

4 SCOPE OF ASSESSMENT AND METHODS

4.1 Environmental Assessment Methods

The assessment methods used to prepare this EIS/Application are described in the following sections. These methods have been developed to meet the requirements of both CEEA 2012 and BCEAA in an effective and efficient manner. They are based on a structured approach which first identifies and assesses the potential project-specific effects and then the proposed Project's potential contribution to cumulative effects. The effects assessment describes the following steps:

1. Identification of potential issues and valued components (VCs) that are relevant to the proposed Project and the assessment
2. Establishment of assessment boundaries for each VC (spatial, temporal, technical, and administrative)
3. Description of the scope of assessment, including:
 - a. Regulatory/policy setting
 - b. Selection of potential effects
 - c. Measurable parameters and significance thresholds
 - d. Spatial, temporal, technical, and administrative boundaries
 - e. Traditional Knowledge and Traditional Use information, as available
 - f. Influence of consultation on the assessment.
4. Describe baseline conditions
5. Assessment of project-specific effects including:
 - a. Identification of project interactions
 - b. Description of potential effects
 - c. Proposed mitigation of potential effects
 - d. Characterization of predicted residual effects
 - e. Significance prediction of likely residual effects.
6. Assessment of cumulative effects:
 - a. Identification of past, present, and reasonably foreseeable projects or activities that would likely interact in a cumulative fashion with predicted residual project effects
 - b. Preliminary assessment of cumulative effects
 - c. Detailed assessment of the potential cumulative effects, where necessary
 - d. Mitigation of cumulative effects
 - e. Characterize predicted residual cumulative effects
 - f. Analyze significance of the proposed Project's contribution to cumulative effects.

4.1.1 Valued Components

Valued components (VC) are aspects of the biophysical and human environment that, if adversely affected by a proposed project, could be of concern to regulators, Aboriginal people, resource managers, scientists, or the general public. The VCs considered in this EIS/Application were finalized after consultation with members of the PNW LNG Working Group, in consideration of input received from the public during the public comment period on the dAIR, and direction from BC EAO and the CEA Agency. The VC selection was also influenced by regulatory issues and guidelines and the professional judgment of the study team.

The BC EAO guideline for the selection of valued components (BC EAO 2013) defines Valued Components (VCs) as “*components of the natural and human environment that are considered by the proponent, public, Aboriginal groups, scientists and other technical specialists, and government agencies involved in the assessment process to have scientific, ecological, economic, social, cultural, archaeological, historical or other importance*”.

The following considerations were used to develop the VCs for this assessment:

- The EIS Guidelines
- BC EAO’s Guidelines for the Selection of Valued Components and Assessment of Potential Effects
- The VC must represent an aspect of one of the five “pillars” of BCEAA (environment, economic, social, heritage or health)
- The VC must be a receptor and susceptible to adverse effects resulting from project-VC interactions
- The nature of project-VC interactions must be clearly understood
- Potential adverse effects on the VC must be meaningful and measurable
- Potential adverse effects should be of concern to regulators, Aboriginal people, resource managers, scientists, and/or the general public
- Discussions with technical experts and various provincial and federal agencies
- Consultations with stakeholders and Aboriginal people
- Review of and findings from recent studies or assessments in the region
- Professional judgment based on experience of the assessment team
- Benefits of grouping similar candidate VCs that are affected by the same or similar project effects under a common “umbrella” VC.

As a result of consideration of these factors, the following VCs are assessed:

- Air Quality
- Greenhouse Gas Management
- Acoustic Environment
- Ambient Light
- Vegetation and Wetland Resources

- Terrestrial Wildlife and Marine Birds
- Freshwater Aquatic Resources
- Marine Resources
- Economic Environment
- Navigation and Marine Resource Use
- Infrastructure and Services
- Visual Quality
- Community Health and Well Being
- Human and Ecological Health
- Heritage and Archaeological Resources
- Current Use of Lands and Resources for Traditional Purposes.

For some of the VCs, subcomponents have been used to focus the scope of assessment. Subcomponents are aspects of a VC that are used to assess the environmental, social, economic, heritage or health effects. For example, subcomponents selected for the Marine Resources VC include fish and fish habitat and marine mammals.

Based on the section 11 Order issued by BC EAO and the federal EIS guidelines issued by the CEA Agency, there are shared federal/provincial interests across many VCs. As a result, federal and provincial technical experts provided input through their involvement in the Working Group so that provincial and federal interests were incorporated throughout the environmental assessment.

No VCs are proposed related to potential adverse impacts of the Project on Aboriginal Rights and Related Interests. The findings of the environmental and socio-economic assessments that are relevant to Aboriginal Rights and Related Interests as well as relevant accommodations are described (see Section 27). The assessment of the environmental effects related to Aboriginal peoples as set out in section 5(1)(c) of CEAA 2012 is included within Sections 21, 26.1 and 27).

Table 4-1 describes the rationale for including each VC; as well as a rationale for excluding several VCs (Soils, Water Quality, and Odour) from the assessment. Additional detail on the rationale for including VCs is provided within each VC section of the EIS/Application.

Table 4-1: Valued Components and Rationale for Inclusion in the EIS/Application

Valued Component	Included/ Excluded	Rationale for Inclusion/Exclusion in the EIS/Application
Environment		
Air Quality	Included	<ul style="list-style-type: none"> ▪ <i>The Canadian Environmental Protection Act</i>, 1999 mandates the reporting of air emissions to the National Pollutant Release Inventory (NPRI). ▪ Operation of the proposed Project will result in air emissions. ▪ Exceeding the BC and National Ambient Air Quality Objectives (AAQO) can negatively affect human and ecological health.
Greenhouse Gas Management	Included	<ul style="list-style-type: none"> ▪ The Project will have emissions of CO_{2e}. ▪ The BC Government's Reporting Regulation – <i>Greenhouse Gas Reduction (Cap and Trade) Act</i>, 2009 requires reporting of greenhouse gas emissions from BC facilities emitting 10,000 tonnes or more of carbon dioxide equivalent emissions per year. ▪ <i>The Canadian Environmental Protection Act</i>, 1999 mandates the reporting of GHG emissions to the National Pollutant Release Inventory (NPRI).
Acoustic Environment	Included	<ul style="list-style-type: none"> ▪ The BC Oil and Gas Commission (BC OGC) requires compressor stations and other oil and gas facilities to meet the British Columbia Noise Control Best Practices Guideline (2009). ▪ Health Canada recommends consideration of noise effects for assessments of projects subject to federal regulatory jurisdiction.
Ambient Light	Included	<ul style="list-style-type: none"> ▪ Construction and operation of the proposed Project will result in an increase in ambient light.
Vegetation and Wetland Resources	Included	<ul style="list-style-type: none"> ▪ <i>The Species at Risk Act</i> (SARA) protects federally and provincially listed plant species on lands within federal jurisdiction. ▪ The Federal Policy on Wetland Conservation promotes conservation of wetlands and wetland function within areas of federal jurisdiction. ▪ Emissions of NO₂ and SO₂ have the potential to result in ecosystem acidification (directly through fumigation and indirectly through effects on soil). ▪ Aboriginal groups are concerned with effects on plants that have traditional use and cultural importance. ▪ Construction and operation of the proposed Project includes activities that could affect rare plants, rare plant communities, and would affect wetland ecosystems.

Valued Component	Included/ Excluded	Rationale for Inclusion/Exclusion in the EIS/Application
Soils	Excluded	<ul style="list-style-type: none"> ▪ The Project is not located within an Agricultural Land Reserve (ALR). ▪ The soils affected by the project will be limited to the Project footprint. Standard industry practices for salvage and storage of topsoil will be undertaken and the Project will incorporate erosion and sediment control measures. ▪ The effect on the quality of soils from potential acidification effects is being addressed under the vegetation VC because it is effects on vegetation that are the primary concern for soils acidification.
Terrestrial Wildlife and Marine Birds	Included	<ul style="list-style-type: none"> ▪ The <i>Migratory Birds Convention Act</i>, SARA, and the <i>Wildlife Act</i>, provide protection to wildlife and specific wildlife habitats. ▪ The Federal Policy on Wetland Conservation promotes conservation of the function of wetlands to provide wildlife habitat within areas of federal jurisdiction. ▪ Aboriginal groups are concerned about effects on wildlife species that are hunted, trapped, or have cultural importance. ▪ Construction and operation of the proposed Project includes activities that would result in effects on wildlife or wildlife habitat.
Freshwater Aquatic Resources	Included	<ul style="list-style-type: none"> ▪ Recreational, commercial and aboriginal fisheries have significant value in BC. ▪ The <i>Fisheries Act</i> regulates activities that may affect fish or fish habitat including introduction of barriers (s.20), modification of flows (s.20), permanent alteration or destruction of habitat (s.35), and deposition of deleterious substances (s.36). ▪ SARA protects aquatic species. ▪ There are 17 mapped watercourses on Lelu Island. Construction of the proposed Project could adversely affect fish and fish habitat. ▪ Emissions of NO₂ and SO₂ have the potential to affect fish and fish habitat through changes in water quality from eutrophication or acidification of lakes.

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Valued Component	Included/Excluded	Rationale for Inclusion/Exclusion in the EIS/Application
Marine Resources	Included	<ul style="list-style-type: none"> Recreational, commercial and aboriginal fisheries have significant value in BC. Aboriginal groups are concerned about potential effects on fish, marine mammals, shellfish, and seaweeds that are harvested or have cultural, ecological, or economic importance. Marine components of the proposed Project include a bridge from Lelu Island to the mainland, a materials offloading facility, marine terminal (trestle supported jetty and berths), temporary facilities (e.g., a pioneer dock), and shipping LNG (between the terminal and Triple Island pilotage station). The <i>Fisheries Act</i> regulates activities that may affect fish or fish habitat including permanent alteration or destruction of habitat (s.35), and deposition of deleterious substances (s.36). In-water construction activities may result in increased sedimentation, alteration, or loss of fish habitat, and underwater noise. The <i>Canadian Environmental Protection Act, 1999</i> regulates disposal of dredged material at sea.
Water Quality	Excluded	<ul style="list-style-type: none"> Air and effluent emissions may affect freshwater and marine water quality; these potential effects will be assessed within the Freshwater Aquatic Resources and Marine Resources VCs.
Economic		
Economic Environment	Included	<ul style="list-style-type: none"> BCEAA requires consideration of adverse economic effects. The potential effects of the economy from Project construction and operation will be assessed. Local and regional governments and businesses are concerned that Project demands for goods and services will have adverse effects on the regional economy. Municipal, provincial, and federal governments are interested in economic effects of major projects.
Social		
Navigation and Marine Resource Use	Included	<ul style="list-style-type: none"> CEAA 2012 and BCEAA require consideration of adverse social effects. The <i>Navigable Waters Protection Act</i> regulates activities that may restrict navigation of waterways. Construction and operation of the proposed Project may alter navigation and cause recreational, commercial, industrial, or traditional users to alter use of marine resources in the vicinity of Lelu Island.
Infrastructure and Services	Included	<ul style="list-style-type: none"> BCEAA requires consideration of adverse social effects. Potential for in-migration of temporary and/or permanent populations leading to increased demand for regional infrastructure and services.

Valued Component	Included/ Excluded	Rationale for Inclusion/Exclusion in the EIS/Application
Visual Quality	Included	<ul style="list-style-type: none"> ▪ BCEAA requires consideration of adverse social effects. ▪ All levels of government and many stakeholders are interested in the potential change to visual quality in the area. ▪ The proposed Project would be visible from viewpoints within the vicinity of Lelu Island and the shipping routes (between the terminal and Triple Island pilotage station).
Odour	Excluded	<ul style="list-style-type: none"> ▪ Odour will not be a concern for the proposed Project because the gas used will be 'sales quality natural gas' and therefore will contain only a small concentration of reduced sulphur compounds, including trace concentrations of H₂S. Methyl mercaptan is normally added to sales quality natural gas as an odorant in the upstream pipeline for safety reasons but this will only be odorous in the event of a pipeline gas leak upstream of the facility.
Community Health and Well Being	Included	<ul style="list-style-type: none"> ▪ Proposed Project may directly and indirectly affect community health. ▪ Proposed Project may affect country foods availability and quality.
Health		
Human and Ecological Health	Included	<ul style="list-style-type: none"> ▪ BCEAA requires consideration of adverse health effects. ▪ Construction and operation of the proposed Project has the potential to affect air, soil, and marine sediment quality, which may provide a pathway for uptake of contaminants in humans and ecological species.
Heritage		
Archaeological and Heritage Resources	Included	<ul style="list-style-type: none"> ▪ Archaeological resources on the mainland are protected under the authority of the <i>Heritage Conservation Act</i> in British Columbia. Archaeological resources on Lelu Island are managed by PRPA. ▪ BCEAA requires consideration of adverse effects on heritage resources. ▪ Heritage and archaeological resources are important to Aboriginal people. ▪ Culturally modified trees (including those which post-date 1846) provide a record of traditional use of the land by Aboriginal people. ▪ Construction of the proposed Project will result in ground disturbance and/or tree removal and has the potential to impact archaeological sites.
First Nations and Aboriginal		
Current Use of Lands and Resources for Traditional Purposes	Included	<ul style="list-style-type: none"> ▪ CEAA 2012 requires consideration of effects on current use of lands and resources for traditional purposes by Aboriginal people. ▪ Construction and operation of the proposed Project has the potential to affect current use of the area.

4.1.2 Assessment Boundaries

4.1.2.1 Temporal Boundaries

The temporal boundaries of the assessment are defined by the timing and duration of project activities that could result in effects on the biophysical and human environment. The purpose of the temporal boundaries is to identify when an effect may occur in relation to specific project phases and activities. Based on the project schedule (see Table 2-3), the temporal boundaries for the assessment are:

- **Construction:** Q1 2015 – Q4 2018
- **Operations:** Q1 2019 – 2048+
- **Decommissioning:** 2048+

Decommissioning of the Project is expected to occur after at least 30 years of operations, and would be subject to laws and regulations in effect at that time. For the purposes of the environmental assessment, decommissioning will include removal of the onshore, above-ground facilities and the loading and unloading infrastructure on the marine terminal and MOF. The terminal and MOF would likely remain in place. The bridge and access road are considered permanent and decommissioning is not anticipated.

4.1.2.2 Spatial Boundaries

Project Development Area

The project development area (PDA) is made up of approximately 160 ha on Lelu Island, 0.3 ha on the mainland (bridge abutment and access road), 0.2 ha covered by the bridge crossing, a 92 ha offshore area covered by the marine terminal, and 7.9 ha offshore associated with the MOF. The total area of the PDA is approximately 261 ha.

Local Assessment Area

The spatial boundaries for each VC include the geographic extent within which the potential effects from the Project are expected to be measurable with a level of confidence that allows for the assessment of residual effects. The local assessment areas (LAAs) for assessing the direct effects on each VC are listed in Table 4-2 and detailed in the relevant VC section. The factors considered in defining the spatial boundaries are:

- Scope of the Project and scope of the assessment defined in the EIS Guidelines/AIR
- The local and regional biophysical and human environmental conditions
- Available traditional use information and traditional knowledge
- Available technical or scientific information
- Social and land use considerations.

Table 4-2: Local Assessment Area Boundaries

Valued Component	Local Assessment Area Boundary and Rationale
Air Quality	The <i>Guidelines for Air Quality Dispersion Modelling in British Columbia</i> (BC MOE 2008) recommend that project effects representing 10% of the ambient air quality objective for the criteria air contaminants should be captured within the modelling domain. For all criteria air contaminants, the USEPA recommended CALPUFF air dispersion model usually determines this threshold to be within a distance of 10 km from the center of the facility footprint boundary for similar projects. To accommodate this recommendation the LAA for the air quality assessment will be a minimum of 30 km by 30 km square centered on the facility. The LAA may be modified to accommodate modelling results.
Greenhouse Gas Management	The boundaries for greenhouse gas management will be administrative. It will be assessed within the frameworks established by applicable provincial and federal greenhouse gas policy and legislation (i.e., those that apply to the oil and gas sector).
Acoustic Environment	The <i>British Columbia Noise Control Best Practices Guideline</i> (BC OGC 2009) recommends that nighttime sound levels from industrial facilities not exceed 40 dBA at a distance of 2 km from the facility or at the nearest receptor, whichever is closer. To ensure acoustic emissions from the facility are fully characterized at various points of reception, the LAA is the area within 2 km of the proposed project fence line and the shipping routes (between the terminal and Triple Island pilotage station).
Ambient Light	Ambient light emissions from the proposed Project may affect individuals living in the community of Port Edward. The LAA for ambient light includes the area within 8 km of the proposed Project.
Vegetation and Wetland Resources	The LAA for the assessment of potential effects to vegetation and wetland resources includes Lelu Island, Stapledon Island (up to the landward edge of the high tide mark) the portion of the mainland southwest of Skeena drive across from Lelu and Stapledon Island
Terrestrial Wildlife and Marine Birds	The LAA for the assessment of terrestrial wildlife includes Lelu Island and extends 1.5 km from Lelu Island and includes a 500 m buffer around the marine terminal. The LAA for the assessment of terrestrial wildlife includes Lelu Island and extends 1.5 km from Lelu Island and includes a 500 m buffer around the marine terminal. To account for potential effects from shipping, the LAA extends 2 km on both sides of the potential shipping routes between the marine terminal and Triple Island pilotage station.
Freshwater Aquatic Resources	The freshwater aquatic resources LAA includes the watercourses on Lelu and Stapledon Island potentially affected by the proposed Project.
Marine Resources	The LAA for marine resources will include the project development area, the potential shipping routes (between the terminal and Triple Island pilotage station), plus a 10 km buffer on both sides of the potential shipping routes to assess potential effects of underwater noise.
Economic Environment	The LAA for the economic environment assessment consists of the communities within the mainland portion of the Skeena Queen Charlotte Regional District. This represents a large area where effects of the proposed Project may overlap with effects of other projects and activities in the area.
Navigation and Marine Resource Use	The LAA for navigation and marine resource use will include the Prince Rupert Port Authority boundary and the waters extending 10 km from both sides of the potential shipping routes (between the terminal and Triple Island pilotage station).
Infrastructure and Services	Infrastructure and services that could be affected by the proposed Project include those within the District of Port Edward and the city of Prince Rupert and Highway 16 up to and including the Terrace airport. These are most likely to be affected by the proposed Project.
Visual Quality	The LAA spatial boundary includes viewpoints within 8 km of Lelu Island and the potential shipping routes (between the terminal and Triple Island pilotage station).

Valued Component	Local Assessment Area Boundary and Rationale
Community Health and Well-being	The LAA for the community health and well-being will include the following communities: Metlakatla First Nation, Lax Kw'alaams First Nation, Gitxaala Nation, the District of Port Edward and the city of Prince Rupert.
Human and Ecological Health	The LAA for human and ecological health is a 30 km x 30 km square area centered on the facility on Lelu Island. The LAA includes the area where potential effects to human and ecological health could occur from chemical changes to the environment, and increased noise and ambient light levels.
Archaeological and Heritage Resources	The LAA spatial boundaries for the archaeological and heritage resources assessment will be the area of ground disturbance (including pre-construction site clearing) within the proposed project development area on Lelu Island, Stapledon Island, and the portion of the mainland southwest of Skeena drive across from Lelu and Stapledon Island

Regional Assessment Area

The spatial boundaries for each VC encompass the geographic extent within which the potential effects of the Project, in combination with effects from other projects, are expected to be measurable. A regional assessment area (RAA) is used for the assessment of potential cumulative effects.

The RAAs for each VC are listed in Table 4-3 and described in the relevant VC section. Factors considered in defining the spatial boundaries for each selected VC were the same as those for the LAAs; however, the RAA covers a larger area that establishes the area within which project-specific effects overlap with other activities (past, present, and reasonably foreseeable), and is consequently the area for which the Project's contribution to cumulative effects is assessed.

Table 4-3: Regional Assessment Area Boundaries

Valued Component	Regional Assessment Area Boundary and Rationale
Air Quality	To encompass baseline air quality and emissions from regional facilities that could interact with the proposed Project's emissions, the RAA for the air quality assessment is established as a minimum of 50 km by 50 km domain centered on the facility footprint. The RAA may be adjusted to address modelling results.
Greenhouse Gas Management	As the assessment for carbon management is based on administrative boundaries, there will not be a cumulative effects assessment for this VC.
Acoustic Environment	To encompass sound emissions that may emanate from surrounding facilities and interact with those from the proposed Project, the RAA for the assessment of sound quality is a buffer that extends 5 km from the LNG facility fence line and within 2 km of the potential shipping routes (between the terminal and Triple Island pilotage station). Because of the noise limits established by the BC OGC's guidelines, sound emissions beyond this distance are not expected to result in cumulative effects.
Ambient Light	To encompass light emissions from the surrounding facilities that may interact with the proposed Project, the RAA includes the portion of the viewshed greater than 8 km from the proposed project site.
Vegetation and Wetland Resources	The RAA for vegetation and wetland resources is the Kaien Landscape Unit of the Central and North Coast Ministerial Order. This landscape unit includes similar ecosystems to those found within the LAA.
Terrestrial Wildlife and Marine Birds	The RAA for the assessment of terrestrial wildlife is the Kaien Landscape Unit of the Central and North Coast Ministerial Order. This landscape unit includes wildlife and wildlife habitat similar to that found within the LAA. The marine component of the RAA includes the Prince Rupert Port Authority boundary and the waters extending 10 km to either side of the potential shipping route from the marine terminal to the Triple Island Pilotage Station.

Valued Component	Regional Assessment Area Boundary and Rationale
Freshwater Aquatic Resources	The RAA for freshwater aquatic resources includes the waters within Chatham Sound that are influenced by freshwater from the Skeena and Nass Rivers (as defined by data from Trites 1956).
Marine Resources	The RAA for marine resources will include the project development area, potential shipping routes (between the terminal and Triple Island pilotage station), plus a 10 km buffer on either side of the potential shipping routes to assess potential effects of underwater noise.
Economic Environment	The RAA for the economic environment consists of the communities within the mainland portion of the Skeena Queen Charlotte Regional District. This represents a large area where effects of the proposed Project may overlap with effects of other projects and activities in the area.
Navigation and Marine Resource Use	The RAA for navigation and marine resource use will include the PRPA Boundary and the waters extending 10 km to either side of the potential shipping routes from the marine terminal to the Triple Island Pilotage Station.
Infrastructure and Services	The RAA for infrastructure and services consists of the communities within the mainland portion of the Skeena Queen Charlotte Regional District and Highway 16 up to and including Terrace Airport.
Visual Quality	For visual quality, the RAA includes the portion of the viewshed greater than 8 km from the proposed project site.
Community Health and Well-being	The RAA for community health and well-being consists of the communities within the mainland portion of the Skeena Queen Charlotte Regional District.
Human and Ecological Health	The RAA for human and ecological health is a 50 km x 50 km square area centered on the facility on Lelu Island. The RAA addresses the area where potential project and cumulative effects to human and ecological health could occur from chemical changes to the environment, and increased noise and ambient light levels.
Archaeological and Heritage Resources	The RAA spatial boundaries for the archaeological and heritage resources assessment will be the same as the LAA which is the area of ground disturbance (including pre-construction site clearing) within the proposed project development area.

4.1.2.3 Administrative and Technical Boundaries

The administrative boundaries for the Project refer to limitation imposed on the assessment by political, economic or social constraints (e.g., municipal boundaries, wildlife management zones). Technical boundaries might include limitations in information, data analyses, and data interpretation relevant particular VCs. Each VC describes administrative and technical boundaries relevant to their assessment.

4.1.3 Baseline Conditions

For each VC, this EIS/Application contains a description of baseline conditions. These conditions are described with the relevant VC sections. Key elements of the baseline descriptions include:

- Requirements set out in the EIS Guidelines and AIR
- Appending and/or referencing of existing reports and documents as appropriate
- Collection, analysis and presentation data following appropriate provincial or federal standards (e.g., Resource Information Standards Committee)
- Provision of rationales for the selection of sampling sites and analytical parameters as appropriate

- Discussion on the quality and reliability of data sources and how they are used to support the assessment
- Incorporation of available traditional knowledge (TK) into the EIS/Application, in addition to information collected through field studies, surveys, and other research methods
- Description of field and laboratory methods, along with any quality assurance and quality control measures applied
- Reference to any relevant provincial, regional or local land use and management plans.

4.1.4 Assessment of Project-Specific Effects

4.1.4.1 Identification of Project Interactions

Assessment of potential project effects begins with a description of project activities and physical works that could result in an environmental effect of concern. A summary of these project activities is provided in Table 4-4.

Table 4-4: Overview of Project Activities

Project Activities	Description
Construction	
Site Preparation (land-based)	<ul style="list-style-type: none"> ▪ Tree removal (including CMTs), vegetation clearing, peat removal, grading, and general site preparation within terrestrial project development area (including the facility on Lelu Island, the bridge, and road access to the mainland)
Onshore Construction	<ul style="list-style-type: none"> ▪ Construction of a two-lane bridge connecting Lelu Island to the mainland (including bridge footings on the mainland) ▪ Construction, operation, and decommissioning of a temporary camp that would accommodate 3,500 to 4,500 people at peak construction for the purposes of constructing the facility and all related infrastructure, services, and facilities ▪ Construction of a heavy-haul road for construction traffic and transport of facility modules ▪ Construction of the LNG production facility (up to the point of connection with the natural gas transmission line), including: <ul style="list-style-type: none"> • Operation of a concrete batch facility • Excavating and pouring foundations • Installation of drainage systems • Constructing of the LNG trains (three 6.4 MTPA trains): <ul style="list-style-type: none"> ○ Feed gas receiving unit ○ Pressure let down unit ○ Gas treatment unit ○ Gas dehydration unit ○ Mercury removal unit ○ Fractionation Unit ○ Liquefaction unit • Construction of LNG storage tanks (three 180,000 m³ tanks) • Construction of utilities and offsite facilities: <ul style="list-style-type: none"> ○ Flare system ○ Electrical power supply ○ Bulk storage

Project Activities	Description
	<ul style="list-style-type: none"> ○ Water supply infrastructure ○ Wastewater treatment systems ○ Storm water management infrastructure ○ Fire control infrastructure ○ Nitrogen generation system ○ Compressed air system ● Construction of non-manufacturing facilities: <ul style="list-style-type: none"> ○ MOF ○ Site roads ○ Administrative and maintenance buildings ○ Site fencing ○ Site lighting ▪ Air emissions, noise, and light from use of construction equipment ▪ Power generation (use of diesel/generators)
Vehicle Traffic	<ul style="list-style-type: none"> ▪ Use of the two-lane bridge connecting Lelu Island to the mainland by construction workers and vehicles ▪ Use of roads on and offsite ▪ Air emissions
Dredging	<ul style="list-style-type: none"> ▪ Dredging within the MOF and for the marine terminal
Marine Construction	<ul style="list-style-type: none"> ▪ Construction of the pioneer dock ▪ Construction of a two-lane bridge connecting Lelu Island to the mainland (including bridge footings in Lelu Slough) ▪ Construction and use of the MOF <ul style="list-style-type: none"> ● Pile driving ● Berthing large roll-on-roll off barges and ships ▪ Construction of the marine terminal <ul style="list-style-type: none"> ● 2.4 km conventional pipe pile supported trestle ● Trestle and berth topside infrastructure including a control room, insulated cryogenic piping, pumping equipment, and LNG loading infrastructure ● Two LNG carrier berths (capable of berthing two 217,000 m³ LNG carriers up to 315 m in length) ● Two loading arms (one hybrid arm and one vapor return) ▪ Construction of breakwaters
Waste Management and Disposal	<ul style="list-style-type: none"> ▪ Disposal of cleared vegetation, peat, waste rock, and overburden ▪ Wastewater treatment systems (for sewage and other oily effluent) and a pipe connecting the mainland and the Port Edward wastewater sewage treatment facility ▪ Storm water management ▪ Solid wastes (garbage removed from island) ▪ Liquid wastes (effluents) ▪ Hazardous wastes
Disposal at Sea	<ul style="list-style-type: none"> ▪ Removal, transportation, and disposal of dredged sediments in Brown Passage
Operational Testing and Commissioning	<ul style="list-style-type: none"> ▪ Air emissions ▪ Noise emissions ▪ Light emissions ▪ Wastewater from tank commissioning

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Project Activities	Description
Site Clean Up and Reclamation	<ul style="list-style-type: none"> ▪ Post-construction site clean up ▪ Re-vegetation (if appropriate)
Operations	
LNG Facility and Supporting Infrastructure on Lelu Island	<ul style="list-style-type: none"> ▪ Operate 24 hours per day, 365 days per year ▪ LNG production and storage: <ul style="list-style-type: none"> • Up to three identical 6.4 MTPA liquefaction trains (two to be constructed in Phase 1 with provision for a third train in Phase 2) • Up to three 180,000 m³ full containment LNG storage tanks (two to be construction in Phase 1 with a provision for a third in Phase 2) • Two or more nitrogen generation and vaporization packages with liquid nitrogen storage • Instrument and facility compressed air system • Storage and use of additional facility materials ▪ Operation of gas-fired turbines capable of producing up to 1,100 MW of combined mechanical and electrical power (including spare units) ▪ Facility maintenance and testing <ul style="list-style-type: none"> • Maintenance of equipment to ensure safe and reliable operation • Inspection of equipment and facilities to maintain mechanical integrity and performance • Road and site maintenance • Inspection and maintenance of safety, civil structures, and environmental monitoring devices
Marine Terminal Use	<ul style="list-style-type: none"> ▪ Berthing and hoteling LNG carriers (315 m Q-Flex LNG carriers) ▪ Loading of LNG on LNG carriers
Shipping	<ul style="list-style-type: none"> ▪ For Phase 1 of the Project, one LNG carrier would be calling at the terminal approximately every two days ▪ For Phase 2 (at full build out) this would increase to approximately one LNG carrier per day and 350 per year calls on the terminal ▪ Ship and tug activities (including moorage and transit) between the terminal and the Triple Island pilotage station
Waste Management and Disposal	<ul style="list-style-type: none"> ▪ Facility Emissions and Waste: <ul style="list-style-type: none"> • Air emissions of NO_x, CO, SO₂, PM, VOCs, HAPs, and GHGs • Storm water runoff • Solid wastes (domestic waste, paper, cardboard, wood and metal) • Liquid waste (liquid effluent treated onsite, treated effluent transported to municipal system) • Hazardous wastes (solvents, trace mercury, catalyst, oil, medical and biological waste)Physical and chemical management of vegetation on Lelu Island and the mainland ▪ Vegetation Management: <ul style="list-style-type: none"> • Herbicides and disposal of vegetation ▪ Shipping waste: <ul style="list-style-type: none"> • Waste from shipping will be managed in accordance with MARPOL and other applicable regulations
Fish Habitat Offsetting	<ul style="list-style-type: none"> ▪ Fish habitat constructed as part of the fish habitat offsetting strategy
Wetland Habitat	<ul style="list-style-type: none"> ▪ Wetland habitat constructed or enhanced as a component of the wetland

Project Activities	Description
Compensation	compensation strategy
Decommissioning	
Dismantling Facility and Supporting Infrastructure	<ul style="list-style-type: none"> ▪ Dismantle/recycle facility equipment and supporting infrastructure
Dismantling of Marine Terminal	<ul style="list-style-type: none"> ▪ Terminal and MOF likely to remain in place ▪ Associated infrastructure (piping etc.) would be dismantled
Waste Disposal	<ul style="list-style-type: none"> ▪ Facility components recycled or disposed of
Site Clean Up and Reclamation	<ul style="list-style-type: none"> ▪ Preparation of the disturbed portion of Lelu Island for other industrial purposes or reclamation to restore ecological values in consultation with PRPA

An interaction matrix of project activities during each phase and the VCs chosen for inclusion in the assessment is presented in Table 4-5. Based on relevant literature, other environmental assessments, and professional judgment, the table indicates the potential for an activity to interact with each VC, i.e., those interactions ranked as 1 or 3, as defined below).

In the assessment for each VC, a table is provided that ranks the interaction for those interactions in Table 4-4 that have a check mark. For the ranking provided in each VC section, the following ranks, as defined, are used:

- 0 = No interaction.
- 1 = Potential adverse effect requiring mitigation, but further consideration determines that any residual adverse effects will be eliminated or reduced to negligible levels by existing codified practices, proven effective mitigation measures, or Best Management Practices
- 2 = Interaction may occur and the resulting environmental effect may exceed acceptable levels without implementation of project-specific mitigation. Further assessment is warranted.

The ranking takes a conservative approach, whereby interactions with a meaningful degree of uncertainty are ranked 2, indicating that a detailed effects assessment is conducted in that VC section. The intent of the project interaction table is to identify where the higher risk interactions occur and focus the environment, heritage and human effects assessment on these interactions. Lower risk interactions (i.e., 0 and 1) and related effects are more briefly assessed.

Table 4-5: Potential for Substantive/Meaningful Project-Environment Interactions

Project Activities and Physical Works	Air Quality	Greenhouse Gas Management	Acoustic Environment	Ambient Light	Vegetation and Wetland Resources	Terrestrial Wildlife and Marine Birds	Freshwater Aquatic Resources	Marine Resources	Economic Environment	Navigation and Marine Resource Use	Infrastructure and Services	Visual Quality	Community Health and Well-being	Human and Ecological Health	Archaeological and Heritage Resources	Current Use of Lands and Resources for Traditional Purposes	
Construction																	
Site Preparation (land-based)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Onshore Construction	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Vehicle Traffic	✓	✓	✓	✓		✓					✓		✓	✓			✓
Dredging	✓	✓	✓			✓		✓			✓	✓		✓	✓	✓	✓
Marine Construction	✓	✓	✓	✓		✓		✓			✓	✓	✓	✓	✓	✓	✓
Waste Management and Disposal						✓	✓	✓				✓			✓		✓
Disposal at Sea	✓	✓				✓		✓			✓			✓	✓		✓
Operational Testing and Commissioning	✓	✓	✓	✓		✓		✓						✓	✓		✓
Site Clean Up and Reclamation	✓	✓	✓	✓		✓		✓				✓		✓	✓		✓

Project Activities and Physical Works	Air Quality	Greenhouse Gas Management	Acoustic Environment	Ambient Light	Vegetation and Wetland Resources	Terrestrial Wildlife and Marine Birds	Freshwater Aquatic Resources	Marine Resources	Economic Environment	Navigation and Marine Resource Use	Infrastructure and Services	Visual Quality	Community Health and Well-being	Human and Ecological Health	Archaeological and Heritage Resources	Current Use of Lands and Resources for Traditional Purposes
Operation																
Operation of LNG Facility and Supporting Infrastructure on Lelu Island	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓
Marine Terminal Use	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓	✓		✓
Shipping	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓	✓		✓
Waste Management and Disposal					✓	✓	✓	✓			✓			✓		✓
Fish Habitat Offsetting						✓	✓			✓						✓
Wetland Habitat Compensation						✓				✓						✓
Facility Decommissioning																
Dismantling Facility and Supporting Infrastructure	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓
Dismantling of Marine Terminal	✓	✓	✓	✓		✓		✓		✓	✓		✓	✓		✓
Waste Disposal						✓	✓	✓			✓		✓	✓		✓
Site Clean Up and Reclamation	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓		✓

4.1.4.2 Potential Effects

For each VC, the mechanisms are described whereby specific project activities and actions are anticipated to result in potential effects on the biophysical or human environment. Where possible, the spatial and temporal extents of these anticipated changes (i.e., where and when the potential effects might occur) are also described.

4.1.4.3 Mitigation

Mitigation is defined as “any practical means or measures taken to avoid, minimize, restore onsite, compensate, or offset the potential adverse effects of a project” (BC EAO 2013). CEAA 2012 further notes that mitigation measures must be “technically and economically feasible”. Mitigation can include specialized measures such as habitat compensation, replacement, transplant and timing considerations.

Mitigation measures that will reduce or eliminate an adverse effect will be described for each VC, with an emphasis on how these measures will help alter the effect. Where possible, the effectiveness of the proposed mitigation measure(s) will be expressed in terms of the expected change in the measurable parameter(s) for the effect. In some cases, mitigation may include monitoring programs to verify results or to monitor effectiveness of mitigation measures.

4.1.4.4 Characterization of Residual Effects

Under CEAA 2012 and BCEAA, the determination of significance is central to decision-making. Accepted practice in meeting this requirement involves establishing and applying evaluation criteria for the determination of significance. The following criteria are used to quantitatively or qualitatively characterize the residual effects for each VC. Definitions are provided when qualitative terms are used.

- **Context:** refers primarily to the current and future sensitivity and resilience of the VC to change caused by the project. Consideration of context draws heavily on the description of existing conditions of the VC, which reflect cumulative effects of other projects and activities that have been carried out, and especially information about the impact of natural and human-caused trends in the condition of the VC. (i.e., low, medium or high resilience).
- **Magnitude:** refers to the expected size or severity of the residual effect. When evaluating the magnitude of residual effects, the proportion of the VC affected within the spatial boundaries and the relative effect (i.e., negligible, low, moderate, high) is considered.
- **Extent:** refers to the spatial scale over which the residual effect is expected to occur (i.e., within the PDA, LAA, or RAA)
- **Duration:** refers to the length of time the residual effect persists—which may be longer than the duration of the physical work or activity that is anticipated to cause the residual effect (i.e., short-term, medium-term, long-term, permanent)
- **Reversibility:** pertains to whether or not the residual effect on the VC can be reversed once the physical work or activity causing the disturbance ceases (i.e., reversible or irreversible)

- **Frequency:** refers to how often the residual effect occurs and is usually closely related to the frequency of the physical work or activity causing the residual effect (i.e., single event, multiple irregular events, multiple regular events, continuous)

4.1.4.5 Likelihood

Likelihood refers to whether or not a residual effect is likely to occur. This may be influenced by a variety of factors, such as the likelihood of a causal disturbance occurring or the likelihood of mitigation being successful. The likelihood of a residual effect occurring is described for each effect, and along with the characterization of the effects, contributes toward a determination of significance where appropriate.

4.1.4.6 Determination of Significance of Residual Effects

A conclusion on the significance of any residual project effects is included for each VC. Where possible, threshold criteria or management standards are identified, above which a residual effect is considered significant. Standards are recognized government or industry regulations or objectives for physical aspects such as air quality, water quality, or effluent release. These thresholds reflect the limits of an acceptable state for a biophysical or human environmental component, based on resource management objectives, community standards, scientific literature, or ecological processes (e.g., desired states for wildlife habitats or populations). Where standards or thresholds do not exist, significance criteria have been defined and justifications for the criteria provided. For each VC, a clear indication of how or whether consideration of likelihood has influenced the determination of significance.

4.1.4.7 Confidence and Risk

The level of confidence is provided for in each prediction, which is typically based on expert judgment, and characterizes the level of uncertainty associated with both the significance and likelihood determinations. A characterization of level of uncertainty is provided for each significance determination based on scientific information, statistical analysis, professional judgment, effectiveness of mitigation, and assumptions made. This includes consideration of the confidence and risk associated with the effectiveness of proposed mitigation measures. A description is provided of any inherent risk associated with that prediction should risk exist. Any follow-up measures to reduce uncertainty are described in the follow-up program described in Section 4.8.

4.1.5 Summary of Residual Effects

For each VC, a summary of residual effects and their significance is provided.

4.2 Assessment of Cumulative Effects

The cumulative effects assessment uses the approach outlined in the CEA Agency's Operational Policy Statement Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*. The cumulative effects assessment considers the baseline effects that have resulted or are resulting from other past physical works and activities. Then, the cumulative contribution of the residual environmental effects of the proposed Project is considered. Finally, the cumulative contribution of other known and announced projects and activities (as determined by the project inclusion list [see Table 4-5]) is considered.

4.2.1 Project Inclusion List

The cumulative contribution of all past, present, and reasonably foreseeable (those that are likely to occur) projects listed in Table 4-6 and shown in Figure 4-1 will be considered. Future projects and activities considered in the cumulative effects assessment are restricted to those that:

- Have been publicly announced with a defined project execution period and with sufficient project details for assessment
- Are currently undergoing an environmental assessment
- Are in a permitting process.

Table 4-6: Project Inclusion List for the Cumulative Effects Assessment

Facility	Description
Atlin Terminal	The Atlin Terminal is a tourism center/dock for small ships in Prince Rupert. It is currently in operation.
Canpotex Potash Export Terminal	The Canpotex Potash Export Terminal and Rail, Road, and Utilities Loop is an approved project. This project is currently in the permitting stage.
CN Rail Line	The CN rail line is currently in operation.
Douglas Channel LNG	The Douglas Channel LNG Project is a proposed floating LNG export facility located in Douglas Channel near Kitimat.
Enbridge Northern Gateway Project	This is a proposed oil export terminal in Kitimat.
Fairview Container Terminal Phase I	The Fairview Container Terminal is a conversion from a bulk and break-bulk terminal to an intermodal container terminal. This is currently operational.
Fairview Container Terminal Phase II	This is the container terminal expansion to Phase I of the project. It is approved and is in the permitting stage.
Kitimat LNG Terminal Project	This is a proposed LNG export facility on Bish Cove, south of Kitimat.
LNG Canada Project	This is a proposed LNG export facility in the District of Kitimat.
Mount McDonald Wind Power Project	This wind energy project has an environmental assessment certificate but has not proceeded into the permitting or development phase.
NaiKun Wind Energy Project	The cable landing for this offshore wind energy project is in the Prince Rupert Area. This wind energy project has an environmental assessment certificate but has not proceeded into the permitting or development phase.
Northland Cruise Terminal	The cruise ship terminal is operational.
Odin Seafood	This commercial seafood packaging facility is operational.
Pinnacle Pellet Inc.	Wood pellet transfer (pellets brought in from Houston, BC), export (to Asia), and storage facility on Kaien Island.
Prince Rupert LNG Facility	This is a proposed LNG export facility on Ridley Island.
Prince Rupert Gas Transmission Project	This is the proposed incoming pipeline to supply natural gas directly to Pacific NorthWest LNG Project.
Prince Rupert Ferry Terminal	This ferry terminal for BC Ferries and Alaska Ferries is operational.

Facility	Description
Prince Rupert Industrial Park	This industrial area containing a saw mill, car manufacturer facility, car mechanics shop is operational
Prince Rupert Grain Limited	This grain storage and handling terminal is operational.
Ridley Island Log Sort	This dry land log sort is operational
Ridley Terminals Inc.	This coal, petroleum coke, wood pellets storage, and handling terminal is operational.
Rio Tinto Alcan Aluminium Smelter and Modernization Project	This is an approved project for a modernized facility to be updated and expanded the facilities smelter by 2014.
WatCo Pulp Mill	This project is for the proposed reuse of Skeena/China Cellulose pulp mill that is currently not operational – would ship metallurgical coal, grain, potash and other commodities.
Westcoast Connector Gas Transmission Project	This is the proposed incoming pipeline to supply natural gas directly to proposed Prince Rupert LNG Project.

4.2.2 Cumulative Effects Assessment

Cumulative effects are considered for each VC that is shown to have residual effects. The residual cumulative effects are characterized and evaluated using the same criteria and significance thresholds established for the project-specific effects.

Not all residual effects will contribute to measurable cumulative effects. A detailed cumulative effects assessment is only included for a VC if all three of the following conditions are met for the environmental, economic, social, heritage, and health effects under consideration:

- The Project results in a demonstrable or measurable residual effect on a component of the biophysical or human environment
- The project-specific residual effect on that VC does, or is likely to, act in a cumulative fashion with the effects of other past, existing or future projects and activities in the area (i.e., there is an overlap of effects)
- There is a reasonable expectation that the combined cumulative effects of all other projects and the project-specific effects, together, will adversely affect the resource value in a meaningful way.

The assessment of each cumulative effect begins with a description of the effect and the mechanisms whereby the effects from the Project might interact with other projects and activities in the VC-defined spatial boundaries.

Where it has been determined that potential project effects on the VC do not, or are unlikely to, act cumulatively with effects of other past, existing or future projects and activities in the area, or where there is a reasonable expectation that the combined cumulative effects are unlikely to result in a change in the viability or sustainability of the resource, a brief assessment is conducted.

Mitigation measures available to PNW LNG to reduce identified potentially adverse cumulative effects are described for each effect, including a discussion of how these measures might modify the characteristics of an effect. Mitigation measures that would require government action or a broader industry approach are briefly identified but not discussed in detail.

This EIS/Application includes a determination of the significance of the residual cumulative effects using the same standards or thresholds established for the effects on individual VCs.

4.3 Accidents or Malfunctions

As required by section 19(1)(a) of CEEA 2012, potential accidents and malfunctions are assessed for the Project. The specific accidents or malfunctions considered for this assessment are:

- Emergency flaring and LNG facility shutdown
- Explosion or fire
- Fuel or hazardous material spill (at the storage or loading facilities from mobile equipment and storage vessels)
- LNG spill (at the storage or loading facilities)
- Marine vessel allision (vessel striking another fixed vessel or object), grounding or collision (two moving vessels).

For each event, a preliminary assessment was conducted to determine if the scenario is likely to affect each VC. For each event, the assessment includes:

- A description of the event.
- The methodology for assessing the potential risk of each event
- Definitions for each category of likelihood and consequence
- The assessment the probability of the event occurring
- The identification of proposed measures to reduce the likelihood of the event
- The assessment of effects and/or consequences that may result from such events
- The identification of measures to mitigate the effects/consequences
- The conclusions on the potential risk of the accident or malfunction.

Effects from accidents and malfunctions are characterized using the same terms as routine project effects. The significance of the effect is determined using the same thresholds as used for the routine project effects.

4.4 Effects of the Environment on the Project

As required by section 19(1)(h) of CEAA 2012, this EIS/Application considers the changes to the Project resulting from the following natural events (see Section 21):

- Extreme weather
- Seismic activity
- Tsunamis
- Climate change and sea level rise.

For each of the above environmental factors, the assessment identifies:

- How the environmental factors result in changes or effects on the Project
- The likelihood and severity of the changes or effects on the Project
- Mitigation measures planned to avoid or reduce the likelihood and severity of the changes or effects, including design strategies.

4.5 Environmental Management Plans

A summary of environmental and operational management plans that will be developed for the Project is provided in Section 24. These summaries outline the environmental protection measures to be implemented on the project site to eliminate or reduce environmental effects. These procedures include performance-based environmental requirements in accordance with regulatory approvals, best management practices (BMPs), and engineering specifications.

4.6 Aboriginal Rights and Related Interests

Aboriginal rights (including “Aboriginal Interests” as defined in the BC EAO section 11 order) are discussed in Section 27.1. Other matters of concern to Aboriginal people are discussed in Section 27.2. This includes discussion of the following Aboriginal groups:

- Metlakatla First Nation
- Lax Kw’alaams First Nation
- Gitxaala Nation
- Kitselas First Nation
- Kitsumkalum First Nation.

4.7 Benefits to Canadians

Section 29 provides information on changes to the Project since initially proposed, and benefits of the Project. This includes discussion of how changes in the Project are beneficial, and information on financial, employment and social benefits arising from the Project.

4.8 Follow-up Program

Where applicable each VC assessment identifies and develops proposed follow-up programs to verify the accuracy of the environmental assessment predictions and/or determine the effectiveness of any mitigation measures. See Section 30 for details of proposed follow-up programs.

4.9 References

- BC Environmental Assessment Office (BC EAO). 2013. *Guideline for the Selection of Valued Components and Assessment of Potential Effects*. September 9, 2013. Available at: http://www.eao.gov.bc.ca/pdf/EAO_Valued_Components_Guideline_2013_09_09.pdf. Accessed: January 2014.
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- Trites, R. W. 1952. "The Oceanography of Chatham Sound". M. A. Thesis. Department of Physics, University of British Columbia. In: Gottesfeld, A. S., C. Carr-Harris, B. Proctor and D. Rolston. 2008. *Sockeye Salmon Juveniles in Chatham Sound*. 2007. Skeena Fisheries Commission.

4.10 Figures

Please see the following pages.



Project Locations Status <ul style="list-style-type: none"> ● Approved ● Operational ● Proposed — Project Component - - - Turning Basin ■ Proposed or Existing Industrial Development Footprint 		<ul style="list-style-type: none"> Airport ● City or Town - - - Electrical Power Transmission Line — Highway — Railway — Secondary Road — Watercourse ■ Indian Reserve Prince Rupert Port Authority Boundary Protected Area Waterbody 	<p style="text-align: center;">Pacific NorthWest LNG</p> <p style="text-align: center;">Past, Present, and Reasonably Foreseeable Projects Near the PNW LNG Project</p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of this data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY: </p> <p>PREPARED FOR: </p> <p>FIGURE NO: 4-1</p>
<p>DATE: 11-FEB-14 FIGURE ID: 123110537-312 DRAWN BY: K. POLL</p>		<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: B. BYRD</p>		

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