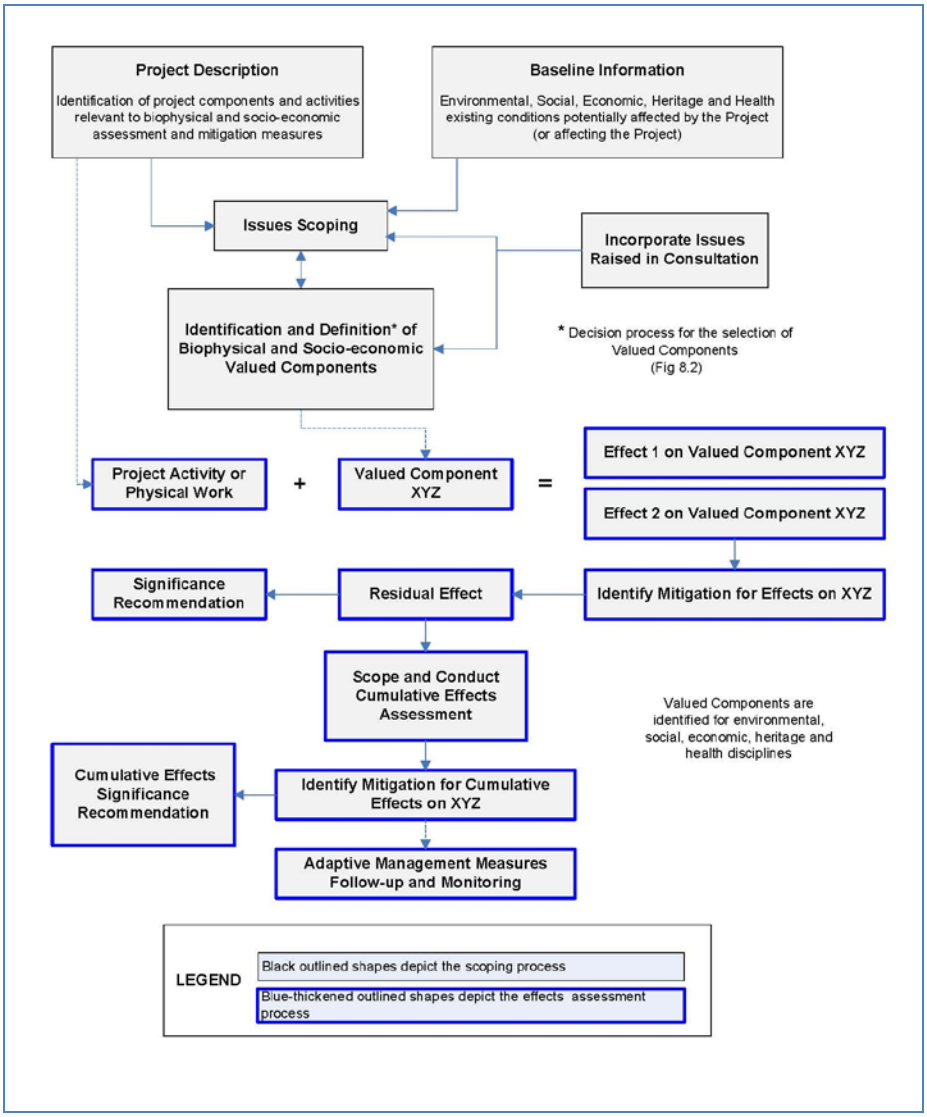

Figure 8.1 Conceptual representation of the environmental assessment process

8.2 Technical Studies and Planning

To conduct an environmental assessment of the Project, planning and technical studies will be undertaken and reports will be prepared. The planning and technical studies will fall within these general categories:

- Reports summarizing consultation with government agencies, Aboriginal groups, and the public;
- Baseline conditions;

- Predictive studies;
- Certain steps in project planning, for example, estimates of the direct employment required for construction of the Project will be derived; and
- A framework for environmental management to be implemented during construction and operation of the Project.

The EIS will describe the planning and technical studies undertaken to produce the information required for the EIS, and will include descriptions of, or attach, the results of the planning and the technical studies.

8.3 Selection of Valued Components

The Proponent will identify the VCs deemed appropriate to ensure the full consideration of the factors listed in Appendix 1 of the Agreement to Conduct a Cooperative Assessment, Including the Establishment of a Joint Review Panel, of the Site C Clean Energy Project. The rationale for selecting these components as VCs and for excluding others should be stated. Challenges may arise regarding particular exclusions, so it is important to document the information and the criteria used to make each determination. Examples of justification include primary data collection, computer modelling, literature references, public consultation, expert input or professional judgement. If comments are received on a component that has not been included as a VC, these comments should be summarised and addressed in this section.

The Proponent proposes to describe the valued components (VCs) identified in accordance with the process described below in sections 8.3.1 – 8.3.3 and shown in Figure 8.2.

8.3.1 Identification of Candidate Valued Components – Step 1

The EIS will describe, as Step 1, the process for identification of candidate-valued components (“candidate VCs”). Candidate VCs will be selected based on interests and concerns raised by the public and Aboriginal groups prior to the issuance of these EIS Guidelines, and input obtained during consultation with the public, government agencies and Aboriginal groups leading up to submission of the EIS to the Agency and the BCEAO. In doing so, the Proponent will seek to identify those components that are valued:

- For environmental, economic, social, heritage or human health reasons; and
- As land or resources currently used by Aboriginal persons for traditional purposes.

Identification of candidate VCs will include the following:

- Interests and concerns raised by Aboriginal groups;
- Interests and concerns raised by the public;
- Regulatory status;
- Protected status;

- Preservation of biodiversity;
- Rarity or special status;
- Sensitivity to disturbance or pollution;
- Important ecological role;
- Transboundary Issues; and
- Human Health.

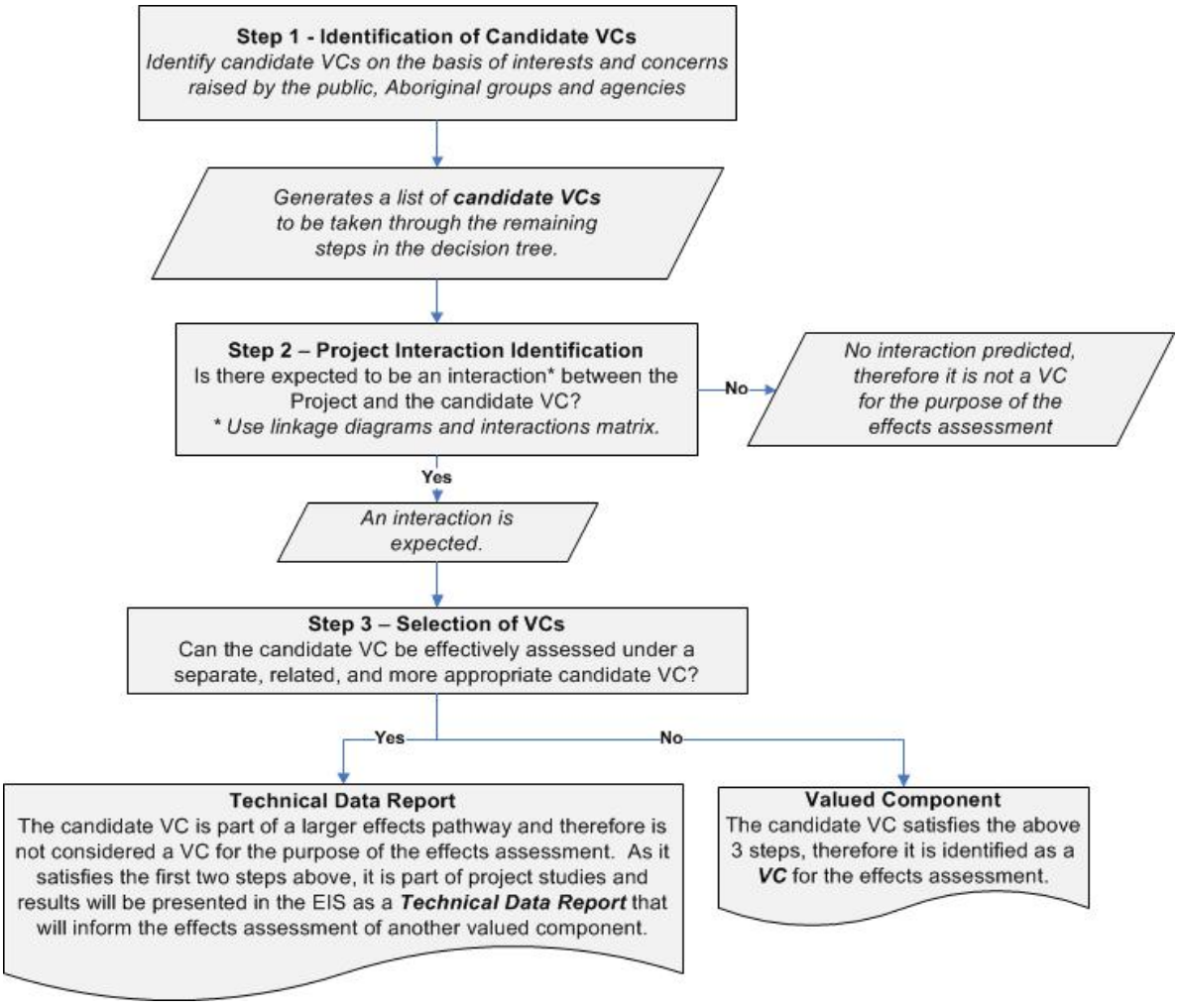

Figure 8.2 Decision process for the selection of valued components

8.3.2 Project Interaction Identification – Step 2

The EIS will describe how the candidate VCs will be evaluated to identify whether there is an interaction, a cause-and-effect pathway, linking the candidate VC to the Project in Step 2. The approach for determining potential project interactions involved the following steps:

- Identify project components and activities;

- Map project activity zones temporally and spatially;
- Locate the candidate VC temporally and spatially; and
- Identify potential interactions between the candidate VC and project components or activities.

In the EIS the Proponent proposes to identify, rank and present the interactions between the project components and each of the candidate VCs in the format shown in Table 8.1.

Potential interactions will be ranked as follows:

- A rank of “0” will be given where no interaction is predicted between a project component and a candidate VC;
- A rank of “1” will be given where an adverse effect may result from an interaction, but standard measures to avoid or minimize the potential effect are available and well understood to be effective, and any residual effects are negligible;
- A rank of "2" will be given where interactions may result in an adverse effect and mitigation measures are not well understood to be effective.

Candidate VCs subject to an interaction ranked “2” will be carried forward into Step 3 of the VC selection process.

Table 8.1 Example of an interactions matrix used to screen project interactions

	Select Valued Components													
Select Project Components, Sub-Components and Associated Activities	Fish and Fish Habitat	Vegetation and Plant Communities	Wildlife Resources	Local Government Revenue	Labour Market	Current Use of Lands and Resources for Traditional Purposes	Agriculture	Forestry	Harvest of Fish and Wildlife Resources	Housing	Transportation	Community Infrastructure and Services	Human Health	Heritage Resources
Construction														
Earthfill Dam and Generating Facility														
Site preparation														
- clearing, grubbing and stripping														
Fuel storage and refuelling sites														
- filling of fuel tanks														
- filling of fuel trucks														
Operations														
Transmission Line to Peace Canyon														
Right-of-Way vegetation maintenance														

8.3.3 Selection of Valued Components – Step 3

Step 3 is a determination as to whether the effect of an interaction on each candidate VC carried through to this point in the selection process can be effectively assessed under a separate and related, but more appropriate, candidate VC.

A key consideration in determining whether a more appropriate candidate VC exists is whether, given the nature of the candidate VC, it falls within the same effects pathway as another candidate VC. An example of an effects pathway is: the burning of project-related woody debris, which may in turn lead to deterioration in “air quality”, which may in turn ultimately contribute to an adverse effect on human health. In this example, parameters of “air quality” will be identified, measured and reported. This data will be used to assess the potential impact of the Project on the human health VC.

The candidate VCs that are not rejected in Steps 1, 2 and 3, and that cannot be effectively assessed under another VC will be taken forward through the effects assessment.

Not all candidate VCs will be carried forward through the effects assessment. However, technical data collected for these candidate VCs will be taken into account in the assessment of potential effects on the VCs that are carried through.

8.4 Assessment Boundaries

8.4.1 Spatial Boundaries

The EIS will describe the spatial boundaries within which each of the potential adverse effects of the Project will be assessed and provide a rationale for each boundary. It is recognized that the spatial boundary for each VC may not be the same.

Study boundaries must be defined taking into account as applicable the appropriate scale and spatial extent of potential effects, and as available, community and Aboriginal traditional knowledge, current land and resource use by Aboriginal groups, ecological, technical and social considerations. The description of the project setting must be presented in sufficient detail to address the relevant effects of the project.

It is noted that the BCEAO and the Agency received many comments regarding the spatial scope of the environmental assessment, including requests to include the Peace Athabasca Delta (PAD). The EIS shall include a scientific justification for the selection of relevant spatial boundaries.

In response to comments submitted during the draft EIS guidelines review, the Proponent indicated that should a technically valid concern with respect to study area boundaries arise during the course of environmental assessment, they would address it in the EIS.

The Proponent has proposed the following approach and presentation for consideration of spatial boundaries in their EIS.

The spatial boundaries will be presented as described in the spatial boundary tables in the VC specific effects assessment sections in these EIS Guidelines. Spatial boundaries will also describe the relevant administrative and technical boundaries, where applicable.

These spatial boundaries will be defined based on applicable discipline guidance documents (e.g., BCMOE 2008, BCOGC 2009). Spatial boundaries descriptors are listed in Table 8.2.

Table 8.2 Spatial boundary descriptors

Spatial Boundary	Details of Spatial Boundary
Technical study area	This is the physical extent of the data collection program, or the physical boundaries for the technical modelling program.
Project activity zone	Area within which the project components will be found or will occur, but not including existing transportation infrastructure that will be used without modification to transport materials or personnel required for the Project.
Local Assessment Area	The Local Assessment Area, or LAA, is the area within which the potential adverse effects of the Project will be assessed.
Regional Assessment Area	The Regional Assessment Area, or RAA, is the area within which projects and activities, the residual effects of which may combine with residual effects of the Project, will be identified and taken into account in the cumulative effects assessment.

8.4.2 Temporal Boundaries

The EIS will present the rationale for the temporal boundaries to be used to assess potential adverse effects of the Project relevant to each VC.

The temporal boundaries of the EA should span all phases of the project: construction, operation, maintenance, and foreseeable modifications where appropriate. Temporal boundaries shall also consider seasonal and annual variations for relevant VCs for all phases of the project, where appropriate. If made available, community and Aboriginal traditional knowledge should be considered where appropriate.

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

8.5 Effects Assessment Methods

The EIS will describe the methods used to assess potential adverse effects on VCs as described below.

8.5.1 Baseline Conditions

In the EIS, the baseline conditions will be described, as follows:

- Identify relevant legal framework (e.g., *Fisheries Act*);
- Explain the methods used to collect the baseline data;
- Identify sources of information;
- Explain the extent to which information has been obtained from the public and has been considered;
- Explain the extent to which Aboriginal traditional knowledge has been obtained and has been considered; and
- Provide an overall baseline description.

8.5.2 Analysis of Effects

For each VC carried through the effects assessment, the EIS will identify, describe and present an analysis of each of the potential adverse effects resulting from the Project.

The assessment of the effects of each of the project components and physical activities, in all phases, shall 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 effects assessment, the Proponent will use best available information and methods. All conclusions must be substantiated. Predictions shall be based on clearly stated assumptions. The Proponent shall describe how it has tested each assumption. With respect to quantitative models and predictions, the Proponent shall discuss the assumptions that underlie the model, the quality of the data and the degree of certainty of the predictions obtained.

The EIS will summarise the analysis of changes to the environment in relation to:

- Changes to components of the environment within federal jurisdiction;
- Changes to the environment that would occur on federal or transboundary lands;
- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

8.5.2.1 Description of Potential Adverse Effects on Valued Components

For each VC carried through the assessment process, potential adverse effects on the VCs will be described, including:

- Cause-and-effect pathway, the mechanism by which the Project may result in each potential adverse effect;
- Quantitative and qualitative parameters by which each potential adverse effect will be characterized; and
- Emphasis must be on those species, communities and processes identified as VCs. However, the interrelations and interactions of these components and their relation to the entire ecosystem and communities of which they are a part of must be indicated.

8.5.2.2 Identification of Mitigation Measures

The EIS will describe the technically and economically feasible measures that the Proponent is proposing to mitigate any potentially significant adverse effects of the Project.

The rationale for and effectiveness of the proposed mitigation measures should be presented.

Other mitigation measures, if any, which were considered shall be identified, and the rationale for rejecting these measures shall be explained. Trade-offs between costs and predicted effectiveness of the mitigation measures shall be justified.

The Proponent shall identify who is responsible for the implementation of these measures and the system of accountability, including the obligations of all its contractors and subcontractors.

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 should be described.

If relevant, the Proponent will identify the extent to which technology innovations could help mitigate environmental effects. Where possible, information on such measures, their implementation, their management and on whether follow-up will be required should be included.

Where mitigation measures have been identified in relation to species and/or critical habitat listed under SARA, the mitigation measures should be consistent with any applicable recovery strategy and action plans.

The EIS will summarise the mitigation measures, follow-up and related commitments identified in relation to:

- Changes to components of the environment within federal jurisdiction;

- Changes to the environment that would occur on federal or transboundary lands;
- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

8.5.2.3 Characterizing Residual Effects

Residual adverse effects are the effects of the Project that may remain after taking into account the implementation of mitigation measures.

The EIS will summarise the residual effects (including residual cumulative environmental effects see Section 8.5.3 below) identified in relation to:

- Changes to components of the environment within federal jurisdiction;
- Changes to the environment that would occur on federal or transboundary lands;
- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

The criteria listed in Table 8.3 will be used to characterize any residual adverse or beneficial effects that may result from the Project.

Where possible, these criteria will be described quantitatively for each VC. When residual effects cannot be characterized quantitatively, they will be characterized qualitatively. Definitions will be provided when qualitative terms are used. For each VC, the characterization criteria provided in Table 8.3 will be defined in specific terms in the EIS.

Table 8.3 Residual effects characterization

Criteria	Description
Direction	This refers to the ultimate long-term trend of the environmental, social, economic, heritage, or health effect (e.g., increase, decrease, or neutral).
Magnitude	This refers to the amount of change in a key indicator or variable relative to baseline case (low, moderate, high), consideration is given to factors such as the uniqueness of the effect, and the comparison to natural or background variation.

Geographic Extent	This refers to the geographic area in which an environmental, social, economic, heritage, or health effect of a defined magnitude occurs (site-specific, local, regional, provincial, national, international).
Duration	The period of time required until the valued component returns to its baseline condition, or the effect can no longer be measured or otherwise perceived (short term, medium term, long term, permanent).
Frequency	The number of times during a project or a specific project phase that an environmental, economic, social, heritage, or health effect may occur (e.g., once, daily, weekly, monthly, continuous).
Reversibility	This refers to the degree or likelihood to which existing baseline conditions can be regained after the factors causing the effect are removed. Effects can be reversible or irreversible.
Context	This refers to the extent to which the area within which an effect may occur; has already been adversely affected by human activities; and is ecologically fragile and has little resilience and resistance to imposed stresses.
Level of Confidence	This is an evaluation of the scientific certainty one has in the review of project specific data, relevant literature, and professional opinion; the EIS will include a statement on the level of confidence in the assessment of direction, magnitude, extent, duration, frequency and reversibility.
Probability	The likelihood that an adverse effect will occur (e.g., low, high or unknown).

8.5.2.4 Significance of Residual Effects

In the EIS, the Proponent will provide its assessment of the significance of any residual adverse effects and its rationale for that determination.

The determination will incorporate the federal and provincial guidance (e.g., Agency 1999, FEARO 1994). The EIS will contain a summary of residual effects in a table format as shown below (Table 8.4).

Table 8.4 Summary of assessment of potential significant residual adverse effects

Valued Component	Project Phase	Potential Adverse Effects	Key Mitigation Measures	Significance Analysis of Residual Effects
VC#1				
VC#2				

In addition, the EIS will summarise the significant adverse environmental effects identified in relation to:

- Changes to components of the environment within federal jurisdiction;

- Changes to the environment that would occur on federal or transboundary lands;
- Changes to the environment that are directly linked or necessarily incidental to federal decisions;
- Effects of changes to the environment on Aboriginal peoples; and
- Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions.

8.5.3 Cumulative Effects Assessment

The EIS will provide an assessment of the cumulative effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out. Federal and provincial guidance will be consulted (e.g., Agency 2007c, BCEAO 2010, Hegmann et al. 1999).

A cumulative effects assessment of the Project on a VC will be conducted if the potential residual adverse effect of the Project on that VC has a spatial and temporal overlap with a residual effect of another project or activity.

Information contained in Section 9.1 Previous Developments may contribute to the cumulative effects assessment.

The EIS will describe the cumulative effects assessment methodology.

The Proponent has proposed a cumulative effects assessment methodology, which would follow the method outlined above for the project-specific VC effects assessment, and proposes the following steps:

- Determination of spatial and temporal boundaries;
- Consideration of other projects and activities and identification of project interactions;
- Description of cumulative effects;
- Identification of mitigation measures;
- Characterization of cumulative residual effects; and
- Determination of significance of cumulative residual effects.

8.5.3.1 Spatial and Temporal Boundaries

The EIS will describe the spatial boundaries within which each cumulative effect of the Project will be assessed and provide a rationale for each boundary.

The Proponent proposes to assess the cumulative effects within the proposed RAA defined for each VC. The spatial boundaries of the RAA will be based on:

- Where possible interactions with other projects or activities overlap; and

- For ecological boundaries, they will be ecologically defensible (e.g., wildlife range boundaries).

The adequacy of data will be assessed in terms relevant to the purpose of the cumulative effects assessment.

To assess the cumulative effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out, the Proponent proposes to present the following in the EIS:

Baseline Case: The Baseline Case will demonstrate the current status of the VC. In doing so, it will reflect the effect of all projects and activities that have been carried out.

Future Case without the Project: To identify the potential adverse effects of projects and activities that will be carried out, the Future Case without the Project will be developed to predict the status of the VC by taking into account the Baseline Case and projects and activities that are at least as foreseeable as the Project. This will demonstrate the potential residual effects of projects and activities that have been and will be carried out.

Project Case: To demonstrate the cumulative effects that are likely to result from the Project, the Project Case will demonstrate the status of the VC, taking into account the residual effects of the Project that are likely combined with those identified in the Future Case without the Project.

8.5.3.2 The Project Inclusion List

The Proponent is proposing to search for projects and activities that will be carried out within the RAA to be taken into account in the Future Case without the Project and in the Project Case:

- Registered active projects on the BCEAO and CEA Agency website, including hydroelectric projects, such as Dunvegan;
- Registered oil and gas applications;
- Registered water licence applications;
- Projects or activities associated with existing or “accepted” applications for land tenure under the *Land Act* (e.g., range tenures, grazing licenses, wind, gravel);
- Currently harvest plans associated with tenured forest operations and timber sales;
- Official Community Plans, and parks and recreation plans; and
- Large waste discharges into the Peace River from Peace Canyon Dam to Vermilion Chutes, Alberta.

The EIS will provide an assessment of the adequacy of existing data in conducting the cumulative effects assessment.

The project-interaction methodology used to determine project interactions for the project-specific effects assessment (shown in Section 8.3.2) is proposed by the Proponent to be used to identify interactions with other projects and activities.

The EIS will provide maps that show the projects and activities that overlap with the Project for each residual effect.

8.5.3.3 Analysis of Cumulative Effects

Description of Potential Cumulative Effects on VCs

The EIS will describe the potential cumulative effects on VCs, including the following:

- Overview of the project or activity;
- Status of project or activity;
- Spatial and temporal boundary; and
- Potential residual cumulative effects.

Identification of Cumulative Effects Mitigation Measures

If cumulative effects are identified, the EIS will recommend possible regional approaches to mitigation.

Characterizing Residual Cumulative Effect

The EIS will characterize the residual cumulative effects using the approach outlined for the Project-specific effects assessment described in Section 8.5.2 and the criteria provided in Table 8.3.

Significance of Residual Cumulative Effects

In the EIS, the Proponent will provide its assessment of the significance of any residual adverse cumulative effect that may result from the Project, in combination with other projects, and the rationale for its assessment.

8.6 References

This subsection will include a list of supporting references used in this section of the EIS.

9 Environmental Background

9.1 Previous Developments

Upstream of Site C, the flow of the Peace River is regulated by the operation of two existing hydroelectric facilities, the WAC Bennett Dam and the Peace Canyon Dam. An understanding of those facilities, of the environmental changes understood to have resulted from those facilities, and of the mitigation measures employed may provide information that could be used to better assess the potential effects of the Project and the feasibility of proposed mitigation measures.

The EIS will include a narrative discussion of existing hydro-electric generation projects on the Peace River (W.A.C. Bennett Dam and the Peace Canyon Dam). The narrative will include the description of any existing studies of changes to the environment resulting from those projects that are similar to potential changes resulting from the project, including any mitigation measures that were implemented, and any long term monitoring or follow up program that were conducted. The effectiveness of those mitigation measures and key results of monitoring or follow-up programs would be described. This narrative discussion should include historical data, where available and applicable, to assist interested parties to understand the potential effects of the Project and how they may be addressed.

9.2 Land

9.2.1 Geology, Terrain and Soils

The EIS will describe the physiographic and topographic setting and the stability of the terrain within the project activity zone.

The EIS will contain a description of bedrock and surficial geology, key landforms (such as mountains, uplands, slopes, terraces and streams), existing and predicted changes to seismic conditions, and geotechnical and geochemical processes (such as erosion, slope stability and acid rock drainage) that may affect land or resource use. This will include:

- Regional bedrock and surficial geology, terrain stability and soil conditions, including an interpreted geological history of valley formation and landsliding;
- Regional seismicity and seismic hazard;
- Pertinent physical and chemical properties of soils and bedrock and potential for contaminants based on current and historic land uses; and
- Relevant geologic structures such as lineaments, faults and joints.

The EIS will describe the geochemical characterization program for acid rock drainage and metal leaching potential that has been undertaken for the overburden and rock materials

that will be excavated, exposed or disturbed at the dam site and at off-site materials sources.

The studies described in the EIS will conform to the requirements of:

- Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia;
- Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia; and
- Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials.

The EIS will:

- Describe the regional geology and the local geology relative to acid rock drainage and metal leaching potential;
- Identify the geologic units that will be excavated, exposed or disturbed;
- Describe the collection of representative samples of the geologic unit;
- Present the results of static tests (one time tests to determine the balance of acid generating versus acid neutralizing components of the geologic units);
- Present the results of kinetic tests (laboratory and field temporal tests to determine the primary rates of acid generation versus acid neutralization, and the time to the on-set of acid rock drainage);
- Define management units (dependent on geological, geochemical and engineering factors); and
- Predict drainage chemistry through time for each management unit.

The Acid Rock Drainage Management Plan will outline:

- The management measures to mitigate acid rock drainage and metal leaching to reduce risks to water quality, with the recognition and understanding that the site geochemical characterization and the management plan will be updated as new information/results are subsequently obtained, through a systematic testing program during construction; and
- Describe the requirements for post construction monitoring.

Characterization and classification of the proposed reservoir shoreline will be carried out, including:

- Description of the geology at select representative cross-sections and extrapolation along the shoreline using borehole and surface mapping observations to produce geological fence diagrams;

- Descriptions of geological materials and/or thickness of colluvium and a description of the underlying geological materials located at the normal maximum reservoir level;
- Inventory of landslides, including their estimated mechanism, volume and current degree of activity;
- Site-specific characterization of significant historic and pre-historic landslides based on the results of surface mapping, geotechnical drilling, instrumentation monitoring, and slope stability analyses, where available;
- Predictions of potential for groundwater changes, including sensitivity to changes in recharge rates and other aquifer characteristics, that could alter the potential for landslides;
- Classification of the erosion and landslide potential of the reservoir shoreline materials (including tributaries) under current and proposed reservoir conditions;
- Estimation of short and long-term beach profiles (physical changes associated with erosion due to wind generated waves) for reservoir operation periods up to 100 years; and
- Physical and numerical modelling of waves that could potentially be generated by landslides into the reservoir.

Predicted changes to shoreline erosion and slope stability due to the Project will be assessed based on the results of shoreline classification. A series of reservoir impact lines will be prepared to delineate areas where limitations on residential land use or other measures may be required to manage public safety.

Sources of information regarding geology and terrain stability conditions within the technical study area will include:

- Historical aerial photographs, ortho-photographs and satellite imagery;
- Published topographic maps;
- Published studies, maps and academic research on regional bedrock and surficial geology and engineering geology;
- Topography and digital elevation models generated from aerial photography and from LiDAR;
- Published studies and academic research on landslides within the region, a detailed landslide inventory within the proposed reservoir area, and relevant landslide case histories; and
- Historical and recent geotechnical investigations (mapping, drilling, test pits, material classification, testing, instrumentation monitoring and other techniques).

The EIS will describe a regional and site-specific seismic hazard assessment, which will include:

- The studies done to assess the seismic hazard at Site C, which will incorporate current understanding of regional plate tectonics and seismotectonics including known and inferred faults, the earthquake recurrence rates, and the maximum earthquake magnitudes considered possible in each potential earthquake source zone;
- The qualifications of the seismic experts who conducted and reviewed the studies;
- The seismic design criteria selected for the project and compare them to the guidelines suggested by the Canadian Dam Association and other relevant guidelines or codes;
- The potential for seismicity induced by reservoir filling;
- The potential for seiches and tsunamis;
- Current understanding of how fracking or other petroleum industry related activities may affect seismicity; and
- Ongoing seismic monitoring during operation.

9.2.2 Land Status, Tenure, and Project Requirements

The EIS will:

- Identify land ownership by area of private, the Proponent owned, and Crown land within the Project activity zones;
- Provide a summary of land tenure within the Project activity zones, with potential effects to tenured areas or activities to be assessed in accordance with Section 16 Land and Resource Use;
- Provide maps illustrating the ownership, tenure and land management areas with the Project activity zone;
- Describe the requirements to acquire or obtain new rights over private or government owned property to construct and operate the Project; and
- Describe the approach for acquiring private property and rights to Crown land.

9.3 Water

9.3.1 Surface Water Regime

The EIS will describe existing surface water hydrology conditions in the Peace River. The Proponent proposes that the spatial boundary would be from Peace Canyon Dam downstream to Peace Point, Alberta.

The EIS will describe existing surface hydrological features (reservoirs, rivers, tributaries), watershed boundaries, mean annual flows, mean monthly and seasonal flows; and extreme monthly, seasonal, and annual flows, if available, and flood zones. The Proponent proposes that the spatial boundary would be from the Peace River down to Peace Point, Alberta, and the main drainage tributaries to the proposed reservoir (Lynx Creek, Farrell Creek, Halfway River, Moberly River).

The EIS will describe in detail the hydraulic models that will be used to predict the potential changes in the hydrological regime as a result of the Project.

The EIS will describe the following information for each model used:

- input parameters and assumptions;
- outputs provided by the model;
- basis of the model methodology;
- the level of confidence; and
- purpose for the model.

Models, as well as additional quantitative and qualitative assessment methods as required, will be used to describe:

- the proposed reservoir (volume, bathymetry, maximum and minimum surface areas, active storage volume, and residence time);
- anticipated changes in the hydraulic regime during construction (e.g., channelization, diversion, reservoir filling, and commissioning), including predicted ranges of water levels with inundation mapping for the construction headpond during channelization and diversion phases;
- seasonal flow patterns of post-construction flows, water levels, wetted widths, and average cross-sectional velocity statistics at selected locations on the Peace River downstream of the proposed dam to Peace Point, Alberta; and
- expected frequency and range of water levels for the project reservoir.

Table 9.1 The Proponent proposes to use the following hydraulic models to predict potential changes in surface water hydrology

Model Name	Use	General Description and Purpose
HYSIM (**)	Operational water management.	Model simulates BC Hydro generation system operations, and produces a Peace River hydrology on a monthly time-step, based on a 60-year historical stream flow sequence.
Generalized Optimization Model (**)	Operational water management.	Model optimizes value of BC Hydro system operations subject to existing operating constraints. Model provides simulated Peace River generation operations for specific operating scenarios and produces, for a range of inflow years, reservoir levels and downstream

		water discharge on an hourly time step.
MIKE11	Construction water management for downstream flow.	One-dimensional hydraulic model to characterize changes in flow volumes, velocities, and river elevations at specific locations within the river during the construction phase and downstream of the project dam during operations.
Telemac2D and River2D	Construction water management for downstream flow and side channel habitat.	Two-dimensional models to provide greater detail than MIKE11 of potential changes to flow volumes, velocities, and river elevations within the river during construction and for site specific studies during operations.
Flow 3D	Construction water management for downstream flow and engineering design.	Three-dimensional model to characterize the hydraulic regime during various phases of construction and operation in the immediate vicinity of the dam.
H3D (++)	Operational water management for reservoir conditions.	A proprietary three-dimensional hydrodynamic circulation model of the proposed reservoir, used primarily to characterize potential future changes to water temperature, ice, sediment transport, and morphological changes in the reservoir.
Notes: Proprietary Models – (**) BC Hydro; (++) EBA Consulting Ltd.		

A representative flow record will be used to assess hydrological conditions during construction and operation phases.

The EIS will describe how the creation of the Project's reservoir will affect existing hydro metric (water gauging) stations, including those on the Peace River and tributaries entering the new reservoir.

9.3.2 Water Quality

The EIS will describe existing water quality conditions in the Peace River and its tributaries. The Proponent proposes the spatial boundaries to be from Williston Reservoir to Alces River, Alberta. The location of public surface drinking water sources will be identified. Water quality parameters recorded during baseline studies (including but not limited to nutrient and metals concentrations (dissolved and total metals), suspended sediment levels, dissolved gas pressure levels, pH, alkalinity, temperature) will be summarized and compared with provincial and federal guidelines, including:

- British Columbia Approved Water Quality Guidelines for freshwater aquatic life, drinking water supply, wildlife water supply, recreation and aesthetics, irrigation, and livestock water supply, as applicable (BCMOE 2010a); and
- Canadian Water Quality Guidelines for the protection of freshwater aquatic life and agricultural water uses, and recreational water quality and aesthetics (CCME 2011a).

The EIS will include a description of sediment quality in the Peace River. Sediment data from the proposed reservoir will be summarized and compared with provincial and federal guidelines (CCME 2011b).

9.3.3 Groundwater Regime

The EIS will contain a description of the following existing conditions and potential changes to the groundwater regime. The Proponent proposes the spatial boundary to be from Peace Canyon Dam to the proposed Site C dam site:

- Location of water wells, springs, infrastructure, contamination, and land use that could be affected by changes to the groundwater regime;
- Development of a series of two-dimensional cross-sections at representative reservoir locations where reservoir filling could affect slope stability, land or resource use;
- In the cross-sections, subsurface geology, aquifers and water table positions will be estimated for the baseline and reservoir conditions. Estimates will be based on a literature review, surface mapping, historic and recent geotechnical drilling, water well data, instrumentation monitoring results installed for the project, aquifer tests (specifically single well rising and falling head tests), lab testing and two-dimensional numerical groundwater flow results;
- Qualitative extrapolation of the results of the two-dimensional cross-sections to lands nearby and adjacent to the reservoir using shoreline classification, geological fence diagrams and other available relevant hydrogeological information along the reservoir; and
- The potential adverse effects of project construction and operations on groundwater quality will be evaluated qualitatively by assessing the potential changes to groundwater chemistry due to the release of substances related to non-natural sources (known or potential contamination) or natural sources (geologic materials).

9.3.4 Thermal and Ice Regime

The EIS will include a description of the existing water temperature and ice regimes of the Peace River. Technical study areas for reservoir and river locations are described below. This section of the EIS will support a description of the anticipated predictive changes in these parameters related to the Project.

Reservoir

The water temperature and ice regimes of the proposed reservoir will be predicted. The Proponent proposes using H3D, a three-dimensional numerical model (Stronach et al. 1993). The Proponent proposes the spatial boundary for the technical study area for thermal and ice regimes in the reservoir to be from the tailrace of the Peace Canyon Dam to the proposed Site C dam. The Proponent proposes the study period will extend from

1995 to 2011, the period for which the data set is available for analysis. These years would be used to simulate post-construction conditions. A description of the model, calibration and validation methods and predicted water temperature and ice characteristics of the proposed reservoir will be provided.

Downstream Temperature

Potential changes to downstream water temperature will be described in the EIS. The Proponent proposes the spatial boundary to be to the confluence of the Alces River with the Peace River (approximately 60 km downstream).

The Proponent proposes to conduct analysis using a two-dimensional cross-sectionally averaged hydrodynamic and water quality model (CE-QUAL W2). This model is being used primarily for the purpose of examining aquatic productivity. The CE-QUAL W2 model simulates basic eutrophication processes such as temperature-nutrient-algae-dissolved oxygen-organic matter and sediment relationships (Portland State University, 2011). The Proponent proposes that changes to water temperature due to Site C will be negligible at Alces River; however, if warranted, the downstream extent of the assessment will be extended to capture the entire extent of Project influence.

Downstream Ice

Existing and post-construction ice conditions in the Peace River will be studied. The Proponent proposes using the Comprehensive River Ice System Simulation Program model (CRISSP), a one-dimensional numerical ice simulation model. The CRISSP model simulates dynamic ice breakup period. The Proponent proposes the technical study area for downstream ice conditions to extend from the proposed Site C dam to a location over 700 km downstream near Fort Vermilion, Alberta. The Proponent's proposed CRISSP model simulates ice processes in natural rivers, including water temperature variation, young ice, anchor ice evolution, surface ice run, ice cover formation, surface and undercover ice transport and jam, thermal growth and decay of ice, and breakup (Clarkson University, 2005).

The EIS will describe the calibration, validation, and expected accuracy of the Proponent's proposed CRISSP ice model.

The Proponent's proposed CRISSP model will be run using a representative range of atmospheric conditions. Results will be compared to determine the potential change on the following characteristics as a result of the Project:

- Timing of ice cover formation and breakup;
- Maximum upstream extent of ice cover;
- Ice thickness; and
- Conditions that affect river transportation.

9.3.5 Fluvial Geomorphology and Sediment Transport

The EIS will present information regarding the existing conditions and predicted project-related changes to fluvial geomorphology and sediment transport. The Proponent proposes the spatial boundary to be the Peace River between the Peace Canyon Dam and Peace Point, Alberta. The Proponent proposes the reservoir technical study area to extend from the Peace Canyon Dam to the proposed Site C Dam location. The Proponent proposes the downstream technical study area to extend from Site C to Peace Point, Alberta.

The fluvial geomorphology and sediment transport investigations will characterize baseline conditions of the following parameters:

- Suspended sediment characteristics and transport rates in the Peace River and tributaries in the reservoir technical study area and in the downstream technical study area to Peace Point, Alberta, as proposed by the Proponent;
- Bed material characteristics and bedload transport rates in the Peace River and tributaries in the reservoir technical study area and in the downstream technical study area within the anticipated extent of Project-related effects as determined from existing information; and
- Historical locations, patterns, and rates of channel erosion and deposition in the downstream technical study area.

The sources of information reviewed will include:

- Channel mapping from remote sensing imagery (aerial photographs and satellite imagery);
- Water Survey of Canada streamflow records;
- Project streamflow, turbidity and suspended sediment records;
- Project bed material sampling and bedload transport calculations; and
- Any other available relevant information.

The EIS will also present the results of predictive modelling, including a discussion of model reliability, used to characterize the potential changes in fluvial geomorphology and sediment transport and will consider the following:

- Suspended sediment dynamics (inflow, deposition and outflow) in the proposed reservoir;
- Suspended sediment concentrations and tributary sediment mixing in the Peace River downstream of the proposed reservoir. The Proponent proposes the spatial boundary to be to Peace Point, Alberta;
- Bed material mobilization in the proposed Site C tailrace area; and
- Channel erosion and deposition downstream of proposed Site C dam site. The Proponent proposes the spatial boundary to be to Peace Point, Alberta.

The EIS will describe the approaches used for predictive analyses of these parameters.

9.3.6 Methylmercury

The EIS will describe the approach used to determine the dynamics of mercury in the environment and an understanding of the conversion of inorganic mercury to methylmercury in the reservoir. The Proponent proposes the spatial boundary to be from the reservoir creation from the Peace Canyon Dam to the proposed Site C dam.

The Proponent proposes that existing conditions and an understanding of the methylation process will be conducted by:

- Reviewing historic information within the Peace River system;
- Collecting mercury and methylmercury baseline data in the technical study area; and
- Reviewing other hydroelectric developments elsewhere in Canada that may pertain to mercury.

The EIS will summarize aquatic and terrestrial baseline information on mercury in environmental media within the technical study area, and will consider mercury concentrations within and downstream of the Site C reservoir. The Proponent proposes the spatial boundary to be from the Site C reservoir to Vermilion Chutes, Alberta by incorporating data collected for the Dunvegan project for the reach between Many Islands and Vermilion Chutes.

The EIS will also describe the methods used to develop a mechanistic model (RESMERC is proposed by the Proponent) for the purpose of predicting mercury and methylmercury concentrations in water and biota (e.g., invertebrates, fish) over the life of the Site C reservoir. This section of the EIS will summarize modelling results that will predict the rates of mercury methylation and de-methylation, as well as transfer and bioaccumulation of mercury through the food chain.

9.4 Air

9.4.1 Micro-Climate

The EIS will present information regarding the existing conditions and predicted project-related changes to the microclimate. The Proponent proposes the spatial boundary to be the Peace River valley and at the Fort St. John Airport.

The Proponent proposes the microclimate technical study area to be defined by the results of preliminary modelling that indicated the spatial extent of potential project changes to meteorology and microclimate. This area the Proponent proposes is the segment of the Peace River valley from upstream of Hudson’s Hope to downstream of Taylor, includes the predicted extent of the reservoir, and includes the Fort St John Airport. This length is

buffered by a rectangular shape with the edges between 10 to 20 km away from the reservoir's water surface.

The Proponent proposes to use the most current 30-year climate normals and hourly meteorological observations, both from Fort St John Airport, to characterize baseline climate conditions. For parameters not provided in standard climate normal format (e.g., absolute humidity), the hourly data for the 30-year period will be summarized in a format consistent with the climate normals provided by Environment Canada. This will include the following parameters:

- Temperature: Annual average, extreme minimum and maximum, daily average, minimum and maximum by month;
- Precipitation: Annual and monthly total precipitation;
- Wind speed: Monthly and annual average, monthly extreme maximum;
- Relative and absolute humidity: Monthly and annual average humidity; and
- Fog: Monthly and annual hours of potential fog.

The climate monitoring network in the Peace River valley between Hudson's Hope and Taylor installed by the Proponent will be used to improve the understanding of micro-climate parameters, including precipitation levels, wind speed and direction, air temperature, barometric pressure, humidity, solar radiation, and heat flux.

The Proponent proposes to use the Weather Research and Forecast model to assess and evaluate potential changes in microclimate due to the proposed reservoir. The Weather Research and Forecast Model is a mesoscale numerical weather prediction system designed to serve both operational forecasting and atmospheric research needs. It is suitable for a broad spectrum of applications across scales ranging from metres to thousands of kilometres. It allows practitioners the opportunity to conduct simulations reflecting either real data or idealized configurations.

The EIS will describe the model, including a discussion of the level of confidence of the predictions of the model, and its input and outputs. Inputs to the model that will be described in the EIS include: meteorological data and geophysical inputs that define land use category and terrain.

9.4.2 Air Quality

The EIS will present information regarding the existing conditions and predicted project-related changes to air quality. The Proponent proposes the spatial boundary to be in the Peace River valley associated with project activity zones. The air quality technical study area proposed by the Proponent encompasses all of the project activity zones and a rectangular spatial buffer that is 135 km by 100 km.

This section of the EIS will describe current ambient levels of the following:

- Nitrogen Oxides (NO_x);

- Sulphur Dioxide (SO_2);
- Particulate Matter less than 10 microns (PM_{10});
- Particulate Matter less than 2.5 microns ($PM_{2.5}$); and
- Other possible contaminants and emissions from the proposed project, as may be identified.

Baseline air quality conditions will be determined from ambient air quality data and emission inventories. Ambient air quality monitors were installed for the Project to collect baseline particulate matter (PM_{10} and $PM_{2.5}$) data. Background ambient air quality data for other contaminants will be obtained from the BC Ministry of Environment (BCMOE). The BCMOE operates a network of ambient air quality monitoring stations in the province of British Columbia. The closest ambient air quality monitoring stations to the potential Site C reservoir that would be included in the baseline study are located at the Fort St. John North Peace Cultural Centre, Taylor Town site, and Taylor South Hill. Information on existing emissions in the technical study area will also be obtained from BCMOE's 2000 provincial emission inventory and from the National Pollutant Release Inventory.

This section of the EIS will describe the estimated air quality emissions during construction activities. The emission estimation methodology will primarily adhere to the US Environmental Protection Agency's Compilation of Air Pollutant Emission Factors guidelines (US EPA 1995). The scope of the emission inventory will consider vehicles and equipment, clearing and burning of vegetation and debris, extraction of construction materials from quarries, gravel pits and borrow pits, material handling and processing, and fugitive emissions from access roads.

9.4.3 Noise and Vibration

The EIS will present information regarding the existing conditions and predicted project-related changes to noise and vibration. The Proponent proposes the spatial boundary to be within the project activity zone, buffered by 1.5 km. The Proponent also proposes that the Technical Noise study will consider human receptors identified in the Human Health Assessment in Section 19 of these guidelines, and will utilize this information in choosing the most appropriate sized technical study area. The EIS will summarize baseline noise conditions determined from noise monitoring at identified receptor sites and through transportation studies.

Noise receptors will be identified in the vicinity of anticipated construction and operation activities and along equipment movement corridors that are used by people and wildlife. The criteria available from the BC Oil and Gas Commission guidance document (BCOGC 2009) and the Ministry of Transportation and Infrastructure will be considered for the purposes of identifying noise effects.

Noise levels will be modelled for selected scenarios during construction and operations. The Proponent proposes to use the CadnaA noise modelling prediction software (ISO

9613). The CadnaA modelling will include, where applicable, the topographic, temperature and wind effects on noise propagation of transportation- and equipment-generated sound emissions. The modelling will be conducted on the basis of sound power levels emitted by equipment that are established using previous measurements, published literature or manufacturer data.

The EIS will describe the evaluation of blasting vibration and "sound-induced" or airborne vibration.

Airborne vibration will be estimated using Canadian and international standards for calculation of vibration, including guidance from the Ontario Ministry of Environment NPC 119 and the US Office of Surface Mining and Reclamation.

9.5 Electric and Magnetic Fields

The EIS will describe the existing electric and magnetic fields associated with the existing 138 kV transmission lines, and will identify and evaluate the potential changes from operational activities on these parameters.

The EIS will summarize baseline conditions based on measurements of electric and magnetic field levels associated with the existing sources. It will describe the modelling approach and results used to predict electric and magnetic fields associated with existing sources and potential changes associated with the Project.

9.6 References

This subsection will include a list of supporting references used in this section of the EIS.

10 Fish and Fish Habitat Effects Assessment

The Proponent proposes to summarize the effects assessment on the aquatic environment based on the methodology described in Section 8, including characterization of the benefits of the Project.

Technical data will inform the fish and fish habitat effects assessment. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, The Proponent will incorporate Aboriginal traditional and local knowledge studies as made available.

10.1 Valued Component Scoping and Rationale

The Proponent's rationale for selection of the fish and fish habitat VC is described in Table 10.1. Fish and fish habitat have the potential to interact with the Project.

Table 10.1 Fish and fish habitat valued component rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Fish and Fish Habitat	Construction and operation activities, water impoundment, flow management and permanent infrastructure will result in a change to fish and fish habitat.	Subsistence, and cultural reasons; Exercise of asserted or established Aboriginal rights and treaty rights.	Food fisheries, recreation, health of aquatic ecosystems, fish habitat and fish populations; Biodiversity.	*Fisheries Act*; Provincial water quality guidelines; Canadian water quality guidelines for the protection of aquatic life.

10.2 Fish and Fish Habitat

10.2.1 Fish and Fish Habitat Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 10.2.

Table 10.2 Fish and fish habitat assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Fish and Fish Habitat	Peace River in the proposed reservoir area; Tributaries entering the proposed reservoir; The Peace River downstream of the proposed Site C dam to Many Islands, Alberta; Watercourses within the transmission line and roadway rights-of-way; Watercourses within the project activity zone (construction materials); Riparian areas.	Peace River from Peace Canyon Dam, BC to Vermilion Chutes, AB, which is a distance of approximately 865 km.

10.2.2 Fish and Fish Habitat Temporal Boundaries

The EIS will describe the temporal boundaries which will reflect the methodology described in Section 8 of these EIS Guidelines.

10.2.3 Fish and Fish Habitat Baseline

The fish and fish habitat baseline data will provide an understanding of the existing fish community, distribution, movement and life history parameters of species populations, fish habitat characteristics, biological assemblages, water quality, and production of aquatic invertebrates that support fish populations in the Peace River and its tributaries in the LAA as proposed by the Proponent. The Proponent proposes that aquatic conditions in the proposed reservoir and downstream of the dam site will be assessed using a predictive modelling approach and that data will be collected for the following key indicators:

- Fish species including identification of species composition, distribution, relative abundance, migration and movement patterns, and general life history parameters (including spawning periods) in the LAA. Fish communities will also be described;
- Fish habitat use including an evaluation of the quality and quantity of fish habitats in the LAA. Critical or sensitive areas such as spawning, rearing, and over-wintering habitats and migration routes will be described and/or mapped. Seasonal variability of the habitat will be considered. The criteria used in the evaluation process will be described; and
- Changes in environmental factors in their environment (e.g., food, water temperature, sediment transport).

The EIS will identify sensitive fish species or species of provincial or federal conservation concern, including any species listed in the federal *Species at Risk Act* (SARA), endangered fish species listed in the BCMOE's Endangered Species and Ecosystems, Provincial Red and Blue Lists (BCMOE 2010b), and fish species of conservation or ceremonial concern identified by Aboriginal groups. The principles of the BC Conservation Framework will be applied.

Information used to describe baseline conditions and predictive analyses will consist of:

- Traditional land use studies or traditional knowledge made available to the Proponent by Aboriginal groups;
- Peace River and tributaries fish and fish habitat inventories;
- Peace River radio telemetry studies;
- Peace River microchemistry-genetics studies;
- Peace River water quality studies;
- Peace River baseline aquatic productivity studies; and
- Site C aquatic productivity modelling, consisting of:

- Multivariate statistical approaches to estimate changes in primary and secondary production based on field data and habitat variables;
- The Proponent proposes to use predictive computer modelling using the CE-QUAL W2 software package originally developed by the US Corps of Engineers for simulating conditions in reservoirs and associated influent and effluent streams to simulate physical and chemical conditions, and primary production;
- The Proponent proposes to use ECOPATH (Christensen and Walters 2004), a steady state model that provides a biological mass balance of an ecosystem; and
- Peace River mercury studies and modelling.

10.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect fish populations.

The potential to adversely affect fish and fish habitat will be assessed by taking into account the potential for the Project to result in changes to the following key aspects of fish and fish habitat:

- Habitat changes created by the reservoir in the mainstem and affected tributaries as well as upstream and downstream of the dam due to flow alterations;
- Upstream and downstream fish migrations by species and life history stage and their potential to be affected by the Project;
- Fish mortality;
- Potential impacts on the genetic diversity of fish populations above and below the project site;
- Potential impacts to predator-prey interactions and expected changes;
- Potential impacts to food web composition and structure; and
- Potential impacts of gas pressure on fish resulting from water discharge over the structure.

Should potential adverse effects be identified, the potential mitigation and benefit enhancement measures will be identified and will include a description of how the mitigation measures can address the potential adverse effect on fish and fish habitat and any mitigation options being considered to minimize the impacts of the project on fish passage.

The EIS will identify and describe the aquatic and riparian habitat and fisheries resources expected to be impacted by the by the project. Proposed mitigation measures to offset losses to fisheries resources during construction and operation of the project will be discussed in relation to applicable legislation and DFO policy, and in relation to any applicable Provincial objectives for the management of fisheries. The EIS will provide

sufficient detail to demonstrate the extent to which applicable DFO policy objectives can be achieved and will identify measures that are technically, economically and biologically feasible.

The EIS will describe follow up and monitoring plans to determine the effectiveness of measures to mitigate or compensate for the adverse environmental effects of the project.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

10.2.5 Summary of Residual Effects on Fish and Fish Habitat

The EIS will summarize residual effects in a table format as shown in Table 8.4.

10.3 References

This subsection will include a list of supporting references used in this section of the EIS.

11 Vegetation and Ecological Communities Effects Assessment

The EIS will summarize the vegetation and ecological communities' effects. The Proponent proposes to do this based on the methodology described in Section 8.

Technical data will inform the vegetation and ecological communities' effects assessment. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate Aboriginal traditional and local knowledge studies as made available.

11.1 Valued Component Scoping and Rationale

The Proponent's rationale for selection of the vegetation and ecological communities VC is described in Table 11.1. Where available, supporting information that shows the importance of the VC is included as part of the rationale for selection, as are regulatory requirements.

The EIS will identify and assess any change the project may cause to the listed vegetation and ecological communities species, its critical habitat or the residences of individuals of that species as defined in SARA.

Table 11.1 Vegetation and ecological communities valued component rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Vegetation and Ecological Communities*	Land clearing and water impoundment will result in a change to vegetation and ecological communities.	Direct use of plants for food, medicinal, spiritual and cultural purposes, indirect effects on wildlife, cultural importance.	Direct use of plants for food, agriculture, timber harvesting, and indirect effects on wildlife.	*Species at Risk Act*, and provincial and federal guidelines on vegetation and biodiversity.

Notes: *Includes Rare and Sensitive Plant Communities and Ecological Communities at Risk

11.2 Vegetation and Ecological Communities

11.2.1 Vegetation and Ecological Communities Spatial Boundaries

The Proponent proposes the LAA and RAA as described in (Table 11.2).

Table 11.2 Vegetation and ecological communities assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Vegetation and Ecological Communities	An approximate 4-km-wide corridor centered on the Peace River from Hudson's Hope to the Alberta border; a 1-km-wide corridor centered on the existing 138 kV wood pole transmission line from the Peace Canyon Dam to Taylor and Fort St. John; a 400 m corridor centered on roads identified for upgrading; a 1-km wide corridor centered on new roads; and a 500 m buffer around the proposed quarry and till sites.	Peace Lowlands Ecosection

11.2.2 Vegetation and Ecological Communities Temporal Boundaries

The EIS will describe the temporal boundaries which will reflect the methodology described in Section 8 of these EIS Guidelines.

11.2.3 Vegetation and Ecological Communities Baseline

The EIS will consider the following in describing the Vegetation and Ecological Communities baseline:

- Important habitats found within the project area including shoreline habitats, banks, wetlands and floodplain;
- Aquatic and riparian vegetation;
- A description of the composition, distribution and abundance of terrestrial flora; and
- Existing patterns of habitat and ecosystem alteration.

Mapping information will provide an understanding of the existing location and spatial extent of these ecosystems within the LAA as proposed by the Proponent using completed ecosystem mapping and field verification. Key indicators will include:

- Total area (hectares) of each ecosystem type, including wetlands, within the mapped area;
- Area (hectares) of each ecosystem by structural stage will be calculated for each of the mapped ecosystems using the final map databases. The 7 class structural stage classification system will be used (BCMOE and BCMFLNRO 1998);
- Number of unique ecosystems mapped and their distribution within the technical study area described; and
- Number of and distribution of rare plant species observed within the technical study area.

11.2.3.1 Rare and Sensitive Ecological Communities

The EIS will describe ecological communities at risk, which are identified as those ecological communities currently designated on the provincial Red and Blue lists[3], communities that are ranked 1 or 2 for Goal 2 of the Conservation Framework[4], and sensitive communities that are communities that are less resilient to disturbance such as wetlands.

[3] Red-listed species and subspecies have or are candidates for official Extirpated, Endangered or Threatened Status in B.C. Placing taxa on these lists flags them as being at risk and requiring investigation (Harper et al. 1994)). The Blue List includes "ecological communities, and indigenous species and subspecies of special concern (formerly vulnerable) in British Columbia" (Harper et al. 1994).

[4] Information on species rankings can be found on the Internet at http://www.env.gov.bc.ca/cdc/methods.html

The EIS will describe the methods used to identify rare and sensitive ecological communities including:

- Descriptions of rare and sensitive ecological community posted on the Conservation Data Center's website, along with descriptions in local field guides (De Long in prep and MacKenzie and Moran 2004) will be used to identify occurrences within the technical study area;
- An assessment of wetland function, including migratory birds, SARA and COSEWIC listed species;
- Evaluation and mapping of potential rare and sensitive communities will be conducted using the protocol developed by the Conservation Data Center. Field visits will be used as required to verify community occurrences;
- Field verification of rare and sensitive ecological communities will be conducted using the protocol outlined in the *Field Manual for Describing Terrestrial Ecosystems* (Ministry of Forests and Range, and Ministry of Environment 2010); and
- Traditional land use studies or traditional knowledge made available to the Proponent by Aboriginal groups.

11.2.3.2 Rare Plants

The EIS will describe rare plants, including both vascular and non-vascular species; focal species, including species listed in Schedule I of the SARA; provincially Red-listed and Blue-listed species; and species considered to be rare, based on the professional judgment of the rare plant specialist.

The Proponent proposes to identify the locations of rare plants observed within the proposed LAA. The methods used to identify rare plants will be based on the following:

- Timing (Klinkenberg and Penny 2006);
- Survey selection and intensity (Whiteaker et al. 1998; USDA FS and USDI BLM 1999);
- Voucher collection (Klinkenberg and Penny 2006; RIC 1999a); and
- Traditional land use studies or traditional knowledge made available to the Proponent by Aboriginal groups.

The EIS will also discuss the results of reviews of established herbarium collections that include the University of British Columbia, the University of Alberta, the Royal Alberta Museum, the Royal British Columbia Museum and the Canadian National Museum.

11.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect terrestrial habitat.

The Proponent proposes to assess the potential to adversely affect Vegetation and Ecological Communities by taking into account the potential for the Project to result in changes to the following key aspects:

- The area of vegetation/ecological community loss, assessed by overlaying the project activity zone on the ecosystem maps and conducting a GIS-based analysis of the area lost due to project activities;
- The area of vegetation/ecological community fragmentation, identified through GIS analysis;
- The area of temporary vegetation/ecological community disturbance will be assessed by overlaying the project activity zone on the ecosystem maps and conducting a GIS-based analysis of the area disturbed;
- The long-term effects of maintenance of vegetation/ecological communities in an early seral stage along the transmission line and around the dam site; and
- Wetlands.

Should potential adverse effects be identified, the potential mitigation measures will be identified (including a wetland compensation plan, if applicable) and will include a description of how the mitigation measures can address the potential adverse effect.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

11.2.5 Summary of Residual Effects on Vegetation and Ecological Communities

The EIS will summarize residual effects in a table format as shown in Table 8.4.

11.3 References

This subsection will include a list of supporting references used in this section of the EIS.

12 Wildlife Resources Effects Assessment

The EIS will summarize the wildlife resources effects. The Proponent proposes to use the methodology described in Section 8 of these EIS Guidelines.

Technical data will inform the effects assessment on wildlife resources. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the

Proponent will incorporate Aboriginal traditional and local knowledge studies as made available.

The EIS will identify and assess any change the project may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species as defined in SARA.

12.1 Valued Component Scoping and Rationale

The Proponent's rationale for selection of the wildlife resources VC rationale is described in Table 12.1. Where available, supporting information that shows the importance of wildlife resources is included as part of the rationale for selection, as are regulatory requirements. Assessment of potential adverse effects on wildlife resources will be based on the following key species groups: butterflies and dragonflies; amphibians and reptiles; migratory birds; non-migratory game birds; raptors; bats; furbearers; ungulates; and large carnivores.

Table 12.1 Wildlife resources valued component rationale

Valued Component	Interactions with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Wildlife Resources	Change in or loss of feeding, breeding or winter habitat due to dam construction and reservoir creation; Habitat fragmentation.	Biodiversity; Loss of habitat, including but not limited to feeding, breeding or over-wintering habitat for: bats; garter snakes; nesting birds including raptors, birds on migration, and game birds; furbearers (incl. rabbit and hare); and ungulates. Changes to populations and distribution of furbearers and ungulates and their predators. Caribou. Impacts on ability to carry out traditional land use practices and on asserted or established Aboriginal rights and treaty rights. Cultural reasons.	Biodiversity; Loss of feeding, breeding or winter habitat for: garter snakes, nesting birds including raptors, birds on migration, game birds, furbearers and ungulates; changes to populations and distribution of furbearers and ungulates and their predators.	Species at Risk Act, Migratory Birds Convention Act, B.C. Wildlife Act, Provincial conservation strategy, Provincial guidelines and management strategies.

12.2 Wildlife Resources

12.2.1 Wildlife Resources Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 12.2.

Table 12.2 Wildlife resource assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Wildlife Resources	An approximate 4-km-wide corridor centered on the Peace River from Hudson's Hope to the Alberta border; a 1-km-wide corridor centered on the existing 138 kV wood pole transmission line from the Peace Canyon Dam to Taylor and Fort St. John; a 400 m corridor centered on roads identified for upgrading; a 1-km wide corridor centered on new roads; and a 500 m buffer around the proposed quarry and till sites.	Peace Lowlands Ecosection

12.2.2 Wildlife Resources Temporal Boundaries

The EIS will describe the temporal boundaries which will reflect the methodology described in Section 8 of these EIS Guidelines.

12.2.3 Wildlife Resources Baseline

12.2.3.1 Butterflies and Dragonflies

The butterfly and dragonfly baseline information will provide an understanding of the existing habitat and species within the LAA as proposed by the Proponent.

The baseline information will be collected following methodology guidelines presented in Inventory Methods for Terrestrial Arthropods (RIC 1998a). Surveys will focus on establishing presence/not-detected status for each listed taxon.

12.2.3.2 Amphibians and Reptiles

The amphibian and reptile baseline information will provide an understanding of the existing habitat and species within the LAA as proposed by the Proponent.

All species observations will be summarized, but the focus will be placed upon the western toad (*Bufo boreas*) as it is a species of concern under SARA.

The baseline information will be collected following the protocols outlined in Inventory Methods for Pond-breeding Amphibians and Painted Turtle (RIC 1998b) and Inventory Methods for Snakes (RIC 1998c).

12.2.3.3 Migratory Birds

The migratory bird baseline information will provide an understanding of the existing habitat, species, relative abundance, distribution and temporal use within the LAA as proposed by the Proponent for the following categories of migratory birds:

- Songbirds;
- Waterfowl and shorebirds;
- Marsh birds (Yellow Rail, American Bittern, Le Conte's Sparrow, Nelson's Sharp-tailed Sparrow);
- Woodpeckers;
- Common Nighthawk; and
- Others as appropriate.

All species observations will be summarized.

The baseline information will be collected following the protocols outlined in Inventory Methods for Forest and Grassland Songbirds (RIC 1999b), Inventory Methods for Swallows and Swifts (RIC 1998d), Inventory Methods for Riverine Birds: Harlequin Duck, Belted Kingfisher and American Dipper (RIC 1998e) and Inventory Methods for Waterfowl and Allied Species: Loons, Grebes, Swans, Geese, Ducks, American Coot and Sandhill Crane (RIC 1999c), Inventory Methods for Marsh Birds: Bitterns and Rails (RIC 1998f), Inventory Methods for Woodpeckers (RIC 1999d), and Inventory Methods for Nighthawk and Poorwill (RIC 1998g).

12.2.3.4 Non-Migratory Game Birds

The non-migratory game bird baseline information will provide an understanding of the existing habitat, species, relative abundance, distribution and location of lek sites (Sharp-tailed Grouse only) within the LAA as proposed by the Proponent.

The baseline information will be collected following the methods outlined in Inventory Methods for Upland Game birds (RIC 1997a). The location of lek sites for Sharp-tailed Grouse within the Peace River valley will be included with baseline information where available and permitted.

12.2.3.5 Raptors

The raptor (eagles, hawks and owls) baseline information will provide an understanding of the existing habitat, location of observed nests, presence, abundance (as feasible) and distribution, and temporal use patterns within the LAA as proposed by the Proponent.

All species observations will be summarized. The Broad-winged Hawk and Short-eared Owl are listed species while Northern Goshawk, Northern Harrier and Bald Eagle are species of regional concern.

The baseline information will be collected following the protocols outlined in *Inventory Methods for Raptors* (RIC 2001) and *Inventory Methods for Owl Surveys* (Hausleitner 2006). Call playback and stand watch studies will be used to document and confirm the presence, possible abundance, and associated habitat use of select species of owls (including Northern Saw-whet, Short-eared, Great Horned, Great Gray, and Boreal Owls), Northern Goshawk, Northern Harrier and Broad-winged Hawk. An inventory of large raptor nest sites along the Peace River will be collected.

12.2.3.6 Bats

The bat baseline information will provide an understanding of the existing habitat, presence and characteristics of hibernacula, and location and characteristics of roost sites within the LAA as proposed by the Proponent.

The baseline information will be collected following protocols outlined in *Inventory Methods for Bats* (RIC 1998h), using mist-netting (to confirm species presence), acoustic detection (to verify bat activity, quantify the level of activity and document species not captured), and radio-telemetry (to investigate day-roost selection).

12.2.3.7 Furbearers

The furbearer baseline information will provide an understanding of the population estimates and distribution of beavers, distribution of potential fisher den trees, seasonal habitat use, orientation and size of fisher home ranges within the LAA as proposed by the Proponent.

All species observations will be summarized, but the focus will be on species that are provincially listed.

The baseline information will be collected following the protocols outlined in Inventory Methods for Beaver and Muskrat (RIC 1998i) and Inventory Methods for Medium Sized Terrestrial Carnivores: Coyote, Red Fox, Lynx, Bobcat, Wolverine, Fisher and Badger (RIC 1997b).

12.2.3.8 Ungulates

The ungulate (including moose, elk and mule deer) baseline information will provide an understanding of the population estimates; habitat use; movement and migration patterns,

including river crossings; and birthing site locations and characteristics within the LAA as proposed by the Proponent.

The baseline information will be collected following the protocols outlined in: Aerial-based Inventory Methods for Selected Ungulates: Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer and Caribou (RIC 2002); Ground-Based Inventory Methods for Selected Ungulates (Moose, Elk and Deer) (RIC 1998j); and Ground-Based Inventory Methods for Ungulate Snow-track Surveys (D'Eon et al. 2006).

12.2.3.9 Large Carnivores

The baseline conditions will be characterized using information from published studies and information made available to the Proponent from local, regional, and provincial organizations and governments.

12.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect habitat available for wildlife resources, as represented by the key species groups.

The potential to adversely affect wildlife resources will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Permanent and temporary habitat alteration and fragmentation;
- Disturbance and/or displacement; and
- Potential for direct and indirect mortality to individuals.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

12.2.5 Summary of Residual Effects on Wildlife Resources

The EIS will summarize residual effects in a table format as shown in Table 8.4.

12.3 References

This subsection will include a list of supporting references used in this section of the EIS.

13 Greenhouse Gases Effects Assessment

The Proponent proposes to describe the greenhouse gases (GHG) effects based on the methodology described in Section 8 of these EIS Guidelines.

Technical data will inform the GHG effects assessment. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate additional baseline information as made available.

13.1 Valued Component Scoping and Rationale

The Proponent's rationale for selection of the greenhouse gases VC is described in Table 13.1. Where available, supporting information that shows importance of the VC is included as part of the rationale for selection, as are regulatory requirements.

Table 13.1 Greenhouse gases valued component rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Greenhouse Gases	Emissions of GHG and the conversion of land use through the creation of the reservoir results in GHG emissions.	Concerns with respect to climate as it relates to Aboriginal interests; Exercise of asserted or established Aboriginal rights and treaty rights.	Increased GHG emissions contribute to global climate change.	Canada – British Columbia Agreement in Principle on Climate Change; B.C. *Greenhouse Gas Reduction Targets Act.*

13.2 Greenhouse Gases

13.2.1 Greenhouse Gases Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 13.2.

Table 13.2 Greenhouse gases assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Greenhouse Gases	A 30-metre buffer zone around the maximum reservoir elevation to describe GHGs from land conversion and the project activity zone to characterize emissions associated with construction activities.	National

13.2.2 Greenhouse Gases Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

13.2.3 Greenhouse Gases Baseline

The GHG baseline information will provide an understanding of the potential net contribution of GHG by using site specific mass balance models to account for net GHG emissions under current conditions using CO_2 equivalents.

13.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will provide an assessment of how the Project has the potential to result in a net change in GHG emissions and GHG intensity based on inundation over a 100-year period.

Methods developed by the Intergovernmental Panel on Climate Change (IPCC) will be used to estimate emissions associated with land use conversion to the reservoir as well as construction-phase emissions based on estimates for quantities of fuel, electricity and materials expected to be required during project development.

This section of the EIS will provide:

- An estimate of the multi-year GHG emissions profile associated with the construction and ongoing operations of the Project;
- An estimate of the net change in GHG emission from current conditions to post-inundation scenarios; and
- A comparison of the GHG profile of the Project with other electricity supply options.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

13.2.5 Summary of Residual Effects for Greenhouse Gas

The EIS will summarize residual effects in a table format as shown in Table 8.4.

13.3 References

This subsection will include a list of supporting references used in this section of the EIS.

VOLUME 3 – ECONOMIC AND LAND AND RESOURCE USE EFFECTS ASSESSMENT

14 Economic Effects Assessment

The EIS will summarize the economic effects based on the methodology described in Section 8 of these EIS Guidelines.

Technical data will inform the economic effects assessment. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate additional baseline information as made available.

14.1 Valued Component Scoping and Rationale

Economic effects arise from changes to economic transactions, such as the Project's use of goods and services, employment of direct and indirect labour, and contracting and business opportunities, as well as Project-induced changes to government revenues. Government revenues will be reported in the Project Benefits section. The Proponent's rationale for selection of the economic VCs, and the proposed VCs are described in Table 14.1.

Table 14.1 Economic conditions valued components rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Group Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Local Government Revenue	Potential change in local and regional government expenditure and revenue streams.		Potential property tax impacts associated with local government expenditure and revenue.	Required by the BCEAO guidelines for environmental assessment.
Labour Market	Demand for labour during construction phase will draw skilled persons from local, provincial and national labour markets. Competition with other projects for	Employment, skill development, and training opportunities.	Employment, skill development, and training opportunities.	Required by the BCEAO guidelines for environmental assessment.

	labour.			
Regional Economic Development	Project offers new contracting opportunities; may diversify and expand local business capacity.	Contracting and business opportunities.	Contracting and business opportunities.	Required by the BCEAO guidelines for environmental assessment.

14.2 Local Government Revenue

14.2.1 Local Government Revenue Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 14.2.

Table 14.2 Local government revenue assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Local Government Revenue	City of Fort St. John, District of Taylor, District of Hudson's Hope, District of Chetwynd, City of Dawson Creek, and Peace River Regional District.	City of Fort St. John, District of Taylor, District of Hudson's Hope, Peace River Regional District, Chetwynd and Dawson Creek.

14.2.2 Local Government Revenue Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

14.2.3 Local Government Revenue Baseline

The EIS will describe the current local government revenue baseline and likely future local government revenue and expenditure streams. Key indicators will include:

- Local government expenditures on specific programs and services; and
- Local government revenue from the Proponent grants-in-lieu payments, property taxes, transfers, income taxes, consumption taxes and royalties.

Information sources for the baseline will include publicly available federal, provincial and local government data and reports and additional information made available to the Proponent.

14.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect local government revenues.

The potential to adversely affect local government revenues will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Legal and policy factors that may influence the effects; and
- The British Columbia Input-Output Model (BC Stats, 2011a) proposed by the Proponent will be used to model the timing and magnitude of project-related transactions.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

14.2.5 Summary of Residual Effects on Local Government Revenue

The EIS will summarize residual effects in a table format as shown in Table 8.4.

14.3 Labour Market

14.3.1 Labour Market Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 14.3.

Table 14.3 Labour market assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Labour Market	Peace River Regional District, and Northern Rockies Regional Municipality.	Peace River Regional District, Northern Rockies Regional Municipality, and Fraser-Fort George Regional District.

14.3.2 Labour Market Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

14.3.3 Labour Market Baseline

The EIS will describe labour market, including the Aboriginal labour market where information is available, baseline and forecast conditions. The labour market baseline data collection will focus on skills and occupations required by the Project, using the following key indicators:

- Number of persons by occupation and industry affiliation, available skills in the local labour force, and turnover rates;
- Unemployment rates, demographics and characteristics, length of unemployment, and job search period;
- Contribution of non-resident workers in the North East Development Region's labour force; and
- Estimates of skill shortages and surpluses.

Baseline information sources will include published employment studies and statistics, and information made available to the Proponent from local, regional, provincial and federal governments (e.g., BC Stats 2011b) and from interviews with local, regional and provincial employment and trade organizations.

14.3.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect the labour market, including the Aboriginal labour market where information is available.

The potential to adversely affect the labour market will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- The direct Project's needs for labour relative to the expected availability and type of skills of the persons in the LAA as proposed by the Proponent;
- The indirect project employment calculated using the BC Input-Output Model; and
- A comparison of the project labour requirements against the baseline and forecast local labour supply and demand by skill category where possible (Work B.C. 2009).

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

14.3.5 Summary of Residual Effects on Labour Market

The EIS will summarize residual effects in a table format as shown in Table 8.4.

14.4 Regional Economic Development

14.4.1 Regional Economic Development Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 14.4.

Table 14.4 Regional economic development assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Regional Economic Development	Peace River Regional District, and Northern Rockies Regional Municipality.	Peace River Regional District, Northern Rockies Regional Municipality, and Fraser-Fort George Regional District.

14.4.2 Regional Economic Development Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

14.4.3 Regional Economic Development Baseline

The EIS will describe current and likely future regional economic development activity. The regional economic development baseline data collection will focus on the types of businesses and contractors required by the Project, as well as those currently required and forecast to be required by other industries in the region, using the following key indicators:

- Regional business and contracting profile;
- Regional business and contracting capabilities and capacity; and
- Regional Aboriginal business and contracting profile, capabilities and capacity where information is available.

Information sources will include:

- Information about the project procurement strategy, including local purchasing policies, if any;
- Published studies and statistics; and
- Information made available to the Proponent from the private sector, industry and trade organizations, and local, regional and provincial organizations and governments.

14.4.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect regional economic development.

The potential to adversely affect regional economic development will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Project contract opportunities in the LAA as proposed by the Proponent; and
- A comparison of the Project's contracting requirements with the regional business and contracting profile, capabilities and capacity.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

14.4.5 Summary of Residual Effects on Regional Economic Development

The EIS will summarize residual effects in a table format as shown in Table 8.4.

14.5 References

This subsection will include a list of supporting references used in this section of the EIS.

15 Traditional Lands and Resource Use Effects Assessment

The EIS will summarize the traditional lands and resource use effects based on the methodology described in Section 8 of these EIS Guidelines.

The EIS will contain an assessment of the potential adverse effects of the Project on the current use and reasonably anticipated future use of lands and resources by Aboriginal persons for traditional purposes. This could also include activities conducted in the exercise of asserted or established Aboriginal rights and treaty rights identified in Section 20 of the EIS Guidelines.

In describing current uses of land and resources by Aboriginal groups for traditional purposes, the Proponent should include activities related, but not limited, to hunting, fishing, trapping, cultural and other traditional uses of the land (e.g. collection of medicinal plants, use of sacred sites). Potential effects on current uses include access to areas that are of importance or concern to Aboriginal groups.

Technical data, traditional land use studies and traditional knowledge will inform the effects assessment on current use of lands and resources for traditional purposes. Requirements

for Aboriginal interests and information requirements are addressed in Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate additional baseline information as made available.

15.1 Valued Component Scoping and Rationale

The potential for effects on current use of lands and resources for traditional purposes arise from the Project's use of land or resources. Table 15.1 outlines the rationale for selection of this VC based on Aboriginal interests and federal regulatory requirements.

Table 15.1 Current use of lands and resources for traditional purposes valued component rationale

Valued Component	Interaction with the Project	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Current Use of Lands and Resources for Traditional Purposes.	Overlap of the potential project impacts with lands and resources that may be used by Aboriginal persons for traditional purposes.	Potential for change to the land, water, resources, or access to lands, water or resources used by Aboriginal persons for traditional purposes.	n/a	CEAA

15.2 Current Use of Lands and Resources for Traditional Purposes

15.2.1 Current Use of Lands and Resources for Traditional Purposes Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 15.2.

Table 15.2 Current use of lands and resources for traditional purposes assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Current Use of Lands and Resources for Traditional Purposes.	Fish and Fish Habitat LAA: Peace River in the proposed reservoir area; Tributaries entering the proposed reservoir; The Peace River downstream of the proposed Site C dam to Many Islands, Alberta;	Fish and Fish Habitat RAA: Peace River from Peace Canyon Dam, BC to Vermilion Chutes, AB, which is a distance of approximately 865 km.

	Watercourses within the transmission line and roadway rights-of-way; Watercourses within the project activity zone (construction materials); Riparian areas. Wildlife Resources LAA: An approximate 4-km-wide corridor centered on the Peace River from Hudson's Hope to the Alberta border; a 1-km-wide corridor centered on the existing 138 kV wood pole transmission line from the Peace Canyon Dam to Taylor and Fort St. John; a 400 m corridor centered on roads identified for upgrading; a 1-km wide corridor centered on new roads; and a 500 m buffer around the proposed quarry and till sites.	Wildlife Resources RAA: Peace Lowlands Ecosection

15.2.2 Current Use of Lands and Resources for Traditional Purposes Temporal Boundaries

The EIS will describe the temporal boundaries defined for the assessment of the potential adverse effects of the Project on current use of lands and resources for traditional purposes in accordance with the methodology set out in Section 8 of these EIS Guidelines.

15.2.3 Current Use of Lands and Resources for Traditional Purposes Baseline

The EIS will describe the current use of lands and resources for traditional purposes by Aboriginal groups within the Proponent's proposed LAA and RAA using the following key indicators:

- Current use of lands and resources for hunting, fishing and trapping activities, including the location of the activity, the species targeted, and the traditional uses of the harvested animals; and
- Current use of lands and resources for activities other than hunting, fishing and trapping by Aboriginal groups, including the nature, location and traditional use purpose.

Information sources may include publicly available information and information as made available to the Proponent, including traditional land use studies, traditional knowledge, consultations between Aboriginal groups and the Proponent, consultations between Aboriginal groups and the provincial and federal governments.

15.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect current use of lands and resources by Aboriginal persons for traditional purposes.

The potential to adversely affect current use of lands and resources by Aboriginal persons for traditional purposes will be assessed by taking into account the potential for the Project to result in changes to key aspects:

- Use of and access to lands used for traditional purposes;
- Availability of harvested species based on the results of the assessment of the potential effects of the Project on fish and fish habitat, vegetation and ecological communities, and wildlife resources; and
- Other relevant considerations raised by Aboriginal groups.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

15.2.5 Summary of Residual Effects for Current Use of Lands and Resources for Traditional Purposes

The EIS will summarize the residual adverse effects on the current use of lands and resources for traditional purposes VC in a table format as shown in Table 8.4.

15.3 References

This subsection will include a list of supporting references used in this section of the EIS.

16 Land and Resource Use Effects Assessment

The EIS will summarize the Land and Resource Use effects based on the methodology described in Section 8 of these EIS Guidelines.

Technical data will inform the effects assessment on land and resource use. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate additional baseline information as made available.

16.1 Valued Component Scoping and Rationale

The land and resource use VCs are agriculture, forestry, oil, gas and energy, minerals and aggregates, harvest of fish and wildlife resources, outdoor recreation and tourism, navigation (air and water), and visual resources. Section 23.4 will summarize in a table format the renewable resources that have been considered in the various sections of the EIS.

Table 16.1 outlines the Proponent's rationale for selection of VCs in the Land and Resource Use section.

Table 16.1 Land and resource use valued components rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Agriculture	Change to the agricultural land base, crop and livestock production.	Interest in loss of agricultural lands; Loss of regional food supply.	Interest in loss of agricultural land, and effect on farm operations. Loss of regional food supply.	Required by the BCEAO, Agricultural Land Reserve lands within project areas, provincial land use plans.
Forestry	Change to crown forested land base, harvest of merchantable trees from project activity zones.	Interest in loss of productive forest land and commensurate habitat. Loss of source of sustainable livelihood for timber and fuel use.	Forest licensee and logging contractor activity in vicinity of the Project. Interest in Reservoir clearing and usable fibre. Interest in TFL, TSA or AAC that may be affected by project area.	Forest Act, Forest and Range *Practices Act*, provincial land use plans.
Oil, Gas and Energy	Changed access roads, and potential for tenures that overlap with the project activity zones.	Concern with increased access and resulting fragmentation of habitat. impacts to	Interest in improvement to access roads, project road use. Interest in tenures that overlap with	Land Act, Petroleum and Natural Gas Act, Oil and Gas *Activities Act*, provincial land

		general landform and habitat; noise; safety.	project area. Concern with increased access and resulting fragmentation of wildlife habitat.	use plans.
Minerals and Aggregates	Changed access roads, and location of known pits in relation to environmental or social VCs.	Concern respecting transport of materials and impacts on wildlife.	Interest in alienation of aggregate due to reservoir inundation. Project use of and improved access to local aggregate pits.	Land Act, Mines Act, Coal Act, Mineral Tenure *Act*, provincial land use plans.
Harvest of Fish and Wildlife Resources	Changed environmental setting, fish and wildlife population and opportunities to trap, hunt and fish. Effects on tenured trapping, guide outfitting areas or activities.	Concern where public or tenured trapping, hunting and fishing may interfere with Aboriginal trapping, hunting and fishing including from increased accessibility and access.	Interest in continued public and tenured opportunities to trap, hunt and fish.	Fisheries Act, BC Land Act, Wildlife Act, Migratory Birds Convention Act, provincial land use plans.
Outdoor Recreation and Tourism	Resident and tourist use of outdoor recreation areas within project activity zones.	Aboriginal participation in outdoor recreation activities.	Resident and tourist use of outdoor recreation areas within the project area.	Local and provincial parks and recreation areas, provincial land use plans.
Navigation (air and water)	Dam, bridges, causeways, booms, culverts interact with water based navigation Consider project interactions with air based navigation.	Concern that reservoir will enhance access to tributaries.	Public use of navigable waterways. Aviation routes near the project area.	Navigable Waters Protection Act Canadian Aviation Regulations, provincial land use plans.
Visual	Changes to the	Inundation of	Public interest	BC Ministry of

Resources	visual landscape, from scenic viewpoints.	reservoir will change the visual landscape.	in scenic viewpoints.	Forests, Lands and Natural Resource Operations Guidebook (BCMOF 2001), and Visual Landscape Inventory (BCMOF 1997), provincial land use plans.

16.2 Agriculture

16.2.1 Agriculture Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.2.

Table 16.2 Agriculture assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Agriculture	Project activity zone and the Peace River Valley between Peace Canyon Dam and the Alberta border.	Peace River Regional District Peace River Census Division (Census Division 55, Agricultural Region 8).[1]

[1] Statistics Canada Census Division 55 in Agricultural Region 8 - Peace River, encompasses the organized areas of Hudson's Hope, Chetwynd, Tumbler Ridge, Pouce Coupe, Dawson Creek, Fort St. John, Taylor and the Electoral Areas D, C, B and E in the Peace River Regional District.

16.2.2 Agriculture Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

16.2.3 Agriculture Baseline

The agricultural baseline information will provide an understanding of the current agricultural land base, operations and systems, including the following key indicators:

- Agricultural land capability ratings, using updated field observations or existing provincial mapping, and updated climatic capability using current climate data (see Kenk and Cotic 1983);
- Agricultural suitability of lands within the project activity zone for growing different crops, determined using updated or available capability ratings, and rated as well suited, suited or not suited for various crops using methodologies similar to the former Gough et al. (1994);

- Agricultural utility ratings, to reflect the likelihood of each area being used for agricultural production in the future. The rating will be based on land capability ratings, as well as constraints to agricultural use (such as location, access, parcel size, land ownership or tenure, and land use plans or designations);
- Agricultural land use, determined from recent air photos of the project area, Crown land tenures, field observations and land owner/operator interviews;
- Agricultural tenure on Crown lands, including range tenures and grazing licenses, determined from provincial data sources, within and near the project activity zone;
- Current and expected future agricultural operations and practices, determined through interviews with owners and operators of potentially affected agricultural operations, as well as through review of agricultural census information for the LAA as proposed by the Proponent;
- Local and regional agricultural economic activity, determined through interviews with owners and operators, relevant agricultural associations, representatives of agriculturally related industries and representatives of government agencies; and
- Local and regional food production and consumption estimates, determined through interviews with owners and operators of potentially affected agricultural operations, relevant agricultural associations, representatives of agriculturally related industries and representatives of government agencies.

16.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect agriculture.

The potential to adversely affect agriculture will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- An estimate of the loss of agricultural land, including a description of these changes to the agricultural resource base on a local, regional and provincial scale;
- Description of effects to individual farm operations, including loss of land, effects to farm infrastructure, and changes to farm activities;
- Quantification of projected immediate and longer-term effects to local, regional and provincial agricultural economies. This will include estimating changes in agricultural costs and revenues at the farm level, changes in opportunities for potential new agricultural economic activity, and changes to primary and secondary agricultural economic activity; and
- Identification of potential changes to local food production and any changes to the ratio of food production to food consumption (a measure of food self-reliance).

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.2.5 Summary of Residual Effects on Agriculture

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.3 Forestry

16.3.1 Forestry Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.3.

Table 16.3 Forestry assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Forestry	Project activity zone	Dawson Creek TSA, Fort St. John TSA, Peace River supply block of TFL 48.

16.3.2 Forestry Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

16.3.3 Forestry Baseline

The EIS will provide an overview of forest and land management planning, and forest industry activities, within the LAA, as proposed by the Proponent, and the Peace Forest District. The future case will consider forest management plans, including any constraints on timber harvesting or land use management. Baseline information using the following key indicators will be collected:

- Timber harvesting land base;
- Site productivity;
- Annual Allowable Cut;
- Forest sector employment;
- Forest sector based government revenue; and
- The inventory of existing merchantable and non-merchantable timber in the reservoir as identified in the project clearing plan.

The forest industry activity information will be collected from industry and Ministry of Forests, Lands and Natural Resource Operations sources. Spatial indicators will be collected from an analysis of GIS data obtained from the same sources.

16.3.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect forestry.

The potential to adversely affect forestry will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Land use, resource use, access and activities related to industrial forestry use; and
- Crown forest management.

The spatial analysis will identify tenured interests or facilities occurring within the Project activity zone that may be alienated from future use, or affected by changes in Crown land use and access during construction and operations.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.3.5 Summary of Residual Effects on Forestry

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.4 Oil, Gas and Energy

16.4.1 Oil, Gas and Energy Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.4.

Table 16.4 Oil, gas and energy assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Oil, Gas and Energy	Project activity zone	Project activity zone

16.4.2 Oil, Gas and Energy Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

16.4.3 Oil, Gas and Energy Baseline

The EIS will describe current conditions and recent trends related to oil, gas and energy sectors within the LAA as proposed by the Proponent, using the following key indicators:

- Tenured oil, gas and energy activities, operations and facilities;

- Production activity; and
- Industry characteristics including new extraction technologies.

Spatial indicators will be collected using a GIS analysis. Other industry data will be collected from the Oil and Gas Commission, Canadian Association of Petroleum Producers and B.C. Ministry of Energy and Mines. Interviews and information requests will be made with these same agencies for information pertaining to production activity and investments.

16.4.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect oil, gas and energy sectors.

The potential to adversely affect the oil, gas and energy sectors will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Land use;
- Resource use; and
- Access and activities for the oil, gas and energy sectors.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.4.5 Summary of Residual Effects on Oil and Gas

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.5 Minerals and Aggregates

16.5.1 Minerals and Aggregates Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.5.

Table 16.5 Mineral and aggregates assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Minerals and Aggregates	Project activity zone	Fort St John/Hudson's Hope/ Taylor/Area "C" for aggregate market assessment.

16.5.2 Minerals and Aggregates Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

16.5.3 Minerals and Aggregates Baseline

The EIS will provide an overview of current conditions related to mineral and aggregate resource development within the LAA as proposed by the Proponent, using the following key indicators:

- Record of metal, industrial mineral, and aggregate potential;
- Record of exploration and development;
- Historic production records;
- Remaining mine, quarry or pit life;
- Existing mineral or aggregate tenures; and
- Local and regional aggregate pricing and current and forecast consumption profile.

Spatial data will be collected (e.g., mineral potential, tenures, mineral reserves, current and past producers). Baseline information will be collected from government databases (e.g., mineral potential, mineral tenures, record of development activity), and interviews with Ministry of Transportation and Infrastructure staff, and other information as made available to the Proponent.

16.5.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect the mineral and aggregate sector.

The potential to adversely affect the mineral and aggregate sector will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Land use, resource use, access and activities related to industrial mineral and aggregate utilization within the Project activity zone;
- The Project's consumption of local aggregate deposits for construction activities; and
- Any new or improved access to aggregate sources created by the Project.

Spatial analysis will be used to determine the Project's effect on minerals and aggregates in the context of the market for minerals and aggregates.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.5.5 Summary of Residual Effects on Minerals and Aggregates

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.6 Harvest of Fish and Wildlife Resources

16.6.1 Harvest of Fish and Wildlife Resources Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.6.

Table 16.6 Harvest of fish and wildlife resources assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Harvest of Fish and Wildlife Resources	Project activity zone and the Peace River downstream to the Alberta border.	Peace River Regional District.

16.6.2 Harvest of Fish and Wildlife Resources Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

16.6.3 Harvest of Fish and Wildlife Resources Baseline

The Proponent proposes to provide an overview of current conditions related to the public and tenured harvest of fish and wildlife resources within the proposed LAA using the following key indicators:

Public Hunting and Fishing:

- Public hunting and fishing licence sales;
- Public hunting and fishing areas;
- Public hunting and fishing harvest information, including numbers and species; and
- Angler creel survey results within the LAA as proposed by the Proponent.

Tenured Trapping:

- Tenured trapline areas;

- Tenured trapline infrastructure (e.g. cabins, trails);
- Tenured trapline harvest volumes and areas;
- Tenured trapline operating and economic information; and
- Aboriginal employment or use of tenured traplines.

Tenured Guide-Outfitting:

- Tenured guide outfitter areas;
- Tenured guide outfitter infrastructure (e.g., cabins, trails);
- Tenured guide-outfitter harvest volumes and areas;
- Tenured guide-outfitter operating and economic information; and
- Aboriginal participation in tenured guide outfitting operations.

Public hunting data will be acquired from BCMOE hunter harvest data, studies on economic effects and value of resident hunting, wildlife studies, interviews with local rod and gun clubs, traditional land use studies, and other data as made available to the Proponent.

Fishing data will be acquired from BCMOE licence sales, creel survey results (LGL 2010), regional angling surveys, fisheries studies, interviews with rod and gun clubs, traditional land use studies, and other data as made available to the Proponent.

Trapping data will be acquired from trapper interviews, trapline tenure and harvest data from provincial government sources, and other information as made available to the Proponent.

Data will be acquired from wildlife studies, BCMOE hunter harvest data, guide outfitter licence areas, Guide Outfitting Association of BC database, and studies on the economic effects and value of guided hunting, and other information as made available to the Proponent.

16.6.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect the use of fish and wildlife resources.

The potential to adversely affect harvest of fish and wildlife resources will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Use of and access to hunting and fishing areas;
- Use of and access to trapline areas;
- Use of and access to guide outfitter areas;
- Tenured areas, and specific harvest areas within tenured areas, using spatial analysis; and

- Availability of harvested species based on the results of the assessment of the potential effects of the Project on the VC, fish and fish habitat, and on the VC wildlife resources.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.6.5 Summary of Residual Effects on Harvest of Fish and Wildlife Resources

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.7 Outdoor Recreation and Tourism

16.7.1 Outdoor Recreation and Tourism Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.7.

Table 16.7 Outdoor recreation and tourism assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Outdoor Recreation and Tourism	Project activity zone and downstream to Peace Island Park.	Peace River Regional District.

16.7.2 Outdoor Recreation and Tourism Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

16.7.3 Outdoor Recreation and Tourism Baseline

The EIS will present an overview of current conditions related to outdoor recreation and tourism within the LAA as proposed by the Proponent, using the following key indicators:

- Outdoor recreation features and amenities, including recreation sites, trails, parks, and proposed Peace River Boudreau Lakes protected area;
- Outdoor recreation use levels;
- Tourism features and amenities, including visitor centres, tourist accommodations, and attractions;
- Regional tourism visitor levels;

- Recreation activities undertaken on the land base, including activities, locations and seasonal nature of activities; and
- Commercial outdoor recreation interests.

Spatial data will be collected through a GIS analysis using available provincial data and data from other sources. Information sources will include information from and interviews with government agencies, local recreation and tourism groups, and other information as made available to the Proponent.

16.7.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect outdoor recreation and tourism.

The potential to adversely affect outdoor recreation and tourism will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Managed and unmanaged outdoor recreation sites, trails and parks, using spatial analysis;
- Visitor centres, tourist accommodations, tourist attractions, and regional visitor levels; and
- Outdoor recreation use, outdoor recreation use levels, and regional tourism visitor levels.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.7.5 Summary of Residual Effects on Outdoor Recreation and Tourism

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.8 Navigation

16.8.1 Navigation Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.8.

Table 16.8 Navigation assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Navigation	Project activity zone, downstream to Peace Island Park, and the Shaftesbury and Tompkins Landing ice bridges.	Project activity zone, downstream to Peace Island Park, and the Shaftesbury and Tompkins Landing ice bridges.

16.8.2 Navigation Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology as proposed by the Proponent described in Section 8 of these EIS Guidelines.

16.8.3 Navigation Baseline

The Proponent proposes to present an overview of current conditions related to navigation within the proposed LAA using the following key indicators:

- Defined existing navigable waters using the methodology outlined in the River Classification System established for rivers in British Columbia;
- Current navigation use (e.g., vessel/boat traffic) of the defined navigable waters for transportation, recreation and commercial purposes;
- Air navigation routes and airports; and
- The ice bridge at Shaftesbury and Tompkins Landing.

Information sources will include information from and interviews with government agencies, local boating groups, Aboriginal groups, and other information as made available to the Proponent.

16.8.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect navigation.

The EIS will contain sufficient detail to inform Transport Canada, under the *Navigable Waters Protection Act* Navigable Waters Works Regulations, of the impacts to navigation both up and downstream of the proposed dam and assist with determination of appropriate mitigation measures.

The potential to adversely affect navigation will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- The navigability and navigation use of defined navigable waters existing, altered or created by the Project in the context of the operation of the W.A.C. Bennett Dam and the Peace Canyon Dam;
- Potential navigation hazards in waterways;

- Proposed public and navigation safety measures, the rationale for any restrictions, and the cause of any interferences to navigation;
- Micro-climate changes (Section 9.4.1) on aviation use at the Fort St. John airport;
- Visibility of structures and overhead wiring, and proposed temporary aviation restrictions; and
- Operation of the Shaftesbury and Tompkins Landing ice bridges and associated ferry operations, using the results of the Proponent's proposed CRISSP ice model in Section 9.3.4.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.8.5 Summary of Residual Effects on Navigation

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.9 Visual Resources

16.9.1 Visual Resources Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 16.9.

Table 16.9 Visual resources assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Visual Resources	The reservoir and dam site as viewable from Visual Landscape Inventory viewpoints.	Visual Landscape Inventory viewpoints within or adjacent to Project activity zone.

16.9.2 Visual Resources Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

16.9.3 Visual Resources Baseline

The EIS will identify current visual resource conditions within the LAA as proposed by the Proponent that may be changed by the Project, using the following key indicators:

- Representative visual receptor sites, considering provincial Visual Landscape Indicator (VLI) sites, and sites identified during field reconnaissance, that offer views of the proposed reservoir and dam site; and
- A public viewpoint of the river from Hudson's Hope, and from near the dam site.

For each site the baseline conditions will be characterised using a photomontage, with quantitative and descriptive information for visual sensitive units. The VLI classifies the provincial land base into visually sensitive areas versus not visually sensitive areas and, for each visually sensitive unit in terms of its existing visual condition, visual absorption capability, biophysical and viewing characteristics, determines or recommends a visual sensitivity class. The provincial Visual Landscape Inventory receptor sites proposed for use in the baseline are shown in Table 16.10. The location and number of receptor sites will be confirmed by field reconnaissance to cover the main view opportunities.

Table 16.10 Proposed visual resources receptor sites

Location	Easting (UTM)	Northing (UTM)
Fort St. John, 100th Street Lookout	633529.33	6231502.12
Highway 29, MOT rest stop overlooking Attachie	598892.44	6233874.26
Hudson's Hope, location to be determined	-	-
Hudson's Hope, Peace Canyon Road	562876.16	6205166.12
Highway 29, overlooking Bear Flat	609645.23	6239176.48
Highway 29, west of Halfway River	591764.45	6228586.29
Highway 29, east of Farrell Creek	586430.13	6224072.87
Highway 29, west of Farrell Creek	575138.92	6219550.34

16.9.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect visual resources.

The potential to adversely affect visual resources will be assessed by taking into account the potential for the Project to result in changes to the following key indicators:

- The visibility of project features from selected receptor sites using GIS-based viewshed modelling proposed by the Proponent; and
- Scenic values predicted using photomontages and assessed according to the Visual Impact Assessment Guidebook's visual impact summary form (BCMOF, 2001).

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

16.9.5 Summary of Residual Effects on Visual Resources

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

16.10 References

This subsection will include a list of supporting references used in this section of the EIS.

VOLUME 4 – SOCIAL, HERITAGE, AND HEALTH EFFECTS ASSESSMENT

17 Social Effects Assessment

The EIS will summarize the social effects based on the methodology described in Section 8 of these EIS Guidelines.

Technical data will inform the social effects assessment. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate additional baseline information as made available.

17.1 Valued Component Scoping and Rationale

Social considerations include potential adverse effects of the Project on the workforce, on local population, housing and community services, including health, emergency, education and transportation. Table 17.1 outlines the Proponent's proposed rationale for the selection of social VCs.

Table 17.1 Social valued components rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Population and Demographics	Project workforce would increase local and regional population.	Regional and First Nation communities interest in population change; concerns related to encroachment and perhaps subsequent displacement, and social effects, thereof.	Regional interest in population change.	Required by the BCEAO guidelines for environmental assessment.
Housing	Project employment and population increase likely to cause measurable	Concern about cost and supply of housing in the region with implications for on-reserve	Regional interest in housing supply, cost of housing short and long term.	Required by the BCEAO guidelines for environmental assessment.

	increase in demand for housing.	housing; concerns related to encroachment and perhaps subsequent displacement, and social effects, thereof.		
Community Infrastructure and Services	Project-induced population change may increase demand for social and community services.	Regional interest of Project demand on access and quality of infrastructure and services; concerns related to encroachment and perhaps subsequent displacement, and social effects, thereof.	Regional interest of Project demand on access and quality of infrastructure and services.	Required by the BCEAO guidelines for environmental assessment.
Transportation	Project use of existing, or development of new, road and rail transportation routes to move people, equipment, goods and materials to and from construction and operating sites.	Regional interest in project demand on transportation and infrastructure; concerns related to encroachment and perhaps subsequent displacement, and social effects, thereof.	Regional interest in project demand on transportation and infrastructure.	Required by the BCEAO guidelines for environmental assessment.

17.2 Population and Demographics

17.2.1 Population and Demographics Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 17.2.

Table 17.2 Population and demographics assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Population and Demographics	Peace River Regional District.	Peace River Regional District.

17.2.2 Population and Demographics Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

17.2.3 Population and Demographics Baseline

The Proponent proposes to present an overview of current baseline and forecast population and demographic characteristics within the proposed LAA, using the following key indicators:

- Population numbers (gender, age profile, labour force participation); and
- Household number and demographic characteristics, including marital status and dependents.

Information sources will include published studies and statistics, and information made available to the Proponent from local, regional and provincial organizations and governments. Information sources will include historic and most currently available census data and population forecasts.

17.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect population and demographics.

The potential to adversely affect population and demographics will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- The Peace River Regional District population, with specific reference to the City of Fort St. John; and
- The results of the assessment of the Project on the labour market will be used to assess the effects on population and demographics.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

17.2.5 Summary of Residual Effects on Population and Demographics

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

17.3 Housing

17.3.1 Housing Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 17.3.

Table 17.3 Housing assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Housing	Peace River Regional District.	Peace River Regional District.

17.3.2 Housing Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

17.3.3 Housing Baseline

The EIS will describe housing baseline conditions within the LAA as proposed by the Proponent, using the following key indicators:

- Occupancy and vacancy rates;
- Occupancy costs;
- Multiple Listing Service activity (BC Stats 2011c);
- Residential construction activity;
- Planned housing developments; and
- Land zoned and available for housing development.

Information sources will include published studies and statistics, and information made available to the Proponent from the private sector, local, regional and provincial organizations and governments.

17.3.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect housing.

The potential to adversely affect housing will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- The demand for housing, with specific reference to the City of Fort St. John;

- The assessment of the Project on the labour market and on Population and Demographics will be used to assess the effects on housing; and
- Specific plans by the Proponent to directly provide worker accommodation.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

17.3.5 Summary of Residual Effects on Housing

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

17.4 Community Infrastructure and Services

17.4.1 Community Infrastructure and Services Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 17.4.

Table 17.4 Community infrastructure and services assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Community Infrastructure and Services.	Peace River Regional District.	Peace River Regional District.

17.4.2 Community Infrastructure and Services Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

17.4.3 Community Infrastructure and Services Baseline

The EIS will describe the capacity, statistics of, and approved plans for community infrastructure and services, using the following key indicators:

- Community Services – recreation and leisure facilities, sewer and water services;
- Emergency Services – police, court, fire protection, ambulance services and provincial emergency planning;
- Education Services – public schools, private schools, post-secondary institutions; and
- Health and Social Services – vital statistics, medical service expenditures, medical and dental facilities, practitioner numbers and services.

Information sources will include published studies and statistics, and information made available to the Proponent from the private sector, local, regional and provincial organizations and governments.

17.4.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect community infrastructure and services.

The potential to adversely affect community infrastructure and services will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- The demand for or provision of community, emergency, education, and health and social services and facilities;
- Specific displacement or effects to infrastructure, such as sewer and water systems; and
- The results of the assessment of the Project on population and demographics will be used to assess the effects on community infrastructure and services.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

17.4.5 Summary of Residual Effects on Community Infrastructure and Services

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

17.5 Transportation

17.5.1 Transportation Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 17.5.

Table 17.5 Transportation assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Transportation	Road and rail networks within the project activity zone.	Peace River Regional District.

17.5.2 Transportation Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

17.5.3 Transportation Baseline

The EIS will describe current road and rail transportation conditions, using the following key indicators:

- Road traffic volumes;
- Road traffic counts;
- Road accident rates;
- Regional Road restrictions; and
- Rail movements.

Information sources will include published studies and statistics, and information made available to the Proponent from the private sector, local, regional and provincial organizations and governments, as well as traffic counts conducted by the Proponent.

17.5.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect transportation.

The potential to adversely affect transportation will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Road and rail transportation in the LAA as proposed by the Proponent;
- The need to develop and use regional road and rail transportation routes for the movement of equipment, materials and people;
- Specific transportation plans proposed by the Proponent;
- Local road and rail traffic forecasts of vehicle and rail movements, with specific reference to intersections near the City of Fort St. John, and to specific rail sidings and yards; and
- The results of the assessment of the Project on population and demographics, the workforce accommodation plan, and assumptions about workforce shift schedules during construction will be used to assess the effects on transportation.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

17.5.5 Summary of Residual Effects on Transportation

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

17.6 References

This subsection will include a list of all supporting references used in the social sections of the EIS.

18 Heritage Resources Effects Assessment

The EIS will summarize the potential adverse effects of the Project on heritage resources, including physical and cultural heritage resources, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Technical data for physical and cultural heritage resources will inform the effects assessment on the heritage resources VC. The interests of Aboriginal groups, including intangible heritage resources, will be presented in the EIS in accordance with Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate additional baseline information as made available.

The EIS assessment should be informed by the Canadian Environmental Assessment Agency “Reference Guide: Assessing Environmental Effects on Physical and Cultural Heritage Resources (April 1996)”.

18.1 Valued Component Scoping and Rationale

The heritage resource VC includes paleontological, historical and archaeological sites, and the Proponent has proposed the rationale for its selection is described in Table 18.1. The selected VC for heritage resources has an identified interaction with the Project and there is a legal requirement to address potential adverse effects on heritage resources.

Table 18.1 Heritage resources valued component rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Heritage resources	Examples include: Loss or damage to heritage sites during construction of project components; Inundation as a result of operation of dam and reservoir; Improved access to, exposure of, or publication of heritage sites may increase theft of resources, prospecting or damage to resources; Reduced access to sites may decrease opportunity for study.	Interest in heritage sites for cultural heritage preserv-ation.	Interests in heritage values, which may have regional, provincial, national or international significance.	Required by the BCEAO; Required by Section 5 of CEAA Some sites are protected under *Heritage Conservation Act;* Reference Guide on Physical and Cultural Heritage Resources (Agency 1996).

18.2 Heritage Resources

18.2.1 Heritage Resources Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 18.2.

Table 18.2 Heritage resources assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Heritage Resources	Project activity zone.	Project activity zone.

18.2.2 Heritage Resources Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

18.2.3 Heritage Resources Baseline

The EIS will describe location and nature of known heritage resources that could be impacted by the project. The proponent proposed this description to be within the LAA.

Baseline data will be acquired through literature reviews of published and unpublished records, interviews with stakeholders, and inventory field work. Interviews and literature reviews will identify cultural heritage resources from various sources of information including, but not limited to, Aboriginal communities, academic and research institutions,

professional societies and organizations, land use plans, and local citizens or associations involved in the area of heritage conservation and protection.

Archaeological and historical site inventory field work will include surface and subsurface inspections, completed in accordance with British Columbia Archaeological Impact Assessment Guidelines (BCMNRO1998:13) and permits issued under the *Heritage Conservation Act*. Paleontological field work will include surface inspections and specimen collection, completed in accordance with standard practice for the paleontological impact assessment, including development of a geologically based paleontological sensitivity map to guide field investigations.

The significance of archaeological and historical resources will be determined using criteria set out in the British Columbia Archaeological Impact Assessment Guidelines (BCMNRO 1998:13). Categories of significance include scientific, public, ethnic, historic and economic. The developing BC Fossil Management Framework (BCMNRO 2010) will guide the significance evaluation of paleontological resources.

18.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect heritage resources.

The potential to adversely affect heritage resources will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Disturbing heritage sites and features;
- Disturbing elements essential to the heritage character of features;
- Disturbing artifacts, features, human remains and fossils;
- Hindering or increasing access to sites and destroying contextual information (Davis et al. 2004; Williams and Corfield 2003); and
- Other relevant considerations raised by Aboriginal groups.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

18.2.5 Summary of Residual Effects on Heritage Resources

The EIS will summarize the residual effects in a table format as shown in Table 8.4.

18.3 References

This subsection will include a list of supporting references used in this section of the EIS.

19 Health Effects Assessment

The EIS will summarize the human health effects based on the methodology described in Section 8 of these EIS Guidelines.

Technical data will inform the effects assessment on human health. The interests of Aboriginal groups will be presented in the EIS in accordance with Section 15 and Section 20 of these EIS Guidelines. Where Aboriginal groups have identified interests in a VC, the Proponent will incorporate additional baseline information as made available.

19.1 Valued Component Scoping and Rationale

The health VC and Proponent's rationale for its selection is described in Table 19.1. The selected VC is based on health values with potential interaction with the Project, regulatory requirements, and heath assessment guidelines (e.g., HC 2010a, HC 2010b, HC 2011).

Table 19.1 Human health valued component rationale

Valued Component	Interaction with Project Components and Activities	Aboriginal Concerns	Public and Stakeholder Issues	Federal and Provincial Regulations and Guidelines
Human Health	Health effects of potential changes to air quality, water quality, noise, electric and magnetic fields and mercury concentrations in country foods.	Changes to use of the land, or environmental conditions, may affect access to or quality of country foods, diet and health; Changes to water quality may affect human health.	Public interest in human health.	Canadian Environmental Assessment Act, Canadian Public Health Act, BC Health Act, BC Drinking Water and Protection Act, Canadian Handbook on Health Impact Assessment (HC 2004) Environmental Health Assessment (HC 2010a, 2010b); WHO.

Notes: HC – Health Canada, WHO – World Health Organization, CIW – Canadian Index of Well-being (CCSD 2009).

19.2 Human Health

19.2.1 Human Health Spatial Boundaries

The Proponent proposes the LAA and RAA as described in Table 19.2. A map characterizing the location of known human receptors will be included in the EIS.

Table 19.2 Human health assessment areas

Valued Component	Local Assessment Area	Regional Assessment Area
Human Health	LAA corresponds to relevant biophysical study areas for air quality, noise, water quality, electric and magnetic fields, country foods and mercury.	Consistent with LAA. RAA corresponds to relevant biophysical study areas for air quality, noise, water quality, electric and magnetic fields and mercury.

19.2.2 Human Health Temporal Boundaries

The EIS will describe the temporal boundaries, which will reflect the methodology described in Section 8 of these EIS Guidelines.

19.2.3 Human Health Baseline

The EIS will describe the current baseline data for human health indicators using information provided in technical data reports on air quality, water quality, noise, electric and magnetic fields, and methylmercury. The baseline data will include the identification of human health receptor locations.

19.2.4 Potential Effects of the Project and Proposed Mitigation

The EIS will assess how the Project has the potential to adversely affect human health.

The potential to adversely affect human health will be assessed by taking into account the potential for the Project to result in changes to the following key aspects:

- Ambient air quality;
- Potable and recreational water quality;
- Noise and vibration;
- Electric and magnetic fields; and
- Country Foods, including reduced consumption and methylmercury concentrations in fish consumed by humans.

Should potential adverse effects be identified, the potential mitigation measures will be identified and will include a description of how the mitigation measures can address the potential adverse effects.

The EIS will describe project residual effects, and cumulative effects, if applicable, using the residual effects characterization described in Table 8.3. A statement of significance will be provided.

19.2.5 Summary Residual Effects on Human Health

The EIS will summarize the residual effects in table format as shown in Table 8.4.

19.3 References

This subsection will include a list of supporting references used in this section of the EIS.

VOLUME 5 – ASSERTED OR ESTABLISHED ABORIGINAL RIGHTS AND TREATY RIGHTS, ABORIGINAL INTERESTS AND INFORMATION, ENVIRONMENTAL MANAGEMENT PLANS, AND FEDERAL INFORMATION REQUIREMENTS

20 Asserted or Established Aboriginal Rights and Treaty Rights, Aboriginal Interests and Information Requirements

The EIS will contain an assessment of the potential adverse impacts of the Project the exercise of asserted or established Aboriginal rights and treaty rights.

The EIS will provide the Proponent's understanding of:

- How the environment is valued by each potentially affected Aboriginal group for current use of lands and resources for traditional purposes, including activities conducted in the exercise of asserted or established Aboriginal rights and treaty rights, and how that current use may be affected by the project to the extent that this information does not duplicate the information provided pursuant to Section 15 of the EIS Guidelines; and
- The asserted or established Aboriginal rights and treaty rights held by each potentially affected Aboriginal group.

20.1 Aboriginal Groups

The Proponent must consult with the Aboriginal groups that have the potential to be adversely affected by the Project.

Treaty 8 First Nation Signatories:

BC:

- Doig River First Nation
- Halfway River First Nation
- Prophet River First Nation
- Saulteau First Nations
- West Moberly First Nations
- Fort Nelson First Nation
- Blueberry River First Nations
- McLeod Lake First Nation

Alberta:

- Athabasca Chipewyan First Nation
- Beaver First Nation
- Dene Tha' First Nation

- Duncan's First Nation
- Horse Lake First Nation
- Little Red River Cree Nation
- Mikisew Cree First Nation
- Smith's Landing First Nation
- Sturgeon Lake Cree Nation
- Tallcree First Nation
- Woodland Cree First Nation

Northwest Territories:

- Deninu K'ue First Nation
- Salt River First Nation

Métis

- Métis Nation of Alberta – Zone 6
- Paddle Prairie Métis Settlement Society
- Fort Chipewyan Métis Association
- Northwest Territory Métis Nation
- Métis Nation of British Columbia (Canada only)
- Kelly Lake Métis Settlement Society (Canada only)

BC First Nations:

- Kwadacha First Nation
- Tsay Keh Dene First Nation

Should the Proponent have knowledge of potential adverse impacts to an Aboriginal group not appearing on the above list, the Proponent should bring this to the attention of the Agency and the BCEAO at the earliest opportunity.

20.2 Aboriginal Groups Background Information

The EIS will:

- Identify Aboriginal groups whose asserted or established Aboriginal rights and treaty rights and Aboriginal interests are potentially affected by the Project
- Provide background information for each potentially affected Aboriginal group identified in Section 20.1 to the extent that information is made available to the Proponent by the Aboriginal groups, or that may be publicly available. This will include:
    - A map of the Aboriginal group’s traditional territory; and

- Information related to ethnography, language, land use setting and planning, governance and economy.

20.3 Asserted or Established Aboriginal Rights and Treaty Rights

The EIS will:

- Identify past, current and reasonably anticipated future use of lands and resources by Aboriginal groups for traditional purposes that may be adversely affected by the project to the extent that this information does not duplicate the information provided pursuant to Section 15 of the EIS Guidelines;
- Identify any asserted or established Aboriginal rights and treaty rights of Aboriginal groups who may be adversely impacted by the project; and
- Assess potential adverse impacts of the Project on the exercise of asserted or established Aboriginal rights and treaty rights identified above.

20.4 Aboriginal Accommodation

This section will describe the measures identified to mitigate/accommodate the potential adverse impacts of the project described in Section 20.3 on the asserted or established Aboriginal rights and treaty rights. Accommodation measures should be written as specific commitments that clearly describe how the Proponent intends to implement them. This description will include a summary of:

- Measures to avoid, reduce or otherwise mitigate potential adverse impacts on the exercise of asserted or established Aboriginal rights and treaty rights identified in Section 20.3;
- Specific suggestions raised by Aboriginal groups for measures to avoid, reduce or otherwise mitigate the potential adverse impacts of the project on asserted or established Aboriginal rights and treaty rights in relation to environmental effects; and
- Environmental mitigation measures identified that also serve to avoid, reduce or otherwise mitigate potential adverse impacts on asserted or established Aboriginal rights and treaty rights.

20.5 Outstanding Aboriginal Issues

This section will describe the potential adverse impacts on potential or established Aboriginal and Treaty rights that have not been mitigated/accommodated as part of the environmental assessment and associated consultations with Aboriginal groups. This

includes potential adverse impacts on asserted or established Aboriginal rights and treaty rights that may result from the residual and cumulative environmental effects.

20.6 Other Interests of Aboriginal Groups

The EIS will:

- Identify interests that Aboriginal groups may have with respect to potential social, economic, health, and physical and cultural heritage effects of the Project;
- Describe how the potential effects on those interests have been considered in the assessment of the potential adverse effects of the Project on VCs or otherwise; and
- Describe the Proponent's approach to building capacity, for example opportunities for Aboriginal employment, contracting, and business development.

20.7 Aboriginal Consultation and Engagement

The EIS will:

- Identify any Impact Benefit Agreements that have been concluded by the time the EIS is submitted; and
- Describe consultation and engagement methods, including specific consultation agreements entered into between the Proponent and Aboriginal groups, and opportunities provided to Aboriginal groups to identify rights, interests and concerns related to the Project, if this information is not contained in Section 7.2.

20.8 Aboriginal Summary

The EIS will provide a summary of the Proponent's understanding of the Aboriginal groups' asserted or established Aboriginal rights and treaty rights, and other Aboriginal interests potentially impacted by, and concerns with respect to, the Project. The summary will also provide the Proponent's understanding of the potential adverse effects of the Project on those asserted or established Aboriginal rights and treaty rights and interests.

The Proponent will provide a copy of the summary to Aboriginal groups.

20.9 References

This subsection will include a list of supporting references used in this section of the EIS.

21 Summary of Proposed Environmental Management Plans

The EIS shall include a commitment by the Proponent to implement EMPs should the project proceed.

The Proponent has proposed the following:

The EIS will describe the framework for environmental management to be implemented during construction and operation to mitigate potential adverse effects. The framework will include:

- The Proponents' environmental policies;
- Statutory requirements;
- Objectives and voluntary commitments;
- Relevant human resource plans;
- Environmental compliance monitoring;
- Mitigation and environmental protection measures; and
- Contingency planning for accidents.

The framework, in the form of an annotated outline, will be presented in the EIS for each Environment Management Plan (EMP). Annotated outlines will be provided for the following EMPs:

Construction Safety Management Plans

- Emergency Response Plan
- Fire Hazard and Abatement Plan
- Public Safety Management Plan
- Worker Safety and Health Management Plan

Construction Environmental Management Plans

- Acid Rock Drainage Management Plan
- Air Quality Management Plan
- Archaeological and Heritage Resources Management Plan
- Blasting Management Plan
- Borrow and Quarry Sites Reclamation Plan
- Communication Plan: Construction

- Construction Waste Management Plan
- Contaminated Sites Management Plan
- Dust Control Plan
- Environmental Training Management Plan
- Erosion Prevention and Sediment Control Plan
- Fisheries and Aquatic Habitat Management Plan
- Groundwater Protection Plan
- Hazardous Waste Management Plan
- Ice Management Plan
- Noise and Vibration Management Plan
- Reservoir, Transmission Line and Road Clearing Plans
- Soil Management, Site Restoration and Re-Vegetation Plan
- Solid Waste Management Reduction and Recycling Plan
- Surface Water Quality Protection Plan
- Traffic Management Plan
- Wildlife Management Plan
- Vegetation and Invasive Plant Management Plan

Operational Safety Management Plans

- Emergency Response Plan
- Public Safety Management Plan
- Worker Safety and Health Management Plan
- Reservoir Shoreline Monitoring and Management Plan

Operational Environmental Management Plans

- Hazardous Materials Management Plan
- Ice Management Plan
- Materials Management Plan
- Vegetation Management Plan
- Waste Management Plan
- Water Management Plan

The Emergency Response Plans for construction and operations and the Environmental Management plans will address contingency and response planning for the accidents and malfunctions identified in the EIS.

21.1 References

This subsection will include a list of supporting references used in this section of the EIS.

22 Compliance Reporting

The EIS will describe the reporting structure as identified in the environmental management plans and conditions.

22.1 References

This subsection will include a list of supporting references used in this section of the EIS.

23 Requirements for the Federal Environmental Assessment

Federal requirements of the environmental assessment of the Project are addressed in various sections of these EIS Guidelines. Table 23.1 describes how the federal requirements will be addressed in the EIS.

Table 23.1 Federal requirements effects assessment concordance table

Federal Requirement	Relevant Section of These EIS Guidelines
Indirect Effects: Section 5 of the CEAA, requires an assessment of the environmental effects of the Project, including certain indirect effects.	The requirements to assess the following indirect effects are found in the sections of these EIS Guidelines referred to below: Volume 3 (Economic) and Volume 4 (Social) – Socio-economic Section 19 - Health Section 15 - The current use of lands and resources for traditional purposes by Aboriginal persons Section 18 - Any structure, site or thing that is of historical, archaeological, paleontological or architectural significance Section 18 - Physical and cultural heritage.
Alternatives to and Alternative means.	Section 4 of these EIS Guidelines.
Need for and Purpose of the Project.	Section 4 of these EIS Guidelines.
Species at Risk Act.	Volume 2 of these EIS Guidelines.
Comments from the Public and Aboriginal persons.	Volume 1 of these EIS Guidelines.
Current Use of Lands and Resources for Traditional Purposes by Aboriginal peoples.	Section 15 of these EIS Guidelines.
Effects of the Environment on the Project.	Section 23.1 of these EIS Guidelines.
Potential Accidents and Malfunctions.	Section 23.2 of these EIS Guidelines.
Cumulative Effects.	Section 23.3 of these EIS Guidelines and the Effects Assessment Sections 10-19.
Capacity of Renewable Resources.	Section 23.4 of these EIS Guidelines.
Requirements of any Follow-up Program.	Section 23.5 of these EIS Guidelines.

Changes to the environment

Section 5 of CEAA describes specific categories of direct and indirect environmental effects that must be considered in the EA. However, to be able to assess these categories of environmental effects, a complete understanding of the changes the project will cause to the environment is required, including changes that are directly linked or necessarily incidental to any federal decisions that would permit the project to be carried out.

Changes to components of the environment within federal jurisdiction

The EIS will include a section that summarises those changes that may be caused by the project on the components of the environment listed in paragraph 5(1)(a) of CEAA, namely fish and fish habitat, aquatic species and migratory birds.

Changes to the environment that would occur on federal or transboundary lands

The EIS will include a section that summarises any change the project may cause to the environment that may occur on federal lands or lands outside the province in which the project is to be located (including outside of Canada).

Changes to the environment that are directly linked or necessarily incidental to federal decisions

In situations where the project requires one or more federal decisions the EIS will also include a section that describes any change that may be caused by the project on the environment that is directly linked or necessarily incidental to these decisions.

Effects of changes to the environment on Aboriginal peoples

The EIS will describe the effects of any changes the project may cause to the environment, with respect to Aboriginal peoples, 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.

Effects of changes to the environment that are directly linked or necessarily incidental to federal decisions

In situations where the EIS has identified changes to the environment that are directly linked or necessarily incidental to federal decisions identified the EIS will also include a section that describes the effects of these changes 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, other than as they pertain to Aboriginal peoples (who are considered in the previous section).

23.1 Effect of the Environment on the Project

The EIS must take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events could adversely affect the project and how this in turn could result in impacts to the environment (e.g., extreme environmental

conditions result in malfunctions and accidental events). These events should be considered in different probability patterns (i.e. 5-year flood vs. 100-year flood). Longer-term effects of climate change must also be discussed. This discussion should include a description of climate data and models used.

The EIS must provide details of any planning, design and construction strategies intended to minimize the potential effects of the environment on the project.

The Proponent proposes to assess the following environmental factors: extreme weather events; sedimentation of the reservoir; seismic activity; wildfire; flooding; low flow or drought conditions; slope stability and mass wasting events; and climate change.

23.2 Potential Accidents and Malfunctions

The EIS will review all parts of the Project to identify those that have the potential, through accident or malfunction, to adversely affect the environment. This must include an identification of the magnitude of an accident and/or malfunction.

The EIS will identify potential accidents and malfunctions that could occur during the construction and operations phases. For example:

Construction phase:

- Release or spill of chemicals or hazardous materials; containment pond leakage or failure; cofferdam failure; sediment control failure; fire and explosion.

Operations phase:

- Dam safety incidents; release or spill of chemicals or hazardous materials; fire and explosion.

The Proponent proposes to describe the effects of a dam break at Site C by tabulating the expected flood arrival time and water surface elevation at downstream communities along the Peace River to Peace Point, Alberta until the estimated water surface is within the estimated 200 year flood level (the level used in British Columbia to delineate natural flood hazard areas).

Dam break analyses will be described for:

- Construction – failure of the main upstream cofferdam; and
- Operations – failure of the earthfill dam.

The EIS will describe the Emergency Preparedness Plans that will be prepared for the cofferdams and the completed facility. Emergency Preparedness Plans will follow the Canadian Dam Association's Dam Safety Guidelines and comply with the BC Dam Safety Regulations. The EIS will commit to submitting the Emergency Preparedness Plans to the BC Comptroller of Water Rights (as the regulator responsible for dam safety in BC). The Emergency Preparedness Plans for the cofferdams will be submitted prior to diversion of the river through the diversion tunnel, and the Emergency Preparedness Plans for the dam

would be submitted prior to reservoir filling. In both cases the Emergency Preparedness Plans will be submitted with sufficient time to make changes that the BC Comptroller of Water Rights may require prior to impounding water.

The EIS will identify the potential effects of accidents and malfunctions on Valued Components.

The likelihood and circumstances under which these events could occur will be assessed along with the potential adverse effects that may result from such events.

The EIS will provide an overview of the measures that would be implemented to reduce the likelihood and those that could be implemented to mitigate the potential occurrence of an accident or malfunction.

23.3 Cumulative Environmental Effects

The EIS will provide an assessment of the potential cumulative adverse effects that are likely to result from the Project in combination with other physical activities that have been or will be carried out.

23.4 Capacity of Renewable Resources

The EIS will describe the type of renewable resources that may be significantly adversely affected by the Project.

23.5 Requirements of any Follow-up Program

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. The EIS should describe the proposed Follow-up Program in sufficient detail to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them), and to confirm both the assumptions and the effectiveness of mitigation. The Follow-up Program should include specific commitments that clearly describe how the Proponent intends to implement them.

The Follow-up Program must be designed to incorporate baseline data, compliance data (such as established benchmarks, regulatory documents, standards or guidelines) and real time data (such as observed data gathered in the field). The Proponent must describe the reporting methods to be used, including frequency, methods and format.

The effects predictions, assumptions and mitigation actions that are to be tested in the follow-up program must be converted into field-testable monitoring objectives. The monitoring design must include a statistical evaluation of the adequacy of existing baseline data to provide a benchmark against which to test for project effects, and the need for any

additional pre-construction or pre-operational monitoring to establish a firmer project baseline.

The Follow-up Program shall include a schedule indicating the frequency and duration of effects monitoring.

The description of the Follow-up Program must include any contingency procedures/plans or other adaptive management provisions as a means of addressing unforeseen effects or for correcting exceedances as required to comply or to conform to benchmarks, regulatory standards or guidelines.

The Follow up Program must also be designed to monitor the implementation of mitigation/accommodation measures resulting from Aboriginal consultation conducted during the EA, including:

- Verifying predictions of environmental effects with respect to Aboriginal peoples, as well as residual impacts that could not be mitigated/accommodated within the context of the EA;
- Determining the effectiveness of mitigation/accommodation measures as they relate to environmental effects with respect to Aboriginal peoples in order to modify or implement new measures where required; and
- Supporting the implementation of adaptive management measures to address previously unanticipated adverse environmental effects with respect to Aboriginal peoples or unanticipated adverse impacts to asserted or established Aboriginal rights and treaty rights.

23.6 References

This subsection will include a list of supporting references used in this section of the EIS.

24 Summary of Potential Residual Effects of the Project

The EIS will summarize each residual environmental, economic, social, heritage or health effect in a table format as shown below.

Table 24.1 Summary of assessment of potential environmental effects

Potential Residual Effects	Project Phase	Contributing Project Activity or Physical Works	Proposed Mitigation	Significance
e.g., Fish and Fish Habitat, Wildlife Resources				
e.g. Furbearers				

25 Complete Lists of Mitigation and Follow-up Measures

The EIS will provide a complete list of mitigation measures contained in the EIS that may be necessary to conclude that a potential adverse effect is either unlikely to result from the Project or unlikely to be significant.

The EIS will provide a complete list of follow up measures identified in the EIS.

26 Conclusion

The EIS will provide the Proponent's conclusion as to the potential benefits of the Project and whether the Project will result in any significant adverse effects.

27 EIS Guidelines References

In preparing these EIS Guidelines, the following references were used:

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28 Appendices

The EIS will include a series of technical data reports and other documentation used to support the content of the EIS.