

# **PACIFIC NORTHWEST LNG PROJECT**

## **ASSESSMENT REPORT**

With Respect to  
the Application by Pacific NorthWest LNG Limited Partnership  
for an Environmental Assessment Certificate  
pursuant to the *Environmental Assessment Act*, S.B.C. 2002, c.43

Prepared by:

Environmental Assessment Office

November 5, 2014



## Preface

The Environmental Assessment Office (EAO) manages the assessment of proposed major projects in British Columbia, as required by the *Environmental Assessment Act* (Act). The process includes:

- Opportunities for the involvement of all interested parties;
- Consultations with Aboriginal Groups;
- Technical studies to identify and examine potential significant adverse effects;
- Strategies to prevent or reduce adverse effects; and
- Comprehensive reports summarizing input and findings.

At the conclusion of each environmental assessment, EAO provides a comprehensive assessment report (Assessment Report), and makes recommendations to the Minister of Environment and, for natural gas proposals, to the Minister of Natural Gas Development. The Ministers may decide to certify a project, decline to certify a project, or require further assessment.

This Assessment Report considers the potential for the Pacific NorthWest Project (proposed Project) to cause significant adverse environmental, economic, social, heritage and health effects. It identifies measures to prevent or reduce adverse effects and sets out EAO's analysis and conclusions. It also documents the work undertaken by EAO to consult and accommodate Aboriginal Groups and treaty nations, in keeping with the Supreme Court of Canada's direction in *Haida v. Minister of Forests* and related case law.

Information and records relating to environmental assessments are available on the EAO website at [www.eao.gov.bc.ca](http://www.eao.gov.bc.ca). Questions or comments can be directed to:

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## Acronyms Used in the Assessment Report

Act	<i>Environmental Assessment Act</i>
AAQO	ambient air quality objectives
AIA	Archaeological Impact Assessment
AIR	Application Information Requirements
ASET	Aboriginal Skills and Employment Training
ATTL	Allied Tsimshian Tribes of Lax Kw'alaams
BA	Benefits Agreement
BAT	best achievable technology
CAC	criteria air contaminants
C&E	Compliance and Enforcement (Program)
CCME	Canadian Council of Ministers of the Environment
CDC	Conservation Data Centre
CEAA	Canadian Environmental Assessment Agency
CEPA	<i>Canadian Environmental Protection Act</i>
CMP	Compliance Management Plan
CMT	Culturally Modified Trees
CH <sub>4</sub>	methane
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalents
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPD	Certified Project Description
CTS	Culture and Traditions Study
CWS	Canadian Wildlife Service
dB	decibel
DFO	Fisheries and Oceans Canada
DI&M	Directed Inspection and Maintenance
EA	Environmental Assessment
EAO	Environmental Assessment Office
EMP	Environmental Management Plan
EIS	Environmental Impact Statement
EPC	Engineering, Procurement and Construction
ePIC	EAO electronic Project Information Centre
ERP	Emergency Response Plan
ESI	Environmental Stewardship Initiative
FEED	Front End Engineering Design
FLNR	Ministry of Forests, Lands and Natural Resource Operations
FRPA	<i>Forest and Range Practices Act</i>
GDP	Gross Domestic Product
GHG	greenhouse gas
ha	hectare
hr	hour
H <sub>2</sub> O	water
H <sub>2</sub> S	hydrogen sulphide
HFC	hydro-fluorocarbons
IPCC	Intergovernmental Panel on Climate Change
kV	kilovolt
LAA	Local Assessment Area
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
LHA	Local Health Area
LNG	liquefied natural gas
LSA	Local Study Area

MAML	Mobile Air Quality Monitoring Laboratory
MAMP	Monitoring and Adaptive Management Plan
Eq/ha/year	equivalence per hectare per year
MOE	Ministry of Environment
MOF	materials offloading facility
MOTI	BC Ministry of Transportation and Infrastructure
MOU	Memoranda of Understanding
Mt	million tonnes
MTPA	million tonnes per annum
NAAQS	National Ambient Air Quality Standards
N <sub>2</sub> O	nitrous oxide
NHSDA	Northwest Health Services Delivery Area
NO <sub>2</sub>	nitrogen dioxide
O <sub>3</sub>	ozone
OGC	Oil and Gas Commission
PDA	project development area
PFC	perfluorocarbons
PNW	Pacific NorthWest
Proponent	Pacific NorthWest LNG Limited Partnership
PETRONAS	Petroliam Nasional Berhad
PM	particulate material
PRACA	Prince Rupert Area Corridor Analysis
PRPA	Prince Rupert Port Authority
PY	person years
RAA	Regional Assessment Area
RCMP	Royal Canadian Mounted Police
RSA	Regional Study Area
SARA	<i>Species at Risk Act</i>
SEEMP	Socio-Economic Effects Management Plan
SF <sub>6</sub>	sulphur hexafluoride
SO <sub>2</sub>	sulphur dioxide
TERMPOL	Technical Review Process of Marine Terminal Systems and Transshipment Sites
TEU	20-foot equivalent units
TLUS	Traditional Land Use Studies
TOC	Table of Conditions
TSS	total suspended solids
TUS	Traditional Use Study
US EPA	US Environmental Protection Agency
VC	Valued Component
VOC	volatile organic compounds
WHO	World Health Organization
WMU	Wildlife Management Unit
WQG	water quality guidelines
YPR	Prince Rupert Airport
YXT	Northwest Regional Airport Terrace-Kitimat

## **PART A – INTRODUCTION AND BACKGROUND**

### **1 Purpose of the Report**

The purpose of this Assessment Report is to summarize the procedures and findings of the Environmental Assessment (EA) conducted on the Application by the Proponent for an EA Certificate for the proposed Project.

EAO is required to prepare this Assessment Report for provincial Ministers who are responsible for making a decision on the proposed Project under Section 17 of the *Environment Assessment Act (Act)*. For liquefied natural gas (LNG) facility projects, the deciding Ministers are the Minister of the Environment and the Minister of Natural Gas Development.

The report:

- Describes the proposed Project, provincial EA process, and consultations undertaken during the EA;
- Documents work undertaken by EAO to consult and accommodate Aboriginal Groups in keeping with the Supreme Court of Canada's direction in *Haida v. Minister of Forests* and related case law;
- Identifies the potential environmental, economic, social, heritage and health effects of the proposed Project and how the Proponent proposes to mitigate effects;
- Identifies the residual effects after mitigation;
- Identifies the conditions proposed by EAO; and
- Sets out conclusions based on the proposed Project's potential for significant adverse residual effects.

In keeping with the Act, the EA is focused on specific environment, economic, social, health and heritage Valued Components (VCs) considered important to assess in order to understand the potential for significant adverse effects of the proposed Project.

This Assessment Report does not replicate the content presented in the Application. The Application and supplemental information provided by the Pacific NorthWest LNG Limited Partnership (Proponent), Working Group and Aboriginal Group comments on the Application and supplemental information and other material, and other information received during the EA process from Working Group members, Aboriginal Groups and members of the public have all been considered in the preparation of this Assessment Report and are posted to EAO's electronic Project Information Centre (ePIC).

## **2 Project Overview**

### **2.1 Proponent Description**

The proposed Project would be designed, owned and operated by the Proponent which is majority-owned by Petroliam Nasional Berhad (PETRONAS). PETRONAS is wholly owned by the Government of Malaysia. PETRONAS is a fully integrated gas business, involved in exploration and production, processing and liquefaction, pipeline operations, shipping, and regasification. PETRONAS' gas and power business processes, liquefies, transmits, markets and trades LNG and other gases.

At the time of the submission of the Application, Japan Petroleum Exploration Company (JAPEX) and PetroleumBRUNEI were minority shareholders in Pacific NorthWest LNG and its associated natural gas supply. Since the Application was submitted, Indian Oil Corporation and SINOPEC became minority partners in Pacific NorthWest LNG Limited Partnership.

On July 5, 2013, the Proponent applied for and, on December 16, 2013, received, a Licence to Export Liquefied Natural Gas from the National Energy Board pursuant to Section 117 of the *National Energy Board Act*. The licence authorizes the Proponent to export up to 19.68 metric tonnes per year for 25 years.

The Proponent's engineering, procurement, construction (EPC) and commissioning contractor would construct and commission the facility and the Proponent would own and operate it.

### **2.2 Project Description and Scope**

#### **2.2.1 Project Description and Location**

The proposed Project would involve the construction and operation of a LNG export facility, primarily located on Lelu Island at the Port of Prince Rupert, BC. Lelu Island and its surrounding waters are under the jurisdiction of the Prince Rupert Port Authority (PRPA), a Canadian Port Authority under the *Canada Marine Act* and its regulations. Lelu Island is about 192 hectare (ha) in size. It lies approximately 2 km from the town centre of Port Edward and 15 km south of the City of Prince Rupert (Figure 2-1). The Project's proposed development area is approximately 261 ha: about 160 ha on Lelu Island and 100 ha of marine infrastructure. The proposed Project's components on the mainland would be limited to infrastructure connecting the bridge and road from Lelu Island to the mainland, with a disturbance area of less than one ha.

The proposed Project would also include Water Lot E off the west-northwest corner of Lelu Island, and two water lots at the location of the materials offloading facility (MOF) and the bridge. A small parcel of private land is also required on the mainland where the proposed road to Lelu Island would connect.

Shipping and other supporting marine traffic activity was assessed along the marine access route between the facility marine terminal and the pilot station at Triple Island.

The proposed Project would be constructed in two distinct phases. Development of the proposed Project would require construction of the following infrastructure:

- Two trains in Phase 1 with the capacity to produce 12.8 million tonnes per year of LNG and one additional train in Phase 2 that would increase capacity of the facility to produce 19.2 million tonnes per year of LNG;
- Two 180,000 m<sup>3</sup> storage tanks in Phase 1 and one additional 180,000 m<sup>3</sup> storage tank in Phase 2 with a total storage capacity of 540,000 m<sup>3</sup>;
- Trestle with two berths, including 100 ha of marine infrastructure, with a 2.7-km cable suspension bridge (1.6 km) and traditional pipe pile jetty (1.1 km) from Lelu Island to Chatham Sound;
- Utilities to support two trains in Phase 1, and expanded to support an additional train in Phase 2;
- MOF, which may be refurbished for Phase 2 depending on the delay between the phases;
- Bridge and roads; and
- Temporary construction facilities to support construction and commissioning of two trains in Phase 1; and, for Phase 2, some facilities would be developed and some may be refurbished from Phase 1, depending on time gap between phases.

The proposed Project would also require a construction worker accommodation facility during construction, which is planned to be owned and operated by a third party.

The proposed Project would be supplied with natural gas from the proposed Prince Rupert Gas Transmission Project, which is a separate project (subject to a separate provincial EA) and is not included in the scope of the proposed Project EA.

If an EA Certificate is issued, and other regulatory approvals are received, construction of the proposed Project would be scheduled to start in 2015. The proposed Project would be expected to be commissioned by 2019.

Figure 2-1 shows the location and configuration of the proposed Project as was presented in the Application. Section 3.4 below describes changes to the proposed Project due to the EA process, and Figure 3-1 shows the new configuration of the marine terminal.

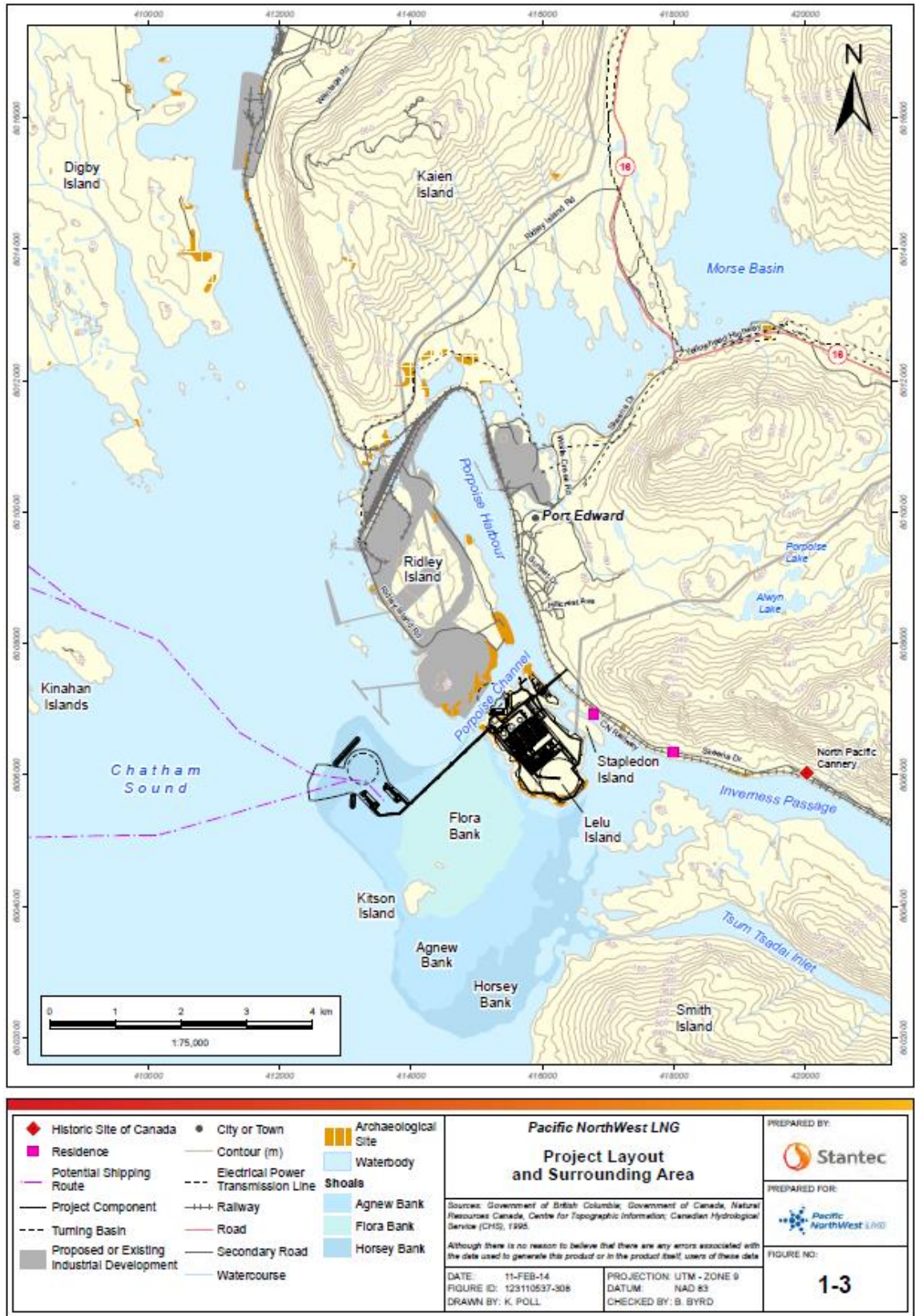


Figure 2-1: Location of the proposed Pacific NorthWest LNG Project.

### **2.2.2 Project Area Context**

The purpose of the proposed Project is to liquefy natural gas originating from Progress Energy Canada Ltd. gas reserves in northeastern BC for export to markets in Asia. The proposed Project does not include the gas pipeline infrastructure, which is proposed by TransCanada Pipeline Corporation and known as the Prince Rupert Gas Transmission project, which is subject to a separate EA by the Province of British Columbia.

The Port of Prince Rupert has a long history as an important deep water port transporting commodities such as coal, grain and forest products, and other materials for export, as well as being a major west coast terminus of imported products. The proposed Project represents a new and technologically sophisticated industry that would build on Prince Rupert's strategic geographic proximity to Asian markets for LNG.

Traditionally, the economy of the Skeena-Queen Charlotte Regional District was sustained by fishing and forestry. Up until the 1980s, much of the northwest experienced rapid population growth. Young families were attracted to the region by BC's expanding resource industry base (forestry, with additional activity in mining, oil and gas, fishing and agricultural development). Since the late 1990s, the City of Prince Rupert, the District of Port Edward and surrounding areas have experienced industrial closures in the resource sector and a general decline in shipments of grain and coal out of Prince Rupert's port facilities.

The Skeena Queen Charlotte Regional District has generally experienced a loss of population over the last 20 years, and encountered greater levels of unemployment than BC has overall (14.4% in 2011 compared with 6.7% for the rest of the province). Economic activities in the regional district currently include fishing, forestry, energy, transportation and tourism. The Port of Prince Rupert serves as a major economic driver in the regional district.

Lelu Island is located within the asserted traditional territories of a number of Tsimshian Aboriginal Groups, including Metlakatla First Nation, Lax Kw'alaams First Nation, Gitxaala Nation, Kitselas First Nation and Kitsumkalum First Nation. During the Pre-Application and Application Review stages, Gitga'at First Nation submitted correspondence to EAO asserting Aboriginal Interests in the Prince Rupert Harbour area.

### **2.2.3 Overview of Liquefied Natural Gas Production and Export Facilities**

LNG is natural gas cooled to  $-162^{\circ}\text{C}$ , the point at which gas condenses to a liquid. When natural gas is converted to liquid, its volume is 1/600th of its vapour state, which allows it to be transported efficiently over greater distances. When cooled to a liquid form, LNG is non-corrosive, non-toxic and non-pressurized and disperses quickly when exposed to air.

## 2.2.4 Project Components of Typical LNG Facilities

- LNG processing lines or production units, also known as trains, where natural gas is converted to a liquid;
- Storage tanks that store the LNG before it is shipped;
- Marine terminals for LNG carriers, including jetties and vessel berths;
- Marine access route, and
- MOF, used to berth roll-on/roll-off, heavy-lift vessels and barges to transport material for facility construction.

As described in Figure 2-2, the production and exportation of LNG has three overall phases: pre-treatment, liquefaction, and storage and loading. The main processing or production units of an LNG facility are referred to as “trains,” where natural gas is converted to liquid.

The Project proposes the construction of two LNG trains in Phase 1 and an additional train in Phase 2, for a total three-LNG-train facility at full build-out. Phase 1 includes two 180,000 m<sup>3</sup> cryogenic storage tanks followed by one additional 180,000 m<sup>3</sup> storage tank in Phase 2. Each train would be capable of liquefying 6.4 million tonnes per annum (MTPA) of natural gas during operations.

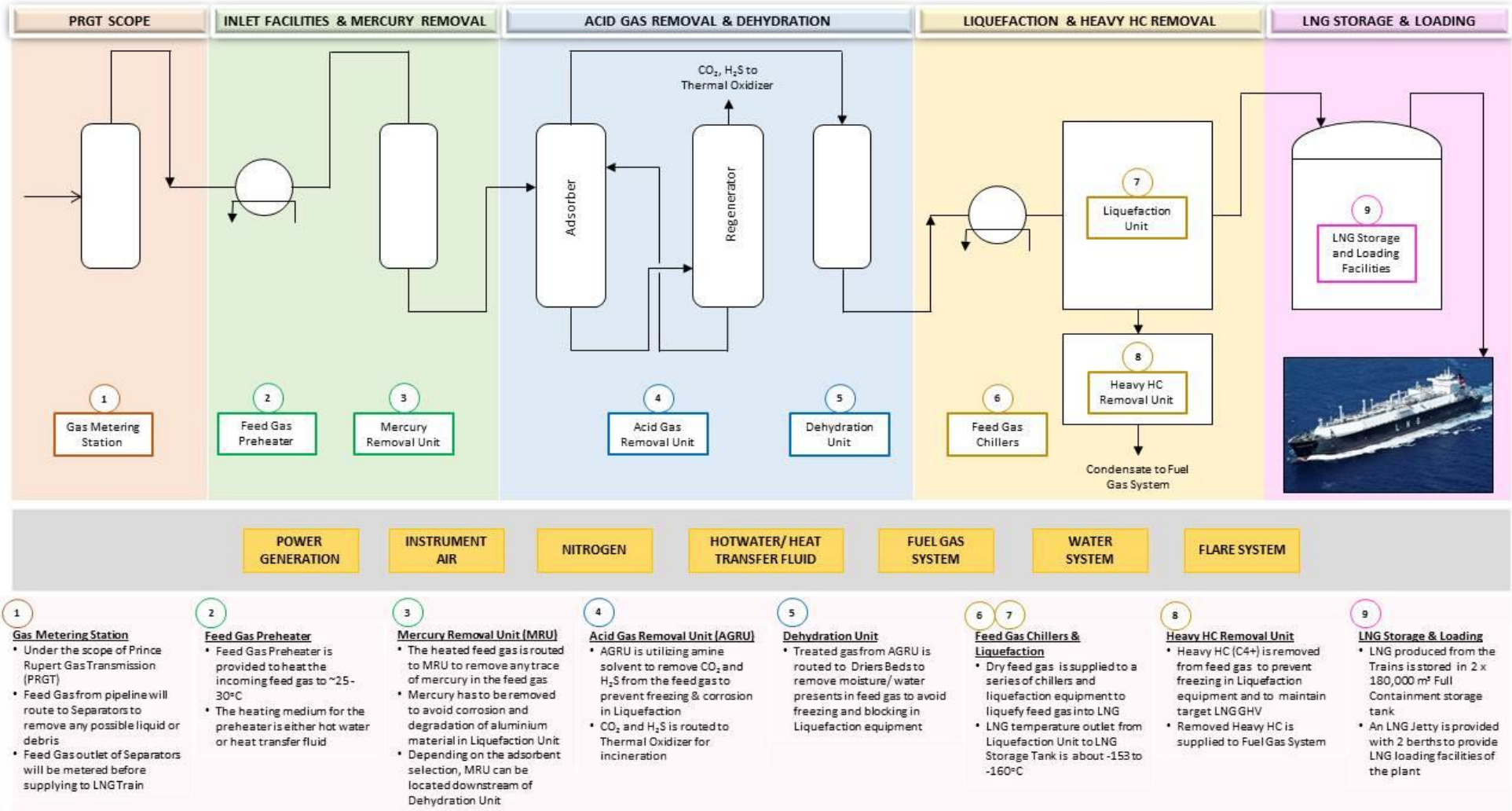


Figure 2-2: Liquefied natural gas production

## **2.2.5 Project Activities**

### **Construction**

Phase 1 of construction of the proposed Project would last three to four years. The commencement and duration of Phase 2 of construction is to be determined.

Construction works and activities include:

- Site preparation (land based);
- Onshore construction;
- Vehicle traffic;
- Dredging;
- Marine construction;
- Waste management and disposal;
- Disposal at sea;
- Operational testing and commissioning; and
- Site clean-up and reclamation.

### **Operations**

Once the first phase of construction is complete, the proposed Project would be commissioned and the operations phase would then begin. The life of the proposed Project is estimated to be in excess of 30 years. The proposed Project would be designed to allow for continuous operation, 24 hours a day and 365 days a year.

Operational activities include:

- Operation of LNG facility and supporting infrastructure on Lelu island;
- Marine terminal use;
- Shipping (between the terminal and Triple Island); and
- Waste management and disposal.

### **Decommissioning and Abandonment**

At the end of the life of the proposed Project (estimated to be in excess of 30 year) the facility may be decommissioned, if rejuvenation is not considered feasible.

Decommissioning activities will likely include:

- Development of a decommissioning and final rehabilitation plan, in consultation with PPRA, applicable regulatory authorities and Aboriginal Groups;
- Dismantling facility and supporting infrastructure;
- Dismantling of marine terminal;
- Waste disposal; and
- Site clean-up and reclamation.

## 2.2.6 Alternative Means of Undertaking the Proposed Project

Alternative means are the various ways that are technically and economically practical to implement and carry out the proposed Project. The Proponent evaluated technical feasibility during preliminary engineering design, and evaluated economic feasibility, capital costs, and operating and life cycle (i.e., equipment maintenance and replacement) costs. The Proponent then considered the environmental effects of those alternatives deemed to be technically and economically feasible, and determined where environmental effects might arise.

The Application identifies a number of factors considered by the Proponent when evaluating alternative options, such as:

- LNG production processes (e.g., Propane pre-cooled mixed refrigerant, ConocoPhillips Optimized Cascade and Dual mixed refrigerant);
- Main refrigerant compressor drivers (e.g., steam turbines, heavy duty industrial gas turbines and electric motors);
- Source of electrical power (e.g., onsite generation, importing electrical power from BC Hydro and offsite generation);
- Land-based access to Lelu Island (e.g., two northern and one southern corridor);
- Site location (e.g., Port Edward (Lelu Island), Georgetown Mills, Port Simpson, Gobeil Bay (Douglas Channel) and Kitimat (Douglas Channel));
- Placement of marine infrastructure (trestle, berths and MOF) (e.g., six southern options and seven northern options);
- Means of marine sediment disposal (in place of disposal at sea) (e.g., terrestrial disposal and beneficial reuse);
- Locations for the disposal at sea of marine sediments (e.g., nine alternative sites);
- Project site layout (e.g., locations of LNG tanks, main flare stack, LP flare stack, warehouse/ workshop/ laboratory facilities and administrative facilities); and
- Construction camp locations (e.g., mainland (outskirts of Port Edward) and Lelu Island).

## 2.3 Project Benefits

This section summarizes the estimated proposed Project benefits during construction and operations as reported in the Proponent's Application.

### **Economic Benefits for Project Construction**

The Proponent expects the capital costs of Phase 1 of the proposed Project (two LNG trains and associated marine shipping facilities) to be \$11.4 billion, spread over the five-year construction period from 2015 to 2019.

Of this, \$3.4 billion is expected to be expended on goods and services with a high Canadian content, including 32% of the labour, goods and services required for engineering, procurement, construction and commission, as well as for subcontracts for site preparation, bridge and building construction, and construction camp operations.

The Application does not assess the economic benefits for the proposed Project expansion from 12.8 million tonnes per annum for Phase 1 to 19.2 million tonnes per annum for Phase 2.

Table 2-1 summarizes some of the Project benefits that would be generated from the proposed Project construction in BC and other Canadian provinces.

Table 2-1: Summary of the proposed Project benefits from facility construction

<b>Project construction costs</b>	<b>\$ billion</b>
Spent in BC/Canada	\$3.4
Imported goods and services	<u>\$8.0</u>
<b>Total construction costs</b>	<b>\$11.4</b>
<b>BC Gross Domestic Product (GDP)</b>	
Direct, indirect and induced <sup>1</sup>	\$2.4
<b>Employment</b>	<b>Person-years of employment</b>
Direct person years based in BC:	
Residents of BC and other provinces	8,000
Foreign	5,000
Indirect and induced person years in BC	<u>14,650</u>
<b>Total person-years of employment in BC</b>	<b>27,650</b>
<b>Effects on government revenues (direct, indirect and induced) over 5 years</b>	<b>\$ million</b>
BC government	\$477
Federal	\$500

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<sup>1</sup> Direct means income/employment directly associated with Project  
Indirect means income/employment from industries supplying goods and services to support the direct activities  
Induced means income/employment from additional spending by direct and indirect workers

## Economic Benefits from Project Operations

The proposed Project is expected to operate for more than 30 years.

Table 2-2 summarizes some of the benefits that would be generated in BC specific to the proposed Project during operations.

Table 2-2: Summary of annual benefits from proposed Project operations to BC

Effects on employment	Jobs/year in BC
Direct jobs (full-time-equivalent positions):	
Company staff	334
On-site facility maintenance contractors	<u>186</u>
<b>Sub-total - on-site workforce</b>	<b>520</b>
Management and operations staff (Vancouver)	<u>130</u>
<b>Total direct</b>	<b>650</b>
Indirect and induced jobs related to LNG facility <sup>(a)</sup>	550
Effects on government revenues	\$ million /year
BC Municipal/regional governments	\$15
BC government	
Direct	\$501
Indirect and induced	<u>\$256</u>
<b>Total</b>	<b>\$757</b>
Federal	\$638

(a) Excludes the 3,605 indirect and induced jobs that would be supported in natural gas exploration and production in BC, and the labour force that would be required to operate the Prince Rupert Gas Transmission (PRGT) pipeline.

## Social Benefits from the Proposed Project

The proposed Project is expected to generate substantial expenditures and employment opportunities for Regional Assessment Area (RAA) residents and procurement opportunities for RAA and other BC businesses.

The Proponent estimates needing to contract \$3.5 billion in goods and services from BC suppliers for Project construction. Of that, 88% would be for engineering services and 12% would be for other goods and services. During operations, most expenditure would be related to the purchase and transmission of natural gas. Ongoing repair and maintenance services of \$141 million per year, of which \$65 million is expected to be

procured from Canadian sources, are expected to represent the key procurement contract opportunities for proposed Project operations. Total annual operating costs are estimated at approximately \$2.8 billion of which \$2.5 billion would be spent in BC including \$1.5 billion on natural gas (or 54% of operating costs).

During construction, the Proponent estimates that an average of 200 existing RAA residents per year could be directly employed on Project construction, although the number could be higher during peak construction periods. This represents 12% of the Canadian portion of Project labour during construction and 8% of the total labour requirements. Another 140 RAA residents per year would be employed as a result of indirect and induced effects on local employment.

During operations, the proposed Project would generate 800 jobs in the RAA, including 520 on-site, high-paying, permanent full-time-equivalent positions, 120 indirect and 160 induced jobs (representing 11.5% of the 2011 RAA labour force).

In addition to employment generated through direct and indirect spending on goods and services, the proposed Project would generate social benefits to local communities and Aboriginal communities. Aboriginal Groups are a key element of the Province's future workforce, including those communities affected by the proposed Project. A number of Provincial and Federal programs exist to assist Aboriginal Groups in addressing training requirements associated with the current and potential future workforce needs associated with LNG-related proposals. As part of the Province's Jobs Blueprint, additional aboriginal-focused skills training opportunities will be developed.

## 2.4 Applicable Permits

If Ministers were to issue an EA Certificate, the proposed Project would also require a positive environmental assessment decision from the federal government in order to proceed. In addition, PNW would need to obtain various permits and authorizations from federal and provincial agencies prior to construction and operation.

### 2.4.1 **Federal Regulatory Environment**

Lelu Island and its surrounding waters are federal port lands administered by the PRPA (Figure 2-3), whose regulatory powers flow from the *Canada Marine Act*, the *Port Authority Operations Regulations* and the Port Authority's Letters Patent issued by the Minister of Transport. These powers include the ability to approve construction of facilities on Port administered lands where these facilities have a navigation and shipping aspect; establish regulations, by-laws, practices or procedures, rules or orders for facilities operating on Port administered lands to address issues including health and safety and the environment. The mission of the PRPA is "to manage, develop, and promote the port for the benefit of its stakeholders and ensure general security of the port while remaining sensitive to the need for a high degree of safety and environmental responsibility."

The PRPA has and would incorporate additional requirements on developers of LNG facilities through project development and land leases with respect to, amongst other things, environmental matters, decommissioning obligations, and consultation with Aboriginal Groups.

Other key federal permits and approvals include:

- Authorization to carry on a proposed work, undertaking, or activity that could cause serious harm to fish, under s.35(2)(b) of the Fisheries Act;
- Permit for works placed in or about a navigable water, under s.5(2) of the Navigation Protection Act;
- Permit for disposal at sea, under s.127(1) of the Canadian Environmental Protection Act;
- Export licence, under s.117 of the National Energy Board Act (received December 16, 2013);
- Lease to occupy and use federal lands administered by the PRPA; and
- Authorizations to conduct site clearing, tree removal, site preparation, water discharge, and other activities from the PRPA, under the Port Authorities Operations Regulations.



Figure 2-3: Prince Rupert Port Authority Area of Jurisdiction

## 2.4.2 Provincial Permits

The primary regulator for construction and operation of a natural gas pipeline in BC is the BC Oil and Gas Commission (OGC), pursuant to the *Oil and Gas Activities Act* (OGAA). The majority of provincial permits would be provided through OGC after decisions are made on the provincial and federal EA processes.

Under that process, the Proponent will require an oil and gas activity permit and associated authorizations for the LNG facility. In particular, the OGC is responsible for the Liquefied Natural Gas Facility Regulation (LNGFR), which regulates the design, construction, operations and decommissioning of LNG Facilities in BC. Some key elements of the LNGFR that relate to the EA process are requirements for LNG facility permit application, regulation of facility emissions, waste and water discharge permits; noise, vibration and light; and flaring & venting limits. The regulation also covers the more technical aspects of engineering design; hazard analysis; safety & loss management; risk assessment; emergency response.

The OGC is also responsible for LNG facility air discharge permits under the BC *Environmental Management Act*. The OGC is responsible for consultation with Aboriginal Groups in respect of the permits for which it has jurisdiction.

EAO established a Memorandum of Understanding (MOU) with OGC in 2013 to:

- Establish a single, predictable regulatory regime for LNG projects;
- Improve engagement with Aboriginal Groups, communities, stakeholders and the public;
- Prevent unnecessary duplication between EAO and OGC;
- Provide the opportunity for proponents to conduct EA and permitting review processes at the same time for timely permit issuance (should an EA Certificate be issued); and
- Design highly effective, legally enforceable conditions, and a robust compliance and enforcement regime.

### 3 Assessment Process

#### 3.1 Overview of the Environmental Assessment and Scope of the Report

EAO determined that the proposed Project was reviewable pursuant to Part 4 of the *Reviewable Projects Regulation*, as the proposed Project would include a new energy storage facility with the capability to store a quantity of energy resource that yields  $\geq 3$  petajoules of energy by combustion.

Consistent with the principles in the “*Canada-British Columbia Agreement for Environmental Assessment Cooperation (2004)*”, EAO and The Canadian Environmental Assessment Agency (CEAA) have worked together in a coordinated EA, with CEAA taking the lead role, because both the land and marine components of the proposed Project are located on federal Crown lands, including the sea bed, administered by the PRPA. In this context, this has meant that BC has utilized the federal EA working group to reduce duplication and EAO and CEAA have cooperated throughout the EA to deliver an efficient and effective review process, while maintaining the roles and decision-making responsibilities of their respective authorities. EAO and CEAA coordinated consultation with Aboriginal Groups throughout the EA process.

CEAA determined that a federal EA would be required for the proposed Project in April 2013, and issued the final Environmental Impact Statement (EIS) Guidelines in October 2013. Under the *Canadian Environmental Assessment Act, 2012 (CEAA 2012)*, CEAA must assess the environmental effects of the proposed Project in areas where the federal government has jurisdiction to ensure the implementation of mitigation measures and follow-up requirements. This includes effects on fish and fish habitat, navigation, Aboriginal peoples, federally protected species, migratory birds and federal lands.

An Order under Section 11 of the Act, which sets the scope, procedures and methods of the assessment, states ‘*the scope of the assessment will take into account the scope of the environmental assessment to be conducted by the Canadian Environmental Assessment Agency and focus primarily on consideration of its potential effects beyond Prince Rupert Port Authority lands*’. EAO’s assessment was therefore focussed in this way.

The Proponent submitted one document that met the requirements of both an EIS under CEAA 2012 and an Application under the Act. Accordingly, the Application Information Requirements (AIR) developed under the provincial process was designed to reference the EIS guidelines, and the review of the Application was jointly undertaken by the Project’s Advisory Working Group.

CEAA has requested information from the Proponent to more fully comply with the Environmental Impact Statement Guidelines and to update the Environmental Impact Statement regarding the effects of the project design changes (discussed below), confirmed in October 2014, on areas of federal interest. CEAA and expert federal

departments are continuing to analyse additional information as it is provided by the Proponent to enable the federal environmental assessment to be completed within the 365-day legislated timeline under CEAA 2012.

With the federal regulatory process ongoing, EAO notes the federal process will have more specific findings and recommendations in areas of federal authority. Ultimately, any federal approvals of the proposed Project would also include specific mitigation measures and project development requirements (e.g. construction and operation conditions) related to areas of federal authority, which would determine how the proposed Project may be eventually developed.

This Assessment Report and EAO's Aboriginal Consultation Report (in Part C of this report) have been provided to the responsible provincial Ministers for consideration in their decision of whether or not to issue an EA Certificate for the proposed Project.

### **3.1.1 Strategic Context**

At present, there are 14 proposed LNG related projects in the EA process with 4 additional projects anticipated this fall/winter.

Aboriginal Groups, special interest groups, the public and stakeholders raised a number of concerns about the multitude of LNG project reviews. Some of those concerns were:

- Increased GHGs associated with LNG Facilities and what those emissions would mean to the provincial GHG reduction targets, as well as the associated effects of climate change;
- Increased air contaminants associated with LNG Facilities;
- Negative social and economic effects such as increased housing costs, homelessness, crime, drug abuse, and related strain on provincial services;
- Potential strain on local government infrastructure and services;
- Increased shale gas extraction through hydraulic fracturing;
- A strong desire to see EAO conduct a strategic EA to assess broad impacts of the LNG industry on the environment, the economy, and future generations of British Columbians; and
- High volume and pace of work associated with the consultation and review of multiple LNG projects.

With those concerns in mind, and given the number of projects being reviewed by EAO at the same time, EAO set out a strategic approach to LNG projects. This strategic approach included:

- Cross-government work for early identification and resolution of strategic and operational policy issues;
- Coordination of regional forums, open houses and Working Group meetings to improve engagement with Aboriginal Groups, stakeholders and the public; and
- To bring the strategic approach to fruition, EAO established the LNG Regulatory Working Group, a group of senior officials representing most provincial ministries,

to identify government initiatives needed to address both EA and permitting issues that were common across the multitude of proposed projects.

EAO heard extensive concerns expressed by all of the Aboriginal Groups regarding the volume and pace of work. To address these concerns, EAO:

- Held regional workshops to address cross-project issues at a strategic level;
- Provided grant funding to Aboriginal Groups for multiple projects in lump sums to enable more effective use of EAO funding;
- Appointed an EAO LNG First Nations lead to support strategic and project-specific consultation;
- Coordinated consultation with OGC with the goal of reducing the consultation burden on Aboriginal Groups;
- Considered and granted, where possible, timeline extensions for participating Aboriginal Groups; and
- Sequenced EAO-led Working Group meetings and public open houses to decrease potential overlap between meetings and consultation fatigue.

### **3.1.2 Valued Components**

The EA is focused on specific environment, economic, social, health and heritage VCs considered important to assess in order to understand the potential for significant adverse effects of the proposed Project.

VCs are 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 VCs assessed in the Proponent's Application for the proposed Project are set out below:

<p><b>Environmental Effects:</b></p> <ul style="list-style-type: none"> <li>• Air Quality</li> <li>• GHGs</li> <li>• <sup>1</sup>Freshwater Aquatic Resources</li> <li>• <sup>1</sup>Vegetation and Wetland Resources</li> <li>• <sup>1</sup>Wildlife Resources</li> <li>• <sup>1</sup>Marine Resources</li> <li>• <sup>2</sup>Acoustic Environment</li> <li>• <sup>2</sup>Ambient Light</li> </ul> <p><b>Economic Effects:</b></p> <ul style="list-style-type: none"> <li>• Economic Environment</li> </ul>	<p><b>Social Effects</b></p> <ul style="list-style-type: none"> <li>• Navigation and Marine Resource Use</li> <li>• Infrastructure and Services</li> <li>• Visual Quality</li> <li>• Community Health and Well-Being</li> </ul> <p><b>Heritage Effects</b></p> <ul style="list-style-type: none"> <li>• <sup>1</sup>Archaeological and Heritage Resources</li> </ul> <p><b>Health Effects</b></p> <ul style="list-style-type: none"> <li>• Human and Ecological Health</li> </ul>
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<sup>1</sup>Due to the scope of the environmental assessment set out in the Order under Section 11 of the Act, EAO primarily focussed the assessment of these VCs in consideration of their potential effects beyond Prince Rupert Port Authority lands.

<sup>2</sup> Acoustic Environment and Ambient light are not included by EAO in this Assessment Report as Valued Components because they are not expected to experience residual adverse effects or known adverse effects would be mitigated through requirements of subsequent permitting. Additionally, effects from acoustic environment and ambient light are included in the assessment of effects in the human and ecological health VC.

### 3.2 Major Milestones of the Environmental Assessment

The provincial EA began in 2013, when the Proponent submitted a project description of the proposed Project to EAO. The Pre-Application period included activities to develop the AIR, technical consultations on the effects assessment, Aboriginal Groups consultation, and changes made to the proposed Project by the Proponent. The Application Review period began in March 2014, with submission of the final Application for review.

The major milestones in the Pre-Application period are listed in Table 3-1.

Table 3-1: Major milestones in the Pre-Application stage of the environmental assessment

Date	Milestone and Link
July 16, 2013	EAO issued a <a href="#">Section 10 Order</a> , initiating the EA.
September 17, 2013	EAO issued a <a href="#">Section 11 Order</a> , defining the scope of the proposed Project and the procedures and methods for conducting the review.
November 5, 2013	EAO issued a <a href="#">Section 13 Order</a> , modifying the Aboriginal Groups to be consulted.
November 13 – December 13, 2013	A 30-day <a href="#">Public Comment Period</a> was held on the draft AIR.
February 20, 2014	EAO approved the <a href="#">final AIR</a> .
February 28, 2014	The Proponent submitted an Application for evaluation.
March 25, 2014	EAO determined that the Application contained the information required by the AIR.

The major milestones in the Application Review period are listed in Table 3-2.

Table 3-2: Major milestones of the Application Review of the EA

<b>Date</b>	<b>Milestone and Link</b>
March 25, 2014	Proponent submitted <a href="#">final Application</a> and distributed it to Aboriginal Groups and Working Group members, including Aboriginal Group representatives. The Application Review began.
April 2, 2014 - May 1, 2014	A 30-day <a href="#">Public Comment Period</a> was held on the Application.
September 12, 2014	EAO issued a <a href="#">Section 24(4) Order</a> extending review of Application for 45 days until November 5, 2014.
October 2, 2014	EAO issued a <a href="#">Section 13 Order</a> , modifying the scope of assessment for the effects related to the temporary workforce.
October 6, 2014	Proponent submitted Public Consultation Report, describing the issues raised during the public comment period and the Proponent's responses. EAO is satisfied with the Proponent's responses.
October 6, 2014	Proponent submitted Final Aboriginal Consultation Report.
October 31, 2014	Working Group and Aboriginal Groups Issues Tracking Tables finalized.
November 5, 2014	EAO referred the proposed Project to Ministers for decision on whether to issue an EA Certificate.

### 3.3 Role of the Advisory Working Group

The Advisory Working Group is established by CEAA and EAO, made up of federal, provincial and local government staff with the mandates and skill sets relevant to the review of the proposed Project and representatives of potentially affected and Aboriginal Groups as set out in the Section 11 Order issued for the EA. See Appendix 1 for a list of Working Group members.

During the course of the EA, EAO sought and considered advice from the Working Group in order to understand and assess the potential adverse effects associated with a proposed Project.

Working Group members were responsible for providing timely advice to EAO on:

- Key EA documents including, but not limited, to the selection of VCs, AIR, Application and EAO's Assessment Report;
- Government policy direction and/or gaps that could affect the conduct of the EA;
- Potential conflicts with the legislation and/or regulations of their organizations;
- EA Information requirements as compared with permitting design and information requirements (it is important to focus on the level of detail appropriate to the EA ); and
- Technical issues that may be raised by the public during the public consultation process.

During Pre-Application and Application Review, Working Group members provided hundreds of comments to EAO about the proposed Project and Application. EAO reviewed the adequacy of the Proponent's responses to all comments received from Working Group members in the Issues Tracking Table (Appendix 2)<sup>2</sup>. EAO required the Proponent to update the Issues Tracking Table and supporting Technical Memos as appropriate. EAO considered all comments and issues raised during the EA, in development of its Assessment Report.

### 3.4 Project Changes Due to EA Process

During the EA, concerns were raised by local Aboriginal Groups, communities, stakeholders, and federal and provincial agencies about the potential effects from the proposed Project. As a result, the Proponent made several design changes to reduce effects from marine components of the proposed Project.

Table 3-3 summarizes the changes the Proponent made to the proposed Project after consultation with stakeholders, the public and Aboriginal Groups.

Table 3-3: Changes as a result of EAO's and CEAA's EA

<b>Project Feature</b>	<b>Project Change</b>	<b>Benefits of Change</b>
<b>Site Layout</b>	A vegetated riparian buffer would be maintained that extends 30 m inland from the high-water mark around Lelu Island	<ul style="list-style-type: none"> <li>• Avoids removal of culturally modified trees</li> <li>• Provides visual barrier for the Project</li> <li>• Maintains some habitat on Lelu Island</li> </ul>
<b>Sitting of main flare stack</b>	Moved to southeast location	<ul style="list-style-type: none"> <li>• Mitigates potential visual quality, ambient light and acoustic effects</li> </ul>
<b>Gas turbines</b>	Switched from industrial gas turbines to aero-derivative gas turbines	<ul style="list-style-type: none"> <li>• Reduces GHG air emissions</li> </ul>
<b>Bunker fuel</b>	Bunker refuelling removed	<ul style="list-style-type: none"> <li>• Eliminates risk of bunker fuel spill while refuelling</li> <li>• Eliminates potential effect on marine and terrestrial species and habitats</li> </ul>
<b>Propane Use and Storage</b>	Propane use and storage removed from the Project design	<ul style="list-style-type: none"> <li>• Reduces the quantity of hazardous materials stored on site</li> <li>• Reduces the complexity and safety risks associated with unloading of propane from marine vessels</li> <li>• Reduces marine traffic</li> </ul>

<sup>2</sup> [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_project\\_doc\\_index\\_396.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_index_396.html)

<b>Marine Terminal</b>	Increased clearance near Lelu Island to 11.3 m	<ul style="list-style-type: none"> <li>• Allows passage of gillnetters and smaller vessels</li> <li>• Reduces navigational effects of terminal</li> </ul>
<b>Marine Terminal</b>	Suspension bridge span of jetty over Flora Bank	<ul style="list-style-type: none"> <li>• Eliminates dredge of Flora Bank, and associated disposal at sea of sediment</li> <li>• Reduces marine traffic effects during construction</li> <li>• Avoiding effects on marine resources</li> </ul>
<b>Marine Terminal</b>	Lengthened from 2.4 km to 2.7 km	<ul style="list-style-type: none"> <li>• Eliminates dredge of marine terminal for construction or maintenance, and associated disposal at sea of sediment</li> <li>• No armouring required at the berth</li> <li>• No breakwaters required</li> <li>• Reduces marine traffic effects during construction</li> <li>• Reducing effects on marine resources</li> </ul>
<b>Bridge from Lelu Island to mainland</b>	Increased clearance to 11.3 m	<ul style="list-style-type: none"> <li>• Allows passage of gillnetters and smaller vessels</li> <li>• Reduces navigational effects of bridge</li> </ul>
<b>Worker Camp</b>	Construction worker camp to be third party owned and operated, and located in Port Edward and/or Prince Rupert area	<ul style="list-style-type: none"> <li>• Eliminates need for utility lines to be trenched through Lelu Slough</li> <li>• Eliminates need for generators to supply power to worker camp</li> </ul>

The modified design for the marine terminal and berths includes approximately 100 ha of marine infrastructure, a 2.7-km jetty that consists of a 1.6-km clear-span suspension bridge over Flora Bank from Lelu Island to Agnew Bank, and a 1.1-km jetty supported by conventional pipe pile trestle from the suspension bridge to the LNG carrier berths. The east bridge abutment is on the Lelu Island foreshore. The west bridge abutment would be on Agnew Bank just north of Flora Bank. Figure 3-1 shows the new marine terminal location.

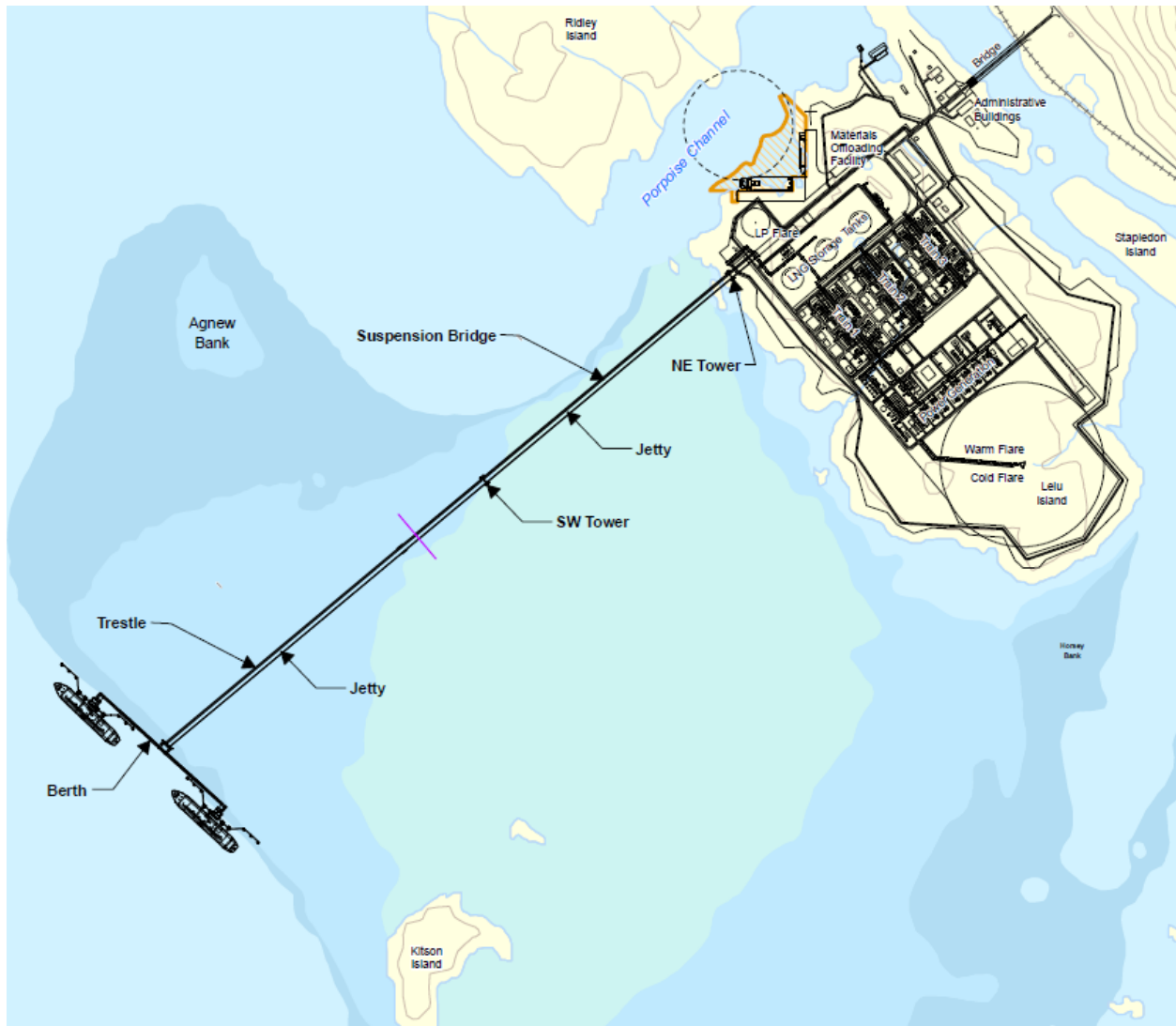


Figure 3-1: New marine terminal configuration

### 3.5 Consultation

#### 3.5.1 **Aboriginal Group Consultation**

On September 17, 2013 EAO issued a Section 11 Order which specified the consultation activities that both EAO and the Proponent would undertake with all Aboriginal Groups potentially affected by the proposed Project.

At the initial stages of EA for the proposed Project, EAO relied primarily on the proximity of the proposed Project to an Aboriginal Group's asserted traditional territory to determine whether an Aboriginal Group would be included on Schedule B or C.

Aboriginal Groups in Schedule B of the Order were consulted at the deeper end of the consultation spectrum, and provided the following opportunities:

- Participation in the Working Group;
- Participation in meetings to identify and discuss both Aboriginal Interests that may be affected by the proposed Project and potential measures to avoid, mitigate, address or otherwise accommodate impacts;
- Review and comment on key documents, including draft AIR, the Proponent's Application for an EA Certificate, and EAO's draft Assessment Report and Aboriginal Consultation Report;
- Submission of a document outlining the Aboriginal Groups' views on the Assessment Report to be included in the package of materials sent to Ministers when the proposed Project is referred for decision;
- Notification of key milestones – such as the issuance of the AIR, acceptance of the Application for review, timing of public comment periods (including open houses) – when the final Assessment Report is referred to Ministers and the resulting decision; and
- Invitation to meet with EAO to discuss any Aboriginal Interests in the proposed Project area.

Aboriginal Groups in Schedule C of the Order were consulted at the lower end of the consultation spectrum, and were provided notification of key milestones such as the issuance of the AIR, acceptance of the Application for review, timing of public comment periods (including open houses) – when the final Assessment Report is referred to Ministers and the resulting decision.

The Proponent was required by EAO to consult with the following Aboriginal Groups on Schedule B of the Section 11 Order:

- Metlakatla First Nation;
- Lax Kw'alaams First Nation;
- Gitxaala Nation;
- Kitselas First Nation; and
- Kitsumkalum First Nation.

The Proponent was directed to: identify potentially affected Aboriginal Interests of these Aboriginal Groups; and to identify measures to avoid, or be used to mitigate, potential adverse effects or otherwise address or accommodate the concerns of these Aboriginal Groups. Following Gitga'at First Nation's new assertions of Aboriginal Interests north of its previously identified consultation boundary, EAO included Gitga'at First Nation on Schedule C of the Order for notification of milestone information and opportunities to comment on key documents.

The Proponent was not required by EAO to consult directly with Gitga'at First Nation; however, the Proponent chose to engage directly with, and to enter an EA Agreement with Gitga'at First Nation.

On June 26, 2014, the *Tsilhqot'in Nation v. British Columbia (Tsilhqot'in)* decision was released by the Supreme Court of Canada. The decision clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation at 1846 (the time of assertion of European sovereignty). In addition, the case set out considerations for government when consulting Aboriginal Groups regarding potential impacts on asserted Aboriginal title claims.

As a result of the *Tsilhqot'in* decision, EAO examined the decision implications on this proposed Project, and specifically:

- Reassessed the strength of claimed Aboriginal title overlapping the proposed Project on the basis of the tests set out in the *Tsilhqot'in* decision, for the purpose of confirming appropriate level or depth of consultation;
- Included the results of that reassessment in this report as it relates to each Aboriginal Group with asserted title claims overlapping the proposed Project;
- Sought Aboriginal Group's perspectives on both the preliminary assessments of strength of Aboriginal claims and seriousness of impacts, as well as proposed accommodations, through the provision of a draft version of this Assessment Report; and
- Considered other approaches being taken by government that may be relevant to the accommodation for potential impacts to Aboriginal Interests.

### **3.5.2 Ensuring the Crown's Duties to Consult and Accommodate Aboriginal Groups**

EAO is required to ensure that the honour of the Crown is discharged by ensuring appropriate consultation and accommodation of potential impacts of the proposed Project on the exercise of proven rights and asserted rights and title (Aboriginal Interests) in respect of the decision by Ministers as to whether to issue an EA Certificate. Aboriginal Groups' comments and interests in terms of consultation and specific consideration of the Crown's duty to consult and accommodate Aboriginal Groups' interests are specifically factored into the analysis in Part C of this report. EAO assessed relevant issues raised by Aboriginal Groups during the course of the EA and whether the Crown has fulfilled its obligations for consultation and, if appropriate, accommodation.

There is often considerable overlap between the interests of Aboriginal Groups and the assessment of environmental, economic, social, heritage and health effects. Aboriginal Groups' comments and interests that directly relate to the environmental, economic, social, heritage and health assessments are discussed in Part B of this Assessment Report.

### 3.5.3 Public Consultation

For the purposes of conducting an EA, public consultation requirements are set out in the Section 11 Order, dated September 17, 2013. The requirements are intended to provide multiple opportunities for the public to provide input into the process. Shortly after the issuance of the Section 11 Order, the Proponent was required to prepare a Public Consultation Plan, which laid out the consultation objectives and activities. The Proponent submitted multiple Public Consultation Reports to EAO during the course of their EA: the first Public Consultation Report was submitted during the Pre-Application stage, the second with their Application, and the third near the end of Application Review.

The Public Consultation Plan and all Public Consultation Reports are posted on EAO's website<sup>3</sup>.

In addition to the Proponent's public consultation activities, EAO required public comment periods and open houses during the Pre-Application and Application Review stages of the EA. The following provides a summary of those activities:

#### Summary of Proponent Activities

At the time EAO was writing this report, the Proponent had completed the following activities:

- Identified 133 stakeholder groups and 508 individual stakeholders;
- Held 74 meetings with local businesses and community groups;
- Held 25 meetings with individual landowners;
- Held 6 open houses with 293 participants, three each in Port Edward and Prince Rupert;
- Held marine workshops with marine users;
- Held community roundtable discussions on November 18, 2013, and February 26 and 27, 2014;
- Made presentations to local governments and community organizations (e.g., District of Port Edward, City of Prince Rupert, Aboriginal Groups, Prince Rupert Rod and Gun Club, Prince Rupert Rotary Club, Prince Rupert Yacht Club and Prince Rupert Chamber of Commerce);
- Developed public communications materials, including: a website, newsletters distributed by mail in Prince Rupert and Port Edward, e-newsletters sent to 700 subscribers, a toll-free phone line, and online comment form; and
- Set up community offices in Prince Rupert and Port Edward.

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<sup>3</sup> [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_project\\_doc\\_index\\_396.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_index_396.html)

Through public engagement during the course of the EA, the Proponent has demonstrated to EAO that they have a good understanding of, and have managed for, public interests.

### **Summary of EAO Activities**

EAO hosted two public comment periods and four open houses over the span of the EA.

Public comment periods were held November 13–December 13, 2013, and April 2–May 1, 2014. Open houses were held in Port Edward and Prince Rupert for both public comment periods. About 205 people attended the open houses during the Application Review.

The key issues raised by the public during these open houses and through the online public comment periods included concerns about:

- Economic benefits, including local municipal tax revenue, job opportunities, training, and contracting opportunities;
- Impacts on the marine environment including changes to Flora Bank and the Skeena Estuary and the resultant habitat impacts on and changes in marine populations;
- Disturbance of historically contaminated marine sediment and water quality effects on marine life;
- The local air quality and GHG emissions;
- The potential for water discharge from the facility and impacts on Flora Bank and the Skeena Estuary;
- Disposal of hazardous materials and sewage treatment;
- Visual, noise and odour impacts;
- Risks to local residents;
- The safety record of the global LNG industry;
- Impacts of increased shipping traffic and impacts on local marine users and safety;
- Impacts on marine navigation, specifically the ability to pass under the jetty trestle/marine terminal, and the height and location of Lelu Island bridge;
- The cumulative effects of all the proposed projects operating in the local area;
- About the potential impacts of construction workers on community services, increased use of drugs and alcohol, and potential boom/bust effects;
- Road and airport congestion;
- The impacts of a potential population increase and resultant increase in rents and housing prices;
- Local labour shortages and wage increases; and
- Interest in power alternatives and the use of renewable power.

These comments were addressed in the Application, and through the Application Review period. Public comments and the Proponent's responses are posted on the EAO's website<sup>4</sup>.

## Results of Public Engagement

As noted in the Proponent's Public Consultation Report 3, the following mitigations have been proposed by the Proponent that addresses some of the public's concerns:

- Dredging: The Proponent heard concerns from local Aboriginal Groups, communities and stakeholders about the previously proposed dredging activity affecting Flora Bank to accommodate a marine terminal on Agnew Bank. In response, the Project's mitigated design proposes a combined trestle and suspension bridge. The suspension bridge would not require any pilings on Flora Bank, and would connect to a trestle linking Lelu Island to the proposed marine terminal in naturally deep water in Chatham Sound. This updated design would not require dredging to accommodate the marine berths. Minimal dredging would be required at the MOF located in Porpoise Channel;
- Lelu Island Bridge: The Proponent heard concerns from marine users and commercial fishers that the proposed bridge connecting the District of Port Edward and Lelu Island would be problematic for marine navigation if it was not high enough to allow vessels to pass underneath. In response to this feedback, the engineering team reviewed options to mitigate potential impacts on marine navigation and is proposing to construct a higher bridge with the capability for most medium-sized vessels, including gillnetters without tall radio antennae, to safely pass underneath with a clearance of 11.3 m at high tide;
- Marine terminal jetty trestle: The Proponent received feedback that navigational impediments to small vessels, particularly in bad weather, around Lelu Island could pose safety concerns. In recognition of these concerns, the Proponent proposes to build a portion of the jetty trestle to a height that would have the capability for most medium-sized vessels, including gillnetters without tall radio antennae, to safely pass underneath. To remain consistent with this commitment, the suspension bridge would have 11.3 m of clearance at high tide;
- The flare stack position was reconsidered in light of the local community feedback and moved farther from Porpoise Channel;
- Proposed bunkering fuel facility has been removed from the proposed Project design.
- On-site propane storage capacity has been reduced; and
- Visual and sound barriers between the facility and Port Edward have been enhanced in the proposed Project design through the maintenance of a 30 m vegetated buffer around the perimeter of Lelu Island.

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<sup>4</sup> [http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_project\\_doc\\_index\\_396.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_index_396.html)

## PART B – ASSESSMENT OF POTENTIAL ADVERSE EFFECTS

### 4 Assessment Methodology and Overview of Potential Effects

#### 4.1 General

##### 4.1.1 Environmental Assessment Methodology

In this Assessment Report, EAO assesses whether the proposed Project is likely to have significant adverse environmental, economic, social, heritage and health effects, including cumulative effects, having regard for the mitigation measures proposed in the Application or otherwise developed through the provincial and federal EA processes, in addition to conditions proposed by EAO.

To conduct this assessment, EAO follows the methodology outlined in its *Guideline for the Assessment of Valued Components and Assessment of Potential Effects* (2013). This section provides a brief summary of the methodology followed.<sup>5</sup> The general steps in EAO's EA process are shown in Figure 4-1.

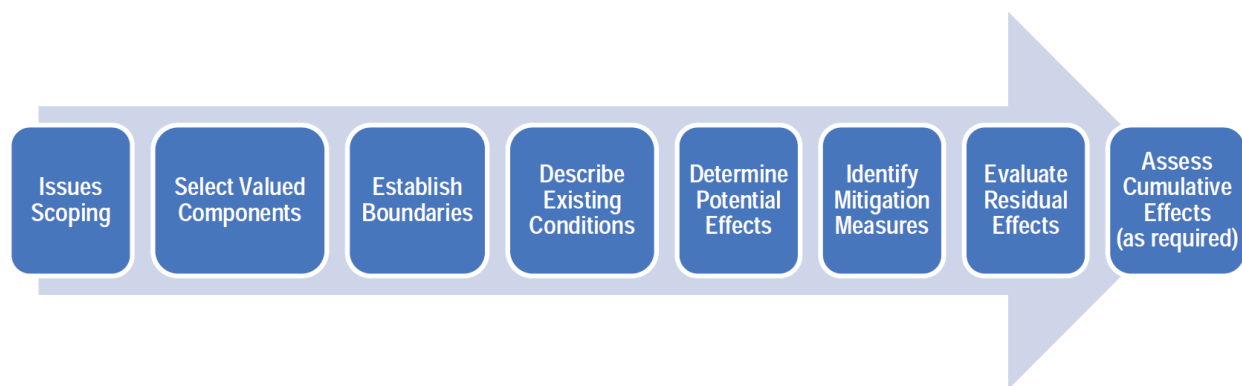


Figure 4-1: EAO's environmental assessment methodology.

EA in BC uses a values-based framework to promote a comprehensive, yet focused, understandable, and accessible assessment of the potential effects of proposed projects. This framework relies on the use of VCs as a foundation for the assessment. VCs are 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.

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<sup>5</sup> The *Guideline for the Assessment of Valued Components and Assessment of Potential Effects* is available at [http://www.eao.gov.bc.ca/pdf/EAO\\_Valued\\_Components\\_Guideline\\_2013\\_09\\_09.pdf](http://www.eao.gov.bc.ca/pdf/EAO_Valued_Components_Guideline_2013_09_09.pdf).

Appropriate VCs are identified and selected during the Pre-Application phase of the EA. Ultimately, the VCs required to be in the Application are established by EAO upon issuance of the AIR. Much of the early part of the Pre-Application phase is focused on consultation on the VCs, key indicators, study area boundaries and technical requirements with Working Group members, including Aboriginal Groups, and the public.

#### **4.1.2 Study Boundaries**

Assessment boundaries serve to define the scope or limits of the assessment. They encompass the areas within and times during which the project is expected to interact with the VCs (spatial and temporal boundaries). They also reflect constraints that may be placed on the assessment of those interactions due to political, social and economic realities (administrative boundaries), as well as limitations in predicting or measuring changes (technical boundaries). These boundaries are discussed in the Application for each VC.

Spatial boundaries encompass the areas within which the proposed Project is expected to have potential effects on the selected VCs. The study areas generally include the:

- Project footprint – the area directly disturbed by the proposed Project’s physical works and activities.
- Local Assessment Area (LAA) – varies by VC, and is based on the zone of influence within which the VC is most likely to be affected by the proposed Project construction and operations.
- Regional Assessment Area (RAA) – provides context for the assessment of potential project effects, and is typically based on a natural transition (e.g., watershed boundary, ecological zone) or on an artificial delineation (e.g., political or economic district or zone) that is relevant to the VC. The RAA is often, but not always, used as the spatial boundary for the assessment of potential cumulative effects.

Temporal boundaries encompass the periods during which the project is expected to have potential effects on the selected VCs. The temporal phases discussed under each VC are construction and operation, and the duration of effect is assessed as the length of time it would persist.

Technical boundaries refer to constraints on an EA where there are limitations in the ability to collect field validation information to support the prediction of effects for a project. Technical boundaries do not preclude the ability to use available data to identify potential adverse effects, identify mitigation and present conclusions about significance.

Spatial, temporal, administrative and technical boundaries are discussed in detail for each VC in the Application. In this Assessment Report, spatial boundaries are presented for each VC and other boundaries are discussed as relevant.

### **4.1.3 Assessment of Valued Components**

For each selected VC, the Application describes the existing conditions within the study area in sufficient detail to enable potential project/VC interactions to be identified, understood and assessed. The description of existing conditions includes, as relevant, natural and/or human-caused trends that may alter the environmental or socio-economic setting irrespective of the changes that may be caused by the project or other projects and activities in the local area.

The assessment then considers the potential interactions of the proposed Project with the VC, and the potential effects that could arise. These potential effects are identified and described, and an analysis is presented of the potential adverse effects resulting from the proposed Project.

The assessment then describes the mitigation measures that would be incorporated into the project, including site and route selection, project scheduling, project design (e.g., equipment selection, placement, emissions abatement measures), and construction and operation procedures and practices. Consistent with the Ministry of Environment's (MOE) Environmental Mitigation Policy and Procedures, EAO considers mitigation to be any practical means or measures taken to avoid, minimize, restore on-site, compensate or offset the potential adverse effects of a project.

Also described are standard mitigation, best management practices, environmental management plans (EMP), environmental protection plans, contingency plans, emergency response plans (ERP), and other general practices assumed or proposed to be implemented by the Proponent.

The residual effects on each VC are then identified. Residual effects are those effects remaining after the implementation of all mitigation measures, and are, therefore, the expected consequences of the proposed Project for the selected VCs. To inform the determination of the significance of a residual (adverse) effect, it is necessary to characterize the residual effect.

Residual effects are usually described using standard criteria: context, magnitude, extent, duration, reversibility and frequency. These criteria, as well as likelihood, are summarized in the following box.

### ***Summary of Criteria for Characterizing Residual Effects***

**Context** refers primarily to the current and future sensitivity and resilience of the VCs 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.

**Magnitude** refers to the expected size or severity of the residual effect. When evaluating magnitude of residual effects, consider the proportion of the VC affected within the spatial boundaries and the relative effect (e.g., relative to natural annual variation in the magnitude of the VC or other relevant characteristic).

**Extent** refers to the spatial scale over which the residual effect is expected to occur.

**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 gave rise to the residual effect).

**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.

**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.

**Likelihood** refers to whether or not a residual effect is likely to occur. It may be influenced by a variety of factors, such as the likelihood of a causal disturbance, occurring or the likelihood of mitigation being successful. Generally speaking, the residual effects described in the assessment comprise the best prediction of what is likely to occur as a result of a proposed project, assuming a suite of proposed mitigation is implemented.

The identification of whether a proposed Project has significant adverse residual effects is a requirement of the Act. It is therefore important to ensure the determination of significance is clearly documented and explained in the assessment. In particular, the assessment should transparently show that “significance” has been determined for each VC.

When determining significance for each VC, consideration should be given to how each of the criteria for characterizing residual effects would inform a determination of significance. Significance may be determined based on a quantitative or qualitative threshold that describes the point beyond which a residual effect would be considered significant. In some instances, thresholds established for some VCs by legislation, regulation, or regulatory standard may be used.

Once the residual effect prediction has been described in terms of significance and likelihood, it is important to explain the level of confidence in each prediction. The level of confidence, typically based on expert judgement, characterizes the level of uncertainty associated with both the significance and likelihood determinations. Specifying the level of confidence associated with these determinations allows the

decision-maker to better evaluate the risk associated with the proposed Project. The assessment also describes the need for and scope of monitoring or other follow-up programs, including adaptive management programs, to address any identified uncertainty.

Significance is usually determined for both the residual effects of the proposed Project and the cumulative effects. This is critical for making an informed decision about the proposed Project. It is important to understand the characteristics and significance of the potential project-specific residual effects in order to also understand the relative contribution of the proposed Project to cumulative effects. The cumulative effects assessment is discussed further below.

#### **4.1.4 Cumulative Effects Assessment**

If the proposed Project is expected to result in any residual adverse effects on the selected VC, the need for a cumulative effects assessment must be considered. It is important to note that this consideration must be made for all residual adverse effects, not only for those predicted to be significant.

Where there is a residual adverse effect, the assessment of cumulative effects for reviewable projects should consider other past, present and reasonably foreseeable projects and activities, which were identified in the AIR. The general steps for a cumulative effects assessment are shown in Figure 4-2. The likelihood of a cumulative interaction with other projects and activities, and the proposed Project's contribution to the overall cumulative effect, should together inform the cumulative effects assessment undertaken.

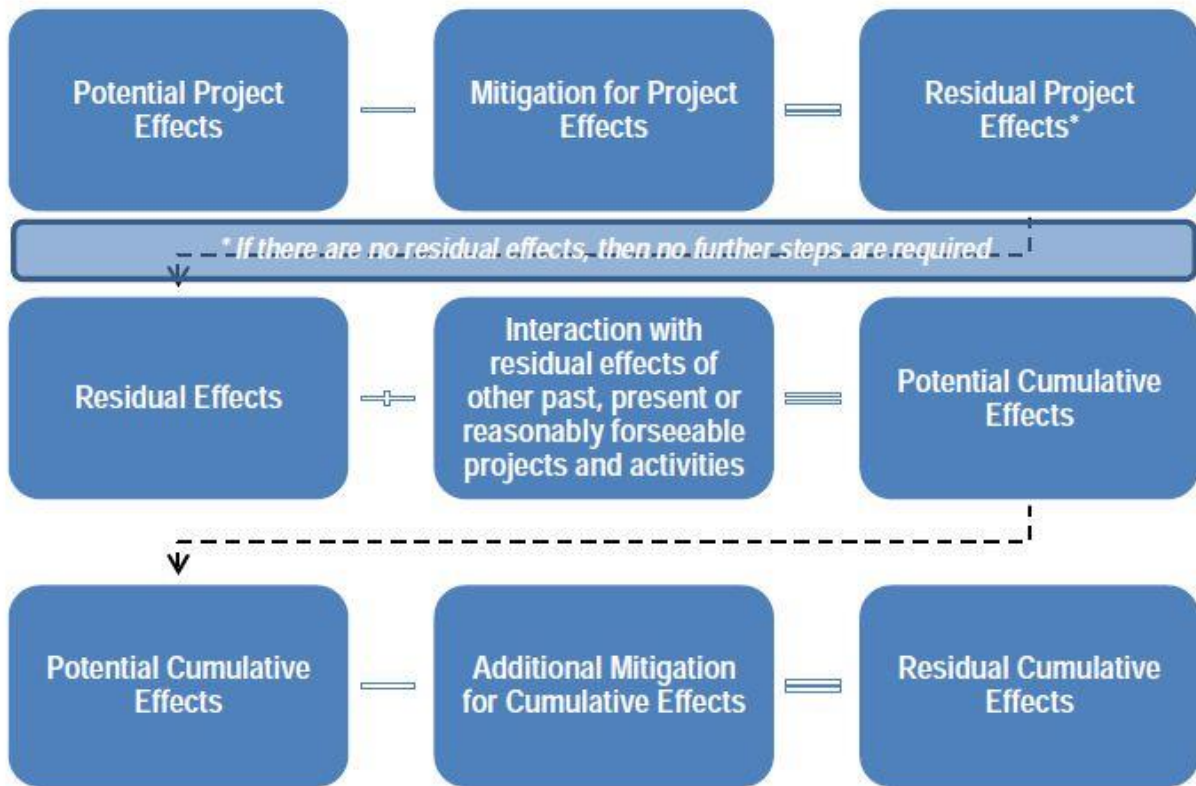


Figure 4-2: Steps to determine residual effects and cumulative effects.

The Application contains maps as well as a list and description of all projects and activities considered in the cumulative effects assessment. These projects and activities are discussed where relevant under the cumulative effects section for each VC in this report.

EAO evaluates the cumulative effects of the proposed Project on VCs based on past, present and reasonably foreseeable project and/or activities included in the cumulative effects assessment, as described in Table 4-1.

Figure 4-3 shows the locations of the projects included in the cumulative effects assessment.

Table 4-1: Project inclusion list for the cumulative effects assessment

<b>Facility</b>	<b>Description</b>
<b>Atlin Terminal</b>	This terminal is a tourism centre/dock for small ships in Prince Rupert. It is currently in operation.
<b>Canpotex Potash Export Terminal</b>	The Canpotex Potash Export Terminal and Rail, Road, and Utilities Loop is an approved project. This project is currently in the permitting stage.
<b>CN Rail Line</b>	The CN rail line is currently in operation.
<b>Douglas Channel LNG Project</b>	This project is a proposed floating LNG export facility located in Douglas Channel near Kitimat.
<b>Enbridge Northern Gateway Project</b>	This project is a proposed oil export terminal in Kitimat.
<b>Fairview Container Terminal Phase I</b>	Phase I is a conversion from a bulk and break-bulk terminal to an intermodal container terminal. It is currently operational.
<b>Fairview Container Terminal Phase II</b>	Phase II is the container terminal expansion to Phase I of the project. It is approved and is in the permitting stage.
<b>Kitimat LNG Terminal Project</b>	This is a proposed LNG export facility on Bish Cove, south of Kitimat.
<b>LNG Canada</b>	This project is a proposed LNG export facility in the District of Kitimat.
<b>Mount McDonald Wind Power Project</b>	This wind energy project has an EA Certificate, but has not proceeded to the permitting or development phase.
<b>NaiKun Wind Energy Project</b>	The cable landing for this offshore wind energy project is in the Prince Rupert area. This wind energy project has an EA Certificate, but has not proceeded to the permitting or development phase.
<b>Northland Cruise Terminal</b>	This cruise ship terminal is operational.
<b>Odin Seafood</b>	This commercial seafood packaging facility is operational.
<b>Pinnacle Pellet Inc.</b>	Wood pellet transfer (pellets brought in from Houston, BC), export (to Asia), and storage facility on Kaien Island.
<b>Prince Rupert LNG Facility</b>	This is a proposed LNG export facility on Ridley Island.
<b>Prince Rupert Gas Transmission Project</b>	This is the proposed incoming pipeline to supply natural gas directly to the Pacific NorthWest LNG Project.
<b>Prince Rupert Ferry Terminal</b>	This ferry terminal for BC Ferries and Alaska Ferries is operational.
<b>Prince Rupert Industrial Park</b>	This industrial area contains a saw mill, car manufacturer facility, car mechanics shop and is operational.
<b>Prince Rupert Grain Limited</b>	This grain storage and handling terminal is operational.
<b>Ridley Island Log Sort</b>	This dry land log sort is operational.
<b>Ridley Terminals Inc.</b>	This coal, petroleum coke, wood pellets storage and handling terminal is operational.
<b>Rio Tinto Alcan Aluminium Smelter and Modernization Project</b>	This is an approved project for a modernized facility to be updated and expanded by 2014.
<b>Walco Pulp Mill</b>	This project is for the proposed re-use of the Skeena/China Cellulose pulp mill that is currently not operational. It would ship metallurgical coal, grain, potash and other commodities.
<b>Westcoast Connector Gas Transmission Project</b>	This is the proposed incoming pipeline to supply natural gas directly to the proposed Prince Rupert LNG Project.

*Note: This table lists only projects and activities included in the cumulative effects assessment of the Proponent's Application, Section 4 Assessment Methodology, for determining potential cumulative effects.*



Figure 4-3: Locations of the projects included in the cumulative effects assessment

#### **4.1.5 Environmental Assessment Certificate Documentation**

If an EA Certificate is issued, it would include a Certified Project Description (CPD) and Table of Conditions (TOC).

The CPD describes what is certified by an EA Certificate. It consists primarily of a description of the components of the project. The goal of the CPD is to describe all of the essential elements of the project proposed by the Proponent, taking into account any changes to the proposed Project that occurred during the EA. If a certificate is issued for the project and the Proponent subsequently proposes to vary from the CPD, an amendment to the EA Certificate would be required.

If the Ministers decide to issue an EA Certificate, they may attach legally binding conditions to it, under Section 17(3)(c)(i) of the Act. A “condition” is a legally binding requirement set by ministers to which a holder of an EA Certificate must adhere. The TOC is provided to Ministers as part of the referral package. As part of their decision regarding whether or not to grant an EA Certificate, Ministers determine which conditions would be attached to the certificate.

EAO’s goal is to ensure that the conditions are clear, measurable and enforceable. In general, conditions are based on mitigation measures identified by EAO, Working Groups, Aboriginal Groups and the public to prevent or reduce potential adverse environmental, economic, health, heritage or social effects. Conditions may also serve the purpose of preventing or reducing potential effects on treaty or Aboriginal rights.

#### **4.1.6 Compliance and Enforcement**

EAO has a Compliance and Enforcement Program (C&E Program), whose primary responsibility is compliance oversight and enforcement of EA Certificate conditions on all projects subject to the Act in BC.

The C&E Program builds on the expertise and resources of other agencies, including the Compliance and Enforcement Branch of the Ministry of Forests, Lands and Natural Resource Operations (FLNR), Ministry of Energy and Mines (MEM), OGC, Conservation Officer Service, and the Environmental Protection Division of MOE.

EAO conducts extensive planning to ensure effective, risk-based compliance oversight. The two key plans prepared by EAO compliance staff are:

- Compliance Management Plans (CMPs) – After a project has been certified, EAO compliance staff prepare a CMP in collaboration with partner agencies. The CMP outlines the general approach to compliance oversight for the project and clarifies inter-agency responsibilities for inspecting and enforcing the EA Certificate conditions. This plan is updated as the Project progresses.
- Annual Inspection Plans – Each fiscal year, EAO plans its administrative (i.e., desk-based) and field-based inspections for the year in keeping with risk-based criteria developed by EAO and the targets specified in MOE’s Service Plan.

Unplanned inspections are also conducted in response to new information received by EAO, public and Aboriginal Group complaints or in follow-up to previous inspections.

When information from an inspection, EA Certificate holder self-report, public or Aboriginal Group complaint or partner agency indicates that a certificate requirement may have been breached, EAO compliance staff conduct an investigation to collect the evidence necessary to determine if enforcement action is warranted. Investigations vary in effort and length of time depending on the nature and complexity of the non-compliance. Often, partner agencies are involved in the investigations.

Throughout the life of a project, EAO and compliance partners collaborate to ensure the project is constructed and operated according to the EA Certificate.

## 5 Assessment of Environmental Effects

### 5.1 Air Quality

#### 5.1.1 Background

Air Quality was selected as a VC because the proposed Project would produce emissions during construction and operations and would have potential impacts to human and ecological health, freshwater aquatic, and vegetation resources.

The atmosphere is a major pathway by which contaminants get transported to freshwater, terrestrial and human environments. The findings from the Air Quality assessment also inform the assessment of other VCs in this Assessment Report: the effects of acidification<sup>6</sup> and eutrophication<sup>7</sup> on Freshwater Aquatic Resources (Section 5.3), the effects of acidification and eutrophication on Vegetation and Wetland Resources (Section 5.4), and Human and Ecological Health (Section 9.1). Potential effects on the Air Quality VC from accidents and malfunctions are addressed in Section 10.

The measureable parameters that were assessed in the Application include concentration levels for the following criteria air contaminants (CACs):

- Inhalable particulate (PM<sub>2.5</sub> and PM<sub>10</sub>);
- Sulphur dioxide (SO<sub>2</sub>);
- Nitrogen dioxide (NO<sub>2</sub>);
- Carbon monoxide (CO);
- Hydrogen sulphide (H<sub>2</sub>S); and
- Volatile organic compounds (VOCs).

Nitrogen oxides (NO<sub>x</sub>) are produced in most combustion processes and are almost entirely composed of nitric oxide (NO) and NO<sub>2</sub>. Sulphur dioxide (SO<sub>2</sub>) can have adverse effects on plant and animal health, particularly with respect to respiratory systems. Sulphur dioxide can also further oxidize and combine with water to form the sulphuric acid component of “acid rain” which can cause acidification effects to soils and adversely affect vegetation.

The LAA is a 30 km by 30 km square centred on the facility footprint. The RAA is a 50 km by 50 km square centred on the facility footprint. The Project footprint is primarily on and around Lelu Island under the jurisdiction of the PRPA and located approximately 2.5 km southwest of the business centre of Port Edward and 12 km south of the business centre for the City of Prince Rupert. Lelu Island and the surrounding area is a flat, low plain mostly below 30 m in elevation.

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<sup>6</sup> Acidification is the process by which pH and buffering capacity of freshwater systems decrease.

<sup>7</sup> Eutrophication describes a process by which excess algal growth associated with particularly inputs of nitrogen can lead to low oxygen levels and increased cyanobacteria growth.

The Prince Rupert area is within a thin coastal strip west of the windward slopes of the Coast Mountains. Weather conditions for the area are recorded at the Environment Canada weather station at the Prince Rupert Airport, 7 km west of Prince Rupert; and at the Holland Rock weather station, 5 km northwest of Lelu Island.

Prince Rupert is Canada's wettest city, with a total annual precipitation (combined rainfall and snowfall) of 3,060 mm. October is the wettest month, and the June to August months are driest with an average of 17 days of rain per month in the summer. The area experiences an average of 189 hours of fog per year where visibility is less than 0.8 km.

Prevailing winds are influenced by regional topography. Lelu Island is exposed to wind conditions over the open waters of Hecate Strait. Holland Rock meteorological station indicated that prevailing winds at Lelu Island are similar to Prince Rupert, but stronger.

Background air quality monitoring considered measurements of NO<sub>2</sub>, SO<sub>2</sub>, CO and PM<sub>2.5</sub> at several Port Edward, Prince Rupert and Kitimat monitoring sites, and determined that Prince Rupert and Port Edward currently have generally good air quality<sup>8</sup>: all measureable parameters are below the most stringent applicable air quality objectives. Localized higher levels of NO<sub>2</sub> west of Prince Rupert, associated with marine-based activities, are currently below air quality objectives.

The primary sources of existing air emissions in the Port Edward and Prince Rupert area include domestic heating and transportation emissions, including motor vehicles and aircraft; local marine vessel emissions, including container ships, fishing, ferry and cruise ship traffic; and, existing marine bulk terminals on Ridley Island.

The proposed Project would require a waste discharge permit under the BC *Environmental Management Act* to authorize emissions of CACs. Provincial and federal ambient air quality objectives (AAQOs) guide permit development, and provide the framework for evaluating observed or predicted air contaminant concentrations. The permit would be issued by OGC under the OGAA.

The Province of British Columbia recently announced that it is implementing new AAQOs for NO<sub>2</sub> and SO<sub>2</sub> for all new and expanding industrial facilities in BC, which established air emission levels to protect human health. These provincial air quality objectives were not implemented at the time the Application was submitted.

Although the Proponent was not required to consider air quality objectives from jurisdictions other than BC at the time of developing the AIR, EAO, in considering advice from MOE, requested in Application Review an assessment of the proposed

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<sup>8</sup> "Good" air quality is defined on BC's Air Quality website (<http://www.bcairquality.ca/101/what-is-air-quality.html>) as "clean, clear, unpolluted air".

Project emissions relative to the SO<sub>2</sub> and NO<sub>2</sub> objectives set by the US Environmental Protection Agency (US EPA).

The Proponent delivered a Detailed Air Quality Dispersion Modelling Plan to MOE, which reviewed the plan and approved it on September 11, 2013. Dispersion simulations of the air contaminants were completed using the CALPUFF air quality modelling system, with input from the CALMET meteorological model. Air dispersion modelling was completed in accordance with regulatory guidance from the Ministry of Environment's *Guidelines for Air Quality Dispersion Modelling in BC* (2008).

The Proponent's Application describes the selection of sensitive receptors, which can be either human residences or sensitive ecosystem areas. The Application lists the sensitive receptors as schools, daycares, hospitals, seniors' housing, nearest residences, Aboriginal Groups' fishing communities, commercial locations and traditional use areas based on traditional use study information. Maximum predicted CAC concentrations were determined for both the project-alone case and cumulative effects assessment case. The effects of air quality on communities are assessed in Chapter 9 of this report.

### **5.1.2 Potential Project Effects and Proposed Mitigation Described in the Application**

The Application identifies that adverse air quality effects would result from activities associated with the different phases of the Project. The main sources of air contaminants emitted during construction would include ground disturbance, site clearing, operation of heavy construction equipment, and the delivery of equipment and supplies to the Project site. Following commissioning, the primary emissions sources during routine operations would include land and marine-based project activities. Land-based emissions would be generated by gas compressor drivers, power generators, thermal oxidizers and flares. Marine-based sources of air emissions would include LNG vessels and assist tugboats.

The Application states that during construction the increases in SO<sub>2</sub> and PM emissions would be minor. The increase in NO<sub>2</sub> emissions would be greater than the SO<sub>2</sub> and PM emissions; however, these construction emissions would be short-term and transient, and would not contribute measurably to any regional cumulative issues of concern. The Application also states that construction emission totals would be minor compared to operations, and therefore were not included in dispersion simulations.

The Application states that the primary source of air quality effects from the proposed Project would be the potential increase in airborne concentrations of CACs during operations. Project activities would also produce VOCs, which are substances that readily evaporate and produce air contaminants under ambient conditions.

The Application notes that inputs and assumptions employed in the modelling reflected a conservative approach due to the following factors:

- Regulatory models such as CALPUFF are designed to be conservative under most conditions;
- Emission rates used in the modelling were derived from front-end engineering studies and operating conditions are expected to be less; and
- The air quality assessment is based only on the maximum predicted concentrations, in reality, atmospheric mixing and dispersion of CACs is expected to result in concentrations well below predicted maximums.

The Application states that VOC emissions were not included in dispersion simulations since applicable objectives were not available for comparison. Additionally, thermal oxidizer operation would oxidize most of the VOC in the waste gas stream and it is expected that none of the remaining constituents would be toxic. Therefore, increased concentration levels of the waste gas constituents should not have an adverse effect.

The Application concludes that:

- All predicted maximum CAC concentrations from operations are below the most stringent applicable objectives, and that most of the effects would occur in the immediate vicinity of the facility, adjacent to the property line or vessel loading area;
- Residual effects as adverse and continuous over the operations phase, but of low to medium magnitude. The geographic extent of the most adverse effects was shown by the modelling to be local and the remainder of affected areas were shown to have a low level of effect. Time series analysis demonstrated that the most adverse effects occur only sporadically and with a very limited frequency; and
- Magnitude of CAC emissions from the construction phase activities to be lower than the operations phase, indicating similar characteristics, but to a lesser degree than the operations phase. The decommission phase emissions are of even lower intensities. For all contaminants and averaging periods, the predictions at each of the sensitive receptors were well below the applicable objectives.

The Application lists proposed mitigation actions to limit air quality effects of CAC emissions from project activities:

- Project design would incorporate MOE's best achievable technology (BAT) policy (2012) to reduce air emissions. Control technologies would focus on managing NO<sub>x</sub> emissions. PM<sub>2.5</sub> emissions are expected to be managed through smokeless flare technology. CO and hydrocarbon emissions (e.g., VOCs) would be reduced by optimizing combustion;
- Use of thermal oxidizers to oxidize H<sub>2</sub>S, other sulphur compounds, and waste VOCs extracted from the natural gas;

- Implement best management practices for its processing systems (i.e., the use of treated feed gas as fuel for power generation);
- Implement a natural gas leak detection program;
- LNG carriers and assist tugs would use low-sulphur fuel in compliance with applicable marine emission standards;
- Dust associated with the use of facility roads would be reduced by using dust suppressants and surface paving;
- Vehicle and off-road equipment would use low-sulphur fuel, when available, and would undergo regular tuning and maintenance; and
- Vehicle idling times during all project phases would be kept to a minimum.

### **5.1.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During their review of the Application, the Working Group raised several key issues on air quality.

The Working Group expressed concern that publically available ambient air quality background (i.e., baseline monitoring data) does not represent existing ambient air quality conditions in the Port Edward/Prince Rupert airsheds. The Working Group also expressed concern about the rationale for including specific regional sources in the Application. The Working Group requested a comparison of the Proponent's work with the preliminary PRPA airshed study that was undertaken by the PRPA.

The Proponent responded that modelling baseline predictions were determined to be a reasonable representation of actual conditions because: maximum permitted emission rates were used and actual values would be much lower; air emissions from linear and areal sources do not contribute meaningfully to the existing conditions and are within the built-in conservatism of the model; and recent studies (both the Mobile Air Quality Monitoring Laboratory [MAML] and the preliminary Prince Rupert Port Authority airshed study<sup>9, 10</sup>) confirm that actual ambient air concentrations are lower than predicted.

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<sup>9</sup> SNC Lavalin Environmental. 2012a. Draft PRPA Air Model Description and Results (in Brief).

<sup>10</sup> SNC Lavalin Environmental. 2012b. Prince Rupert Port Authority Environmental Footprint Study. Phase 1 – Review of Existing Baseline Data and Data Gas Assessment.

The Working Group expressed concern about the rationale for excluding other sources of emissions (i.e., on- and off-road vehicles, rail, aircrafts, wood smoke, dust) in the Application.

The Proponent responded that other sources of air emissions (i.e., on- and off-road vehicles, rail, aircrafts, wood smoke, dust) would be short term, intermittent, low in magnitude and typical of small rural communities. Given the existing meteorological and topographic features combined with the small population size in Port Edward and Prince Rupert, it is reasonable to assume these sources would have negligible effects on the overall air quality compared to major continuous contributors.

MOE and EAO asked the Proponent to assess the proposed Project's emissions in relation to the US EPA's SO<sub>2</sub> and NO<sub>2</sub> objectives, and use those as interim objectives.

The Proponent compared its dispersion modelling predictions to the US EPA's 1-hour SO<sub>2</sub> and NO<sub>2</sub> National Ambient Air Quality Standards (NAAQS) and found that all predictions were well below the applicable Standards. This supports the findings of the air quality assessment presented in the Application.

During Application Review, the Proponent decided to not build a worker accommodation camp on Lelu Island, and instead use a third-party operated accommodation camp in the Port Edward and/or Prince Rupert general area, estimating a requirement for up to 450 bus trips per day to Lelu Island during peak construction. This change is described in the Addendum to the Application dated October 6, 2014. There is uncertainty about how this would change the net air emission levels during construction, in part because it is not known at this time what type of fuel the buses would use and what distance they would travel; however, the following is generally expected:

- Increased air emissions due to the increase in vehicle traffic associated with transporting workers to Lelu Island;
- The above mitigations for low-sulphur fuel, maintenance and idling restrictions would apply to the buses transporting workers; and
- Decreased air emissions from diesel generators would be greatly reduced because moving the camp would eliminate the need to supply power to the camp.

In light of the concerns raised during the Application Review, EAO believes that additional management strategies are warranted and therefore proposes a condition requiring the Proponent to develop and implement an air quality and acidic deposition monitoring program to determine the appropriate level of monitoring, as well as establish soil and water sampling and reporting requirements at permitting. In the event that MOE establishes a regional air quality and deposition monitoring program within the local airshed, the Proponent would also be required to participate in it.

### 5.1.4 Characterization of Residual Project Effects

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in an increase in elevated concentrations of CACs and PM during operations.

Summarized below is EAO's characterization of the expected residual effects of the proposed Project on air quality, as well as EAO's level of confidence in the effects determination (including their likelihood and significance). The magnitude of CAC emissions from the construction phase is lower than the operations phase, so the same characterizations apply to the construction phase, but to a lesser degree.

Criteria	Assessment Rating	Rationale
Context	High resilience	Currently, the air quality is considered good, and all CACs are below AAQOs and applicable standards (US EPA NAAQS).  Environmental sensitivity and resilience are considered implicit in the applicable ambient air quality and supplemental BC interim objectives.
Magnitude	Moderate	Residual effects would cause an increase in CACs relative to baseline, but the effects from the proposed Project CAC emissions would be below AAQOs and US EPA NAAQS and would be within regulatory limits and objectives.
Extent	LAA	Residual effects would extend beyond the activity area but remain within the LAA. Modelling results show that the geographic extent of most of the adverse effects would be local.  For assessment of effects of emissions on other VCs, refer to Vegetation and Wetland Resources, Human and Ecological Health, and Freshwater Aquatic Resources chapters.

Duration	Long term	The duration of the effects of the proposed Project on air quality would be the life of the proposed Project (30+ years).  Time series analysis demonstrated that most of the adverse effects would occur only sporadically and with a very limited frequency.
Reversibility	Reversible	Residual effects would cease when operations cease.
Frequency	Continuous	Residual effects would occur continuously.
Likelihood	The likelihood is high that the construction and operation of the proposed Project would result in emissions of CACs and a residual effect on air quality.	
Significance Determination	Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on air quality.	
Confidence	There is a high level of confidence in the significance and likelihood determination based on the emissions data provided and the analytical techniques used to support the assessment.	

### 5.1.5 Cumulative Effects Assessment

The Application's dispersion modelling results indicate that residual effects from the proposed Project do not substantially overlap with existing regional source effects. The Application includes emissions from the existing CN Rail Line, Fairview Container Terminal Phase I, Northland Cruise Terminal, Prince Rupert Ferry Terminal, Prince Rupert Grain Limited, and Ridley Terminals Inc.

The Application's dispersion modelling results also indicate that residual effects from the proposed Project would have some overlap with effects from reasonably foreseeable future projects in the assessment area, but the cumulative effect is not significant. Major planned projects to be located in the RAA include: Fairview II expansion facility, Canpotex Potash Export Terminal, and the Prince Rupert LNG facility.

The Application found that its dispersion modelling predictions were well below the applicable objectives and standards (AAQO and NAAQS), with the exception of one, 1-hour result of NO<sub>2</sub> that was 17% higher than the objective. This exceedance of the

1-hour objective occurred over a 3 year simulation period west of Prince Rupert and on the east side of Digby Island, each about 2.3 km apart.

These exceedances were concluded to be the result of emissions contributions originating from existing regional sources and are attributed to marine-based activities (i.e., ferries, bulk carrier vessels and tugs) that are located far from the proposed Project. These exceedances did not account for the 2015 clean fuel regulation (MARPOL 2013) requiring vessels to use low-sulphur fuel. Based on this, the results of the cumulative effects assessment are conservative. If existing emissions estimates are revised to reflect the 2015 clean fuel regulation, the 1-hour NO<sub>2</sub> exceedance is expected not to occur.

EAO concludes that no significant cumulative effects to air quality are expected as a result of effects of the proposed Project interacting with effects of other past, present and reasonably foreseeable future projects and activities.

### **5.1.6 Conclusions**

Considering the above assessment and Condition 3 in the TOC (which would become legally binding under an EA Certificate) requiring the Proponent to develop and implement an air quality and deposition monitoring program, EAO is satisfied that the proposed Project would not have significant adverse effects on air quality.

Considering the above analysis, permit emission levels and permit conditions during operations, taking into consideration that the projected emissions would fall within federal and provincial guidelines and having regard to the conditions identified in the TOC (which would become legally binding as a condition of the EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on air quality.

## **5.2 Greenhouse Gas Emissions**

### **5.2.1 Background**

GHG emissions was selected as a VC because of its effects on the global climate. GHGs would be released during the construction and operation of the proposed Project.

There are four major gases or groups of gases that are influenced by human activities that are of interest with respect to GHG emissions: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and, synthetic (not naturally occurring) fluorinated gases (i.e., sulphur hexafluoride (SF<sub>6</sub>), hydro-fluorocarbons (HFCs) and perfluorocarbons (PFCs). Total GHG emissions are reported in this report as carbon dioxide equivalents (CO<sub>2</sub>e), where emissions of each specific GHG are multiplied by their global warming potential. GHGs are generated through the combustion of fossil fuels and fugitive emissions.

Both the federal and provincial governments have indicated a desire to address GHG emissions and have created strategic-level plans. The Government of Canada has set a target of reducing Canada's total GHG emissions by 17% from 2005 levels by 2020. At present, with respect to GHG emissions reporting, Environment Canada requires that any facility emitting more than 50 kt CO<sub>2</sub>e report their annual GHG emissions online.

In 2007, the BC Government passed the *Greenhouse Gas Reduction Act*, legislating provincial GHG reduction targets of 33% below 2007 emission levels by 2020 and 80% below by 2050. Interim reduction targets of 6% by 2012 and 18% by 2016 have been set in policy to guide and measure progress. An Oil and Gas Climate Action Working Group, including representatives of provincial agencies and the oil and gas industry, was established in 2008 to develop strategies to reduce GHG emissions within the industry.

In the Province's most recent Greenhouse Gas Inventory Report, BC's 2012 CO<sub>2</sub>e emission levels were reported at 61,500 kt, 4.4% below 2007 levels.

BC's 2012 CO<sub>2</sub>e emission levels were reported at 61,500 kt, 4.4% below 2007 levels, in the Province's most recent Greenhouse Gas Inventory Report.

In order to achieve the legislated GHG reduction goals, BC has designed and implemented a suite of policy, regulatory, and legislative measures to reduce emissions across the province. These measures include:

- A provincial carbon tax, introduced in 2008 through the *Carbon Tax Act*;
- A carbon-neutrality mandate for all public sector operations (Carbon Neutral Government Regulation), largely achieved through the sourcing of province-based offsets via the Pacific Carbon Trust (Emissions Offset Regulation);
- Mandatory GHG reporting program (Reporting Regulation); and
- A potential cap-and-trade program and compliance offset scheme for large final emitters.

BC understands the potential of GHG emissions from LNG facilities and their potential to impact on BC's legislated GHG targets, including Pacific NorthWest LNG, and is therefore contemplating having a GHG intensity benchmark for LNG production that LNG facilities would be required to meet. In October 2014, BC introduced the *GHG Industrial Reporting and Control Act* that would put in place a GHG benchmark of 0.16 tonnes of CO<sub>2</sub>e (CO<sub>2</sub> or CH<sub>4</sub>) per tonne of LNG produced in LNG facilities, measured yearly. LNG facilities can use offsets and a technology fund to reach the benchmark, and facilities below the benchmark can receive a credit that they can sell. Money received into the technology fund would go to technology investment to reduce GHG emissions.

In recognition of these planned changes, and if this proposed Project is granted an EA Certificate, the proposed Project would require a Greenhouse Gas Management Plan that is consistent with the approach required to calculate the GHG intensity of the facility. It is anticipated that the approach to calculating the facility's GHG intensity and total annual GHG emissions would be set out in regulation by government, and administered by the MOE.

EAO recognizes that the impacts of GHG emissions must be addressed globally, and that it is not possible to estimate the impacts of an individual project's emissions on global climate change. However, EAO also recognizes that BC's GHG reduction targets were established in the context of the best science about the necessary reductions to global GHG emissions to address impacts on global climate change, and that it is BC's responsibility to contribute to the global reduction. As such, individual projects are compared with provincial natural and introduced GHG emission levels, as well as with the industry average of GHG intensity (calculated as tonnes of GHG CO<sub>2</sub>e per tonne of LNG produced).

The Intergovernmental Panel on Climate Change (IPCC) is an international scientific body under the United Nations whose role is to assess available scientific information related to climate change. The IPCC's scientific consensus is that anthropogenic sources of GHG emissions are altering the global climate, and that concentrations above 450 parts per million (ppm) of CO<sub>2</sub> in the atmosphere would result in a 50% chance of increasing average global temperatures by 2°C over the pre-industrial average.<sup>11</sup>

The IPCC has developed scenarios (called Representative Concentration Pathways) to support the development of global policy, mitigation and adaptation measures in response to a changing climate. These scenarios are presented in Figure 5-1, with the image on the left showing the projected global CO<sub>2</sub> emissions, and the image on the right showing the associated trends in the atmospheric concentrations of CO<sub>2</sub>.

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<sup>11</sup> Intergovernmental Panel on Climate Change (IPCC). 2013. Working Group I Contribution to the IPP 5th Assessment Report. *Climate Change 2013: The Physical Science Basis*. IPCC. Geneva, Switzerland.

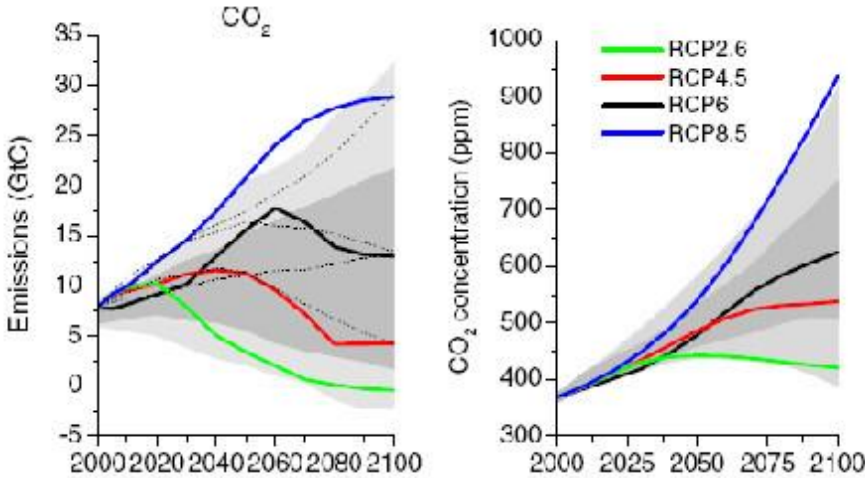


Figure 5-1: The IPCC's CO<sub>2</sub> emissions and concentration projections.

These scenarios provide some information on the global context for GHG emissions. In three of the scenarios, GHG emissions are expected to begin declining in the period 2020–2060. In one scenario, this would result in atmospheric concentrations of GHGs starting to decline around 2050, while the growth in concentrations would begin slowing down mid-century. All scenarios would result in atmospheric concentrations exceeding 450 ppm.

In the Application, GHG management considers project emissions in terms of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O. The Application states the proposed Project activities would not contribute emissions of SF<sub>6</sub>, ozone (O<sub>3</sub>), water (H<sub>2</sub>O), HFCs and PFCs. The Application states that the proposed Project may use a SF<sub>6</sub> insulated switchgear (34.5 kV in the main substation). The SF<sub>6</sub> would be contained in sealed vessels, eliminating any potential for fugitive emissions.

To establish a baseline, the Proponent compared the carbon footprint of 12 LNG export facilities proposed worldwide. The Proponent used an intensity benchmark, which is a ratio of “tonnes of GHG (CO<sub>2</sub>e) to tonnes of LNG production.” It generally includes all processes and equipment required for the liquefaction process from the point of receipt of natural gas (the gas metering station) to the point of loading onto a vessel or vehicle for transport to customers or market. The average GHG intensity for the facilities used as comparison is 0.33 t CO<sub>2</sub>e/t LNG. Among projects that are proposed or under development, the Queensland Curtis LNG Project is designed to have the lowest GHG intensity of about 0.25 t CO<sub>2</sub>e/t LNG, forming the basis for the LNG export industry profile used in this assessment.

## 5.2.2 Potential Project Effects and Proposed Mitigation Described in the Application

The Application states that the proposed Project would emit GHGs through the combustion of fossil fuels during all phases of the Project.

The Application states that during construction, site clearing would reduce the carbon sink on Lelu Island by removing trees and peat bog. GHGs would be emitted during combustion of fossil fuels by land-based and marine-based heavy duty equipment, as well as during the burning of vegetation that is not sold as merchantable timber. About 178,169 tonnes CO<sub>2</sub>e would be released during the five-year construction period.

The Application states that the largest source of GHG emissions during operations would be from the use of natural gas to drive refrigerant compressors and power generators during operations. There would also be GHGs emitted from fugitive emissions originating from piping, valve and other connections, and combustion of fossil fuels by LNG carriers and tug boats.

The Application states that at full build-out, the proposed Project would release about 5.28 Mt CO<sub>2</sub>e/year to the environment (Table 5-1). This would increase BC's emissions total by 8.5% to 62.2 Mt CO<sub>2</sub>e/y and the national emissions total by 0.75% to 702 Mt CO<sub>2</sub>e/y (Table 5-2) based on 2011 levels.

Table 5-1: Estimated GHG emissions during operations

Operation Type	GHG Emissions (t/y)			
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
3 LNG Trains	4,158,973	293	279	4,251,498
Gas turbine power generation	951,078	74	71	974,737
Flares	7,077	1	0	7,148
<b>Total Land-Based Emissions</b>	<b>5,117,127</b>	<b>368</b>	<b>350</b>	<b>5,233,383</b>
<b>Total Marine-Base Emissions</b>	<b>47,559</b>	<b>3</b>	<b>2</b>	<b>48,266</b>
<b>Total GHG Emissions</b>	<b>5,164,687</b>	<b>371</b>	<b>352</b>	<b>5,281,649</b>

Table 5-2: GHG Emissions estimates (CO<sub>2</sub>e tonnes/year)

Project	Provincial (2011)	National (2011)
5,281,649	62,213,000	702,000,000

The Proponent determined that when the proposed Project is operating at peak capacity of 19.2 million MTPA, the GHG intensity of the proposed Project would be a ratio of 0.27 t CO<sub>2</sub>e/t LNG. The Proponent expects that actual GHG emissions during normal operations would be less than 0.25 t CO<sub>2</sub>e/t LNG because:

- The Project's GHG intensity of 0.27 t CO<sub>2</sub>e/t LNG assumes sources of emissions would operate at 100% load, but the load factor during normal operations would likely be lower;

- Final engineering would include further engineering solutions that reduce emissions; and
- Final engineering would reduce GHG emissions by selecting technology and best management practices that comply with the MOE's BAT policy for controlling air emissions (2012)

The Application states that their GHG emissions estimate is conservative due to the use of conservative numbers in the calculations and the probability that, by the time the Proponent completes final engineering, technology will be improved. The Proponent has stated during Application Review that front end engineering design (FEED) predicts GHG emissions in the 0.19 t CO<sub>2</sub>e/t LNG range, and they have set 0.22 t CO<sub>2</sub>e/t LNG as a design criteria to its contractors.

Because the *GHG Industrial Reporting and Control Act* that has been tabled sets out requirements for LNG facilities to achieve a specific benchmark, as well as setting out a defined approach to reduce those emissions if the facility operations alone do not achieve the benchmark, EAO has confidence in not recommending any conditions.

### 5.2.3 Characterization of Residual Project Effects

The residual effects of the proposed Project during construction would be 178,169 tonnes CO<sub>2</sub>e during the five years of construction.

The residual effects of the proposed Project during operations is assessed based on a release of approximately 5,281,649 t CO<sub>2</sub>e/year to the environment, which would have an intensity ratio of 0.27 t CO<sub>2</sub>e/t LNG, although this value is predicted by the Proponent to be lower after final engineering is completed.

Summarized below is EAO's characterization of the expected residual effects of the proposed Project on the environment from GHG emissions, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	Moderate to high	The IPCC has confirmed that GHG emissions are at levels that are impacting the global climate.
Magnitude	High	Emissions from the proposed Project at full build-out are estimated to be 5.28 Mt CO <sub>2</sub> e/year and are anticipated to increase BC's provincial GHG emissions by 8.5%. The proposed Project would also increase national GHG emissions by 0.75%, as well as contribute to global GHG emissions.
Extent	Global	The geographic impact of GHG emissions from the proposed Project is cumulative globally.

Duration	Long-term	CO <sub>2</sub> constitutes the majority of the proposed Project's GHG emissions. CO <sub>2</sub> remains in the atmosphere for 100 years or more.
Reversibility	Irreversible	Given current technology and the persistence of CO <sub>2</sub> in the atmosphere, the effects of the GHG emissions are effectively irreversible.
Frequency	Continuous	GHG emissions would be continuous for the life of the proposed Project.
Likelihood	It is certain that the proposed Project would emit GHGs. However, GHG emissions may be reduced over time due to changes in technology and/or regulatory requirements.	
Significance	After considering all relevant mitigation measures identified in the Application, EAO has determined that the proposed Project would have significant residual adverse effects on GHG emissions, particularly considering the magnitude of the proposed Project's GHG emissions in relation to BC's reduction targets.	
Confidence	<p>High level of confidence.</p> <ul style="list-style-type: none"> <li>EAO considers the estimates presented in the Application to be a conservative estimate of potential GHG emissions during construction and operations.</li> <li>The technical approach for estimating GHG emissions has a high level of confidence.</li> </ul>	

#### 5.2.4 Cumulative Effects Assessment

EAO did not require the Proponent's Application to include a cumulative effects assessment for GHG emissions.

GHG emissions are a global issue, and the IPCC has produced several scenarios forecasting global GHG emissions and the potential impacts associated with these emissions levels.

#### 5.2.5 Conclusions

Considering the above assessment, EAO concludes that there would likely be significant residual adverse effects of the proposed Project related to GHG emissions.

## 5.3 Freshwater Aquatic Resources

### 5.3.1 Background

Freshwater aquatic resources was selected as a VC because fish are an important component of local recreational, commercial and Aboriginal fisheries (including food, social and ceremonial purposes), and are also important indicators of overall aquatic ecosystem health.

Key effects to freshwater aquatic resources are direct effects to freshwater fish (such as the removal of habitat), and indirect effects that change abiotic conditions (such as nitrogen or acid deposition from air emissions).

Due to the scope of the EA set out in the Order under Section 11 of the Act, EAO primarily focussed the assessment of this VC in consideration of its potential effects beyond PRPA lands. For this VC, the potential effects beyond PRPA lands are primarily the indirect effects of air emissions deposition, causing acidification and eutrophication.

The spatial boundaries for the VC include:

- The Project Development Area (PDA) - includes Lelu Island to within 30 m of the average high water mark, the bridge abutments and access road corridor, and areas covered by the bridge, pioneer dock, MOF, marine terminal and associated dredging.
- The LAA – includes the watercourses on Lelu Island.
- The RAA - encompasses the waters in Chatham Sound, which are affected by the outflow of the Skeena and Nass Rivers. This area includes the riverine and estuarine plume areas, as well as Chatham Sound waters that are under the riverine influence.

Key issues of concern raised during stakeholder and Aboriginal engagement were the increased risk of acidic deposition (acidification of soil and water) related to air contaminant emissions and the desire for periodic monitoring of downwind freshwater bodies. MOE and Environment Canada expressed concerns that there may be sensitive soft water systems in the RAA, which could be impacted to a greater degree by acidic deposition.

#### *Freshwater Fish*

Canada's *Fisheries Act*, 1985 (including June 12, 2012, amendments), and the *Species at Risk Act* (SARA), 2002, administered by Fisheries and Oceans Canada (DFO), are the primary laws providing protection for fish and fish habitat within the project boundaries. A *Fisheries Act* authorization under Section 35(2) is mandatory for project activities that would result in serious harm to fish, and requires that harm offsetting be provided through habitat creation, restoration or enhancement.

### *Acidification and Eutrophication*

For proposed Project effects related to acidification and eutrophication, the Project would require a waste discharge permit under the authority of the BC *Environmental Management Act* (2004), issued by the OGC, to authorize emissions of CACs. Provincial and federal AAQOs guide permit development, and provide the framework for evaluating observed or predicted air contaminant concentrations.

Emissions of NO<sub>x</sub> and SO<sub>2</sub> can affect health of freshwater ecosystems. These compounds have the potential to cause acid deposition by reacting with water and oxygen in the atmosphere and precipitating as sulphate (SO<sub>4</sub>) and NO<sub>x</sub>. Over time, acidic deposition can lead to the acidification (both SO<sub>4</sub> and NO<sub>x</sub>) and eutrophication (NO<sub>x</sub> only) of lakes and streams which can adversely affect fish and other aquatic biota. Eutrophication of water bodies promotes algal growth that leads to low oxygen levels.

### **5.3.2 Potential Project Effects and Proposed Mitigation Described in the Application**

#### *Freshwater Fish*

The Application identifies that proposed Project construction would result in the elimination of the two watercourses on Lelu Island that are large enough to be classified as streams, and therefore would affect fish habitat availability in these watercourses. The total loss of instream habitat from infilling and removal of fish habitat on Lelu Island is 740 m<sup>2</sup>. Both watercourses were rated as marginal for fish due to their low pH.

The Application states that:

- Where practical, effects to the lower sections of these watercourses would be avoided, and infilling of water courses would be minimized.
- A sedimentation and erosion control plan would be implemented to avoid downstream effects and a vegetated buffer that extends 30 m inland from the high-water mark around Lelu Island would be maintained.
- A fish habitat offsetting strategy is proposed that would mitigate the loss of freshwater fish habitat as a result of construction, with the aim of achieving no net loss of the productive capacity of the fish habitat.

The Application states that infilling and removal of freshwater watercourses on Lelu Island would remove the input of food and nutrients to the surrounding near shore waters and may result in the loss of productive capacity of those waters. The Application states that the 30 m vegetated buffer would mitigate the potential loss of productive capacity by reducing the amount of infilling of watercourses, and would also help maintain the hydrology of Lelu Island as well as reducing sedimentation and erosion. Fish salvage would be conducted prior to infilling of watercourses to reduce mortality of fish during construction.

### *Acidification and Eutrophication*

The Application assesses the effects of altered abiotic conditions caused by air emissions that could affect the condition of freshwater aquatic resources. To support the effects assessment of this VC, the Proponent used air emissions modelling results (see Air Quality, Section 5.1, in this report) to assess the potential for acidification of surface waters and eutrophication of aquatic systems near the project development area from emissions during operation of the LNG facility.

The Proponent conducted a critical load assessment, as directed by MOE, to determine whether modelled atmospheric deposition of SO<sub>4</sub> and NO<sub>x</sub> exceeds the critical load of acidity determined for Alwyn Lake, a protected watershed located 3.5 km from Port Edward. Alwyn Lake is of importance to the public because it is used recreationally and it supplies drinking water to the District of Port Edward.

Water sampling of Alwyn Lake shows that the general water chemistry of the lake falls within expected parameter ranges for north temperate aquatic systems. The lake is characterized by soft water (which means that it is more susceptible to acidification), and is primarily oligotrophic (which means that it has low algal growth). Alwyn Lake is a protected watershed that supplies drinking water to the District of Port Edward, and is used recreationally.

The Application states that air emissions from the proposed Project's operations would result in the deposition of substances that could cause acidification of Alwyn Lake. The outlet and the inlet of Alwyn Lake already have critical load exceedances for SO<sub>4</sub>; SO<sub>4</sub> levels are not expected to substantially deviate from baseline conditions when Project contributions are added. The middle of the lake has greater buffering capacity, and therefore is less likely to become acidified by Project contributions.

The Application also states that air emissions from operations would result in the deposition of substances that could cause eutrophication, which may change the state of Alwyn Lake from oligotrophic (low algal growth) to mesotrophic (moderate algal growth). However, the modelling data presented in the Application shows that only a small proportion of the exceedance would be attributable to the Project, with the results including the Project being very close to the baseline results. This deposition could potentially affect fish habitat availability and, in extreme cases, result in fish mortality, although this is not expected to occur with the expected levels of deposition from the Project.

The mitigation measures for the Air Quality VC also apply to the indirect effects on Freshwater Fish Resources VC (see Section 5.3 in this report).

The Proponent also proposes to complete a follow-up monitoring program to determine the accuracy of their analysis, and to identify potentially sensitive fish and fish habitat and the potential effects of acidification on freshwater aquatic resources.

### **5.3.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During review of the Application, MOE expressed concern that critical loads analysis showed that Alwyn Lake is vulnerable to both acidification and eutrophication because it is a softwater system with low buffering capacity. Data from both the lake inlet and outlet showed large critical load exceedances, though only a small proportion of the exceedance was attributable to the project. Data from the middle of the lake showed a small level of buffering capacity above the critical load. This points to the sensitivity of the softwater lakes in the area and suggests a requirement for careful monitoring.

MOE stated that during permitting it may be necessary to examine surface waters more intensively so as to identify sensitive water bodies (Alwyn Lake and additional regional lakes, for example in the Wolf Creek drainage) vulnerable to changes in chemistry, to survey their biota (benthos, macrophytes, fish, zooplankton, algae), and to assess the potential aquatic effects. Potential effects include changes in pH, changes in trophic status, and the loss of sensitive species (fish, invertebrates, and plants).

The Proponent agreed to complete this additional work (as necessary) as part of the proposed follow-up program (Section 30 of the Application) on eutrophication and acidification.

MOE provided the Proponent direction on how to model the effects of air emissions on soil and surface water acidification and eutrophication. The Proponent used another modelling approach, which is not supported by other jurisdictions in Canada, the US and Europe.

The Proponent stated that they followed the approach that was outlined in the Pacific NorthWest LNG (PNW LNG) model plan reviewed by MOE.

MOE also expressed concern that baseline data collected in support of the Proponent's assessment of the potential effects of acid deposition on surface waters did not include other lakes and streams in the vicinity because they were outside of the assessment area defined by MOE's 150 critical load of eq/ha/year for the sulfate and nitrogen deposition isopleth.

The Proponent stated that this work would be completed (as necessary) as part of the proposed follow-up program on eutrophication and acidification.

MOE evaluated the data collected by the Proponent, and the modeling methods used to assess the data. The ministry considers the Proponent's assessment of surface waters to be data deficient, leaving some uncertainty about the risk of acidification for regional lakes and streams.

The Proponent stated that this work would be completed (as necessary) as part of the proposed follow-up program on eutrophication and acidification.

In response to these concerns, EAO has proposed conditions requiring the development (with MOE and OGC) and implementation of an air quality and deposition monitoring program to determine the appropriate level of air monitoring, as well as to establish soil and water sampling and reporting requirements to ensure potential effects from air emissions are monitored. In the event that MOE establishes a regional air quality and deposition monitoring program within the local airshed, the Proponent would also be required to participate in it.

### 5.3.4 Characterization of Residual Project Effects

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on freshwater aquatic resources:

- Infilling of two watercourses on Lelu Island that are marginal freshwater fish habitat; and
- Potential increase in eutrophication and acidification of lakes and streams in the RAA, including Alwyn Lake.

Summarized below is EAO’s characterization of the expected residual effects of the proposed Project on freshwater aquatic resources, as well as EAO’s level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Freshwater fish:</b> High resilience</p> <p><b>Acidification and eutrophication:</b> Low resilience</p>	<p><b>Freshwater fish:</b> The two watercourses on Lelu Island provide marginal freshwater fish habitat due to low pH.</p> <p><b>Acidification and eutrophication:</b> Alwyn Lake provides drinking water for Port Edward and is in close proximity to the proposed Project. Alwyn Lake is a soft water lake and is sensitive to acidification and eutrophication. Other water bodies in the area may also be sensitive to acidification and eutrophication.</p>

Magnitude	<p><b>Freshwater fish:</b> Low</p> <p><b>Acidification and eutrophication:</b> Moderate</p>	<p><b>Freshwater fish:</b> A measurable effect on habitat function is anticipated during construction due to infilling of the watercourses on Lelu Island. As these watercourses are marginal fish habitat, the loss of habitat is anticipated to be low impact. Due to the Proponent's Habitat Offsetting Plan, no net habitat loss is anticipated.</p> <p><b>Acidification and eutrophication:</b> A measurable effect on lakes and streams is expected to occur over the operations of the proposed Project due to the deposition of materials from air emissions resulting in potential acidification and eutrophication. Alwyn Lake is anticipated to be impacted to a greater degree as it is a softwater lake.</p>
Extent	<p><b>Freshwater fish:</b> PDA</p> <p><b>Acidification and eutrophication:</b> LAA</p>	<p><b>Freshwater fish:</b> Residual effects are restricted to the streams within the construction area on Lelu Island.</p> <p><b>Acidification and eutrophication:</b> Residual effects extend beyond the activity area with respect to eutrophication and acidification.</p>
Duration	<p><b>Freshwater fish:</b> Single event</p> <p><b>Acidification and eutrophication:</b> Long term</p>	<p><b>Freshwater fish:</b> Infilling will occur during construction, resulting in the loss of habitat.</p> <p><b>Acidification and eutrophication:</b> The effects of eutrophication and acidification would continue for the duration of the proposed Project while air contaminants are being emitted.</p>
Reversibility	<p><b>Freshwater fish:</b> Irreversible</p> <p><b>Acidification and eutrophication:</b> Reversible</p>	<p><b>Freshwater fish:</b> The construction of the project will result in a permanent loss of the fish habitat of the two streams on Lelu Island.</p> <p><b>Acidification and eutrophication:</b> The effects of eutrophication and acidification would recover after disruption when the proposed Project operations cease.</p>
Frequency	<p><b>Freshwater fish:</b> Single event</p> <p><b>Acidification and eutrophication:</b> Continuous</p>	<p><b>Freshwater fish:</b> The residual effect on freshwater fish habitat will occur once.</p> <p><b>Acidification and eutrophication:</b> The effects of eutrophication and acidification would occur during the operations phase of the proposed Project.</p>

Likelihood	<p><b>Freshwater fish:</b> While there is a high likelihood of residual effects to the freshwater fish and fish habitat on Lelu Island, the Habitat Offsetting Plan will result in low likelihood of residual effects to freshwater fish overall.</p> <p><b>Acidification and eutrophication:</b> The likelihood is moderate of residual effects of eutrophication and acidification on freshwater fish habitat due to the apparent sensitivity of these water bodies.</p>
Significance	<p>Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on freshwater aquatic resources.</p>
Confidence	<p>There is a moderate to high level of confidence in the significance and likelihood determinations of effects on fish and fish habitat based on:</p> <ul style="list-style-type: none"> <li>• The analysis used to predict effects to freshwater fish and fish habitats;</li> <li>• The proposed Project is primarily within federal regulatory authority;</li> <li>• Project activities, components and most of the effects related to fish and fish habitat are within federal lands;</li> <li>• The federal regulatory process is ongoing, and EAO recognizes the federal process will have more specific findings and recommendations in areas of federal authority; and</li> <li>• Ultimately, any federal approvals of the proposed Project, through any number of agencies or the PRPA, would also include specific mitigation measures and project development requirements (e.g. construction and operation conditions) related to areas of federal authority, which would determine how the proposed Project may be eventually developed.</li> </ul> <p>There is a moderate level of confidence in the acidification and eutrophication effects, based on:</p> <ul style="list-style-type: none"> <li>• The analysis used to support the assessment due to the modelling methodology applied by the Proponent.</li> <li>• If an EA Certificate is issued, the Proponent would be required to conduct further assessment as part of a follow up monitoring program.</li> </ul>

**5.3.5 Cumulative Effects Assessment**

The Application states that the proposed Project is not expected to result in direct cumulative effects on freshwater aquatic resources. Only two watercourses on Lelu Island are identified as potential fish streams. Habitat quality in these watercourses is rated as marginal, at best. It is highly unlikely that these watercourses support any resident or anadromous fish species. Due to the anticipated loss of these watercourses from the construction of the proposed Project, there would be no potential interactions with other existing or future projects.

The potential exists for cumulative emissions of SO<sub>2</sub> and NO<sub>x</sub>, which may reduce the production of aquatic invertebrates and therefore cause a reduction in the available food and nutrient content of freshwaters in the RRA. The Proponent has committed to conduct a follow-up monitoring program to determine the accuracy of the desktop review, and identify potentially sensitive fish and fish habitat and potential effects of acidification on freshwater aquatic resources. The EA Certificate condition to develop and implement an air quality and deposition monitoring program as outlined in Section 5.3.3 would require the Proponent to carry out a follow-up monitoring program.

EAO concludes that no significant cumulative effects to freshwater aquatic resources are expected as a result of effects of the proposed project interacting with effects of other past, present and reasonably foreseeable future projects and activities.

### **5.3.6 Conclusions**

Considering the above analysis, the scope of assessment being focussed primarily on potential effects beyond PRPA lands, the ongoing federal regulatory processes, permit emission levels and permit conditions during operations, and having regard to the conditions identified in the TOC (which would become legally binding as a condition of the EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on freshwater aquatic resources.

## **5.4 Vegetation and Wetland Resources**

### **5.4.1 Background**

Vegetation and wetland resources was selected as a VC because of its cultural and ecological importance, as well as their importance to Aboriginal Groups. The ecological resources considered in this assessment are:

- Plant species at risk (as defined by the federal SARA and the BC Conservation Data Centre [BC CDC]);
- Non-native invasive plant species (as listed in the *Weed Control Act* and associated Regulation, or the Northwest Invasive Plant Council);
- Provincially listed ecological communities at risk (as defined by the BC CDC);
- Traditional use plants (identified through Aboriginal engagement);
- Old-growth forests; and
- Wetlands (includes marshes, swamps, fens, bogs and shallow open water).

Key effects to vegetation and wetland resources are direct effects to vegetation and wetland function (such as removing vegetation cover and draining or filling wetlands during construction), and indirect effects that change abiotic conditions from air emissions potentially affecting soil and water quality, during operations.

Due to the scope of the EA set out in the Section 11 Order of the Act, EAO primarily focussed the assessment of this VC in consideration of its potential effects beyond (PRPA lands). For this VC, the potential effects beyond PRPA lands are primarily the indirect effects of air emissions on vegetation and wetlands.

The PDA includes Lelu Island to within 30 m of the average high water mark, the bridge abutments, the access road corridor, and areas covered by the bridge, pioneer dock, MOF, marine terminal, and associated dredging.

The LAA includes Lelu Island with a 120 m buffer which encompasses an area of approximately 254 ha. The LAA contains 16 distinct plant communities, approximately 61% of which are classified as wetland.

The RA is the Kaien Landscape Unit which encompasses approximately 50,000 ha and contains similar ecosystems to those in the LAA.

Key issues of concern raised during stakeholder and Aboriginal Groups engagement were related to the increased risk of acid rain.

#### *Vegetation and Wetland Function*

Federal and provincial Acts and policies relevant to vegetation and wetland function include:

- The federal SARA prohibits killing, harming, or taking of federally-listed species;
- The federal Policy on Wetland Conservation commits all federal departments to the goal of no net loss of wetland functions on federal lands and waters;
- The OGAA directs proponents to avoid operating in wetlands and riparian reserve zones, maintain natural flows, retain vegetation within riparian management areas, prevent the transport of invasive species, and limit alteration to natural surface drainage patterns;
- The *Forest Act* requires a master license to cut Crown timber for purposes under the OGAA; and
- The *BC Weed Control Act* and associated regulations requires control of designated noxious plants.

#### *Deposition of Emissions*

Since the proposed Project air emissions have the potential to cause acidification<sup>12</sup> and eutrophication<sup>13</sup> (resulting from acid and nitrogen deposition), the proposed Project

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<sup>12</sup> Acidification is the process by which pH and buffering capacity of freshwater systems decrease.

<sup>13</sup> Eutrophication describes a process by which excess algal growth associated with particularly inputs of nitrogen can lead to low oxygen levels and increased cyanobacteria growth.

would require a waste discharge permit under the authority of the BC *Environmental Management Act* to authorize emissions of CACs. Provincial and federal AAQOs guide permit development, and provide the framework for evaluating observed or predicted air contaminant concentrations.

Emissions of SO<sub>2</sub> and NO<sub>x</sub> are carried to area soils via precipitation and can cause acid deposition. This deposition can initiate chemical reactions that result in acidification (lowering of pH) of soils. As well, emissions would deposit nitrogen (N) on soils, which can affect soil nutrient characteristics and potentially affect vegetation communities and ecosystems and cause eutrophication. Acids can also trigger the release of aluminum (Al) within the soil, which can result in toxicity to vegetation.

The Proponent assessed the indirect effects of acid and N deposition in the RAA on vegetation and wetland communities. To support the effects assessment of this VC, the Proponent conducted baseline mapping on ecological communities, bioterrain and soils and carried out field studies and lab soil sample analysis. Dispersion of air emissions was modelled using the CALPUFF modelling system. Section 5.1 of this Assessment Report contains EAO's assessment of air quality effects.

#### **5.4.2 Potential Project Effects and Proposed Mitigation Described in the Application**

##### *Vegetation and Wetland Function*

The Application states that no SARA, red-or blue-listed vascular plants, mosses, or lichens were found within the LAA. The Application states that plant species that are used by Aboriginal communities for traditional purposes were found within the LAA, including six tree species, ten shrub species, three herb species and one fern species. The Application states that no weeds were found within the LAA.

The Application states that of Lelu Island's approximate 192 ha, approximately 2.7 ha of blue-listed plant communities, 86 ha of old forest and 119 ha of wetland area would be lost due to construction. In addition, construction may result in the introduction of invasive, non-native plant species to the Island and change of function for remaining wetland areas.

The Application states that, overall the proposed Project would affect less than 1% of the total area of ecological communities at risk and/or old forest within the RAA. The Application states that this is considerably below regional ecosystem-based planning objectives, which have set management targets that allow for a loss of 30% (ecological communities at risk) and 40% (old forest), respectively.

The Application lists mitigation actions to limit direct impacts to vegetation and wetlands:

- Development of a Wetland Habitat Compensation Plan in consultation with the Canadian Wildlife Service;

- Traditional use species would be used for planting wherever possible and practical;
- Standard mitigation practices would be used during construction to prevent any introduction and spread of noxious weeds and invasive plants;
- A Species at Risk Discovery Contingency Plan would be developed and followed to address any chance-discoveries of plant species at risk during construction;
- Potential direct effects to ecological communities of interest would be reduced through drainage and erosion controls, with the objective of retaining the baseline hydrological regime;
- Ecological communities of interest located adjacent to construction limits would be clearly marked with signs to alert workers to these features and ensure they are protected, and the use of herbicides would be restricted near such communities;
- Wetlands outside the PDA would be delineated as environmentally sensitive areas during construction, marked with fencing, and construction access would be restricted within these areas; and
- Drainage and erosion control techniques intended to maintain the local surface and ground hydrology would be designed and implemented to maintain the pre-disturbance drainage pathways through the wetlands bordering the PDA.

### *Deposition of Emissions*

The Application states that in the RAA and LAA the abundance of ecological communities of interest could change directly due to soil acidification or eutrophication resulting from acid or N deposition. The Proponent's air dispersion modelling indicated that there were areas of exceedance for acid deposition for both the Application case (baseline plus the project) and the cumulative case. For the Application case, areas where there was a predicted exceedance of acid deposition included 6.7 ha of upland forest, bog, and swamp, while 591.5 ha have a predicted exceedance of acid deposition in the cumulative case.

The Proponent conducted a soil study in the LAA and found that the buffering capacity of the soils would make acid deposition negligible. The soils had low pH at baseline and high organic matter content (litter and humus) as well as deeper organic deposits. These soil characteristics would likely buffer against further change in acidity arising from acid deposition associated with air emissions.

As well, the Proponent studied N deposition and found that critical loads were exceeded in the Application case. Seven ecological communities comprising 3.5 ha occur within the areas of exceedance in the Application case. While N deposition can trigger changes in soil nutrient levels, altering patterns of plant community structure, the modelled exceedance of nitrogen deposition would not present an adverse effect on soils due to fertilization. However, it is possible that the modelled rates of N deposition could cause a shift in community composition within the relatively small area of sensitive communities (wetlands and bogs) within the area of persistent exceedance.

The Application states that there would be negligible H<sub>2</sub>S emissions and negligible potential for acidification risk to vegetative communities.

The Application lists proposed mitigation actions to limit air quality effects of CAC emissions from Project activities, and these actions apply equally to the reduction of potential effects from acid or N deposition on ecological communities. The Proponent commits to the following mitigation measures specific to vegetation:

- Monitor soils and vegetation within the areas of predicted N deposition exceedance of empirical critical loads (since the precise response of these communities to such deposition is uncertain); and
- Develop a Wetland Habitat Compensation Plan in consultation with the Canadian Wildlife Service.

#### **5.4.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During their review of the Application, the Working Group raised several key issues about proposed mitigation, N deposition and the Proponent's modelling approach. Summarized below are the issues and the Proponent's or EAO's responses.

FLNR noted that the Proponent has identified in several circumstances that the primary mitigation for several VCs will be the maintenance of an undisturbed 30 m buffer around the perimeter of Lelu Island, except at access points (e.g., at the bridge, pioneer dock, MOF, trestle, and pipeline interconnection). With the changes anticipated to air quality, hydrology, and landscape as a result of the proposed Project, it is a requirement for the Proponent to develop a management plan for this 30 m buffer to ensure its health and resilience to other factors like blowdown for all phases and life of the proposed Project.

The Proponent stated that the Vegetation Management Plan will apply specifically to the vegetated 30 m buffer around the perimeter of Lelu Island. The objectives of the Vegetation Management Plan include:

- To protect the health and function of wetlands in the 30 m buffer;
- To protect the health and function of ecological communities of interest in the 30 m buffer; and
- To maintain the functions provided by vegetation within the 30 m buffer related to the mitigation of noise, light and visual quality effects.

In response to these concerns, EAO proposes a condition requiring the Proponent to develop a specific Vegetation Buffer Management Plan to meet these objectives in consultation with FLNR, OGC, and the PRPA.

Aboriginal Groups expressed concerns that ecosystems would be affected due to N deposition, and if ecosystems sensitive to N deposition are affected, it is unclear whether there are any mitigation actions that could offset the impact.

In response, the Proponent is recommending a follow-up program to confirm the predictions of potential effects of acidification and eutrophication on vegetation communities.

MOE was concerned about the modelling approach taken by the Proponent, which led the agency to express some uncertainty in the Proponent's results and conclusions. MOE recommended a follow-up Soil Acidification Assessment Plan be developed to the satisfaction of the MOE.

The Proponent responded by clarifying that they used conservative assumptions in their soil acidification assessment for unknown values. The Application includes a commitment to monitor soils and vegetation within the areas of predicted N deposition exceedance of empirical critical loads.

In response to these concerns, EAO proposes a condition requiring the development and implementation of an air quality and deposition monitoring program to determine the appropriate level of air monitoring, as well as establish soil and water sampling and reporting requirements to ensure potential effects from emissions are monitored. In the event that the MOE establishes a regional air quality and deposition monitoring program within the local airshed, the Proponent would also be required to participate in it.

#### **5.4.4 Characterization of Residual Project Effects**

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following indirect residual adverse effects on vegetation and wetland resources:

- Loss of ecological communities of interest due to clearing and site preparation, and of their condition due to the introduction of invasive non-native plant species;
- Loss of wetland function (hydrological, habitat or biogeochemical) as a result of clearing, filling, or draining; and
- Effects of deposition of emissions causing soil acidification or eutrophication.

Summarized below is EAO's characterization of the expected residual effects of the proposed Project on vegetation and wetland resources, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Ecological communities:</b> Low to moderate resilience</p> <p><b>Wetlands:</b> Low resilience</p>	<p>The proposed Project site is currently undisturbed habitat.</p> <p>Ecological communities of management concern and wetland ecosystems have low resilience to direct disturbance from vegetation clearing and construction.</p> <p>Ecological communities, including traditional use plants, are moderately resilient to soil acidification and eutrophication because of high buffering capacity of soils.</p>
Magnitude	<p><b>Ecological communities:</b> Low to moderate</p> <p><b>Wetlands:</b> Moderate</p>	<p><b>Ecological communities:</b> The magnitude for change in ecological communities' abundance and condition is low because, although there would be a measureable change in RAA, the regional population will be able to sustain itself without active management.</p> <p>The magnitude of indirect effects from emissions deposition on the abundance and condition of ecological communities is moderate due to emissions deposition. There would be 6.7 ha of upland forest, bog, and swamp within the areas of exceedance for acidic deposition and seven ecological communities comprising 3.5 ha within the areas of exceedance for N deposition.</p> <p><b>Wetlands:</b> The magnitude for change in wetland function is moderate because 119 ha of wetland area would be lost due to the proposed Project construction and would require active management.</p>
Extent	PDA and RAA	<p>Direct clearing of vegetation and changes in wetland function would occur on the proposed Project footprint.</p> <p>Air emissions and associated effects on ecological communities would occur in areas of exceedance.</p>
Duration	Long-term to permanent	<p>Effects on ecological communities and wetland function due to construction of the proposed Project would be permanent.</p> <p>Indirect effects from air emissions resulting in deposition would be long-term for the duration of the proposed Project and may be permanent if there is a shift in ecological community composition in areas of persistent exceedance.</p>

Reversibility	Reversible to irreversible	<p>Effects on ecological communities and wetland function due to construction would persist after the life of the proposed Project.</p> <p>Indirect effects from air emissions resulting in deposition may not recover after closure and decommissioning of the proposed Project if there is a shift in ecological community composition in areas of persistent exceedance.</p>
Frequency	Single event and continuous	<p>Vegetation clearing and wetland function changes would be a single event.</p> <p>Indirect effects from air emissions would be continuous for the duration of proposed Project operations.</p>
Likelihood	<p>The likelihood is high of direct residual effects to vegetation and wetland resources from the construction of the proposed Project.</p> <p>The likelihood is low of a residual effect from acid deposition, because the soils within the area have a low pH and high organic content, giving them resilience against additional acid inputs.</p> <p>The likelihood is moderate of a residual effect from N deposition since proposed Project activities would lead to air emissions in excess of empirical critical loads within 3.5 ha of ecological communities.</p>	
Significance	<p>Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on vegetation and wetland resources.</p>	
Confidence	<p>There is a moderate to high level of confidence in the likelihood and significance determination of indirect effects from emissions. There is some uncertainty due to the modelling approach taken by the Proponent for soil acidification and how this rate of deposition would affect ecological communities within this area.</p> <p>There is a moderate to high level of confidence in the likelihood and significance determinations of direct effects based on:</p> <ul style="list-style-type: none"> <li>• Direct vegetation and wetland effects prediction based on the analysis used to support the assessment;</li> <li>• The proposed Project is primarily within federal regulatory authority;</li> <li>• Project activities, components and most of the effects related to vegetation and wetlands are within federal lands;</li> <li>• The federal regulatory process is ongoing, and EAO recognizes the federal process will have more specific findings and recommendations in areas of federal authority; and</li> <li>• Ultimately, any federal approvals of the proposed Project, through any number of agencies or the PRPA, would also include specific mitigation measures and project development requirements (e.g. construction and operation conditions) related to areas of federal authority, which would determine how the proposed Project may be eventually developed.</li> </ul>	

#### **5.4.5 Cumulative Effects Assessment**

The direct vegetation losses represent a small portion of the total of these ecological communities with a 1% loss in the RAA.

As noted above, in the cumulative case, there would be areas of acid and N deposition that exceeds critical loads; however, these areas represent very small proportions of the total resource base for ecological communities within the RAA.

The Application states that 591.5 ha, or 1% of the total area within the RAA, would potentially be affected by acid deposition in the cumulative case because acid deposition would be in excess of empirical critical loads. There is a low likelihood of the potential effects of acidification to vegetation due to the buffering capacity of the soils.

The Application states that 144.6 ha, or less than 1% of the total area within the RAA, would potentially be affected by N deposition in the cumulative case because N deposition would be in excess of empirical critical loads. Although modelled rates of N deposition might cause a shift in community composition within the relatively small proportion of the RAA predicted to be affected under the cumulative case, sensitive communities (wetlands and bogs) within the area of exceedance are expected to persist. There is some uncertainty about how the community composition would actually change in terms of the extent and time frame of such changes. Regardless of this uncertainty, most communities within the area of exceedance are abundant elsewhere within the RAA and would persist within these unaffected areas.

EAO has determined that the proposed Project's residual effects acting cumulatively with other current and proposed projects in the area would most likely not threaten the regional sustainability of the vegetation and wetland resources identified in this assessment.

#### **5.4.6 Conclusions**

Considering the above analysis, the scope of assessment being focussed primarily on potential effects beyond PRPA lands, the ongoing federal regulatory processes, permit emission levels and permit conditions during operations, and having regard to the conditions identified in the TOC (which would become legally binding as a condition of the EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on vegetation and wetland resources.

## 5.5 Terrestrial Wildlife and Marine Birds

### 5.5.1 Background

Terrestrial Wildlife and Marine Birds was selected as a VC because of its cultural and ecological importance, and importance to Aboriginal Groups. The assessment considered the potential for the proposed Project to adversely affect terrestrial wildlife (i.e., mammals, amphibians, reptiles, terrestrial birds, and invertebrates) and marine birds (including shorebirds and waterfowl), and their habitats.

The spatial boundaries for the VC include:

- The PDA includes Lelu Island to within 30 m of the average high water mark, the bridge abutments, and access road corridors, and areas covered by the bridge, pioneer dock, MOF, marine terminal, and associated dredging. Terrestrial components of the PDA (i.e., the LNG facility) encompass 164 ha; marine infrastructure (i.e., the bridge, marine terminal, MOF, and pioneer dock) encompass 97 ha.
- The LAA extends 1.5 km from the perimeter of Lelu Island, 500 m from the marine terminal, and 2 km on both sides of the proposed primary and alternate shipping route between the marine terminal and Triple Island.
- The RAA is the Kaien Landscape Unit. The marine component of the RAA includes the PRPA boundary and the waters extending 10 km on both sides of the shipping route from the marine terminal to the Triple Island pilotage station.

Due to the scope of the EA set out in the Order under Section 11 of the Act, EAO primarily focussed the assessment of this VC in consideration of its potential effects beyond PRPA lands.

Terrestrial wildlife and marine birds were identified through analysis of existing data sources, field surveys, vegetation assessments and ecological community modelling, and wildlife habitat suitability modelling.

Federal and provincial Acts and policies relevant to wildlife and marine birds include:

- The federal SARA prohibits killing, harming, or taking of federally-listed species;
- the federal *Migratory Birds Convention Act*, regulates and restricts the harvest of individuals and the disturbance of habitat, prohibits destruction or possession of migratory birds, their nests, or eggs;
- The federal Policy on Wetland Conservation commits all federal departments to the goal of no net loss of wetland functions on federal lands and waters;
- The BC *Wildlife Act* prohibits disturbance or destruction of any bird or its eggs, or its nest (while occupied by a bird or its eggs). Nests of eagles, peregrine falcon, gyrfalcon, osprey, heron, or burrowing owl are protected year-round;

- The 2006 Central Coast and North Coast Land Use Decision provides land use planning policies and specific objectives, and strategies for managing terrestrial wildlife and marine birds along the north coast.

### **5.5.2 Potential Project Effects and Proposed Mitigation Described in the Application**

Potential effects to terrestrial wildlife and marine birds from the proposed Project include:

- Change in habitat - Habitat removal and noise disturbance associated with vegetation clearing during construction and operations;
- Change in mortality risk - Increased risk of mortality from vegetation clearing, land and water-based traffic or artificial lighting; and
- Alteration of movement - resulting from the location of project-related infrastructure or noise.

#### *Change in availability of terrestrial or marine habitat*

The greatest effect from the change in terrestrial habitat would be on wildlife species that use shrub-dominated bogs, treed swamp or bog, and old coniferous forest habitats for foraging, breeding, staging during migration, and/or overwintering such as black-tailed deer, northwestern salamander, songbirds, and shorebirds. Construction and operation of the proposed Project would also alter the suitability of habitat adjacent to the PDA for wildlife that avoid anthropogenic features.

The proposed Project would result in the removal of 164 ha of terrestrial habitat for species designated as Threatened or Endangered on Schedule 1 of SARA. The Application states that the proposed Project would not result in the loss or alteration of critical habitat for species listed as Threatened or Endangered on Schedule 1 of SARA. The proposed Project would result in the loss or alteration of 91 ha of preferred habitat for marbled murrelet, 85 ha of preferred habitat for northern goshawk, and 133 ha of preferred habitat for olive-sided flycatcher.

Noise during construction and operation would cause additional disturbance of terrestrial habitats, extending to the LAA. Sound levels would be lower during operations of the proposed Project than during construction. After mitigation measures are applied, noise would average 65 dBA at the PDA boundary, and 30-35 dBA at a distance of 2 km from the Project. The Application indicates that noise levels are at or below 30 dBA, or beyond 2 km from the point source of noise, and are not anticipated to influence wildlife species presence and habitat use.

Construction of the marine terminal, MOF, and the bridge would result in the direct loss of 6 ha of ocean and 5 ha of estuarine tidal flat habitat. The area of ocean and estuarine tidal flat habitats removed represents a small proportion of these habitats within the modelling limits (7% of ocean and 1% of estuarine tidal flat). Clearing of marine habitats would have the greatest effect on birds that forage along mudflats (e.g., herons, geese,

dabbling ducks, shorebirds) and in shallow, nearshore waters (e.g., diving ducks, alcids, gulls, and bald eagles).

As with terrestrial wildlife, sensory disturbances during construction and operation of the proposed Project can alter the suitability of marine habitats adjacent to the marine terminal, the MOF, bridge, vessel berthing areas, and shipping lanes. Depending on the frequency, intensity and duration of noise, changes in marine bird foraging patterns, predator avoidance, and communication could influence displacement of marine birds from suitable habitats.

### *Change in Mortality Risk*

Vegetation clearing during construction would present the greatest risk of mortality to birds as destruction of active nests could result in direct mortality of young. Indirect mortality could also occur through the creation of edge habitats which can result in reduced nest success.

Small mammals are at greatest risk of mortality if clearing and construction occurs during spring and summer months, when these species are occupying dens. Amphibians are at greatest risk of direct mortality if wetland habitat is drained or filled during construction activities that overlap with the breeding period for amphibians. Mortality of large and medium sized mammals and adult birds is unlikely due to the high mobility of such species and their ability to disperse from the PDA during site clearing and construction.

Birds, particularly marine species, are highly susceptible to mortality events caused by sources of artificial lighting at the LNG facility (including the pilot flare), marine terminal, and berthed or anchored vessels. Birds are also attracted to artificial lighting and could suffer mortality through direct collision with lighting structures.

Vehicle-related wildlife mortality could occur if roads are located along traditional migration routes between important habitats or if species are attracted to roadsides that have been artificially seeded or provide easier access for travel. The Application reports that during construction traffic volumes would increase by 98%, resulting from an additional 2970 vehicles per day. During operations, the Proponent expects traffic from the proposed Project to be comparable to that of other industries operating in the region.

Improper waste management and disposal procedures have the potential to attract bears, wolves, and coyotes to the project site. Modern waste management practices focus on reducing the causes of human-wildlife encounters (e.g., food, garbage, and other attractants) as an effective means to limit human injury, property damage, and animal removal.

### *Alteration of Movement*

An increase in vessel traffic is expected to result in multiple, regular displacements of marine birds within the LAA. Many marine bird species are also nocturnal migrants, suspected of orienting migration routes on star patterns. Artificial lighting could interrupt natural behavioural patterns of birds by replicating environmental sources of nocturnal light.

Wildlife are expected to adjust movement patterns to navigate around the LNG facility or avoid Lelu Island completely. In addition, wildlife will tend to avoid noisy areas, although the response would vary by species.

### *Proposed Mitigation*

The Application identifies a number of key measures to mitigate adverse effects to wildlife, including:

- Retaining a 30 m vegetation buffer around the perimeter of Lelu Island, except at access points (e.g., at the bridge, pioneer dock, MOF, trestle, and pipeline interconnection);
- Wetland habitat compensation will include restoration and compensatory activities to recover the loss of wetland habitat function to terrestrial mammals, amphibians, and birds;
- Fish habitat offsetting will include restoration and compensatory activities to recover the net loss of marine fish habitat used for foraging by marine birds;
- Guidelines for restricted activity periods to protect wildlife and marine birds will be followed. Clearing activities will occur outside of the breeding season for terrestrial birds, amphibians, and bats (April 15 through July 31), and will avoid the breeding period for raptors (January 5 through September 6);
- If clearing is required during these breeding periods, bird surveys will be conducted in advance of vegetation clearing by a BC-certified Registered Professional Biologist to comply with the Migratory Birds Regulations of the *Migratory Birds Convention Act* and the *BC Wildlife Act*. Buffers will be established around active nests and clearly marked to show the extent of clearing (BC MOE 2013);
- To mitigate potential light-induced mortality, lighting mitigations will follow objectives contained within the Canada Green Building Council LEED guidelines and the International Commission on Illumination (LEED 2004; CIE 2003; Section 9). The use of exterior lighting (including portable lighting structures) at the LNG facility, the MOF, marine terminal, trestle, berth, and on berthed vessels will be limited where practical and permissible under federal safety and navigation regulations;
- Position road and bridge construction to avoid migration corridors; and
- Implement a Project Waste Management Plan to ensure that wastes and recycling materials will be temporarily stored on site in wildlife-proof containers and regularly transferred to an approved disposal or sorting facility.

### **5.5.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During the Application Review, questions and concerns were raised by Aboriginal Groups and government agencies about effects from noise, potential for interactions of birds with the pilot flare, the loss of habitat and the potential destruction of nest sites.

As a result of concerns raised during Application Review, the Proponent made several changes to the project design that resulted in a decrease in the proposed Project's potential residual adverse effects. The Proponent introduced design modifications to the jetty and marine terminal design to mitigate and reduce the marine Project footprint effects. This design mitigation is described in greater detail in Section 5.6.3.

The new suspension bridge design includes towers and cables up to 140 m high (above sea level), and may result in a small increase in bird mortality from collisions with the structure. The suspension bridge may have a negligible effect on alteration of marine bird movements as any course correction required to avoid it would be minor. The Proponent stated that the size of the suspension bridge towers and cables will make them visible to birds in flight. Aviation lighting on the top of the tower will be designed (in consultation with Transport Canada) to reduce risk of attracting migrating birds (e.g., red-flashing lights).

The Proponent also stated that the marine terminal design mitigation reduces potential effects of disturbance to marine birds due to fewer construction vessels required for dredging and disposal at sea compared to what was assessed in the Application.

Aboriginal Groups also raised a concern regarding the potential increase in hunting pressure on terrestrial wildlife as a result of recreational hunting activities by in-migrant workers involved in the construction phase of the Project.

The Proponent responded that wildlife education and awareness training would be provided to employees, including education about the importance of wildlife to local Aboriginal Groups. The Proponent also stated that mitigation would include prohibitions on feeding and harassment of wildlife during construction and operations.

### **5.5.4 Characterization of Residual Effects**

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on terrestrial wildlife and marine birds:

- Loss or alteration of terrestrial, ocean and estuarine habitat;
- Increase in mortality risk, primarily from construction and artificial light; and

- Alteration of movement, including seasonal migration and local dispersal patterns due to physical barriers and sensory disturbance.

EAO’s characterization of the residual effect of the proposed Project is summarized below, as well as EAO’s level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Habitat availability:</b> Medium resilience</p> <p><b>Mortality risk:</b> Medium resilience</p> <p><b>Movement:</b> Medium resilience</p>	<p><b>Habitat availability:</b> The proposed Project occurs in a stable ecosystem that will continue to support terrestrial wildlife and marine birds after direct loss and alteration of habitat. Most regional marine bird species have secure populations and access to other suitable habitats within the LAA and RAA. As such, regional populations are expected to demonstrate a moderate degree of resilience to changes in marine habitat availability caused by the proposed Project.</p> <p><b>Mortality risk:</b> Baseline survey information indicated that key bird species that are more susceptible to light induced mortality are uncommon along nearshore coastal habitats within the LAA and are unlikely to interact with sources of artificial light in the PDA.</p> <p><b>Movement:</b> The energetic costs associated with altering movement vary depending on the species and their range, but terrestrial wildlife and marine birds are expected to have a moderate degree of resilience to disturbance and displacement from the proposed Project.</p>
Magnitude	<p><b>Habitat availability:</b> Moderate</p> <p><b>Mortality risk:</b> Moderate</p> <p><b>Movement:</b> Low</p>	<p><b>Habitat availability:</b> Effects are considered moderate because of the loss of 164 ha of terrestrial habitat and the loss of 6 ha of ocean habitat and 5 ha of estuarine habitat.</p> <p><b>Mortality risk:</b> Effects are considered moderate because light from the facility, marine vessels and the flare have the potential to attract nocturnal migrating birds and cause mortality, particularly in precipitation or fog conditions.</p> <p><b>Movement:</b> Effects are considered low; noise is expected to result in avoidance behaviour by many wildlife species and there is the potential for the proposed Project to alter seasonal migration and local dispersal patterns of marine birds, but effects are not expected to result in declines in sustainability of populations.</p>

Extent	LAA	Effects to <b>habitat availability, mortality risk and movement</b> extend beyond the PDA into the LAA but not the RAA.
Duration	<p><b>Habitat availability:</b> Permanent</p> <p><b>Mortality risk:</b> Short to long-term</p> <p><b>Movement:</b> Short to long-term</p>	<p><b>Habitat availability:</b> Construction of the proposed Project would result in the permanent loss of habitat for wildlife and marine birds.</p> <p><b>Mortality risk:</b> Effects on mortality risk from construction would be short-term because the effects occur for less than one breeding season or generation (e.g., less than one year). Effects on mortality risk from operations would be long-term because the effects occur across multiple breeding seasons or generations, or multiple project phases.</p> <p><b>Movement:</b> Effects on wildlife or marine bird movement from construction would be short-term because the effects occur for less than one breeding season or generation (e.g., less than one year). Effects on wildlife or marine bird movement from operations would be long term.</p>
Reversibility	<p><b>Habitat availability:</b> Irreversible</p> <p><b>Mortality risk:</b> Reversible</p> <p><b>Movement:</b> Reversible</p>	<p><b>Habitat availability:</b> There will be a permanent loss of terrestrial and estuarine habitat.</p> <p><b>Mortality risk:</b> Effects on mortality risk would cease when project operations cease.</p> <p><b>Movement:</b> Effects on alteration of movement will cease when project operation ceases.</p>
Frequency	<p><b>Habitat availability:</b> single event</p> <p><b>Mortality risk:</b> Multiple, regular events</p> <p><b>Movement:</b> Multiple, regular and irregular events</p>	<p><b>Habitat availability:</b> Impacts to habitat would be continuous and take place during a single event when construction occurs.</p> <p><b>Mortality Risk:</b> effects due to lighting would occur during multiple events, linked to timing of bird migrations.</p> <p><b>Movement:</b> effects to movement would occur in multiple regular and irregular events during construction and operations due to noise and activity from construction and regular marine vessel activity.</p>
Likelihood	The likelihood is high that some degree of adverse effects would occur, particularly during Project construction due to direct habitat loss and alteration of movement to avoid the area. The likelihood of mortality due to artificial lighting is moderate as it depends on conditions and the timing of migrations.	

Significance Determination	Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on terrestrial wildlife and marine birds.
Confidence	<p>There is a moderate to high level of confidence in the likelihood and significance determination of effects on terrestrial wildlife and marine birds based on:</p> <ul style="list-style-type: none"> <li>• The effectiveness of mitigation, and the quality and quantity of baseline data used to support the assessment;</li> <li>• The proposed Project is primarily within federal regulatory authority;</li> <li>• Project activities, components and most of the effects related to wildlife and marine birds are within federal lands;</li> <li>• The federal regulatory process is ongoing, and EAO recognizes the federal process will have more specific findings and recommendations in areas of federal authority; and</li> <li>• Ultimately, any federal approvals of the proposed Project, through any number of agencies or the PRPA, would also include specific mitigation measures and project development requirements (e.g. construction and operation conditions) related to areas of federal authority, which would determine how the proposed Project may be eventually developed.</li> </ul>

### 5.5.5 Cumulative Effects Assessment

The Application states that a total of 1,944 ha (or 1%) of habitat in the RAA has been removed or altered due to past and present projects and activities. An additional 478 ha of development is planned in the reasonably foreseeable future within the RAA (representing 0.3% of the RAA). The Project’s contribution to overall development within the RAA is 261 ha, or 0.2%.

An estimated 111 ha of old coniferous forest are expected to be removed by reasonably foreseeable future developments. However, the trend for Marbled Murrelet habitat in the RAA is a net increase of nesting habitat through recruitment of old-growth coniferous forest classes exceeding the rate of harvest.

The Application states that the Project’s contribution to cumulative risk of mortality is not expected to reduce the sustainability of regional populations.

The Application notes that two areas located on Kaien and Ridley Islands may exceed the MOE empirical critical loads for sulfate and nitrogen deposition due to cumulative effects of emissions in the RAA, which have the potential for acidification or eutrophication of freshwater systems. Acidification or eutrophication of freshwater systems would have the greatest effect on amphibian species with potential to breed in freshwater habitats in these areas, including coastal tailed frog (BC Blue List; SARA

Special Concern) and western toad (BC Blue List; SARA Special Concern). Changes to water quality in freshwater systems could reduce survival and reproductive success of amphibian species. Local populations of species of management concern are expected to have low to moderate resilience in recovering from acidification or eutrophication of freshwater systems.

A soil and water sampling program would be a condition of an EA Certificate, should one be granted, requiring the development and implementation of a plan to monitor of effects from acidification and eutrophication of freshwater systems in the region, and, if necessary, to mitigate effects. For more discussion, see the Air Quality and Freshwater Aquatic Resources chapters of this report.

The Application states that the proposed Project-related vessel traffic would have a residual effect on marine bird movement that would interact spatially and temporally with present and reasonably foreseeable future marine activities, but the proposed Project's contribution to cumulative effects on marine bird movement is not expected to influence the sustainability of regional populations.

EAO concludes that no significant cumulative effects to terrestrial wildlife and marine birds are expected as a result of effects of the proposed project interacting with effects of other past, present and reasonably foreseeable future projects and activities.

### **5.5.6 Conclusions**

Considering the above analysis, the scope of assessment being focussed primarily on potential effects beyond PRPA lands, the ongoing federal regulatory processes, EAO is satisfied that the proposed Project would not likely have significant adverse effects on terrestrial wildlife and marine birds.

## **5.6 Marine Resources**

### **5.6.1 Background**

Marine resources was identified as a VC because of the importance of marine fish and fish habitat, marine species at risk, sediment and water quality, and the intrinsic connection to the local commercial fisheries and local communities. Marine resources is also an important VC for Tsimshian Aboriginal Groups whose cultures and traditional resource harvesting activities are deeply connected to the marine environment.

As per the scope of the EA set out in the Section 11 Order of the Act, EAO has primarily focussed the assessment of this VC in consideration of the effects beyond PRPA lands.

The marine waters surrounding Port Edward and Prince Rupert provide diverse habitats supporting many species that contribute to the ecological, cultural and economic well-being of the region. The Marine Resources VC assessment focused on potential effects on marine species. The Marine Resources section of the Application (Section 13)

reports on four potential project effects, each with its own set of measurable parameters:

Change in sediment or water quality:

- Contaminant concentrations in sediment and water; and
- Total Suspended Solids concentrations in water column (mg/L).

Change in fish habitat:

- Area of fish habitat permanently altered or destroyed (m<sup>2</sup>).

Direct mortality or physical injury to fish or marine mammals:

- Area of fish habitat permanently altered or destroyed (m<sup>2</sup>).

Change in behaviour of fish or marine mammals:

- Timing (seasonal), duration (hr), sound level (dB) and extent (km from sound source) of underwater noise potentially affecting marine mammals; and
- Timing (seasonal) and duration (hr) of underwater noise potentially affecting fish.

Key issues of concern raised during stakeholder and Aboriginal engagement were related to recreational, commercial and Aboriginal fisheries, marine species direct mortality and effects on habitat, and alteration of fish and mammal behaviour.

The Working Group and the public raised concerns regarding cumulative effects, potential effects on Skeena River fisheries, potential effects of dredging and sedimentation on sensitive habitat such as Flora Bank eelgrass, and potential effects on fish and marine mammals from underwater noise during in-water construction activities.

Aboriginal Groups raised concerns about potential direct proposed Project effects on fish, fish habitat, marine mammals, shellfish and seaweeds that are harvested or have cultural, ecological or economic importance. Aboriginal Groups also raised concerns about water quality and sediment as it relates to human health effects of consumption of marine foods.

The LAA and Regional Study Area (RSA) in which marine resources are identified includes the PDA (Lelu Island to within 30 m of the average high water mark, and all of the marine areas over which construction and operation activities will occur); the proposed disposal at sea site of Brown Passage; and potential shipping routes with a 10 km buffer on both sides of the potential shipping routes.

## *Regulatory Context*

CEAA is conducting an assessment of the proposed Project under the CEAA 2012, which includes an assessment of environmental effects in areas where the federal government has jurisdiction, and may include the specification of mitigation measures and follow-up requirements.

The federal *Fisheries Act*, administered by DFO, is the main federal statute related to the conservation and protection of marine fish, fish habitat and marine mammals. Fish and fish habitat protection measures include a prohibition, if unauthorized, against serious harm to fish that are part of a commercial, recreational, or Aboriginal (CRA) fishery, or to fish that support such a fishery (Subsection 35[1]); and a prohibition against the deposit of deleterious substances in water frequented by fish (Subsection 36[3]). SARA provides protection of marine species at risk.

Environment Canada administers the *Canadian Environmental Protection Act and Disposal at Sea Regulations*, which regulate the disposal of material at sea (e.g. dredge material). Schedule 5 of the *Canadian Environmental Protection Act* lists the type of substances that may be considered for a disposal-at-sea permit, which include dredged materials, inert inorganic geological matter, and uncontaminated organic matter of natural origin.

Other federal legislation of relevance to the marine environment is the *Navigation Protection Act* which is administered by Transport Canada.

The land and marine components of the proposed Project are located on federal Crown lands and water, administered by the PRPA. The PRPA's regulatory powers flow from the *Canada Marine Act*, the *Port Authority Operations Regulations* and the Port Authority's Letters Patent issued by the Minister of Transport. These powers include the ability to approve construction of facilities on PRPA administered lands where these facilities have a navigation and shipping aspect; establish regulations, by-laws, practices or procedures, rules or orders for facilities operating on PRPA administered lands to address issues including health and safety and the environment.

EAO notes that the federal EA process, DFO and Environment Canada, may require evaluation of more detailed and specific information, and may also require specific mitigation measures and project conditions, should the proposed Project be developed. Additionally, the PRPA has, and would, incorporate additional requirements on developers of LNG facilities through project development and land lease agreements with respect to, amongst other things, environmental matters, decommissioning obligations, and consultation with Aboriginal Groups.

## 5.6.2 Potential Project Effects and Proposed Mitigation Described in the Application

This section provides an overview of baseline context, potential effects and proposed mitigation identified in the Application for the marine resources VC. The assessment of the Marine Resources VC supports the assessment of human health, economic, and navigation and marine resource use VCs, as well as the associated effects on Aboriginal Interests.

Components of the proposed Project that have potential effects on the marine resources VC include a bridge from Lelu Island to the mainland, a MOF, marine terminal (e.g., trestle, jetty and berths), temporary facilities (e.g., pioneer dock), and utility lines. Activities that have potential effects on the Marine Resources VC are construction (including dredging, disposal at sea and pile driving) and shipping (including ship berthing and tug maneuvering).

The design of the marine terminal presented in the Application includes a jetty that would have required dredging approximately 7 million m<sup>3</sup> of material over an area of approximately 84.6 ha in sensitive fish and eelgrass habitat at Flora Bank. Because of substantial concerns raised by regulators, Aboriginal Groups and the public, during Application Review, the Proponent submitted a major redesign to avoid or mitigate many of the identified direct effects.

For clarity, the discussion in the remainder of this section does not consider the original terminal design. The redesigned jetty and associated potential effects are discussed below in Section 5.6.3.

### *Baseline Context – Marine Habitat and Species*

Marine habitats and species within the LAA are typical of the north coast of BC. A number of fisheries resources are harvested extensively in the LAA, including all five Pacific salmon species, steelhead, eulachon, Pacific herring, Pacific halibut and rockfishes. Several marine mammal species are resident or seasonally present in the LAA. The most commonly observed species that have been identified as species of conservation concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and SARA are humpback whale, northern resident and Bigg's killer whale, and harbour porpoise. Other common species are Dall's porpoise, Pacific white-sided dolphin and harbour seal. Less common species include sea lions, other species of whales and sea otters. Waters within the PRPA boundary have been identified as being within the Chatham Sound ecologically and biologically significant area, due mostly to coastal tidal mixing and upwelling that results in high seasonal productivity.

The Skeena River, the second largest river in BC, influences the structure and circulation of coastal waters in the area. The influence of the Skeena River is one of the unique characteristics of the LAA, including the manner in which the Skeena River influences currents, salinity and turbidity, and the associated influences on the species

in the area. Runoff (also known as freshet) from the Skeena River is highest in spring and late fall and lowest in summer. Fresh water from the Skeena River mixes with salt water in Chatham Sound, forming a layer of brackish water. The Skeena River deposits large amounts of sediment, resulting in the formation of the second largest delta in BC, extending 30 km west from the mouth of the Skeena River into Chatham Sound. Flora Bank, west of Lelu Island, contains extensive eelgrass beds and is an important rearing area for Skeena River salmon. It also contains a rich community of invertebrates, including Dungeness crab and *Pandalus* shrimp.

Lelu Island is identified in the PRPA 2020 Land Use Management Plan for future major industrial uses, including marine terminal and other associated marine transportation uses. The Proponent would lease the land and water lots for the proposed Project. The marine components of the proposed Project described in the Application include:

- A MOF and the approaches to the facility (vessel turning basin for safe navigation), located on Porpoise Channel;
- Pioneer dock located in a small bay east of the MOF adjacent to Porpoise Channel;
- A bridge from Lelu Island to the mainland, with footings within Lelu Slough and sewage pipes running underneath the on the seabed; and
- The marine terminal, including a trestle, trestle control room, berths, cryogenic piping and loading arms for delivery of LNG to LNG carriers.

There are no existing land-based industrial activities on Lelu Island or on the south end of Ridley Island directly north of the PDA. The main marine based activity within the PDA is navigation out to CRA fisheries. There are commercial fisheries for Dungeness and king crab, shrimp and prawn, salmon, and herring within a 4 km by 4 km area overlapping with the PDA. Exact catch data within the PDA are not known; however, the PDA is considered high use areas for recreational fisheries as well as recreational boating, particularly kayaking.

The proposed Project area, including Chatham Sound and Flora Bank, is recognized as an important area for Aboriginal fisheries due to its proximity to communities and ease of access. Based on TUS information provided by Aboriginal Groups, the area is identified as important for harvesting of seaweed, eulachon, salmon, crab, halibut and cod. More extensive review of the area for Aboriginal Groups' fishing, marine plant gathering and marine mammal hunting can be found in section 13 and 14 of Part C.

#### *Baseline Context – Water Quality and Sediment*

The LAA has been subjected to human activities around Prince Rupert. Contaminant levels referenced by the Working Group, Aboriginal Groups and the public are reflective of past and current industrial activities, including a now-closed pulp mill, terminal and port facilities, fish processing facilities, log dump and sanitary and storm water discharges from developed areas.

Baseline data were collected to facilitate assessment of the potential effects of the proposed Project on marine sediment and water quality. For purposes of the assessment two study areas were defined: the PDA, defined as the proposed dredge area for the MOF area and approach; and the PRPA, defined as the zone of interest in which sediment may have been contaminated.

Baseline information regarding sediment and water quality indicated that the PDA are composed primarily of sands and silt, while subtidal surface sediments are composed of fine sand, silt and clay. Deeper sediments contain pockets of gravel, coarse sand, or clay at various depths. Bedrock was found at 5.5 m to 12.5 m below mudline at the MOF dredge area.

The Proponent assessed contaminant levels in the PDA using both field-based studies and a review of existing information within the PRPA boundary. Existing literature and historical data on human activities and potential contaminant sources was collected to inform the EA. The information was used to support the assessment of potential Project effects on sediment and water quality and development of options for dredging and preparation for an application for disposal at sea under the *Canadian Environmental Protection Act, 1999*, under Part 7, Division 3. Sediment quality is assessed against screening criteria for disposal at sea and the Canadian Council of Ministers of the Environment (CCME) sediment and water quality guidelines for protection of marine life. The Proponent's assessment of potential contaminants included hydrocarbons, dioxins and furans, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), metals, bacteria and organic matter. Further detail is contained in Section 13 and Appendix L of the Application.

#### *Effects and Mitigation – Marine Habitat and Species*

The proposed Project has the potential to result in the loss or alteration of marine habitat and the direct mortality or injury of species, including as a result of underwater noise. Indirect impacts as a result of sedimentation or water quality are discussed below.

The construction of facility structures and disposal of dredged sediment at sea would result in localized changes in fish habitat. Blasting, dredging and construction around the pioneer dock, the MOF, potential breakwaters and turning basin would result in temporary disturbance, permanent alteration and destruction of intertidal and subtidal habitats, as well as marine riparian vegetation.

Construction of the facility infrastructure (the MOF, bridge, marine terminal, potential breakwaters, pioneer dock and sewage interconnection) would result in the permanent alteration and destruction of habitat. The total area that would be permanently altered or destroyed is approximately 60,677 m<sup>2</sup> (0.06 km<sup>2</sup>). Table 5-3 below summarizes the amounts and types of habitat that would be permanently altered or destroyed, and may constitute serious harm under the *Fisheries Act*. The Proponent provided a supplemental *Conceptual Fish Habitat Offsetting Plan* (CFHOS). The plan included a

preliminary assessment of marine habitat alteration areas which may require *Fisheries Act* authorization and offsetting for serious harm to fish, and provided information on proposed offsetting measures.

As represented in Table 5-3, over 98% of the impacted marine habitat would be the loss of riparian or intertidal habitat. The MOF would be the only facility that would directly impact eelgrass habitat (following the terminal redesign, discussed below), impacting 904 m<sup>2</sup> of eelgrass. The figures presented in the table do not account for any habitat offsets proposed in the CFHOS.

Table 5-3: Marine Habitat Alteration during Construction

Habitat Type	MOF (m <sup>2</sup> )	Lelu Access Bridge (m <sup>2</sup> )	Pioneer Dock (m <sup>2</sup> )	Water/Sewage Pipeline (m <sup>2</sup> )	Total Area (m <sup>2</sup> )
Marine riparian (destruction)	19,833	3,322	537	0	23,692
Intertidal (destruction)	35,905	0	0	120	36,025
Intertidal (alteration)	43	6	5	0	54
Eelgrass (destruction)	904	0	0	0	904
Subtidal (destruction)	0	0	0	0	0
Subtidal (alteration)	0	0	2	0	2
<b>Total Habitat Affected</b>	<b>56,685</b>	<b>3,328</b>	<b>544</b>	<b>120</b>	<b>60,677</b>

The construction of the MOF would include blasting (of 800 m<sup>2</sup>) and dredging of rocky shorelines and sediments. In addition to the habitat destruction and alteration identified in Table 5-3, MOF construction would have temporary disturbance to 17,019 m<sup>2</sup> of subtidal habitat, which is expected to recover post-construction.

Proposed Project construction could cause direct mortality or physical injury to fish or marine mammals. Blasting and impulsive underwater noise can cause permanent physical damage to tissue or organs (barotrauma) in fish, direct mortality to marine mammals (blasting only), and temporary or permanent auditory injury to marine mammals. The primary effect of blasting would be on fish and invertebrates that inhabit the rocky subtidal and intertidal areas. The sudden nature of blasting means that species are unlikely to be able to evade the effects. Dredging also has the potential to displace, bury or crush benthic or demersal fish and invertebrates within intertidal and subtidal areas.

During operations, sediment deposition from vessel maneuvering at the berths could result in injury or mortality to fish by burial or smothering caused by sediment deposition. Vessel maneuvering at the berths could also result in TSS levels that can cause injury or mortality to fish and invertebrates.

Blasting and pile driving produce pressure pulses, which can cause auditory injury or pressure injuries to fish and marine mammals close to the sound source. The effects of noise on marine mammals are highly context dependent and difficult to predict, and may vary substantially between species and individuals. Due to this uncertainty, mitigation measures consider the maximum possible threshold exceedances for underwater noise to cetaceans.

The Application suggests that generally pinnipeds (e.g. seals, sea lions) have a greater sensitivity to noise disturbance than baleen (mysticetes) or toothed (odontocetes) whales. With mitigation (i.e. bubble curtain), the maximum distance at which vibratory pile driving is predicted to cause potential injury to porpoises and killer whales is 0.8 km, to humpback whales is 1 km, and to seals and sea lions is 5 km.

The Application predicts that vessel maneuvering from LNG carriers and tugs during berthing and departure would result in deposition of sediment over areas outside the marine berth area, with the greatest thickness (>37.5 mm) of sediment deposition occurring directly within the berth area over the short-term (22 hours after vessel departure and approach). These levels of sedimentation have the potential to cause mortality in salmonids, but only in a very localized area in the area of Flora Bank abutting the original jetting/trestle design. The jetty redesign increases the distance from Flora Bank, and may result in a decrease in the predicted sedimentation in the Application.

The Application indicates that continuous (or non-pulse) sounds such as those produced by shipping and dredging would not be likely to cause mortality or injury to marine mammals, as they lack the rapid rise-time to maximum pressure that characterizes pulse noises.

Mitigation measures that would be incorporated to reduce changes to fish habitat caused by project activities are as follows:

- Hard multi-faceted shoreline protection material would be used where needed (e.g., at the trestle abutment) to promote colonization by marine biota;
- Habitat offsetting would be implemented to achieve no net loss of productivity; and
- The outer limits of foreshore construction areas (the materials offloading facility, marine terminal, bridge and pioneer dock) would be demarcated to avoid habitat damage outside of these areas.

The following mitigation measures would be implemented to reduce the potential for injury or mortality to fish and marine mammals during construction, including:

- DFO's Blasting Guidelines would be implemented including enforcing a safety radius of 500 m and ensuring marine mammals are not present in the safety radius prior to blasting;
- Blasting would be conducted within DFO least-risk timing windows;

- A Blasting Management Plan would outline management measures for both terrestrial and underwater blasting (Section 24.4.8 of the Application);
- Vibratory methods of pile installation with the use of a bubble curtain would be used to reduce noise effects;
- A Pile Driving Management Plan as outlined in Section 13.5.4.2 of the Application would be implemented;
- Dungeness crabs would be relocated from construction zones;
- Material from the dredge area that is suitable for construction or habitat compensation would be used, where possible;
- LNG carriers, tugs and barges would not exceed a speed of 16 knots within the LAA;
- LNG carrier vessels would reduce speed to 6 knots when approaching the Triple Island Pilot Boarding Station;
- Arrivals and departures of LNG carriers would be avoided at low water slack tide, and as the tide rises, from low water up to mean sea level;
- Use of Voith-Schneider design tugs that have less sediment scour-inducing propulsion systems will be evaluated; and
- A marine mammal observation program would be conducted during pile driving and blasting.

#### *Effects and Mitigation – Water Quality and Sediment*

Various construction (dredging) and operations (vessel maneuvering during berthing and maintenance dredging at the marine berth area) activities would be expected to affect sediment and water quality through dispersal of contaminants present in sediments and increases from background TSS levels.

Dredging at the MOF and the proposed disposal of dredged material at Brown Passage would result in resuspension of marine sediment, leading to increases in TSS levels and potential for dispersal of contaminants from sediment. Dredging at the MOF would occur over six months and require approximately 205 one-way trips to the ocean disposal site. Pile installation, shoreline infilling, and breakwater construction could also disturb the sediment.

Dredging at the MOF would be conducted over an area of 54,000 m<sup>2</sup> to a depth of 12.5 m, removing 690,000 m<sup>3</sup> of material. Up to 75,000 m<sup>3</sup> is expected to rock that can be reused during construction. The remaining 615,000 m<sup>3</sup> would be disposed of, if of suitable quality, at sea. Dredging is expected to occur using a clamshell dredge, which typically releases up to 1% of sediment due to bottom wake. Modelling suggests that TSS levels would typically not exceed background levels by more than 1 mg/L. However, during some flood and ebb tide situations TSS is predicted to exceed the 5 mg/L BC *Water Quality Guidelines* (WQG) for continuous activity.

Elevated TSS is also predicted for disposal at sea activity. TSS concentrations were modelled through the 200 m water column. Modelling results are compared to the CCME and BC WQG of 25 mg/L above background for activities less than 24 hours.

The model predicted that TSS levels would be highest (1,100 mg/L above background) in deep water (180 m depth) immediately after sediment is released from the barge. Near bottom TSS levels were predicted to decrease to 45 mg/L and 10 mg/L at 6 and 12 hours after the event, respectively, due to sediment settling and to dilution in surrounding water. For the majority of the water column, TSS levels are predicted to be below the 25 mg/L WQG, with TSS levels of less than 2 mg/L above background in the surface 10 m, up to 25 mg/L in mid depths (to >50 m) and 29 mg/L at 100 m. The spatial extent of the major TSS plumes is concentrated within the disposal site, and maximum TSS values 3 km away from the disposal site in any direction would be below the 5 mg/L WQG for continuous activities.

The Application reports that within the MOF PDA, the PAH, PCB, mercury, cadmium and lead concentrations are below the disposal at sea screening criteria. Metals in 81 subtidal and intertidal samples analyzed met the disposal at sea screening criteria and CCME interim sediment quality guidelines (ISQG) for all measured parameters except arsenic and copper. Elevated levels for arsenic and copper were observed in more than half the samples, but deemed to be reflective of natural background conditions. PAH and PCB concentrations were below disposal at sea screening criteria. PAHs and PCBs were measurable in 3 and 0 of 81 samples, respectively.

The presence of dioxin and furans reflects historical inputs from the closed Skeena Cellulose pulp mill (about 3 km from Lelu Island). Dioxins and furans can be of concern because they can bioaccumulate in the food chain, leading to toxicological risks for vertebrates (fish, marine mammals, and humans). However, all concentrations were well below the probable effects level (PEL) of 21.5pg/g toxic equivalency (TEQ) – the level above which biological effects are expected to occur.

The Application's TSS modelling was done assuming use of a clamshell dredge but without other mitigation, such as silt curtains. The Application identified the following mitigation measures that would be implemented to reduce effects to sediment or water quality:

- A 30 m vegetation buffer would be retained around the perimeter of Lelu Island, except at access points;
- Sediment and erosion control measures would be used (e.g., sediment fences) for land-based construction, particularly at the shoreline, to reduce TSS inputs into the water;
- TSS and turbidity would be monitored in real-time during dredging activities, for which a calibration curve would be developed to infer TSS from turbidity for comparison against water quality guidelines (WQG);
- Dredge operations would be conducted using methods that reduce sediment spill;
- At the disposal at sea site, sediment would be disposed of in an area distant from the area used on the previous trip, but still within the disposal site; and
- Trenching for the installation of water and sewage would use best practices and standard mitigation measures such as silt curtains; and working during low tide, when feasible, would ensure that water quality guidelines are not exceeded.

The Application stated that the following mitigation measures would also be considered:

- Extension of disposal at sea timelines beyond one year, resulting in fewer disposal events per day; and
- Selection of alternative disposal sites in addition to Brown Passage.

### **5.6.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During the Application Review, the Aboriginal Groups, Working Group and the public raised concerns about the potential effects of the proposed Project on marine resources. A primary concern related to various impacts associated with the design of the marine jetty and berth proposed in the Application. On October 6, 2014, the Proponent proposed a substantial redesign of this aspect of the proposed Project to seek to avoid and mitigate many of these effects. This redesign is discussed in detail below.

#### *Mitigation by Redesign of Marine Components*

The Proponent initially designed and assessed marine infrastructure that, through the EA process, resulted in numerous concerns from local Aboriginal Groups, communities, stakeholders, and federal and provincial agencies about the potential adverse effects on the marine environment. These potential effects primarily related to the effects on fish and fish habitat, marine mammals and on navigation, human health and impacts on Aboriginal Interests related to access to and harvesting of marine resources from the in-water construction, dredging and disposal at sea of dredged sediment.

In order to avoid and/or mitigate these potential effects, and in direct response to key concerns raised by Aboriginal Groups, government agencies and the public during the Application Review, on October 6, 2014 the Proponent submitted a report titled *PNW LNG Project Design Mitigation* to EAO and CEAA. In this report, the Proponent proposed a major design change to the proposed Project to avoid, and further reduce, potential effects on the environment. These design mitigations included:

- Redesigning the marine terminal and relocating the berths to remove project infrastructure (i.e., piles) on Flora Bank, and eliminate the need for dredging on Agnew Bank and the associated disposal at sea of the dredged materials; and
- Moving the construction worker accommodation facility (accommodation camps) from the proposed Lelu Island location and incorporating third party owned-and-operated worker accommodation camps on private property in Port Edward and/or in the Prince Rupert area.

Figures 5-2 and 5-3 show the proposed terminal design and location respectively. The figures illustrate how the clear-span suspension bridge would allow the structure to avoid direct impacts to Flora Bank, while maintaining sufficient clearance to allow vessels to navigate beneath the bridge at high tide.

In the Application, the trestle was proposed as a 2.4 km conventional pile-supported jetty, while the design mitigation now proposes a 2.7 km trestle comprised of a 1.6 km suspension bridge from Lelu Island to Agnew Bank, over Flora Bank, followed by a 1.1 km conventional pile-supported jetty to the marine berth in Chatham Sound. As a result of the modified trestle design, other changes to the proposed Project include:

- No infrastructure (i.e., piles) or construction activities would occur Flora Bank;
- The total number of piles would be reduced from 546 to 464;
- No dredging would be conducted for the marine terminal, reducing the total amount of dredged material from ~7.7 million m<sup>3</sup> to ~200,000 m<sup>3</sup>, the total dredged area from 90 ha to 6 ha, and the approximate number of return barge trips from 1,280 to 85;
- The in-water construction period would be reduced from about 27 months to about 6 months;
- No dredge slope armouring would be required at the berth;
- No breakwaters would be constructed; and
- A clearance height of at least 11.3 m above high water would be maintained to allow local fishing vessels to navigate the passage west of Lelu Island.

For the original design, approximately 125 ha of marine habitat would have been permanently lost or altered during marine construction, including approximately about 1.8 ha of eelgrass habitat on Flora Bank. The design change mitigation eliminates the dredge at Flora Bank and Agnew Bank, and reduces the total dredge area to approximately 6 ha (associated primarily with the MOF, as discussed above).

With the original design described in the Application, the Proponent found that direct mortality or injury may occur as a result of blasting, crushing or burial during construction activities, or underwater noise if impact pile driving was used (sudden pressure can cause swim bladder rupture in fish and auditory injury of marine mammals).

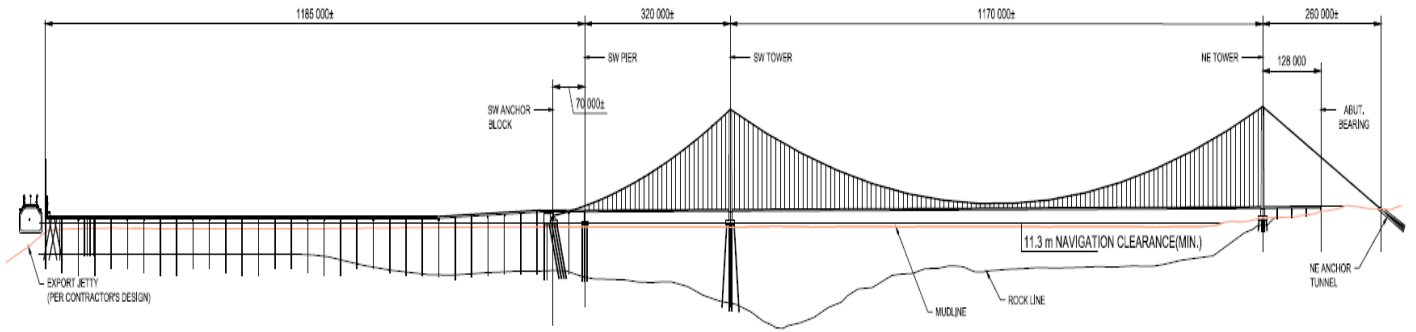


Figure 5-2: New marine trestle design

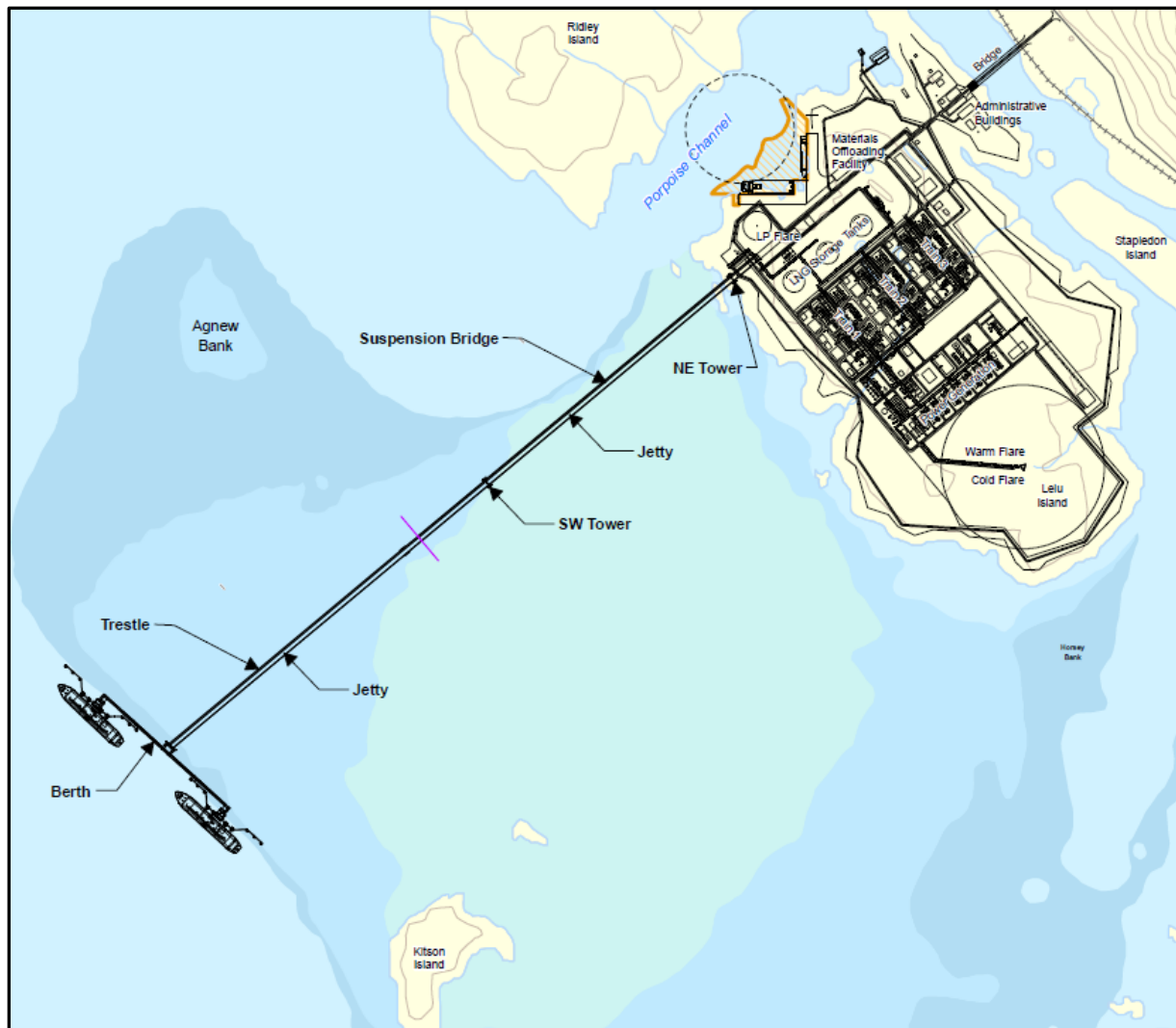


Figure 5-3: New marine trestle and berth location

The design mitigation would also somewhat reduce disturbance, mortality and injury to marine species, including as a result of underwater noise. This reduction would be due to a shorter construction period, substantially decreased dredging and disposal activity, and a slight decrease in the number of piles.

The design mitigation would also reduce potential effects related to TSS, primarily as a result of the substantially decreased dredge and reduced in-water construction period.

#### *Other Key Issues and Concerns Raised*

Working Group members, including Aboriginal Groups, marine user groups and the public expressed a need for more information about the effects of dredging and disposal at sea. Related comments included concerns about the effects of TSS on fish and fish habitat, and assumptions used in modelling TSS plumes and deposition of sediment.

In response, the Proponent prepared a memo dated June 23, 2014 that provided additional information about effects of dredging and disposal at sea and clarified the modelling approach that was used. The assessment effects of TSS on fish and fish behavior relied upon water quality guidelines that reflect levels at which chronic effects to marine aquatic life may occur. For metals, the water quality guidelines were derived from toxicity tests and based on the most sensitive organisms (for the assessment, these species were salmon and herring) used and with a safety factor (typically a ten-fold factor) applied.

The Proponent's assessment of effects of TSS indicated that species that use Flora Bank and the surrounding areas are not expected to experience chronic or acute effects from TSS based on CCME water quality guidelines. Sediment deposition during dredging at the MOF as modelled in the assessment is not expected to affect eelgrass, as most deposition would occur within the dredge areas and areas where eelgrass is not present (except for a small area at the location of the pioneer dock). The model assumed that fine grained sediment would be released mid-channel where currents are stronger, and would be suspended and transported out of the MOF. Some deposition was expected to occur at the proposed pioneer dock with a maximum thickness of 15 mm, which is well below the critical sedimentation threshold for eelgrass mortality, which ranges from 2 to 10 cm per year.

Aboriginal Groups and other Working Group members raised concerns about bioaccumulation of contaminants due to dredging and disposal at sea. Specifically, MOE stated that As, Cu, dioxin and furans are over the CCME's Interim Sediment Quality Guidelines (ISQG) in marine sediment. A potential effect of the project is an increase in contaminants in marine country foods. MOE also noted that bioaccumulation modelling of contaminants is missing from the Application.

The Proponent stated that they provided a Human Health Risk Assessment (HHRA) report as part of the Information Request responses.

The Proponent stated that the project will not introduce any new sources of arsenic, copper or dioxins and furans into the environment. Arsenic and copper were above the ISQG at all sediment depths from 0 to 15.6 m below the mudline, indicating that they are not contaminants in the local environment. Arsenic and copper naturally exist in the area at levels above the guidelines set by the CCME. This does not imply the area is contaminated, nor does it suggest that arsenic and copper would bioaccumulate in country foods. A substance above the ISQG is not an indicator for bioaccumulation potential. Since there is no potential for arsenic and copper to increase in the sediment, modelling would result in no change to country food quality.

Aboriginal Groups raised concerns on the lack of information provided regarding marine scour effects and changes in sediment regimes from marine trestle piles, and how these shifts could drive modifications in the structure of surrounding marine habitats. Metlakatla noted that far field effects of marine infrastructure have been documented in other locations around the world, and are concerned about long term far-field changes throughout Chatham Sound.

The Proponent responded that the effects of scour from piles has been considered in calculating the over footprint of the Project in marine habitat. Preliminary modelling and assessment of scour from marine infrastructure has been undertaken, and was used to inform the assessment in the Application, but final, detailed modelling is not yet complete. Additional modelling and analysis of scour is ongoing, in concert with development of final engineering designs for the Project. Finalized scour studies addressing potential effects on long-shore and far-field sediment transport and potential interactions with Flora and Agnew banks will be completed along with final engineering designs during the permitting phase of the Project.

EAO proposes a condition to the EA Certificate that would require a tissue sampling program to assess toxin concentrations in marine country foods.

#### **5.6.4 Characterization of Residual Project Effects**

After considering potential effects and all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on marine resources:

- Alteration or destruction of marine habitat;
- Disturbance, injury and mortality to marine species; and
- Water quality effects due to sediment re-suspension and increased toxicity and bioavailability of contaminants.

EAO's characterization of the combined residual effects of the proposed Project on marine resources is summarized below, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Habitat:</b> Moderate to high resilience</p> <p><b>Species:</b> Low to moderate resilience</p> <p><b>Water Quality:</b> Moderate resilience</p>	<p><b>Habitat:</b> Overall, marine habitat in the PDA has a moderate to high resiliency. Habitat with higher sensitivity to disturbances includes eelgrass, which provides important habitat for juvenile salmon and other species. Many invertebrates have a high resiliency to habitat alteration or loss, while juvenile salmon and other fish have a moderate resiliency to habitat alteration.</p> <p><b>Species:</b> Marine species may be sensitive to effects relating to disruption of benthic habitats and interference with critical life history stages. Many invertebrates have a high resiliency, while juvenile salmon and eulachon have a low to moderate resiliency. Species at risk have a low resiliency. Marine mammals may be temporarily displaced or affected during construction and operation. Most marine mammals and fish species are sensitive with a low to moderate resiliency to effects relating to pressure waves from blasting. For underwater noise, many species have a higher resiliency, while whales have a lower resiliency and are more sensitive to disturbance based on underwater noise hearing thresholds.</p> <p><b>Water Quality:</b> Marine water quality and seabed sediment at the MOF has been historically contaminated and shown a moderate resiliency to residual effects from historic pulp mill discharges. Residual effects from the proposed Project on sediment re-suspension, increased TSS, increased toxicity and bioavailability are considered to have a moderate resiliency.</p>
Magnitude	<p><b>Habitat:</b> Low to moderate</p> <p><b>Species:</b> Low to moderate</p>	<p><b>Habitat:</b> Alteration or loss of marine habitat, as well as disturbance, injury or mortality of marine life would be of low magnitude based on:</p> <ul style="list-style-type: none"> <li>• A dredged area of 6 ha;</li> <li>• Sediment requiring disposal at sea of 200,000 m<sup>3</sup>;</li> <li>• No direct alteration of Flora Bank;</li> <li>• No required breakwaters or seabed armouring; and</li> <li>• Habitat compensation could be required under a DFO authorization.</li> </ul> <p><b>Species:</b> Sound levels would approach and exceed documented thresholds for behavioural response in marine mammals, but would not</p>

	<p><b>Water Quality:</b> Moderate</p>	<p>exceed thresholds considered to possibly harm or injure marine mammals.</p> <p>Impacts due to construction sound levels would be moderate, and at or near the construction site they would approach levels known to evoke behavioural response in some fish and mammal species.</p> <p>During operations, effects are expected to be negligible to low, as the only effects would be from LNG vessels and tugs approaching and leaving the berth ship speeds would be reduced to 6 knots approaching the terminal.</p> <p><b>Water Quality:</b> Total amount of disposed sediment that may be re-suspended would be from dredging 200,000 m<sup>3</sup>. With the implementation of the identified mitigation, the magnitude of effects on water quality and resuspension of historically contaminated sediments is expected to be moderate.</p>
Extent	<p><b>Habitat:</b> Project footprint</p> <p><b>Species:</b> Local to regional</p> <p><b>Water quality:</b> Local</p>	<p><b>Habitat:</b> Direct habitat effects from dredging would be within the proposed Project footprint.</p> <p><b>Species:</b> The displacement and disturbance of marine life would largely be within the LAA. Effects on marine species are not predicted to extend beyond the immediate vicinity of the LAA, with the possible exception of underwater sound interactions with whales, which have the potential to extend further within the RAA.</p> <p><b>Water quality:</b> Sediment and any related contaminant dispersion have been modelled and are predicted to remain in relatively close proximity to the PDA.</p>
Duration	<p><b>Habitat:</b> Medium-term to permanent</p> <p><b>Species:</b> Short-to long-term</p>	<p><b>Habitat:</b> Some habitat would be temporarily impacted during the construction period and would be expected to recover in the medium-term (effect continues for up to two years following construction before returning to baseline conditions), while habitat alteration or destruction would be permanent. DFO may require offsetting for permanent alteration or destruction of habitat.</p> <p><b>Species:</b> Impacts due to underwater noise would be short-term during construction and primarily from dredging, blasting and pile driving.</p>

	<p><b>Water Quality:</b> Short- to medium-term</p>	<p>Operational noise impacts due to shipping would occur during the transiting of ships, but because of the relatively frequent activity the effects to marine species may be long-term.</p> <p><b>Water quality:</b> Sediment dispersion during construction would be relatively short-term, and their availability may persist for one or more years.</p>
Reversibility	<p><b>Habitat:</b> Reversible and irreversible</p> <p><b>Species:</b> Reversible</p> <p><b>Water Quality:</b> Reversible</p>	<p><b>Habitat:</b> Impacts to some habitat would be irreversible as the marine infrastructure would be present for at least 30 to 40 years. Other impacts would be reversible following construction activity.</p> <p><b>Species:</b> Impacts due to underwater noise would be reversible following the cessation of the activity causing the noise.</p> <p><b>Water quality:</b> reversible as this effect is only expected during the roughly 6 months of in-water construction, and would return to baseline.</p>
Frequency	<p><b>Habitat:</b> Single event and continuous</p> <p><b>Species:</b> Frequent and continuous</p> <p><b>Water Quality:</b> Frequent and continuous</p>	<p><b>Habitat:</b> The loss of habitat would occur once due to the single construction event, and the effect would be continuous where habitat is lost or altered.</p> <p><b>Species:</b> Disturbance would occur continuously during the in-water construction phase, including dredging and disposal at sea of approximately 6 months, and frequently during operations shipping.</p> <p><b>Water Quality:</b> Construction related effects will occur relatively continuously (seabed alterations) or at multiple times at regular intervals (disposal at sea) during construction, including during dredging and disposal at sea activities.</p>
Likelihood	<p>The likelihood is high of residual effects of change in fish habitat, disturbance, mortality or injury to marine species and change in sediment or water quality.</p>	
Significance Determination	<p>Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on marine resources.</p>	
Confidence	<p>There is a moderate to high level of confidence in the likelihood and</p>	

	<p>significance determination based on:</p> <ul style="list-style-type: none"> <li>• The reduction of effects from the design mitigation and other mitigations;</li> <li>• The condition proposed by EAO for marine species tissue sampling;</li> <li>• EAO proposes a Condition (Condition #3) that would require the Proponent to develop a tissue sampling program to assess toxin concentrations in marine country foods. The condition would be developed in consultation with EAO and PRPA, and consistent with any monitoring program developed in consultation with DFO. The Proponent would be required to implement the program at the commencement of dredging associated with the Construction of marine infrastructure and for one year after the completion of those activities.</li> <li>• Proposed Project activities, components and most of the effects related to marine resources are within federal lands;</li> <li>• As the federal regulatory process is ongoing, and EAO recognizes the federal process will have more specific findings and recommendations in areas of federal authority; and</li> <li>• Ultimately, any federal approvals of the proposed Project, through any number of agencies or the PRPA, would also include specific mitigation measures and project development requirements (e.g. construction and operation conditions, and habitat offsetting requirements) related to areas of federal authority, which would determine how the proposed Project may be eventually developed.</li> </ul>
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### 5.6.5 Cumulative Effects Assessment

The Application includes a cumulative effects assessment of the combined residual effects that the proposed Project, existing projects and reasonably foreseeable future projects could have on marine resources. Cumulative effects on marine resources are likely to occur if there is a spatial and/or temporal overlap of present and reasonably foreseeable projects.

The existing projects of Fairview Container Terminal Phase I, Prince Rupert Grain Limited, Ridley Terminals Inc., and the Westview Terminal at Pinnacle Pellet Inc could interact with the proposed Project. The proposed pipeline projects of Prince Rupert Gas Transmission Project and Westcoast Connector Gas Transmission Project (currently under EA review) could result in the installation of pipelines on or under the seabed in the area of the proposed Project. Pipeline installation would cause sediment disturbance, which would affect water quality.

The proposed Prince Rupert LNG Project has recently announced delays in their regulatory timelines. It is unclear whether timing of construction would overlap with the proposed Project, should either project be approved and built. Although it is unknown what the potential effects would be from the construction of proposed Prince Rupert LNG Project, it is assumed that the contaminant profile is similar for both projects.

There is the potential for cumulative effects to marine habitats as the result of past, present and reasonably foreseeable projects and activities in combination with the proposed Project. Impacts to fish habitat required habitat compensation under the former sections of the *Fisheries Act*. For future projects, if there is a change in habitat resulting in serious harm to fish DFO may require an authorization and offsetting measures. Mitigation measures to avoid causing serious harm to fish identified in the Application and offsetting measures outlined in the conceptual habitat offsetting plan have been proposed to further mitigate residual effects on fish and fish habitat. If other projects considered in the cumulative effects assessment within the RSA would result in serious harm to fish (if and as determined by DFO), would also be expected to implement similar mitigation and offsetting strategies.

Cumulative effects on sediment and water quality are likely to occur if there is any spatial and temporal overlap of dredging and disposal of marine sediment for other reasonably foreseeable projects. The Application notes that given that the projects have multi-year construction schedules, it is possible, though unlikely, that other projects' dredging and disposal activities would be scheduled to occur during the proposed Project's construction period. Should that occur, it is anticipated that regulatory authorities would dictate timing windows for dredging and disposal for each proponent in order to avoid temporal overlap associated with TSS plumes if the same disposal site is being used.

Concurrent pile driving from multiple projects would result in a larger area of injury potential, especially if all three projects (i.e., the proposed Project, the Prince Rupert LNG Project and the Canpotex Project) have temporal overlap; however, the duration and degree of overlap is uncertain at this time. It is presumed that other marine projects recently permitted would also be required to mitigate potentially injurious levels of noise.

The Application notes that the PRPA plans to increase annual shipping from 1,000 to 2,000 ships (4,000 movements) by 2025. All shipping traffic into both the Prince Rupert Harbour and Kitimat would follow shipping lanes around Triple Island, where overlapping of underwater noise could result in a larger area where behavioural effects (e.g., potential avoidance or masking) could occur. Cumulatively, an increase in traffic levels will increase the duration of noise effects in the RAA, potentially causing longer term avoidance of high traffic areas by marine mammals.

Berthing related vessel movement is temporary, occurring over no more than a few hours per vessel. Temporal overlap is expected to be minimal as PRPA would likely stagger arrivals and departures of large vessels operating within the general area. However, the number of hours of underwater noise per day is likely to increase as a result of increased numbers of vessels berthing in the RAA.

EAO has considered that the majority of present and reasonably foreseeable projects and activities are within the PRPA and/or require federal authorizations related to their potential effects on marine resources. Federal regulatory processes remain ongoing for a number of proposed projects and activities, and EAO recognizes the federal

processes are likely to have additional specific findings and recommendations in areas of federal authority.

Considering the limited spatial and temporal overlap between the proposed Project and other reasonably foreseeable projects and activities, and the implementation of mitigation measures for this proposed Project and others, particularly the mitigation measures to be imposed by federal and provincial regulators, the cumulative effects on marine resources are not likely to be significant.

#### **5.6.6 Conclusions**

Considering the above analysis, the scope of assessment being focussed primarily on potential effects beyond PRPA lands, the ongoing federal regulatory processes, and having regard to the conditions identified in the TOC (which would become legally binding as a condition of the EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on marine resources.

## **6 Assessment of Economic Effects**

### **6.1 Economic Environment**

#### **6.1.1 Background**

The Application provides background information on communities that could potentially be adversely affected by the proposed Project. A single VC, Economic Environment, was selected by the Proponent to assess the proposed Project's adverse economic effects. (The Project's benefits are discussed in Section 29 of the Application and summarized in Section 2.3 of this Assessment Report.) The economic effects assessment also informs the assessment of social effects (Section 7 of this report).

To assess the adverse economic effects of the proposed Project, the Application examines the following three potential adverse effects, each with its own set of measurable parameters:

- Regional labour supply and demand:
  - Labour force participation rates;
  - Unemployment rates; and
  - Skill levels.
- Cost of living and economic activity:
  - Median/ average earnings;
  - Living costs (including housing); and
  - Employment in other economic sectors,
- Municipal government finances:
  - Revenues and costs.

The mainland portion of the Skeena-Queen Charlotte Regional District was both the LAA and RAA for the economic assessment (Figure 6-1).

The LAA communities include:

- City of Prince Rupert;
- District Municipality of Port Edward;
- Skeena-Queen Charlotte Regional District Electoral Areas (RDEAs) A and C;
- S1/2 Tsimpsean Indian Reserve (IR) 2 (Metlakatla First Nation);
- Lax Kw'alaams IR 1 (Lax Kw'alaams First Nation); and
- Dolphin Island 1 (Gitxaala Nation).

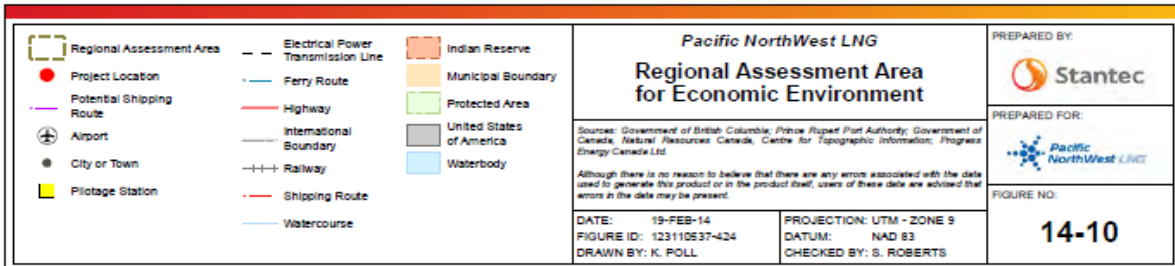
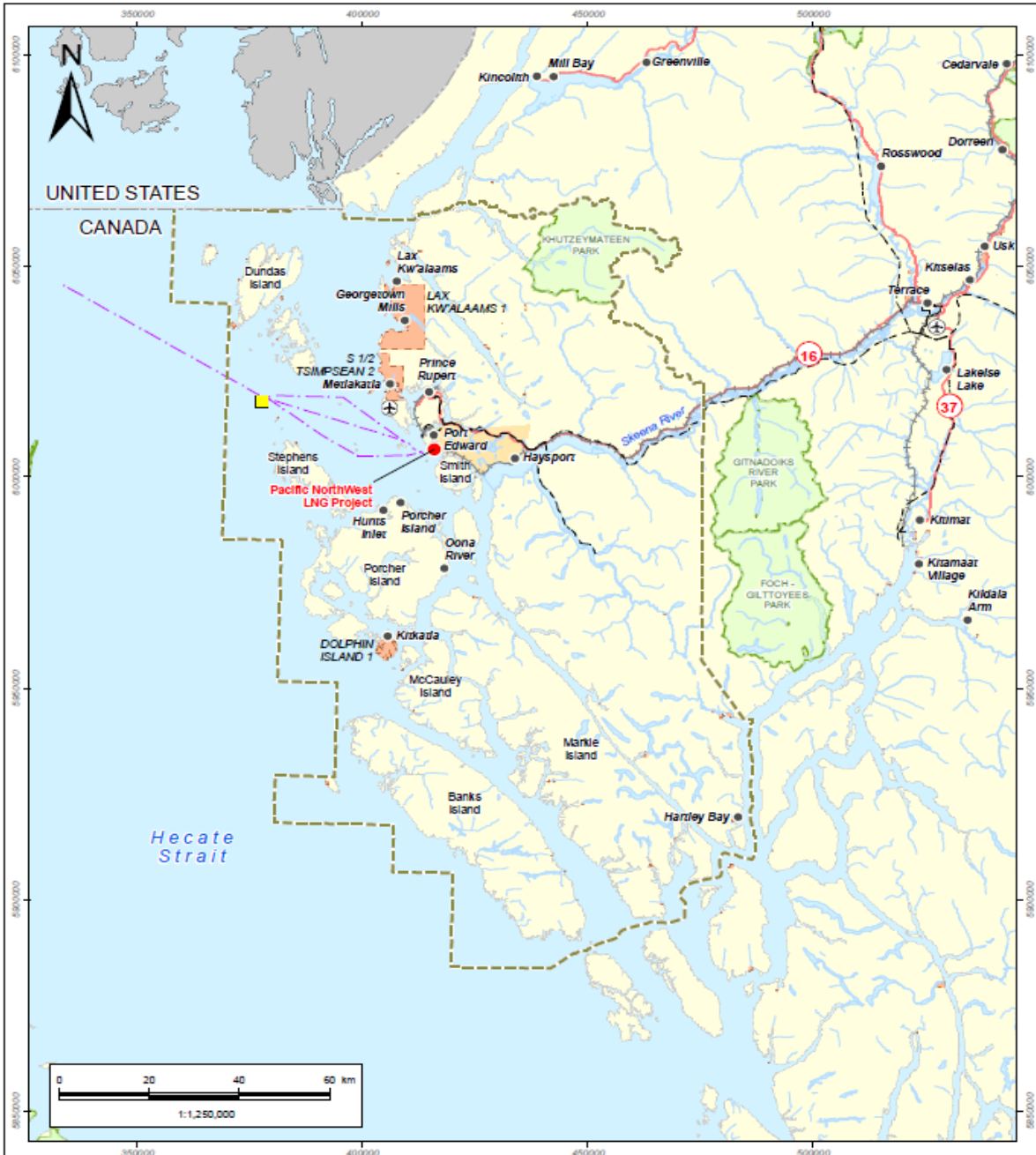


Figure 6-1: Area selected for the assessment of the proposed Project's impacts on economic environment.

## 6.1.2 Potential Project Effects and Proposed Mitigation Described in the Application

### *Economic Context*

Based on the information presented in Section 14.3 of the Application, this section presents a brief overview of the economic context for the region.

The economy of the RAA, which was in decline for much of the 15-year period between 1996 and 2011, is today regaining momentum, largely as the Port of Prince Rupert grows in regional and international importance.

*Population* – In 2011, the RAA's permanent population was 14,397 (down by more than 13% from a decade earlier):

- 87% (12,510) lived in the City of Prince Rupert;
- 4% (545) lived in Port Edward;
- 8% lived on reserves of Metlakatla First Nation, Lax Kw'alaams First Nation, and Gitxaala Nation; and
- 1% lived in rural surrounding areas.

In 2011, 41% of the population in the area identified themselves as Aboriginal – an increase from 37% in 2006.

*Employment sectors* – In the mid-1990s, economic growth in the region was linked to the forest sector, notably wood and pulp processing facilities such as West Fraser's sawmill and chipping facilities and the Skeena Cellulose pulp operations (then Repap). These facilities ceased operations over a decade ago.

Commercial fishing and fish processing have also declined in economic importance, although Canfisco (Canadian Fishing Company) and a few other operators have continued to be major-private sector employers. In October 2012, Coast Tsimshian Seafood, a company wholly owned by Lax Kw'alaams First Nation, re-opened a renovated fish processing plant. At the peak of the salmon season in September 2013, it employed about 225 workers and provided employment and skills training to 150 fishing boat crew members in the community.

The main operation driving the economic momentum in the RAA today is the Port of Prince Rupert. In 2013, bulk cargo tonnage handled by the port was 23.1 million tonnes, more than five times the amount processed in 2003. There have been a number of recent and current expansions, including the Prince Rupert Fairview Intermodal Container Terminal, the wood pellet facility at Westview Terminal, and the on-going expansion of the Ridley Terminals facility.

Tourism is a key industry in the RAA, but it was negatively affected by the global economic downturn of 2008–2009. For example, the number of cruise passengers at the Northland Terminals in Prince Rupert fell from a peak of 103,635 cruise passengers in 2008 to 4,856 passengers in 2013.

*Employment rates and other economic metrics* – Employment rates, average incomes and the cost of housing in the RAA also reflect the difficult economic conditions that have prevailed in the RAA in recent years relative to the BC average:

- In 2011, the labour force was 6,980 (6,520 in Prince Rupert), of which 1,045 people were unemployed (15%). Unemployment rates for the Aboriginal population (25%) were higher than for the non-Aboriginal population (10%). (This excludes labour force data for Lax Kw'alaams First Nation and Metlakatla First Nation communities, which in July 2013 had a combined on-reserve population of 826 people.);
- In 2010, the average income of residents aged 15 years or older was 8% below the BC average (\$36,291 for Prince Rupert relative to \$39,415 for BC);
- In 2010, the average income of Aboriginal people living in Prince Rupert was 37% lower than that of non-Aboriginal residents, and average earnings from full-time employment were 23% lower; and
- In 2011, 2% of occupied private dwellings in the Prince Rupert area were constructed since 2000, reflecting the relatively weak housing market. The average housing value for Prince Rupert was \$210,168 per private dwelling.

### *Regional Labour Supply and Demand*

The construction and operation of the proposed Project is expected to generate employment and income for workers in the RAA and beyond. The labour requirements for Project construction would vastly exceed the labour supply in the RAA.

*Construction effects* – Phase 1 of Project construction is expected to require about 500 workers in 2015, 2,500 in 2016, 4,000 in 2017 and 2018, and 1,500 in 2019. This would be equal to about 13,000 person-years (PY) of employment, of which 8,000 are expected to be filled by BC residents and Canadians from other provinces, and 5,000 by foreign workers.

Canadians are expected to account for 70% of the on-site workforce for the first three years of construction. However, because of competition for labour from other projects and the specialized skills required for the later stages of construction, Canadians would only account for 30% of the on-site workforce for the remaining two years of construction.

Residents in the RAA are expected to fill an average of 200 construction jobs for each of the five years of construction (1,000 PYs), which represents about 3% of the 2011 RAA labour force and 60% of the 2011 RAA construction labour force.

The indirect and induced employment that would be generated by the Project is expected to be about 140 jobs annually (700 PYs) for RAA residents and 3130 jobs annually (15,650 PY) for BC residents.

The Application states that direct Project construction employment would not likely affect the RAA labour force participation rate for non-Aboriginal residents (70%), but could increase labour force participation by Aboriginal residents (currently at 59%). Regarding the proportion of construction phase workers expected to be sourced from RAA communities, the Application states that the Proponent “adopted conservative assumptions about regional participation to ensure that its role in future regional labour shortages is minimal.”

The Application states that construction workers who are not RAA residents are to be lodged in a construction camp. The Proponent expects relatively few workers to relocate to the RAA during the Project construction and so does not anticipate a boom-bust cycle of construction-period effects in RAA communities.

*Operations effects* – During operations, the Proponent estimates that the Project’s total direct employment would be 650 full-time equivalent (FTE) positions (see Table 6-2), composed on 520 FTEs in the RAA (334 employees and 186 contractors) and 130 FTEs in Vancouver.

Table 6-1: Pacific NorthWest LNG operating workforce

	<b>Number of FTEs</b>
PNW LNG on-site staff	334
<i>Management staff</i>	29
<i>Technical and service workers</i>	147
<i>Operations and security</i>	109
<i>Administrative workers</i>	49
On-site facility maintenance contractors	186
<b>Total On-Site Operating Workforce</b>	<b>520</b>
Off-site management and operations staff (Vancouver)	130
<b>Total Operating Workforce</b>	<b>650</b>

The Application estimates that the proposed Project would generate 180 indirect and induced FTEs in the RAA and an additional 370 indirect and induced FTEs in the rest of BC.

During operations the total 800 new direct, indirect or induced permanent FTEs in the RAA would represent 11.5% of the 2011 RAA labour force of 6,980 people.

*Decommissioning effects* – The Application estimates that the activities associated with decommissioning the proposed Project at least 30 years from now would provide short-term employment for RAA residents. However, ultimately decommissioning would mean the end of the 520 direct operations jobs and many of the indirect and induced jobs associated with the proposed Project.

*Key potential labour force effects* – The key potential adverse effect to labour force discussed in the Application related to the construction period, when as many as 4,000 people may be employed in a year.

There may be adverse effects on the labour force due to a lack of training and employment preparation prior to construction. The substantial employment opportunities have the potential to influence on young people to leave secondary school before graduation to seek training or employment. In addition, there is potential for an uneven distribution of employment benefits to among residents in RAA communities, particularly Aboriginal Groups.

The Application lists a number of mitigation measures to address each of these concerns, including:

- Work with training and educational facilities so that programs necessary to prepare regional residents for work on the proposed Project are available;
- To encourage young people not to leave school prematurely, require all workers to complete grade 12 or have an appropriate equivalency;
- Develop career pathways that would provide for local construction workers to transition into operational employment;
- Facilitate hiring and employment opportunities for RAA residents by posting qualifications and skill requirements in advance of construction and operation;
- Work with contractors to remove barriers to employment for RAA residents (e.g., promote literacy and Grade 12 training, offer childcare; provide occupational training and support for Aboriginal workers from local First Nations;
- Identify work packages that would be consistent with the capabilities of local and regional businesses to maximize local procurement opportunities; and
- Work with Aboriginal Groups to identify partnership or other arrangements that would increase the opportunities for their participation.

### *Cost of Living and Economic Activity*

The Application states that workers directly employed in construction and operations would earn substantially more than the reported RAA average earnings. The higher incomes earned by construction and operations workers have the potential to increase income disparities within the RAA communities. In addition, there is the potential that greater demand for workers directly and indirectly involved with the proposed Project could result in high-income households moving into the communities (with or without their families), thereby increasing the demand for housing and other goods and services.

The Application indicates that a small proportion of the direct construction workforce would consist of RAA residents (or 8% of the total workforce), while the balance of that group of workers (92%) would be housed in a construction camp. As a result, there is expected to be little impact on local income disparities and the cost of living.

During operations, the Application estimates that effects on the demand for housing and other goods and services would be limited to 120 workers and their families moving into the area. The Application indicates that this is unlikely to materially impact the current supply of housing and the capacity for additional private dwellings to be constructed in Prince Rupert and Port Edward, given the existing undeveloped, residentially zoned land.

The Application does not propose any further mitigation measures.

### *Municipal Government Finances*

The Application estimates that annual property and other local and regional taxes paid by PNW LNG would be approximately \$15 million per year. Property taxes are expected to be paid to Port Edward and not Prince Rupert, although the arrangements for PNW LNG contributions to local government revenues are still under negotiation.

During construction, the Application states that demands on municipal services from the direct construction workforce, and resulting costs would be minimal and more than offset by the increased revenues from taxes resulting from the proposed Project and indirect and induced economic activity.

The proposed construction camp would limit in-migration of workers, while in-migration of workers for operations would likely be gradual and easily absorbed by the local communities, resulting in no sudden increase in demand for municipal infrastructure.

During operations, the Application states that overall effects of the proposed Project on municipal government finances to be positive.

As a mitigation strategy, the Proponent has committed to continuing consultation with local governments to monitor whether the Project is creating issues, in terms of effects on municipal finances or demands for infrastructure or services. Section 7.2.2 includes a more detailed assessment of the impacts to municipal infrastructure and services.

### **6.1.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During Application Review, questions and concerns were raised by Aboriginal Groups, communities and government agencies about the proposed Project's potential adverse effects on labour supply and demand, cost of living and economic activity, and municipal government finances.

Metlakatla, Lax Kw'alaams and Gitxaala First Nations expressed doubts that the proposed mitigation strategies would be sufficient to provide opportunity for existing residents to gain long-term benefits from employment opportunities. Metlakatla First Nation indicated that the Proponent should have additional mitigation in the event that the uptake of the skills training program is low.

The Proponent responded by re-iterating its commitment to working with the local community to improve and enhance access to employment and training.

Aboriginal Groups and others also expressed concern that existing employers could have difficulty sourcing labour as a result of the proposed Project's labour requirements, particularly during construction, and therefore result in greater labour supply and demand imbalances than predicted by the Proponent.

The Proponent responded that the proposed Project construction is estimated to directly employ 200 residents, many of whom could be currently unemployed. If RAA residents supply only 340 jobs for each of the five years of construction (i.e., 200 direct jobs and 140 indirect and induced jobs), then the proposed Project would not cause any regional labour supply and demand imbalances during construction.

Northern Health reported that anecdotal information suggests that families are already being displaced in the region from increases in housing prices as a result of the anticipated projects in the area. Lax Kw'alaams First Nation also indicated that the cost of housing has already increased substantially in the course of the last year. A number of other Working Group members raised concerns about the impacts on the local cost of living.

The Proponent indicated that the only construction workers who would be allowed to live outside the camp would be the 50 to 100 workers who would prepare the camp and the 100 to 150 workers who would be employed for the duration of construction, including managers and supervisors.

Metlakatla First Nation and others raised concern that municipalities often experience a mismatch between the timing of additional service requirements and increases in tax revenues. Groups relying on social and other infrastructure services are most likely to be adversely affected by an increase in service demands.

The Proponent responded that pay-per-use offsetting and other mitigation strategies discussed in the assessment of Project related effects on infrastructure and services would help alleviate some of these concerns.

In light of the economic concerns raised during the Application Review, EAO proposes a the SEEMP Condition that would require the Proponent to develop and implement a plan, which would lead to management activities aimed at mitigating potential adverse socio-economic effects. The plan would provide:

- An effective engagement process between the Proponent and Aboriginal Groups, local governments, and government service providers;
- An approach to implementing mitigations and plans contained in the Application;

- Clarity for all participants about timing of project activities so that planning and actions are based on current information;
- An approach to ensure unplanned effects are understood and new mitigations are considered; and
- A monitoring and reporting framework.

#### 6.1.4 Characterization of Residual Project Effects

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the residual adverse economic effect of:

- Changes in regional labour supply and demand due to the availability of local skilled workers during construction; and
- Increased cost of living resulting from higher than average incomes earned by construction and operations workers and in-migration.

EAO's characterization of the residual effect of the proposed Project is summarized below, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Labour:</b> Moderate resilience</p> <p><b>Cost of living:</b> Low to moderate resilience</p>	<p><b>Labour:</b> The RAA economy declined in size between 1996 and 2011, although there have been signs of resurgence since 2011.</p> <p><b>Cost of living:</b> Prince Rupert Local Health Areas has some of the highest rates of human economic hardship across 77 Local Health Areas, which suggests relatively low resilience of vulnerable population segments to potential increases in cost of living. Overall resilience of the population is moderate.</p>
Magnitude	<p><b>Labour:</b> Moderate</p> <p><b>Cost of living:</b> Moderate</p>	<p><b>Labour:</b> A construction workforce of up to 4,500 would likely result in imbalances in the regional labour supply and demand during construction. The supply of some skilled labour may become less available (or increase in cost), due to increased demand, potentially impacting labour supply for other sectors.</p> <p><b>Cost of living:</b> A construction camp is an important mitigation strategy, but evidence from other communities where major construction has taken place suggests that cost of living would nevertheless likely increase because of the proposed Project despite a construction camp being established. Impacts during operations would be low.</p>
Extent	Regional	Most adverse construction-related effects on the economic environment would be experienced by the RAA communities.

Duration	Medium to long-term	The duration of effects would be primarily during construction (5 years), but are likely to persist for somewhat post-construction. Some cost of living effects may persist for the duration of the proposed Project.
Reversibility	Reversible	The adverse effects are expected to be reversible at the community level after activities have ended.
Frequency	Continuous	The adverse effects would occur continuously during construction.
Likelihood	The likelihood is high that some degree of adverse effects would occur, particularly during construction.	
Significance	Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on labour supply and demand and on cost of living would likely not be significant.	
Confidence	There is a moderate level of confidence in the likelihood and significance determination. There is some uncertainty due to the inherent difficulties in accurately predicting how local labour markets and local economies may respond to new events.	

### 6.1.5 Cumulative Effects Assessment

The Application's cumulative effects assessment lists several proposed Projects in the North Coast/Nechako Development Region, which takes in the RAA that could produce effects overlapping both geographically and temporally with those associated with the proposed Project construction. The \$10-billion Prince Rupert LNG facility being proposed by BG Group is the largest project and the one most likely to have residual effects that could overlap geographically and temporally with those of the proposed Project. Effects of the proposed pipeline projects associated with these two LNG facilities and other reasonably foreseeable LNG projects could also overlap with those of the proposed Project in the RAA.

#### *Regional Labour Supply and Demand*

The Application identifies that the cumulative labour requirements of all major proposed projects would vastly exceed the capacity of the RAA construction labour force for the period from 2013 to 2021. Thus, major construction labour shortages are expected in the RAA; labour would have to be brought in from other parts of BC, Canada and other countries.

During construction, the cumulative labour requirements for the proposed Project facility and the Prince Rupert LNG facility are estimated to reach 8,000 workers during the peak construction periods.

During operations, the cumulative labour requirements for both facilities could result in approximately double the on-site operating workforce of 520 people projected for the

proposed Project including on-site maintenance contractors. These jobs would benefit the sustainability of the RAA economy by providing local residents with the opportunity to find work in their home communities. However, increased demand for labour and increased wages could impact labour supply for other sectors.

### *Cost of Living and Economic Activity*

During the period of construction, it is expected that purchases of goods and services by the proposed Project and all other projects underway at the same time would result in further increased economic activity.

Evidence from other municipalities experiencing rapid growth due to large construction projects suggests that economic growth is often accompanied by inflationary pressures that can create adverse effects particularly on vulnerable populations and local residents that are not participating in the Project. Anecdotal evidence from northern BC communities such as Kitimat, Fort St. James and several smaller northeast BC communities where large construction projects have been underway demonstrate the potential effects on cost of living locally. Similar examples are available in Australia regarding effects from LNG facility construction projects.

### *Additional Initiatives to Address Cumulative Social and Economic Effects*

The BC Government, industry, Aboriginal communities and other communities have embarked on several initiatives to identify potential adverse cumulative effects on labour markets to help mitigate labour shortages expected in Northern BC and/or increase the proportion of potential benefits likely to accrue to local communities and Aboriginal Groups from the LNG sector. These include:

- British Columbia Natural Gas Workforce Strategy Committee: The Committee was established with financial support from the provincial and federal governments under the Labour Market Partnership Program and comprises representatives from major companies, industry associations and provincial government ministries. In July 2013, the Committee released the BC Natural Gas Workforce Strategy and Action Plan, which details multiple strategies and actions on the local, regional, Canadian and international front to help overcome issues that have prevented portions of the labour force from participating in regional employment. That report estimated that at peak construction, which could occur between 2016/2017 and 2021, some 21,600 jobs could be directly involved in building up to 5 LNG export facilities and associated pipelines in Northern BC. (BC Natural Gas Strategy, 2013)
- Premier's LNG Working Group: In September 2013, the BC Government established the Premier's LNG Working Group with representatives from organized labour, industry, Aboriginal Groups and the province to review the skills training and workforce planning issues associated with the LNG industry. In March 2014, this Working Group issued a detailed report outlining key strategies

for addressing the potential skilled labour shortages likely to emerge as major proposed projects in the LNG and other sectors proceed to the construction phase. (Premier's LNG Working Group, 2014)

- Northwest Readiness Project: In December 2013, the BC Ministry of Community, Sport and Cultural Development initiated the Northwest Readiness Project in consultation and collaboration with the BC Ministry of Jobs, Tourism and Skills Training. This project is key in ensuring provincial service providers and communities expected to experience significant population growth in the Northwest region are prepared to meet infrastructure, health, safety and social services demands as proposed new industrial projects move from concept to construction stages and beyond.

Drawing from data sourced from project proponents, and in consultation with a number of regional stakeholders, the Northwest Readiness Project Team has now begun to develop a standardized set of scenarios of probable employment and population growth resulting from major project development in the region to assist communities with service planning.

- Northwest Regional Economic Collaborative: The BC Jobs, Tourism and Skills Training Northwest Regional Economic Collaborative includes the Northwest Labour Market Partnership, Northwest Tourism Strategy, Regional Investment Readiness and Bio-Energy Investment Attraction. The Northwest Regional Economic Collaborative brings the communities of Kitimat, Terrace and Prince Rupert, as well as the Aboriginal communities of the Kitselas, Kitsumkalum, Haisla, Metlakatla and Lax Kw'alaams First Nations, together to identify priority areas for regional collaboration and promote economic diversification across the region.
- Industry – BC LNG Alliance: The BC LNG Alliance brings together four major BC LNG proponents to coordinate community relations and labour strategies related to the proposed LNG facilities in northwest BC. They include: Petronas' PNW LNG, Shell Canada Energy's LNG Canada, BG Group's Prince Rupert LNG, and Chevron's Kitimat LNG project.

EAO proposes the SEEMP that, if an EA Certificate is issued, the Proponent would be required to develop a plan that includes monitoring activities, which would inform provincial management of potential cumulative socio-economic effects relating to LNG facility and pipeline construction, and other projects. The Ministry of Community, Sport and Cultural Development (CSCD) would take the lead coordinating role.

EAO concludes that, during construction, there would be a high likelihood of medium to high magnitude cumulative adverse effects on the regional labour supply and demand balance and on regional costs of living, but that the effect would be primarily during Project construction.

### **6.1.6 Conclusions**

Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as conditions of an EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on the economic environment.

## 7 Assessment of Social Effects

Potential adverse social effects were examined with respect to four VCs, each with its own set of measurable parameters:

- Navigation and Marine Resource Use;
- Infrastructure and Services;
- Visual Quality; and
- Community Health and Well-Being.

### 7.1 Navigation and Marine Resource Use

#### 7.1.1 Background

Navigation and marine resource use was selected as a VC because activities related to the proposed Project have the potential to interfere with the public's right to navigate and to affect recreational, commercial and Aboriginal fisheries and use of marine resources, particularly in the vicinity of Lelu Island. The federal government has the primary regulatory responsibility for most aspects related to managing navigation and marine resource use, particularly within much of the LAA and RAA.

The LAA and RAA are the same, and include the PRPA boundary and the waters extending 10 km from either side of the potential shipping routes between the marine terminal and the Triple Island Pilotage Station.

The *Navigable Waters Protection Act* protects the public's right to navigate, and regulates the construction of works that may infringe on this right. The *Navigable Waters Protection Act* was replaced by the *Navigation Protection Act* April 1, 2014, which is administered by Transport Canada. This Act requires the Proponent to have Transport Canada's approval before the construction of works in listed waterways could go ahead. This would apply to the construction of wharves, docks, piers, dams, booms, bridges, overhead cables and pipelines.

Shipping traffic is regulated under several Acts and regulations. Among these are the *Canada Shipping Act*, the *Canadian Ballast Water Control and Management Regulations*, and the *Canada Marine Act*.

Figure 7-1 shows the key marine anchorages, facilities and navigational aids in the area near the proposed Project.

The Port of Prince Rupert operates under the *Canada Marine Act* (S.C. 1998, c.10) and related regulations, and through Letters Patent issued by the federal Minister of Transport under the Act. This regulatory framework gives the Port Authority the mandate to administer the lands and waters within the boundaries of the port in Prince Rupert Harbour. The Port Authority has developed a Harbour Operations Practices and Procedures manual, and is currently developing policies and procedures for LNG carriers.

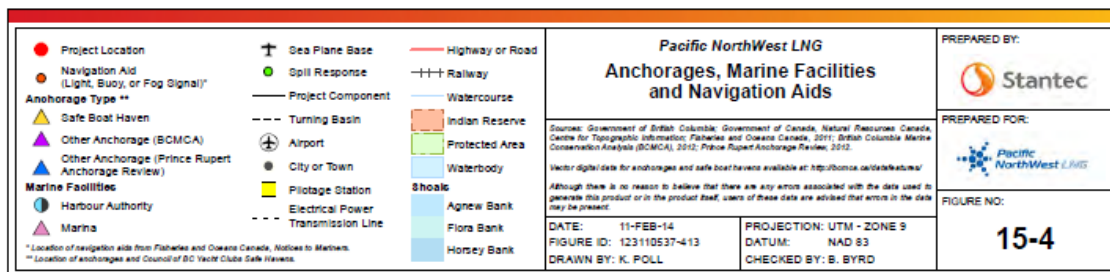
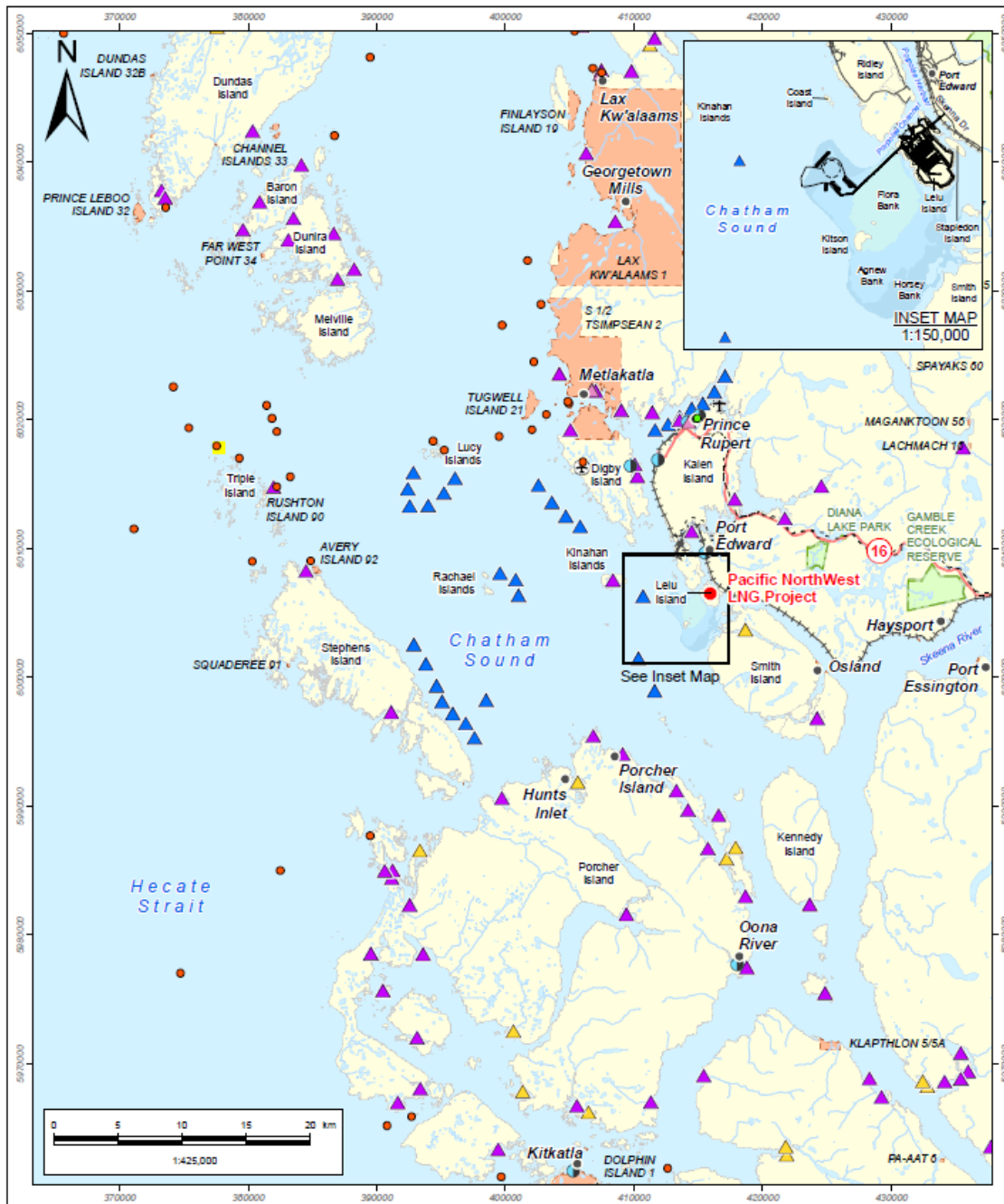


Figure 7-1: Anchorages, marinas facilities, and navigation aids.

The LAA/RAA has five industrial terminals (e.g., Fairview Terminal) and seven marine facilities, including marinas with public wharves, yacht clubs and coastal ecotourism and fishing lodges. Cruise ships, ferries and water taxis also stop in Prince Rupert Harbour. Commercial, recreational and Aboriginal fisheries (mainly for crab, shrimp and salmon) are important to the local economy and traditions; and ecotourism and recreational boating are common. In the area there also are vessels used for commercial shipping of cargo: tankers, barges, tugboats, bulk carriers and ships designed to transport a range of raw materials and finished products. BC Ferries runs year-round scheduled services from Prince Rupert to both Port Hardy and Skidegate.

The Prince Rupert Port Authority reports a 30% increase in large marine vessel traffic between 2009 (311 vessels) and 2011 (406 vessels), excluding traffic from the 780 commercial and recreational fishing vessels based out of Prince Rupert and smaller recreational boats.

According to the Application, the Port Authority is undergoing improvements to increase capacity, and the Port Edward Harbour Authority is working collaboratively with its Prince Rupert counterpart to manage and attract commercial marine traffic.

A number of fisheries resources are harvested extensively in the LAA/RAA, including all five Pacific salmon species, steelhead, eulachon, Pacific herring, Pacific halibut, rockfishes, Dungeness crab and *Pandalus* shrimp.

### **7.1.2 Potential Project Effects and Proposed Mitigation Described in the Application**

This section summarizes the potential proposed Project-related effects on navigation and marine resource use, and proposed mitigation, as described in the Application.

*Interference with recreational and commercial navigation* – Construction of the Pioneer dock, the Lelu Island bridge, the MOF and the marine terminal could cause congestion in Porpoise Channel, prevent access through Lelu and Stapledon Sloughs, and affect navigation across Flora Bank. Marine transportation would be required during construction to facilitate movement of workers to Lelu Island prior to completion of a bridge connecting Lelu Island to Skeena Drive. Modular equipment and site construction materials would also be transported via barge or other vessels. Discussions between the Proponent and the PRPA and Transport Canada would be required in order to plan and coordinate vessel movement in the Prince Rupert Harbour, and to minimize effects on other mariners.

During operations, vessels requiring more than 11.3 m of clearance would be prevented from going through Lelu Slough, which is used mostly by local recreationalists at high water. The marine offloading facility could temporarily restrict passage conditions in Porpoise Channel during manoeuvres of construction vessels entering or leaving the facility. Vessels requiring more than 11.3 m of clearance would be prevented from passing under the marine trestle to traverse Flora Bank. Both LNG berths and manoeuvring LNG vessels would require exclusion zones.

*Effects on fishing, recreation and marine use* – Vessel traffic would increase in the LAA/RAA during construction of the LNG facility, the marine terminal and supporting infrastructure. Support vessels (e.g., cranes, tug boats, drill rig, vibro-hammer, excavators and dredgers) would be required during construction for pile driving, dredging and disposal of dredge material. This increased traffic with operational safety buffers would mean less space for navigation of existing marine traffic, including fishers, boaters, and recreationalists such as kayakers. It would also affect those in the vicinity such as commercial vessels. Areas of concern include Porpoise Channel where the average width is approximately 300 m.

The Application estimated that (using 2011 data) restricting access to Flora Bank could result in the loss of up to 500 salmon recreational landings by recreational fishers, or 2% of 25,180 salmon caught that year in Fisheries Management Area 4. The Application states this to be a conservative worst-case estimate since it assumes that all recreational salmon fishing in Fisheries Management Area 4-12 sub-region would be occurring in Flora Bank, which is unlikely due to water depth and other factors.

During operations at full build-out, about one LNG carrier a day is expected, plus associated tugs. LNG carriers would travel between Triple Island and the terminal, and would adhere to standard PRPA vessel management procedures including mandatory pilotage.

Safety and exclusion zones might preclude fishing, crabbing and shrimping in the areas around the berth and trestle.

The following measures would be carried out to comply with federal and provincial laws and regulations:

- Navigational charts would be updated to show the MOF and trestle and berth locations;
- Escort vessels would be used to confirm the route is clear and safe and that other vessels do not intrude into safety zones; and
- Tugs would be used for the safe transit and docking of LNG carriers.

The Application's proposed mitigation measures include:

- A Marine Communications Plan would be implemented. The plan would identify measures to ensure all marine traffic is made aware of any any temporary restrictions due to project construction activities, and would detail the local marine communications and project-related safety procedures;
- Safety zones would be established during construction that specify "no go" areas;
- Lighting would be designed to reduce stray lighting;
- Navigational aids would be installed on structures where required to enhance navigation safety. Sufficient clearance (11.3 m above higher high water) for gillnetters would be provided beneath the Lelu Island bridge and the trestle spans that best support navigation to and from Porpoise Channel over Flora Bank.

- Traffic management and routing options would be assessed to help small craft know which route a carrier would follow, if deemed necessary by the port and pilots, and based on analysis of TERMPOL<sup>14</sup> studies; and
- Limits on environmental conditions under which operations can be conducted safely (visibility, daytime operations, wind) would be set, consistent with results from the TERMPOL studies, consultation with pilots, and LNG terminal practices throughout the industry.

### **7.1.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During Application Review, questions and concerns were raised by Working Group members and the public about the Project's potential adverse effects on navigation and marine resource use.

A number of concerns were raised about impacts during the construction phase, including:

- Additional congestion in vessel traffic caused by construction-related vessels;
- Effects on commercial and Aboriginal fishing operations; and
- Increased marine traffic through Metlakatla and Venn Pass and implications for safety, visual quality, traditional use and archaeological resources.

The Proponent responded that construction-related traffic is expected to be related to dredging, roll-on/roll-off, heavy-lift vessels and barges used to transport material for facility construction. At a peak stage during the construction phase, a worst-case scenario of an additional 4.5 large vessels per day would be expected for a six-month period – about 820 vessels for a six-month period. In 2013, there were 457 large vessel calls within the Prince Rupert port for the entire year. By 2020, about 1,500 vessels a year are expected. During full operations, there would be about 350 large vessel visits a year. The Proponent stated that current vessel traffic within the LAA is considered to be low compared with that in other large ports on the west coast.

The Proponent also does not anticipate that shipping and construction related to the Project would take place through Metlakatla/Venn Pass. The Proponent also noted that marine users would still be able to continue with all the marine activities they are currently conducting through Porpoise Channel, across Flora Bank, and through Lelu Slough, with only temporary restrictions because of construction.

Concerns were also raised about the effects on navigation and fishing that the 50 to 100 m safety and exclusion zones could have around the MOF, trestle, berths and LNG carriers.

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<sup>14</sup> Technical Review Process of Marine Terminal Systems and Transshipment Sites, a Transport Canada-led process

The Proponent calculated that the total area covered by the maximum safety zone is 78.5 ha, which represents 0.1% of the available salmon and Dungeness crab fishing areas in the LAA, and would block 4.3% of crab fishing grounds in the immediate vicinity of the marine terminal. There would also be safety zones surrounding berthed LNG carriers that would be marked and patrolled.

Lax Kw'alaams First Nation raised concerns regarding avoidance of active shipping lanes by mariners due to perceived or actual risks, more specifically navigation risk, exposure to accidents and malfunctions at an industrial site, and potential contamination of fisheries. Lax Kw'alaams First Nation noted that the marine trestle would extend across almost the entire east-west length of Flora Bank, cutting off navigation for about 2.5 km for many navigators seeking to travel north to south.

The Proponent stated that marine users would not be prevented from accessing areas in proximity to the Project (outside of the 50 to 100 m safety zone). Marine access would still exist for navigation and recreational and commercial activity.

Gitxaala Nation noted that travel routes around Ridley and Lelu Islands are important for boat travel between *Lach Klan* and Prince Rupert and Port Edward, and are not only key access, safety, and time saving routes, but key harvesting, and fishery routes.

The Proponent proposed a marine terminal re-design mitigation that reduces the effects of project infrastructure construction and dredging on navigation. Overall, duration of dredging and disposal would be reduced from 27 months to 6 months, and the number of barge trips for sediment disposal is reduced from 2,555 to 170 one-way trips to Brown Passage. Maintenance dredging at the materials offloading facility is anticipated to be infrequent, if at all. The breakwaters are also eliminated from the proposed Project design. The jetty length would increase by 300 m, but vessels would continue to be able to pass underneath it.

#### **7.1.4 Characterization of Residual Project Effects**

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on navigation and marine resource use:

- Interference with recreational and commercial marine navigability; and
- Disruption and reduction of fishing, recreation and marine use.

Summarized below is EAO's assessment of the expected residual effects of the proposed Project on navigation and marine resource uses, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

<b>Criteria</b>	<b>Assessment Rating</b>	<b>Rationale</b>
Context	Low to moderate level of disturbance	<p>There are several industrial developments underway within the PRPA, as well as other types of marine facilities in Prince Rupert and Port Edward, including marinas, yacht clubs, public wharves, and coastal ecotourism and fishing lodges. Overall, disturbance to navigation in the area is currently low, while there is moderate disturbance to marine uses.</p> <p>Flora Bank is an important location for commercial, Aboriginal, and recreational fishers.</p> <p>Currently a relatively low level of vessel traffic between the pilotage station at Triple Island and the project site.</p>
Magnitude	Moderate	<p>The proposed Project would result in a measurable change to navigation and marine resource use in moderate-use areas with an increase in vessel traffic during construction and a 77% increase in large vessels during full operations.</p> <p>Exclusion zones surrounding the marine terminal would have a low magnitude effect on marine travel and access to fisheries.</p> <p>During operations, increased shipping and potential for restricted areas around the marine terminal would prevent users from using only a negligible amount (less than 0.1%) of the LAA/RAA for recreational, fishing and other marine use purposes.</p>
Extent	Local	Any potential adverse effects of increased vessel movements during the construction and operation phases of the proposed Project would be felt within the PRPA boundary and the waters extending 10 km on both sides of the potential shipping routes.
Duration	Long term	Adverse effects would occur over the life-time of the project.
Reversibility	Reversible	Adverse effects of the proposed Project would be reversible after decommissioning and site reclamation.
Frequency	Continuous	Adverse effects would occur with some regularity throughout the proposed Project.
Likelihood	The likelihood of there being a residual effect on marine resource use in the LAA and RAA is moderate. There is a low likelihood of a permanent impairment to fishing, recreation and marine use in areas of high importance.	
Significance	EAO acknowledges that the CEAA, with technical support from Transport Canada, as well as PRPA may develop require additional mitigation measures	

	<p>to address residual effects on navigation and marine resource use.</p> <p>Considering the above analysis and having regard to the CPD and conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on navigation and marine resource use.</p>
Confidence	High level of confidence based on the Proponent's analysis of similar projects that have posed potential barriers to marine resource use, and the proposed mitigation.

**7.1.5 Cumulative Effects Assessment**

The Application states that vessel traffic generated by the Project would overlap with that of other facilities, including the 7 projects already in operation and 10 either in the planning stages or now under construction (see Table 6-1 in Section 6.1.2). The configuration of the proposed Prince Rupert LNG facility, which is to be located on Ridley Island, could have additional effects on vessels using Porpoise Channel given the narrow width of the channel (300 m). The water lots assigned to both the Prince Rupert LNG Project and the proposed Project are designed to maintain full access to Porpoise Channel, and safety zones would not exceed water lot boundaries. Therefore, access restrictions to and from Porpoise Harbour are not anticipated.

The Application indicates that the overlap between the proposed Project and other facilities generating vessel traffic within the RAA is expected to be easily manageable in comparison to other ports on the BC North Coast based on current and planned levels, and the separation distances between the Project and other local projects. The cumulative effects would not affect the viability of navigation within the RAA.

The PRPA expects to increase shipping to 2,000 ships (4,000 movements) by 2025. Given the current volume of movements from Triple Island at less than 1,000 pilotage assignments annually, there is clear capacity to increase the amount of traffic calling at Prince Rupert in reference to other pilotage areas in BC.

Metlakatla First Nation identified that Metlakatla First Nation's commercial fishermen, like most small-scale fishermen on the BC north coast, are already on the margin of economic viability. Fish stocks are already compromised, and future development would add stress and negatively affect marine environmental quality and fish habitat. With the in-migration of labour to the Prince Rupert area, this would increase recreational fishing and put further pressure on fish stocks.

Considering the above analysis, EAO is satisfied that the proposed Project is not likely to have significant cumulative adverse residual effects on navigation and marine resource use.

### 7.1.6 Conclusions

Considering the above analysis and having regard to the CPD and the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on navigation and marine resource use.

## 7.2 Infrastructure and Services

### 7.2.1 Background

The Application's assessment of impacts to the Infrastructure and Services VC considered three potential project effects, each with its own set of measurable parameters:

- Change in traffic and pressure on transportation infrastructure including air, rail and road corridors:
  - Daily traffic volumes (vehicles/day);
  - Air traffic; and
  - Traffic incidents in Port Edward and Prince Rupert.
- Change in housing availability and affordability:
  - Housing supply and demand (units); and
  - Housing cost.
- Effects on infrastructure and community services:
  - Number of workers and their dependents for each phase;
  - Change in demographic composition;
  - Demand and supply of infrastructure and community services (e.g., education, social services); and
  - Parameters based on infrastructure and services affected (e.g., police officers/1,000 people).

The LAA includes the District of Port Edward and the City of Prince Rupert and Highway 16 up to and including the Northwest Regional Airport Terrace-Kitimat (YXT). The RAA includes the mainland portion of the Skeena-Queen Charlotte Regional District and Highway 16 up to and including the YXT. The RAA communities within this area are:

- City of Prince Rupert;
- District of Port Edward;
- Skeena-Queen Charlotte Regional District Electoral Areas A and C;
- S1/2 Tsimpsean Indian Reserve 2 (Metlakatla First Nation);
- Lax Kw'alaams Indian Reserve 1 (Lax Kw'alaams First Nation); and
- Dolphin Island 1 (Gitxaala Nation).

## 7.2.2 Potential Project Effects and Proposed Mitigation Described in the Application

This section summarizes the potential Project-related effects on transportation infrastructure, housing availability, infrastructure and community services and proposed mitigation, as described in the Application.

### *Transportation Infrastructure*

*Vehicle traffic* – Between 1994 and 1997, the median traffic volumes on Skeena Drive were 2,970 vehicles per day, which is 98% higher than the current traffic volumes of 1,498 vehicles per day. During construction, the Proponent does not expect traffic volumes to exceed the 1994 to 1997 levels.

Traffic to and from the site is expected to be required for carrying merchantable timber (for site preparation), equipment, domestic waste and incidental movements of hazardous waste. Workers would be bussed to the extent possible or practicable. At peak construction, it is envisioned that up to 450 buses a day would take the construction workers from the privately owned and operated camps to the Lelu Island work sites. During construction, between 100 and 150 administrative staff are expected to travel daily to the construction site.

According to the Application, Highway 16 has the capacity to meet current and increased demand.

The Proponent has committed to rebuilding Skeena Drive from the intersection with the private industrial road back into a point in Port Edward. The road is being reconstructed to accommodate new waste water and water mains with the road right of way.

*Air transport* – The Prince Rupert Airport (YPR) is located on Digby Island and depends on a shuttle bus and ferry service operated by the City of Prince Rupert to move passengers between the airport and the city. The Prince Rupert Airport Authority is planning improvements to its runway and terminal building, although it is not known to what extent these improvements will increase passenger handling capacity. In 2013, passenger traffic at YPR was 60,914 passengers, up 12% from 2010 but down 8% from 1997. Aircraft movements totalled 2,164 aircraft, down 6,621 aircraft movements in from 1997.

Passenger traffic at the Northwest Regional Airport in Terrace-Kitimat (YXT) in 2013 was 177,600 passengers. The Application suggests that YXT currently has limited capacity to meet additional passenger demand. However, airport authorities are planning upgrades to the terminal buildings to increase passenger handling capacity.

Proposed Project construction is expected to result in an estimated 384 annual aircraft movements at either YPR or YXT. If all Project-related traffic were to occur at YPR, this would represent 18% of YPR's 2013 aircraft movements. The number of passenger

movements could be noticeably higher at each airport, if for example, the majority of the 4,000 to 4,500 workers expected during the peak of construction were flown in and out of Prince Rupert and/or Terrace on a monthly basis.

If there were an increase in flights to YPR located on Digby Island, additional passenger traffic would need to be accommodated by the city-operated ferry service or the use of an existing water taxi service if ferry service is required outside of standard operating hours.

As part of design mitigation to address effects on marine resources, the Proponent is proposing to build a 1.6 km long suspension bridge as part of the marine terminal, which includes two towers and suspension cables up to 140 m high above sea level.

The presence of the bridge has potential to affect the safe and efficient use of an aerodrome, airport or heliport within, or close to, the take-off or approach areas. The YPR is approximately 13 km northwest of the bridge at the nearest point. The runway is aligned such that aircraft approaching from or departing to the southeast may fly over the intended location of the suspension bridge. The Proponent stated that the vertical separation of aircraft flight paths from the bridge would be sufficient to avoid effects.

The presence of the bridge also has the potential to affect the safe and efficient use of the Digby Island Seaplane Base and Seal Cove Seaplane Base, located approximately 15 km and 17 km north of the bridge respectively. The Proponent stated that seaplanes using these bases reach cruising altitudes shortly after take-off, and well before reaching the suspension bridge.

The Application states that the Proponent would comply with all regulatory requirements with respect to aviation safety, including submitting details necessary to support revising aeronautical charts to identify the location and height of the bridge towers, and marking and/or lighting the bridge towers as prescribed in Standard 621.19 of the Canadian Aviation Requirements.

*Rail transport* – Project effects on rail infrastructure and services have not been assessed as these services are not anticipated to have interactions with the proposed Project.

### *Housing Availability*

Port Edward and Prince Rupert have little capacity to accommodate increased demand for rental housing, hotels and motels. Only about 0.5% of the rental housing market is unoccupied, and local hotels and motels rarely have vacancies because of construction projects and increased tourism.

According to the Application, there is sufficient capacity to meet increased demand for owner-occupied dwellings and more permanent housing through construction on pre-existing undeveloped residentially zoned land. The City of Prince Rupert's population in

2011 was 25% lower than it was at its historical peak in 1996 and the population of Port Edward was 22% lower in 2011 than it was in 1996.

Phase 1 of Project construction is expected to spread over five years, and for two of those years, the construction workforce would be approximately 4,000 people. The Application proposed to have a construction camp on Lelu Island (at the Project site) with a capacity of between 3,500 and 4,500 people. Since the Application submission, the Proponent stated that the accommodation camp will be built and operated by a third-party that will be located in the Port Edward and/or to the Prince Rupert general area. This would likely increase the interactions between construction workers and the local populations, but is unlikely to change the effects to housing availability.

The Application states that between 100 and 150 personnel would reside in Port Edward and Prince Rupert and commute to the site for the duration of construction activities.

The Application indicates that the proposed Project would increase demand for housing in the LAA through both visiting and in-migrating workers employed and seeking employment with the Project either directly, indirectly or through induced opportunities.

In addition to the proposed construction camp, the Application states mitigation strategies related to changes in housing availability that include developing an Accommodation Plan, which would commit the Proponent to:

- Engaging with city and district planners in Port Edward and Prince Rupert in order to respond to potential community grievances and changes in demand for housing infrastructure;
- Providing housing policies for non-local temporary workers who are not housed in the construction camp; and
- Outlining camp management policies and practices.

### *Infrastructure and Community Services*

Some municipal infrastructure in Prince Rupert is aging and in need of upgrading, such as the water and sewer systems. Water is supplied from the 92-year-old Woodworth Lake dam and distributed through 80-year-old distribution pipes. The water distribution system in Port Edward is currently being replaced, and the water treatment facility completed in 2004 has a current capacity of 2,400 m<sup>3</sup> per day, with peak demand of 1,470 m<sup>3</sup> per day. Port Edward's sewer lines were updated in the 1970s and the sewage treatment facility completed in 1997 can serve up to 1,500 people.

Other infrastructure and community services include power, communications, police, fire, education, recreation and community social resources. The Application does not clearly define the extent to which existing capacity would be sufficient to meet increased demand. The police force in Prince Rupert appears to handle a greater case load than the provincial average, and replacement of Prince Rupert's fire hall is being considered.

*Water and wastewater systems* – The construction camp and facility would use Port Edward’s drinking water and waste water treatment facilities. The Application states i that current wastewater systems can meet increased demand, and the Proponent has committed to working with the District to upgrade existing infrastructure.

*Solid waste* – Waste generated from construction activities and camp operations could be disposed of at the Prince Rupert Landfill, which has approximately 75 years of capacity at current rates of fill. Alternatively, barges could be used for off-site solid waste disposal.

*Camp-related demand for community services including emergency services* – The construction camp is intended to have recreational facilities, on-site security staff, on-site fire suppression equipment and on-site trained first responders.

*Non-camp-related demand for infrastructure and community services* – During construction, the Application states that the demand for community infrastructure and services would not exceed current seasonal variations: between 50 and 100 construction workers during site preparation, and between 100 and 150 administrative staff for the entire construction period.

During operations, the Application states that the demand for infrastructure and community services would be limited to the 120 workers and their families who would be permanently moving into the area. The existing RAA infrastructure and community services are expected to be sufficient.

The Application proposes several strategies to mitigate potentially adverse Project effects on community infrastructure and services as follows:

For water and wastewater systems, the Application proposes:

- Developing waste management, disposal and recycling programs for construction and domestic waste, targeted at reducing demand on municipal landfill facilities and operations; and
- Working with the District of Port Edward to upgrade existing wastewater infrastructure.

For other community services including emergency services, the Proponent commits to establishing:

- A community crime prevention initiative with the RCMP to collaborate on and communicate Project updates and activities that could influence community safety and Project-related traffic concerns;
- A Project community engagement plan to help address potential effects, facilitate communication with communities and provide a framework for handling grievances;
- An emergency response plan;
- Mandatory awareness programs for employees regarding fire suppression systems; and

- On-site recreational facilities at the construction camp to reduce potential demand on infrastructure and municipal services.

### **7.2.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

This section summarizes the primary concerns raised during the Application Review about potential Project-related adverse effects on transportation infrastructure, housing availability, and other community infrastructure and services.

#### *Transportation Infrastructure*

The Application identified that there would be an increase in vehicular traffic as a result of the proposed Project, particularly during construction due primarily to the movement of workers, material and equipment to and from the proposed Project site at Lelu Island. As a result of changing the proposed worker camp location off Lelu Island, there would be an increase in local traffic within the Port Edward area.

During the Application Review, the BC Ministry of Transportation and Infrastructure (MOTI) raised several concerns regarding effects on traffic volumes and the RAA transportation infrastructure as a result of the proposed Project. These concerns included the effects of the proposed Project on local roads and provincial highways within the RAA, and in particular between Highway 16 and its connection with Skeena Drive. The effects of concern included general transportation safety, effects to the condition of provincial transportation infrastructure as a result of volume and movement of heavy equipment and industrial vehicles.

EAO, following additional consultation with MOTI, proposes a condition that would require the Proponent to develop a Traffic Impact Assessment, a Traffic Management Plan, and a Traffic Safety Analysis. Should the Proponent make any changes that could affect transportation infrastructure, the Proponent would be required to update those plans, in consultation with MOTI.

Lax Kw'alaams First Nation expressed concern that increased use of the YPR could affect the ability to service flights at the Seal Cove Seaplane Base.

The Proponent noted that there are no plans for the proposed Project to use that facility and, as a result, concerns about the use of the Seal Cove Seaplane Base can likely be resolved through the planned community consultations as construction proceeds.

Concern was expressed that increased airport traffic in Prince Rupert would increase demand for ferry and shuttle service from the YPR connecting Kaien Island to Digby Island.

MOTI stated that the Province is leading a corridor analysis in the Prince Rupert Area to look at access improvement options to directly connect Prince Rupert/ Port

Edward to Digby Island Airport, Aboriginal Group communities and proposed developments (LNG and other industrial developments) by road and bridges. Fixed-link connections between LNG developments, communities and the YPR would benefit all stakeholders through improved access (including for the proposed Project) and eliminate the ferry capacity issues that could arise as a result of the volume of development worker traffic generated by the proposed Project and other projects in the area. The Province is engaging with Proponent and other LNG proponents to confirm its participation in the corridor analysis.

### *Housing Availability*

Concerns were raised during the Application Review about the Project-related effects on the cost of housing, primarily in relation to impacts on the cost of living. These are discussed in Section 6.1.2 of this Assessment Report.

Northern Health and other working group members raised concerns about the assumptions made in regards to the limited effects on housing within the LAA and that the forecasted limited effects on rental housing availability are not backed by evidence. Anecdotal evidence suggests that communities such as Terrace and Prince Rupert have already experienced changes (e.g., housing prices) in anticipation of the proposed projects. There are risks that a greater-than-assumed proportion of construction workers could choose to reside in the communities of Prince Rupert and Port Edward, which could create major supply and demand imbalances for temporary housing in RAA communities.

The Proponent anticipates that during construction, monthly rental payments may increase in the LAA, driven primarily by site-preparation workers who would be staying in the LAA. The Proponent considered the market resilient to an increase in rental payments based on data that shows rental prices have dropped since 2001, and capacity exists to accommodate an increase in population and demand for tenant-occupied housing. The Proponent expects that housing costs are not expected to increase beyond that of historical variation.

*Project-related effects on housing availability from indirect and induced employment –* Northern Health expressed concern that identified vulnerable populations may be disproportionately impacted and suggested that the level of uncertainty in effects on vulnerable populations requires an adaptive management framework with additional local monitoring, surveillance and action on part of industry and government agencies, if impacts are identified. Northern Health is aware of anecdotal information that suggests that families are already being displaced in the region from increases in housing prices as a result of anticipated projects in the area. Aboriginal Groups also expressed concern about disproportionate impacts to Aboriginal Groups.

The Proponent acknowledges that low-income households could be disproportionately affected by changes in monthly rental payments. It was noted that these populations may have access to publicly funded support programs that

could offset these impacts, but that this may require increased public funding in addition to mitigation measures implemented by the Proponent. The proposed Project could indirectly increase the demand for non-market housing units from low-income individuals as the cost of market housing rises, and disproportionately affect Aboriginal Groups.

Northern Health expressed concerns on the potential effects that may result during the transition from the construction to the operation phase when required workers drops from 3,500 to 680 jobs, and following operations during the decommissioning phase.

The Proponent anticipates an increase of 120 households for the operations phase of the proposed Project, and concludes that there is sufficient supply available to accommodate the in-migrating workforce. The Proponent stated that RAA communities would likely have sufficient capacity to meet additional housing requirements during facility operations by renovating or redeveloping existing housing units and/or by developing current residentially zoned lands.

During Application Review, the Metlakatla First Nation and others raised concern about tenant-occupied housing availability in Prince Rupert citing the baseline conditions in the Application that indicate a vacancy rate for rental housing in Port Edward and Prince Rupert of only 0.5% of the total rental market.

In response to these concerns, the Proponent presented additional Canada Mortgage and Housing Corporation (CMHC) data which showed that from 2011 to 2013, rental vacancy rates for Prince Rupert catchment area (which includes Port Edward) fluctuated from 17.6% in October 2011 to 3.6% in April 2013. More recent data are not readily available from CMHC but anecdotal evidence suggests that rental vacancy rates may have continued to decline in 2014.

#### *Municipal Infrastructure*

Concerns were raised about construction effects on municipal infrastructure (including the direct effects from the construction camp, and potential indirect and induced effects through increased population), and the use of mitigation measures that are dependent on anticipated increase in municipal government revenue.

The Proponent stated that the additional tax revenue would aid in mitigating potential effects, in addition to Proponent-specific mitigation measures such as municipal infrastructure investment strategies, pay-per-use offsetting, and the use of Best Management Practices.

#### *Community Infrastructure and Services*

The Prince Rupert Rod & Gun Club raised concern that the proposed Project would result in additional requirements for launching and moorage facilities, public access to beach frontage for the purpose of public picnicking, and camping sites in proximity to Prince Rupert and Port Edward.

The Proponent re-iterated its commitment to work with stakeholders to identify appropriate measures that would enhance the benefits of the proposed Project to local and regional communities.

#### *Additional Mitigation Strategies*

In light of the infrastructure and services concerns raised during the Application Review, EAO proposes a condition that would require the Proponent to develop and implement a plan. The SEEMP Condition would lead to management activities aimed at mitigating potential adverse socio-economic effects. The plan would provide:

- An effective engagement process between the Proponent and Aboriginal Groups, local governments, and government service providers;
- An approach to implementing mitigations and plans contained in the Application;
- clarity for all participants about timing of project activities so that planning and actions are based on current information;
- An approach to ensure unplanned effects are understood and new mitigations are considered; and
- A monitoring and reporting framework.

EAO also proposes Condition requiring the Proponent must complete a Traffic Impact Assessment, a Traffic Management Plan, and a Traffic Safety Analysis prior to the construction of the bridge connecting Lelu Island to the provincial highway system.

#### **7.2.4 Characterization of Residual Project Effects**

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on infrastructure and services:

- Increased traffic and pressure on transportation infrastructure, including air and road corridors;
- Decrease in housing availability and affordability; and
- Increased demands put on other community infrastructure and services

Summarized below is EAO's characterization of the expected residual effects of the proposed Project on traffic and transportation infrastructure, housing availability and affordability, infrastructure and community services during construction, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Transportation:</b> Moderate resilience</p> <p><b>Housing:</b> Low to moderate resilience</p> <p><b>Infrastructure:</b> Low to moderate resilience</p>	<p>Skeena Drive has capacity for increased traffic. YPR has capacity for an increase in flights, but there are challenges with moving passengers to and from Digby Island where the airport is located.</p> <p>The available housing and community infrastructure has limited ability to accommodate population increases.</p> <p>There is low to moderate resilience for other community services and infrastructure give the design capacity and age.</p>
Magnitude	<p><b>Transportation:</b> Moderate</p> <p><b>Housing and Infrastructure:</b> Moderate to high</p>	<p>There would be a measurable increase in traffic pressure on transportation infrastructure, including air and road corridors throughout the RAA.</p> <p>Change in activity expected from Project construction and a construction workforce of 4,000 is likely to result in moderate to larger changes in demand for infrastructure and services. In spite of the construction camp that there is expected to be moderate pressure on housing availability and other infrastructure and community services.</p>
Extent	Regional and beyond	Effects during construction would extend beyond the local community to the RAA, particularly when indirect and induced effects are considered (e.g., Terrace). Effects during operations would be primarily local.
Duration	Medium term	The duration of effects is would be greater during construction, but would likely persist somewhat into operations, until infrastructure and services have adapted.
Reversibility	Reversible	The adverse effects to infrastructure and services once local and regional communities have adapted.
Frequency	Continuous	The effect would occur continuously, with some variation from construction to operations.
Likelihood	The likelihood is high that some degree of adverse effects would occur to infrastructure and services LAA and RAA.	
Significance Determination	Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on infrastructure and services.	
Confidence	There is a moderate level of confidence in the likelihood and significance determination, particularly in consideration of the on-going monitoring and adaptive management required under the proposed SEEMP condition and the industry, regional and provincial initiatives.	

## 7.2.5 Cumulative Effects Assessment

There are several proposed projects that could overlap with the proposed Project's construction and operations, as identified in the Application and Section 6.1.4

During construction, the cumulative labour requirements for the proposed Project and the Prince Rupert LNG facility are estimated to reach 8,000 workers during the peak construction period. During operations, the cumulative labour requirements for both facilities could be approximately twice the proposed Project's on-site operating workforce.

The BC Government, industry, Aboriginal communities and other communities have embarked on several initiatives to identify potential cumulative effects on communities, infrastructure and services expected from this proposed Project and other natural gas pipeline and other projects, and develop mitigation strategies to address these effects. Section 6.1.4 of this Report described initiatives that focused at least in part on the potential cumulative effects on skilled labour shortages in the RAA. These include:

- BC Natural Gas Workforce Strategy Committee;
- Premier's LNG Working Group;
- Northwest Readiness Project, a project that hopes to develop a standardized set of scenarios of probable employment and population growth resulting from major project development in the region to assist communities with service planning;
- Northwest Regional Economic Collaborative (which includes the Northwest Labour Market Partnership, Northwest Tourism Strategy, Regional Investment Readiness and Bio-Energy Investment Attraction); and
- The BC LNG Alliance, which brings together four major British Columbia LNG proponents to coordinate community relations and labour strategies related to the proposed LNG facilities in northwest BC.

There are several other initiatives that specifically target community readiness and the establishment of infrastructure and services at the community and regional levels. These include:

- BC Government Community Readiness Initiatives and Grants from Northern Development Initiative Trust: Grants totalling up to \$1 million are being provided to help local governments in the Northwest plan for economic growth associated with LNG developments and industrial expansion. Two grant programs, at up to \$500,000 each, will assist communities to develop plans for:
  - Asset Management Capacity Building: Grants will support the review of infrastructure capacity (water, sewer, drainage, local roads) and assist communities in determining what additional services are required for their specific growth needs;

- Community Land-Use Planning: Grants will assist local governments in doing the work required so that their land use bylaws, policies and plans align with the needs for industrial expansion and maintain community health and quality of life for existing residents. This could include updating local official community plans or zoning bylaws, or conducting new studies for targeted areas like housing affordability;
- The grants are available to the City of Terrace, City of Prince Rupert, District of Kitimat, District of Port Edward, Regional District of Kitimat-Stikine, and the Skeena-Queen Charlotte Regional District.
- Federal government and First Nations: The federal government has announced the establishment of a major projects management office in Vancouver to help develop greater cooperation with Aboriginal Groups on energy development.
- Fair Share Agreements: In northeast BC, the Fair Share Agreements provide for provincial royalties in the oil and gas sector to be reallocated to municipalities in the Peace River Regional District to support infrastructure development; and
- Other Initiatives: Several government funded projects and initiatives such as Western Diversification, Community Futures, and the Northern Development Initiative Trust make strategic investments in initiatives that enhance and strengthen businesses and the economy of northern BC.

MOTI is leading the Prince Rupert Area Corridor Analysis (PRACA), which will involve assessing the cumulative impacts of industrial developments on regional transportation infrastructure and access improvements to communities and YPR.

EAO recognizes that while there are a number of developments being contemplated or proposed in the RAA, there is substantial uncertainty regarding which project will proceed and the timing of development. The temporal overlap of the construction of multiple projects in the RAA is an important factor for any increased cumulative effects. EAO's proposed the SEEMP Condition for an adaptive plan to mitigate social and economic effects, and the many industry regional and provincial initiatives, seek to anticipate and mitigate these potential cumulative adverse effects.

EAO determines the magnitude of cumulative residual adverse effects to be medium to high in magnitude as construction of the proposed Project would combine with other reasonably foreseeable developments to cause an increase in demand for infrastructure and services, which could exceed existing capacity. The effects would be medium term in duration, continuous and reversible, as taxation levels increase and infrastructure and services are increased by governments. Given the number of proposed and contemplated projects in the RAA, and the uncertainty associated with their potential development, there is low to moderate confidence in the likelihood and significance determination. If several projects develop concurrently, additional mitigation measures

may be required through the process set out in the above noted SEEMP Condition, to ensure the mitigation of significant adverse cumulative effects.

## **7.2.6 Conclusions**

Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on infrastructure and services.

## **7.3 Visual Quality**

### **7.3.1 Background**

Visual Quality was selected as a VC because of the proposed Project's potential effects on local viewscales. The proposed Project is in close proximity to the community of Port Edward, Aboriginal communities, tourism businesses, a national historic site and a major shipping channel used by BC Ferries and cruise ships.

The LAA for visual quality includes all lands and waters within 8 km of the proposed Project development area and the primary and alternate shipping routes. The RAA for visual quality includes the area beyond the LAA where there is a potential view of proposed Project components in the background.

Lelu Island is within the Port of Prince Rupert, and future land use on the island is subject to the strategic direction set in the Port of Prince Rupert Land Use Management Plan (2011). That plan does not provide direction on the management of, or indication of, the visual sensitivity of lands within the port, but it does acknowledge the potential for port development to affect Port Edward residents.

The Port Edward Official Community Plan (2013) also includes elements relevant to visual quality that promote and protect the quality of life of its citizens.

Lelu Island does not have any visual quality objectives; however, the proposed Project has the potential to influence the views within the jurisdiction of the Province (guided by the Central and North Coast Land Use Decision). The Proponent used the methods described in the FLNR's' *Visual Landscape Inventory Procedures and Standards Manual* (1997) and the ministry's *Visual Impact Assessment Guidebook* (2001) to guide assessment of the proposed Project effects.

During the stakeholder and public engagement process, a primary concern raised was about the visual impact of the proposed Project on the views from Port Edward and from marine vessels.

### **7.3.2 Potential Project Effects and Proposed Mitigation Described in the Application**

The Proponent anticipates that the proposed Project would create a considerable visual quality change within the Port of Prince Rupert and change some views of high importance. The facility and marine terminal would be visible to:

- Some residents in Port Edward; businesses along Skeena Drive;
- Visitors to the Kitson Island Marine Provincial Park and the North Pacific Cannery National Historic Site;
- Recreational and commercial fishermen and mariners;
- Tourism operators in the Inverness Passage; and
- Passengers on BC Ferries and cruise ships travelling to Prince Rupert.

According to the Application, the main source of visual quality effects from shipping would be from LNG carriers transiting the proposed shipping routes. The Application identified that vessels involved in dredging could also have an effect on visual quality. However, these vessels are much smaller than the LNG carriers and would be active only during part of the five-year construction phase, while LNG carriers would be present for over 30 years of operations. Thus, effects from dredge vessels would be much less than those from LNG carriers.

For this reason, the assessment of visual quality from vessels in the Application focused on effects from LNG carriers. The Application states that large vessel movements through the harbour in 2011 and 2012 were, on average, equivalent to less than one movement a day (0.8–0.9), assuming regular distribution of this traffic throughout the year. The Application concludes that at full build out, up to one LNG carrier per day could be expected to visit the marine terminal, which represents two movements a day.

The Application assesses visual quality impacts from various viewpoints. The facility and marine terminal were assessed from 16 viewpoints of importance, while the shipping routes were assessed from 8 viewpoints of importance.

According to visual landscape inventory standards, 58% of the island is categorized as important to viewers, and there is a probability that the public would be concerned if the island is modified. The Application states that the proposed Project site is moderately to highly visually sensitive, as Lelu Island and much of the land visible from the assessed viewpoints are relatively intact and generally have limited human interventions.

Ninety-one percent of the LAA is expected to have a view of one of more of the project components (marine terminal, facility and any of the three shipping route options). Considering the topography, relatively homogenous vegetation patterns and aspects of many slopes that will be influenced by the vertical development of the project facilities and marine components, the visual absorption capability in the LAA is moderate to low

The facility and marine terminal will be visible to some residents in Port Edward; businesses along Skeena Drive; visitors to Kitson Island, North Pacific Cannery and

National Historic Site; recreational and commercial fishermen and mariners; tourism operators in the Inverness Passage; and travelers on BC Ferries and cruise ships travelling to Prince Rupert. Figure 7-2 **Error! Reference source not found.** and 7-3 show the view of the facility and terminal from Port Edward and Port Edward School respectively. The facility and terminal would be visible from 11 of the 16 assessed viewpoints.



Figure 7-2: View looking south near Port Edward.



Figure 7-3: View looking southwest from Port Edward School.

All eight of the assessed shipping viewpoints would have a view of the shipping routes, while one would also have a view of the proposed trestle and berth. Assuming the LNG carriers would travel at a constant speed of 15 to 17 km/h and that two carrier trips would occur each day, the duration that an LNG carrier would be visible from each viewpoint would range from 1.3 hours to 5.2 hours. Figure 7-4 shows a view of the trestle and facility from the water.

The shipping assessment considered the prominence of the visual impact (based on the distance and vertical and horizontal angles). Four locations would be further than 8 km

away and would have low prominence, while three locations would generally be 1.2 km to 5.4 km away and have moderate prominence. One location (Kinahan Islands) would generally be <0.5 km away and would have high prominence.



Figure 7-4: View looking north from water.

The Proponent states that mitigation measures are limited, given the exposed, the relatively flat topography of Lelu Island, the amount of vegetation clearing that is required to accommodate the components, the dimensions of the components, the large vessels, and high numbers of vessel movements associated with the proposed Project activities.

The Proponent has integrated several measures into the proposed Project design to reduce effects on visual quality. For example:

- A 30 m vegetation buffer has been retained around Lelu Island to reduce the visual impact;
- The heights of components have been minimized to allow maximum facility screening by the vegetation buffer;
- The flare stack has been relocated to the south side of the proposed Project site; and
- The bridge and marine terminal have been designed to minimize their visual bulk.

### **7.3.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

Some concerns were raised during the Application Review by Working Group members and the public regarding potential proposed Project-related adverse effects on visual quality.

Lax Kw'alaams and Kitsumkalum First Nations raised that the degradation of the visual quality would reduce the aesthetic experience of marine users and reduce the demand for tourism; this would have a negative effect on tourism related economic activity.

The Proponent stated that potential residual effects would affect a limited number of users in the LAA. Although users' experience may be affected, they would be able to continue to fish, crab, catch shrimp, kayak, camp, and conduct all other marine activities that they are currently doing. There is low likelihood of permanent impairment to fishing, recreation and marine use in areas of high importance.

Lax Kw'alaams First Nation raised concerns about the potential psycho-social impacts of visual changes on community members and questions about the potential human response to changes in visual quality.

The Proponent responded that while assessment of effects on visual quality was conducted using FLNR's standard visual quality method, this method includes an estimate of visual sensitivity class, which includes consideration of numerous criteria related to the characteristics of the views being affected, as well as potential importance to human receptors. In addition, the Proponent considered any Aboriginal Group's consultation input with respect to concerns associated with potential changes in visual quality in undertaking the analysis.

During Application Review, the Proponent proposed a design mitigation, which would eliminate the dredge for the marine terminal. This would reduce the number of one-way trips to a disposal at sea site (e.g. Brown Passage) from 2,555 to 85, and duration of dredging activity from 27 months to 6 months. This would reduce the visual impacts of marine traffic during the construction period.

The marine terminal design mitigation would include a 1.6 km long suspension bridge, which would include two towers and suspension cables 140 m above sea level. The Proponent stated that the suspension bridge would be distantly visible from the town centre of Port Edward, and would be visible from the waters around Lelu Island.

#### **7.3.4 Characterization of Residual Project Effects**

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on visual quality:

- Views of the facility and marine terminal would be visible to some Port Edward residents and marine users, including recreationalists, tourists and visitors travelling by ship to Port Edward and Prince Rupert; and
- Views of LNG carriers transiting the proposed shipping routes would be visible to some residents in the LAA.

Summarized below is EAO's characterization of the expected residual effects of the proposed Project on visual quality, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	Moderate resilience	Visual quality is a desired element in residents' quality of life and is important, but not essential, to tourism operations and recreation opportunities.
Magnitude	<b>Facility:</b> High <b>Vessels:</b> Low to moderate	There would be a high magnitude change in visual quality from the baseline conditions, resulting in a decrease in Visual Quality Class from <i>preservation</i> to <i>partial retention</i> and lower.  There would also be visual impacts vessel movements of low to moderate magnitude.
Extent	Local	The adverse effects would within most of the LAA.
Duration	Long term	The adverse effects would be experienced for at least 50 years – the 30+ year estimated life of the proposed Project, plus additional time for vegetation to become visually effective.
Reversibility	Reversible	The adverse effects would be reversible after decommissioning and reclamation.
Frequency	Continuous	The adverse effects would occur continuously through the operational life and for some years following.
Likelihood	There is a high likelihood of residual effects on visual quality.	
Significance	Considering the above analysis, including the planning context for Lelu Island as described in the Land Use Management Plan, and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on visual quality.	
Confidence	There is a moderate level of confidence in the analysis undertaken to support the conclusions regarding the effectiveness of mitigation measures and the likelihood and significance of the residual effects.	

### 7.3.5 Cumulative Effects Assessment

EAO concludes that the viewshed of this Project, where it intersects with that of the other projects planned or underway in the RAA, have the potential to result in cumulative effects on visual quality.

The PRPA is rapidly expanding. In addition to the port's own developments, the RAA is undergoing new green field developments in the pipeline, forestry and wind energy sectors. Thus, in addition to the proposed Project, there are 23 other projects within the RAA at various stages of development – operational, approved, proposed or reasonably foreseeable.

The increased shipping associated with the projects located outside the RAA in the Kitimat area (Enbridge Northern Gateway, Kitimat LNG, LNG Canada, and the Rio Tinto

Alcan Aluminum Smelter and Modernization Project) would also interact cumulatively to affect visual quality.

Lax Kw'alaams First Nation raised concerns that the cumulative effects assessment in the Application did not appear substantiated and the methodological approach was unclear.

The Proponent indicated that the assessment included a quantitative-based prediction of change in visual quality, an analysis of the potential importance of Lelu Island from a visual quality perspective, and a review of the planning context, as understood through the review of two planning documents. These developments largely occur within the PRPA, which has been identified for future industrial expansion. Considering the public processes under which the PRPA LUMP (2011) and Port Edward OCP (2013) were developed. Planning objectives for an area, particularly if developed through a public planning process, were important considerations in the assessment of cumulative effects on visual quality. As a result, the Proponent indicated that it can be assumed that the community will accept a cumulative change to visual quality.

In consideration of the above analysis, the mitigation strategies proposed by the Proponent, together with mitigation strategies and planning initiatives by the provincial and federal governments, EAO concludes that the residual adverse cumulative effects on visual quality would not be significant.

### **7.3.6 Conclusions**

Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on visual quality.

## **7.4 Community Health and Well-Being**

### **7.4.1 Background**

The Application's assessment of impacts to the Community Health and Well-Being VC considered three potential project effects, each with its own set of measurable parameters:

- Change in social determinants of health:
  - Population (demographics, rate of change);
  - Education, employment and income;
  - Housing;
  - Community cohesion;
  - Physical and mental health conditions;

- Supply and demand of health infrastructure and services including:
  - Demand associated with physical health;
  - Demand associated with mental health; and
  - Demand associated with health and safety site inspections.
- Recreation opportunities;
- Change in diet and nutrition:
  - Change in the composition of diets (proportion of country foods to market foods).

The LAA includes the communities of Metlakatla First Nation, Lax Kw'alaams First Nation, Gitxaala Nation, District of Port Edward, and the City of Prince Rupert. The RAA consists of the mainland portion of the Skeena Queen Charlotte Regional District, which includes all LAA communities.

The Application provides an overview of baseline conditions and provides data on population, labour force, income, education, crime rates, health behaviour measures, health infrastructure and diet and nutrition. Section 6.1 (Economic Environment) and Section 7.2 (Infrastructure and Services) of this Assessment Report provide summary data on population, labour force, income, community infrastructure and services, and emergency services. Other background information relevant to community health and well-being is discussed below.

### *Social Determinants of Health*

The Application refers to a composite index compiled by BC Stats called the Overall Regional Socio-Economic Index, which annually ranks Local Health Areas (LHAs) based on indices of human economic hardship, crime, health problems, education concerns, children-at-risk and youth-at-risk. The Prince Rupert LHA, which corresponds fairly closely with the RAA and includes the City of Prince Rupert and Port Edward, ranks as the third worst in BC in terms of the overall regional socio-economic index. Based on the BC Stats socio-economic indices, in 2012:

- The Prince Rupert LHA ranked as one of the five worst LHAs in the province in terms of children-at-risk, youth-at-risk, education concerns, and human economic hardship; and
- The Prince Rupert LHA scored in the worst third of LHAs in terms of crime and health problems.

The Application indicates that because of high density living in construction camps and overcrowding in households, infectious disease is a common problem in resource development projects. The Application provides 2011 rates of reportable infectious diseases and incidence of mental health issues for the Northwest Health Services Delivery Area (NHSDA), a region with 73,283 people in 2011, of which approximately 20% reside in the RAA. Some of the more common diseases reported for the NHSDA in 2011 included relatively high levels of: chlamydia; hepatitis C, gonorrhoea campylobacteriosis (a form of gastroenteritis) and salmonellosis.

Relative to the BC average, the NHSDA is reported to have higher self-perceived mental health issues and higher rates of clinically diagnosed cases of depression and anxiety.

The Application describes health infrastructure and availability of health services in the RAA as follows:

- Prince Rupert Regional Hospital is a 24-bed facility that operates at 90% to 95% of capacity;
- In 2011, the NHSDA, had 178 physicians per 100,000 population compared to a provincial average of 212 physicians per 100,000 population; and
- Prince Rupert has approximately 15 general practitioners and 7 specialists, with an RAA population of 14,397 people.

### *Diet and Nutrition*

The Application provides general information on the consumption of country foods (wild plants and animals) by the Aboriginal residents of coastal BC. On the north and central coast of BC, about one-third of all meals consumed by Aboriginal residents consist of seafood. Aboriginal residents often are involved in the processing or harvesting of this seafood.

## **7.4.2 Potential Project Effects and Proposed Mitigation Described in the Application**

### *Social Determinants of Health*

In the Application, the Proponent makes several assumptions regarding proportions of foreign, Canadian, BC and local workers that are likely to supply labour to the Project during construction. As discussed in the economic environment effects assessment, Project construction would result in employment for 340 local residents: 200 local residents associated with direct project construction and 140 local residents associated with indirect and induced employment. The balance of the direct construction workers would reside at the construction camp.

The Application anticipates that there would be limited or no in-migration of direct workers during construction, and that in-migration of workers for the operations phase would be gradual and easily absorbed by the local communities.

The Application states that the proposed Project operations would create 800 direct, indirect and induced full-time-equivalent jobs for RAA residents, including 680 jobs that would be filled by existing residents and 120 jobs that would be filled by workers permanently relocating to the RAA with their families.

The Application expects that the majority of workers relocating to the RAA with their families would likely choose to live in Prince Rupert. This would not result in a rapid population change in Prince Rupert considering the gradual progression of the Project from construction to operation and the size of the population in that community. However, Port Edward could experience rapid population change relative to baseline from in-migrating workers given its currently small population of 545 people (2011).

*Education, Employment, Income, Housing, Crime and Community Cohesion* - The Application concludes that the Project is not expected to have adverse effects on education levels, employment or income – only primarily beneficial effects. The Proponent expects that workers directly employed in construction and operations would earn substantially more than the reported RAA average earnings that could increase income disparities within the RAA communities.

The Application indicates that it has begun funding skills training programs such as the Coastal Pathways Partnership and has opened a community office to assist RAA residents in determining the skills needed for a variety of construction and operational positions.

The Proponent suggests that higher incomes and employment from the proposed Project could help reduce the proportion of children-at-risk and youth-at-risk in the Prince Rupert LHA.

The Proponent suggests that while changes in population could result in increased crime, the nature of employment in the RAA and the proposed temporary construction camp would limit exposure of workers to individuals residing in the RAA, which would reduce the potential for increases in violent crime in the community (e.g., homicide, attempted murder, sexual and non-sexual assaults). With regard to the proposed Project workforce residing at the construction camp, the Application proposes several crime prevention strategies and workforce drug and alcohol corporate policies to mitigate potential adverse effects on crime rates and unhealthy behaviours. As noted by the Proponent, however, increased population and changes to local demographics during construction and operation combined with potential increased crime rates and drug trafficking specifically at the worker camp, as cautioned by local RCMP, could increase demand for RCMP services.

*Physical and Mental Health Conditions* - Table 7-1 provides estimates of potential reportable infection rates per year for the Project workforce based on averages for infection rates in the NHSDA, including the potential number of injuries based on average WorkSafeBC injury rates for the BC construction and oil and gas sectors.

Table 7-1 Potential Reportable Infection Rates (Per Year) – Construction Camp Workers

Disease	Rate per 100,000 population
	Greatest Potential Camp Workforce (4,500 persons)
<b>Sexually Transmitted and Bloodborne Pathogens</b>	
HIV	0.2
AIDS	0.0
Chlamydia (genital)	22.1
Gonorrhea (genital)	1.4
Hepatitis B (Chronic and Unknown)	0.5
Hepatitis B (Acute)	0.0
Hepatitis C	1.8
Infectious Syphilis	0.1
<b>Disease Transmitted by Respiratory Routes</b>	
Streptococcal Disease (Invasive)	0.4
Tuberculosis	0.1

The Application states that the proposed Project would have first-aid facilities and personnel on site, which would help reduce the demand for community-supplied health infrastructure and services. Table 7-2 provides estimates of potential Project-related injuries per year.

Table 7-2: Potential Project-related injuries per year

Estimated Project-Related Injuries	Potential Number of Injuries Per Year As Estimated by Proponent	Potential Number of Injuries Per Year Based on Peak Workforce
Per Construction Year (2015 to 2019) (1)	130	203
During Operations per Year of Operation (2)	3	5
<b>Assumptions:</b>		
<b>BC Rate Per Person Year of Employment (Worksafe BC):</b>	<b>Injury rate per PY</b>	<b>Injury rate per PY</b>
Construction Sector	0.045	0.045
BC Oil and Gas	0.010	0.010
<b>Average Number of Workers Per Year During Construction and Operations:</b>	<b>Average per Year</b>	<b>Peak Workforce</b>
Number of Construction Workers Per Year	2,870	4,500
Number of Operation Workers Per Year	300	520

The Application states that the potential exposure of local populations to increased rates of infection would be limited, as workers would reside primarily at the construction camp and be transported to and from airports on rotational work schedules.

The Application states that proposed training programs would assist community members to secure employment, which could help them realize improved physical and mental health. Community members unable to secure employment could be negatively affected, which could increase stress and depression symptoms for those individuals. However, the Application states that effects on mental health are anticipated to be minimal:

- Adverse effects on mental health from an increase in negative coping behaviours are expected to be managed through standard workplace drug and alcohol policies and through employee assistance programs (available through employee benefit programs); and
- Positive effects on mental health as a result of increased employment and income are expected to improve the quality of life within the RAA.

*Health Infrastructure and Services* - The Proponent expects that Project-related effects of increased hospitalizations and demand for health infrastructure and services would be greatest during construction and would decrease during operations.

The Proponent expects that, during construction, the use of on-site ambulatory care at Lelu Island would help reduce demand on community-based health infrastructure and services. Based on WorkSafeBC workplace injury rates, the Proponent expects that proposed Project-related demand for health infrastructure and services would increase during construction but not exceed capacity. During operations, the demand for health infrastructure and services as a result of workplace injury would be minimal, and increased demand from operations workers and their families who migrate to the RAA would be within acceptable levels.

The Application states that the proposed Project is expected to increase demand in the RAA for health and safety site inspections by health professionals during site preparation, construction and operation activities. However, the increased demand on health professionals in the LAA as a result of site inspections is not expected to exceed available capacity.

### *Recreational Opportunities*

The Application indicates the following expected proposed Project-related effects on recreational opportunities:

- Recreational activities that are currently occurring on Lelu Island such as camping, berry picking and bird watching would be lost;

- Restricted access to marine areas near Lelu Island, in compliance with shipping and marine regulations, could affect recreational fisheries and marine recreational activities such as swimming, kayaking, canoeing and boating; and
- Access to Kitson Island, a 44.7 ha island 5 km south of Port Edward that is a popular recreational destination for beach activities, picnicking and short hikes; it is not expected to be affected by the Project, but use and enjoyment of the area could be affected mainly due to residual effects on visual quality.

The Application states that considering the adequate supply of recreational sites in the LAA, changes in access and recreational use and enjoyment of Lelu Island, Kitson Island and surrounding marine environments is not expected to affect perceived quality of life within the LAA.

#### *Changes to Diet and Nutrition*

The Application indicates that the proposed Project-related access restrictions would result in measurable changes to the availability of country foods in the RAA for the lifetime of the proposed Project, but that these changes would not affect the composition of local diets made up of country foods or affect nutrition. Changes would be primarily the result of impacts to access or availability of marine resources, while there may be some impacts due to the perceived contamination of marine country foods.

### **7.4.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

This section summarizes the primary concerns raised by Working Group members and the public during Application Review regarding potential Project-related adverse effects on community health and well-being.

There were concerns that establishing a large construction camp in close proximity to the communities of Port Edward and Prince Rupert could potentially result in increases in organized crime, drug and alcohol abuses and other unhealthy behaviours.

The Proponent's mitigation strategies include workforce drug and alcohol policies, crime prevention mitigations and mitigation measures targeted at providing employee assistance programs.

There were concerns that demographic changes related to rapid population change during construction, even if temporary, could have adverse effects on community cohesion and other social determinants of health.

The Proponent noted that several measurable parameters could be affected by rapid population growth. However, the assessment suggests that population effects during

construction would be minimal, which suggests the capacity of RAA communities to absorb additional population changes was not evaluated thoroughly. Any rapid population change could affect several social determinants of health, including housing, emergency services, health care services, public safety and security and access to recreational and municipal services.

The relocation of the construction worker accommodation camp to the Port Edward and/or Prince Rupert general area may result in an increase in interactions between construction workers and local populations, potentially affecting community cohesion, physical and mental health, demand on health infrastructure and services, and recreational opportunities.

Comments were received from the Working Group requesting additional information on medical infrastructure and services the Proponent will provide on-site at the accommodation camp on Lelu Island. The Northern Health Authority and others also expressed concerns during the Application Review about the potential increase in demand on health infrastructure and services. The primary concerns relate to the potential increase in demand from the proposed construction camp.

The Proponent prepared a memo 'On-Site Medical Infrastructure and Services' (June 23, 2014), which responded to these concerns. During construction and operations, workers seeking first aid attention would be primarily treated by onsite medical services and facilities; the level of services provided and the qualification of the personnel would likely vary during the life of the project; however, it would include (not limited to) registered nurses and nurse practitioners, advanced paramedics and off site medical doctor support. Additional services would be offered during construction and operation through first aid facilities located at the construction camp on Lelu Island.

During the Application Review, the Northern Health Authority and others requested more information to understand the risk of adverse effects posed by the location and scale of the construction camp, and the consequent risk to sensitive receptors in RAA communities. Reports on outcomes from other construction camps, preferably of similar scale and in similar settings, were sought to support a better understanding of these risks. More evidence was also requested on successful measures taken in other construction camps and their nearby communities to counter the specific types of potential adverse effects from large construction camps.

As a result of those concerns and EAO request, the Proponent provided case studies of Santos LNG in Australia (a joint-venture to convert coal seam natural gas to LNG for export that is 75% complete), the Rio Tinto Modernization project in Kitimat, and a proposed project in Alberta. The case studies highlighted differences and similarities with this Project and added some further context for the assessment.

### *Potential Project Effects Identified by Aboriginal Groups*

Additional concerns came from the Metlakatla First Nation's report *Impact Assessment of LNG and other Development on the Metlakatla First Nation*. While the Proponent didn't respond directly in regard to the Metlakatla First Nation, the Proponent provided responses to these issues during Application Review.

Metlakatla First Nation expressed concerns that few Metlakatla First Nation members would attain jobs without additional mitigation, even with the large increase in demand for labour that would be associated with LNG facilities. The reasons: the greatest labour demand would be for people with trade skills and Aboriginal people have low high-school completion rates; people living in Metlakatla Village are geographically separated from jobs; and a variety of social, economic, psychological, cultural and historical factors affect Aboriginal employment success.

The Application (Section 27) outlines commitments by the Proponent to continue to engage all five of the Aboriginal Groups listed on Schedule B of the Section 11 Order in the negotiation of Impact Benefit Agreements for the purposes of fostering and maintaining good relations, providing appropriate economic benefits and opportunities, including training, employment and procurement. The Proponent's stated commitments to addressing barriers to Aboriginal employment opportunities include:

- The development of measures to optimize Aboriginal participation in procurement and contracting opportunities during construction and operations;
- The development of measures to encourage the hiring of qualified Aboriginal people; and
- Development of Aboriginal-specific training programs.

In addition, the Proponent is also conducting labour market analysis with Aboriginal Groups to understand the potential numbers of workers and their skill sets, as well as gathering information about Aboriginal businesses. The Proponent has taken steps to connect Aboriginal economic development contacts with FEED contractors, and assessing opportunities for procurement contracts to be directed to Aboriginal Groups.

Metlakatla First Nation also expressed concern that LNG facilities directly and indirectly increase pressure on the health and emergency service capacity in Prince Rupert, and would therefore result in diminished services to the community. They note that Prince Rupert and area residents have poor health relative to provincial averages, and demands on health care are high in Prince Rupert.

The Proponent responded to these concerns in the technical memo 'On-site Medical Infrastructure and Services' (June 23, 2014). The Proponent stated that the proposed Project will include on-site registered nurses, nurse practitioners, advanced care paramedics, and off-site support from a medical doctor.

Metlakatla First Nation also expressed concern about the negative effects of an influx of people into Prince Rupert, which would result in increased substance abuse and crime and reduced safety – all of which would negatively impact some Metlakatla First Nation. Metlakatla First Nation noted that these effects were common in the history of major project boomtowns, and that Prince Rupert is particularly susceptible because of already high rates of alcohol consumption and crime rates.

The Proponent responded to these concerns in the technical memo 'Responses to Northern Health's Substantive Comments'. The Proponent stated that workers may visit local communities before and after their work shifts; however crime prevention mitigation measures (Section 16.5.4.2 of the Application) and workforce drug and alcohol policies (Section 16.5.4.1 of the Application) are expected to reduce the potential magnitude of increased crime associated with the proposed Project.

Through current and ongoing collaboration between the Proponent, its contractors, the RCMP, health care service providers, and representatives of local communities in the development of management plans (Section 16.5.4.2 of the Application), adverse changes to crime rates are anticipated to be manageable to acceptable levels to the extent possible.

### *Mitigation Strategies*

In light of the economic concerns raised during the Application Review, EAO proposes a the SEEMP Condition that would require the Proponent to develop and implement a plan, which would lead to management activities aimed at mitigating potential adverse socio-economic effects. The plan would provide:

- An effective engagement process between the Proponent and Aboriginal Groups, local governments, and government service providers;
- An approach to implementing mitigations and plans contained in the Application;
- Clarity for all participants about timing of project activities so that planning and actions are based on current information;
- An approach to ensure unplanned effects are understood and new mitigations are considered; and
- A monitoring and reporting framework.

### **7.4.4 Characterization of Residual Project Effects**

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on community health and well-being:

- Change in social determinants of health (e.g. population, education, employment, income, housing, community cohesion); and
- Change in the composition of diets (proportion of country foods to market foods).

Summarized below is EAO’s characterization of the expected residual effects of the Project during construction on community health and well-being, particularly the social determinants of health and composition of diets, as well as EAO’s level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Social determinants:</b> Low to moderate resilience</p> <p><b>Diets:</b> Moderate to high resilience</p>	<p><b>Social determinants:</b> The Prince Rupert LHA ranks in the worst third of the province in terms of health concerns (ranks 20 out of 77) and crime concerns (25 out of 77, with rank 1 being worst). As a result, it could be vulnerable to rapid population changes and proximity to a large construction camp.</p> <p><b>Diets:</b> Local diets, particularly of Aboriginal Groups, include a high proportion of country foods, which are widely available in the area.</p>
Magnitude	<p><b>Social determinants:</b> Moderate</p> <p><b>Diets:</b> Low</p>	<p><b>Social determinants:</b> Population changes during construction, including temporary populations or “shadow” populations could be larger than are anticipated in the Application. The construction camp is an important mitigation strategy but evidence from other communities where major construction has occurred (e.g., Kitimat, northeast BC communities, etc.) suggests potentially greater population changes than those noted in the Application.</p> <p><b>Diets:</b> There may be a slight reduction in harvests due to impacts to access and availability of sites.</p>
Extent	<p><b>Social determinants:</b> RAA and beyond</p> <p><b>Diets:</b> Local</p>	<p><b>Social determinants:</b> The Proponent suggests effects on community health and well-being are limited to the RAA, but some adverse effects during construction would likely be felt beyond the LAA/RAA particularly when indirect and induced effects are considered (e.g., in Terrace).</p> <p><b>Diets:</b> Impacts to diets would be restricted to the local areas directly in the vicinity of the proposed Project.</p>
Duration	Medium to long term	The duration of effects would be greater during construction (medium term, or 5 years), while some effects would persist for the life of the proposed Project.
Reversibility	Reversible	The adverse effects on community health and well-being are reversible at the community level after the cause of the effects ceases.
Frequency	Continuous	The effect would occur continuously.
Likelihood	The likelihood is moderate to high that there would be residual effects to community health and well-being as a result of the proposed Project.	

Significance Determination	Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on community health and well-being.
Confidence	There is a moderate to high level of confidence in the likelihood and significance determination, particularly in consideration of the on-going monitoring and adaptive management.

#### **7.4.5 Cumulative Effects Assessment**

There are several proposed projects that could overlap with the proposed Project's construction and operations, as identified in the Application and Section 6.1.5.

The Application indicates that current and future projects considered in the assessment primarily would draw on health infrastructure and services offered by the District of Port Edward and the City of Prince Rupert. Although increased demand for health infrastructure and services in Port Edward could be expected, Prince Rupert's health infrastructure and services would be more heavily used, but would be within manageable levels. Additional tax revenue generated from proposed projects in Prince Rupert (not including the proposed Project, which would be located within the District of Port Edward) could help fund major health infrastructure improvement projects and social health programs. Municipal investment in conjunction with mitigation measures taken by each project increase the supply of services and infrastructure and decrease demand. Through these measures, capacity of health infrastructure and services would be expected to be responsive to increased demand and capable of accommodating increased cumulative use.

With regard to the potential cumulative effects to diets and nutrition, the Application notes that the most of the proposed projects are currently situated or planned to be developed primarily on industrially zoned land, and that changes in access to harvested terrestrial areas or areas used for hunting and trapping would be expected to be minimal, as access to industrial areas in the LAA is currently restrictive and little hunting or gathering occurs in these areas.

EAO is satisfied that the adoption of the Proponent's mitigation strategies, supplemented by initiatives by the BC Government and others that are documented in this section of the report would be sufficient to mitigate cumulative adverse effects to community health and well-being. EAO concludes that the residual adverse cumulative effects on community health and well-being would not be significant.

#### **7.4.6 Conclusions**

Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is

satisfied that the proposed Project would not likely have significant adverse effects on community health and well-being.

## 8 Heritage Effects

### 8.1 Archaeological and Heritage Resources

#### 8.1.1 Background

Archaeological and heritage resources was selected as a VC because of the potential for the proposed Project to affect these resources within the PDA. These resources are important to scientific and cultural communities and the public. Archaeological and heritage resources are also important to Aboriginal Groups and communities because they demonstrate the long-term use of their traditional territories and provide a physical link to their cultural history. Traditional sites such as named geographical features, culturally modified trees unprotected by legislation, and other resources are also important to Aboriginal Groups. Historical features such as cabins, trails and historic (post-1846) artifact scatters or middens may be important to local communities and/or Aboriginal Groups. These archaeological and heritage resources are vulnerable to surface and subsurface alteration from project activities.

The Application assesses the following potential impacts to archaeological and heritage resources:

- Destruction or disturbance of CMTs; and
- Destruction or disturbance of other archaeological or heritage sites.

The LAA includes the proposed PDA on Lelu Island, Stapledon Island, and the portion of the mainland southwest of Skeena Drive across from Lelu and Stapledon Islands.

Due to the scope of the EA set out in the Section 11 Order of the Act, EAO primarily focussed the assessment of this VC in consideration of its potential effects beyond PRPA lands.

#### *Regulatory Context*

While the proposed Project is on Lelu Island (Federal lands), the mainland portion of the bridge structure is partially on privately owned fee simple land. The *Heritage Conservation Act* (HCA) will only apply on the private land portion.

The CEAA *Reference Guide on Physical and Cultural Heritage Resources* (Canadian Environmental Assessment Agency 1996) details the kinds of considerations that are required for heritage resources as detailed in Section 5 of the CEAA 2012. Also, the federal *Standards and Guidelines for the Conservation of Historic Places in Canada* and the PRPA's directive referencing the Treasury Board *Policy on Management of Material* provide clear guidance on mitigating impacts on character-defining elements and heritage values of historic places. In particular, the policy states that these heritage resources are to be identified and protected, their heritage value is to be assessed, and

a record that includes accurate information about their nature and condition is to be kept.

### **8.1.2 Potential Project Effects and Proposed Mitigation Measures in the Application**

The Application describes that a study from the early 1980s recorded six CMT sites, including total of 21 CMTs, were recorded on Lelu Island. Re-examination of the six original sites resulted in an increase in the sizes of the CMT sites, effectively resulting in more or less continuous CMTs across the island. Subsequent inventories conducted in 2012 resulted in the identification of 431 individual CMTs with 558 modification features, all within the Lelu Island portion of the LAA. The 2012 work included a probability model for CMTs, and the subsequent field survey covered approximately 50% of the areas predicted to have high potential for CMTs.

For CMT recording, at the request of Metlakatla First Nation, no distinction was made between pre- and post-1846 CMTs. The field studies were also conducted in consideration of heritage interests and concerns expressed by participating members of Lax Kw'alaams First Nation. Aboriginal Groups field assistants were part of the survey crew.

Three types of CMTs were recorded in the field program: bark-stripped trees, aboriginally logged trees and other modified trees (including kindling trees, cut marks, chainsaw marks, spring board notches and boom cuts).

Field studies have not identified any other archaeological sites within the LAA; however, it is possible that such sites are present and could be affected by project activities. A chance find protocol and existing regulatory requirements would mitigate potential effects.

As indicated by FLNR's Archaeology Branch, the cultural significance of a CMT or CMT site should only be measured through discussion with Aboriginal Group communities, and cannot be independently assessed by an investigating archaeologist. Therefore, the Application focuses on the archaeological significance (rating of condition and antiquity) of the CMTs recorded on Lelu Island.

The archaeological significance of CMTs was based on the condition and antiquity of the individual tree or group of CMTs. In the absence of dating each CMT, the type of tool mark can be used as a proxy for relative age. CMTs with modifications made by stone, bone, antler, or wood tools were considered to be of a greater antiquity than those with metal tool marks, and were therefore assessed as highly significant. CMTs with unclassifiable tool marks were also considered to have high archaeological significance as they have the potential to be of greater antiquity. Of the 431 CMTs, 175 were identified as having high archaeological significance.

Clearing of vegetation from the PDA prior to grading and construction would result in the destruction of CMTs within the PDA. It is possible, however, that CMTs would be

disturbed rather than destroyed; for example, a canoe blank may be removed from its original context but not be destroyed. Some standing CMTs could be removed but not destroyed, resulting only in loss of context.

It is possible that additional, unrecorded CMTs would be encountered within the PDA. If this occurs, the Application indicates that work affecting these features would cease until the trees can be properly assessed by a professional archaeologist.

The areas of high potential for CMTs and archaeological resources are primarily within 250 m of the coast of Lelu Island. Figure 8-1 below shows the locations of identified CMTs and shovel test locations. The current design of the proposed Project minimizes impacts to known CMTs and high archaeological potential areas.

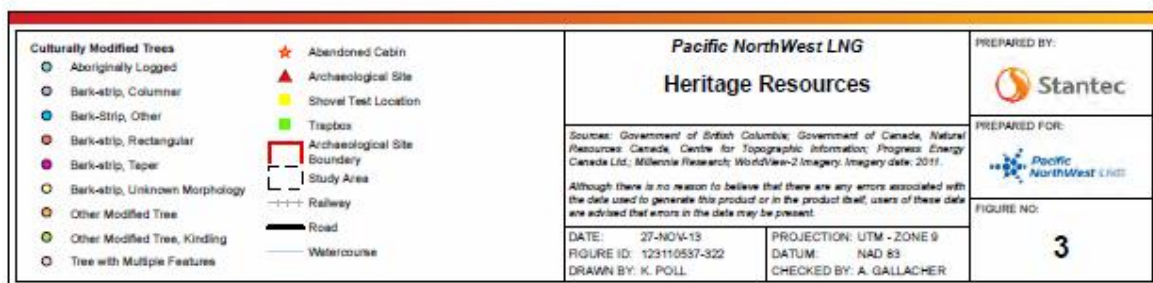
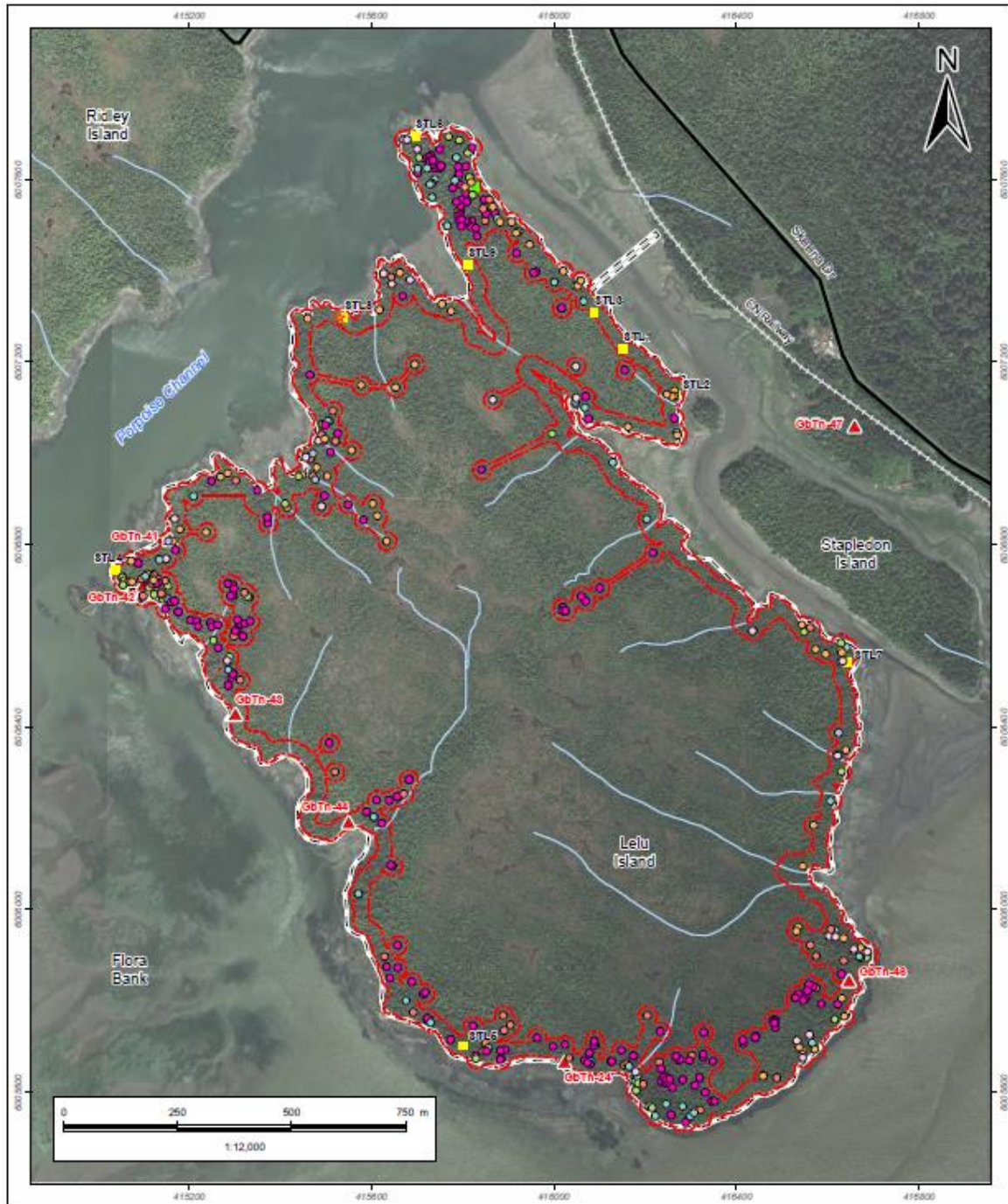


Figure 8-1: Identified Archaeological and Heritage Resources

Site-specific mitigation recommendations would be based on the final results of the Archaeological Impact Assessment (AIA) studies and inventory studies, following professional standards and federal and provincial guidelines and requirements. The following measures would be applied:

- Systematic Data Recovery studies for CMT sites will be conducted by recording a representative sample of CMT features, consisting of:
  - Detailed recording as outlined in the Archaeology Branch's CMT Handbook;
  - Stem round collection;
  - Monitoring of CMT removal by a crew comprised of a professional archaeologist and a local Aboriginal Group representative;
  - Direct dating by stem-round sampling; and
  - Production of a comprehensive report.
- A chance find protocol document will be used during construction in the event that unrecorded CMTs are encountered.

No impacts are anticipated in the 30 m riparian buffer zone surrounding Lelu Island.

### **8.1.3 Potential Project Effects during Application Review**

During Application Review, comments on archaeological and heritage resources were raised by a number of Working Group members, particularly Lax Kw'alaams First Nation, Metlakatla First Nation, and Kitsumkalum First Nation.

Questions were raised regarding the confidence in field assessments and the potential to impact unidentified CMTs and sites.

The Proponent indicated that prior to field studies, an archaeological potential model covering the LAA was completed, which addressed all requirements of an Archaeological Overview Assessment. The ground truthing of areas of modeled low potential revealed that the island lacks an inland forest and these areas are predominately characterized by limited vegetation and muskeg like terrain.

Some areas were not surveyed thoroughly on the field but predictions were ground truthed in field and determined to be of low archaeological potential based on topographic and drainage characteristics. A Chance Find Protocol would be finalized prior to construction and may include additional mitigation measures put forward during the Application review period. The Proponent also produced the memo 'Standards and Chance Find Protocol' (June 23, 2014), which provided additional information on the proposed approach.

There were additional questions and comments regarding the participation of Aboriginal Groups in field programs and the role that Aboriginal Groups would have in determining importance of CMTs.

The Proponent indicated that there were Aboriginal participants in the field programs and that Aboriginal Groups were consulted on the approach. The Proponent also produced the technical memo 'Incorporating Indigenous Perspectives into the Assessment' (June 23, 2014), which described how Aboriginal perspectives would continue to be considered in the assessment and proposed Project refinement.

Several Aboriginal Groups expressed concerns over wake effects, and the potential of wakes to affect archaeological and heritage resources such as fish traps, canoe runs, shellfish terraces and petroglyphs.

The Proponent stated that the wake waves produced by the proposed Project-associated vessels are expected to be within the range of natural wave heights in the LAA. Also, these vessels would be travelling at speeds less than 5 knots within the PRPA boundaries.

The Proponent indicated that an archaeological and heritage inventory study within the intertidal areas of Lelu Island would be completed prior to construction. If archaeological or heritage features are found, mitigation measures described within the Application would be applied.

#### 8.1.4 Characterization of Residual Project Effects

The proposed Project would have the following residual effect on heritage resources:

- The destruction or disturbance of CMTs; and
- The disturbance of some archaeological sites, and loss of some site-specific archaeological information.

Summarized below is EAO's characterization of the expected residual effects of the proposed Project on visual quality, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	Undisturbed	Heritage resources are protected under the <i>Heritage Conservation Act</i> on provincial land and federal requirements on PRPA land. Mitigation measures for potentially affected sites would be determined in consultation with the Archaeology and Heritage Branch, and may take the form of avoidance, systematic data recovery, and/or construction monitoring to avoid or reduce the loss of scientific data resulting from site destruction.
Magnitude	Low to medium	Generally impacts would be avoided, minimized or largely mitigated. Although the proposed Project would likely result in the destruction or disturbance to numerous CMTs, the implementation of appropriate

Criteria	Assessment Rating	Rationale
		mitigation measures means that little archaeological information associated with CMTs will be lost. If previously unidentified archaeological sites or heritage resources are impacted, information collection should generally mitigate these impacts to be relatively low.
Extent	Project footprint	Limited to portions of the PDA that are having direct ground disturbance.
Duration	Permanent	Any values not collected would likely be permanently destroyed.
Reversibility	Irreversible	Any permanent losses would be irreversible.
Frequency	Once	Disturbance to archaeological and heritage sites and resources (including CMTs) would occur only one time (i.e. during construction ground disturbance)
Likelihood	There is high likelihood that some CMTs would be adversely affected, and low to moderate likelihood that any other archaeological sites would be adversely affected.	
Significance	<p>EAO notes that within the PDA heritage resources are protected under the federal legislation and policy, and that any additional site-specific mitigation measures for potentially affected CMTs and sites would be determined in consultation with the PRPA, CEAA and appropriate federal agencies. Mitigation related to any impacts on provincial or private land would be determined in consultation with FLNR's Archaeology Branch.</p> <p>Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual archaeological effects.</p>	
Confidence	<p>Limitations on the effects assessment include the difficulty to accurately identify the presence of all CMTs and archaeological resources within the project footprint and PDA.</p> <p>Confidence in the likelihood and significance determination is high, based on:</p> <ul style="list-style-type: none"> <li>• Proposed Project activities, components and most of the heritage effects would be within federal lands;</li> <li>• The federal regulatory process is ongoing, and EAO recognizes the federal process will have more specific findings and recommendations in areas of federal authority;</li> <li>• Ultimately, any federal approvals of the proposed Project, through any number of agencies or the PRPA, would also include specific mitigation measures and project development requirements (e.g. construction and operation conditions) related to areas of federal authority, which would determine how the proposed Project may be eventually developed; and</li> <li>• Any required mitigation programs to be implemented would be based on input from Aboriginal Groups.</li> </ul>	

### **8.1.5 Cumulative Effects Assessment**

Mitigation of destruction or disturbance of CMTs and archaeological sites are requirements for all projects; therefore, it is assumed that the mitigation implemented for the proposed Project would be similarly implemented for other projects that could potentially have cumulative effects.

Given the localized nature of the potential impacts on archaeological resources, and in consideration of information made available in the Application and during Application Review, EAO does not anticipate any significant cumulative effects to heritage resources as a result of effects of the proposed Project interacting with effects of past, present and reasonably foreseeable projects and activities.

### **8.1.6 Conclusions**

Considering the above analysis, the scope of assessment being focussed primarily on potential effects beyond PRPA lands, and the ongoing federal regulatory processes, EAO is satisfied that the proposed Project would not likely have significant adverse effects on community heritage resources.

## 9 Health Effects

### 9.1 Human and Ecological Health

#### 9.1.1 Background

Human and ecological health was selected as a VC because the proposed Project has the potential to affect human health through emissions, change in noise levels and change in ambient light. Chemicals in the environment can be transferred to humans and biological receptors either from direct exposure to air, water, soil and marine sediment or through food sources. Changes to levels of noise may disturb local people and marine and terrestrial wildlife. Changes to ambient light may disturb people and disorient migrating birds.

Human health effects are assessed in relation to compliance with the BC *Public Health Act*, which is the responsibility of the BC Ministry of Health. Health Canada's mandate includes the protection of human health from exposure to chemicals and noise. In that capacity, Health Canada provides guidance on human health risk assessments and evaluates human health issues for major projects regulated under the CEEA 2012. Health Canada generally advises on changes to air quality, acoustics, and country foods as a result of a project that could impact the health of Aboriginal people and the public.

Ecological health is the responsibility of multiple regulatory institutions including the MOE, CCME, Environment Canada, and DFO.

The Proponent used the following guidelines and objectives for this assessment:

- *Air quality* – MOE AAQOs, Health Canada NAAQOs, and the US EPA NAAQOs;
- *Water quality* – Health Canada and CCME water quality guidelines and the BC *Drinking Water Protection Act* and related standards;
- *Soil quality* – CCME soil quality guidelines, BC Contaminated Sites Regulations and US EPA soil screening levels;
- *Sediment quality* – CCME and MOE *Sediment Quality Guidelines for the Protection of Aquatic Life*;
- *Marine tissue* – CCME tissue residue guidelines for the protection of mammalian and avian consumers of aquatic biota; and
- *Noise levels*– Health Canada guidelines for the construction phase, and the OGC's *Noise Control Best Practices Guideline* for the operations phase.

The LAA for the Human and Ecological Health VC was an area 30 km by 30 km centred on Lelu Island and including the City of Prince Rupert. The RAA encompassed the LAA and extended out another 20 km from the boundary, for a total area of 50 km by 50 km.

### 9.1.2 Potential Project Effects and Proposed Mitigation Described in the Application

The Proponent identified the following potential effects of the proposed Project on human health:

- Construction, operations and decommissioning of the proposed Project would increase air emissions that could affect human health through inhalation of CAC and other contaminants;
- Dredging during construction could expose marine species to sediments containing historical deposits of chemicals. These chemicals could accumulate in the tissues of marine country food species and affect human health when those foods are consumed; and
- Increased noise and light could increase annoyance and disturbance levels experienced by local residents.

The Proponent developed a conceptual site model to evaluate potential exposure pathways of chemical and non-chemical stressors to people. The chemicals of potential concern included SO<sub>2</sub>, NO<sub>2</sub>, CO, inhalable particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>), and dioxins and furans (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans). Non-chemical stressors included noise and light. The Proponent characterized the potential effects on the health of ecological receptors:

#### *Inhalation exposure to air emissions of CACs*

The Application states that during operations no CAC's would exceed applicable health-based AAQOs, and there would be no changes to human health for the general population. There were short-term concentrations of NO<sub>2</sub> that reached 45% of the AAQO, but occurred less than 1% of the year, which could have adverse health effects to sensitive receptors such as infants, elderly or people with pre-existing respiratory conditions. During operations there would be no changes to ecological health.

The predominantly southeastern winds and the geophysical barrier of Hays Mountain would shield Prince Rupert from most changes in air quality associated with the Project.

During construction CACs would be substantially less than during operations, and there would be negligible health risks present.

#### *Ingestion exposures to dioxins and furans that are in the tissues of marine country foods*

The Application states that people who harvest and consume local marine country foods including crabs, prawns, clams, fish, seaweed and various marine mammals could potentially be exposed to contamination. Dioxins and furans, that were historically introduced into Porpoise Harbour from a former pulp and paper mill, have the possibility to bioaccumulate in marine organisms and biomagnify to higher order predators in the food chain.

The Application states that plume modelling at the MOF dredge site predicted that up to 2 mm of sediment would re-settle in the majority of the surrounding area up to a radius of 3 km from the MOF, with maximum sediment deposition reaching up to 11.3 mm within 500 m of the dredge site. From baseline studies, contaminants were detected in surface sediments up to a depth of 1.5 m. Dredging would occur at the MOF site for 6 months, after which potential exposure from the dredge to marine organisms will stop.

The Application states that the proposed Project would not introduce dioxins and furans into the environment. Dredging may disturb sediments that already contain these chemicals, but no increases in concentration are expected in both sediment and marine country foods, and there is no increased health risk to marine country food consumers from exposures to dioxins and furans.

Dioxins and furans in the sediment were above the interim sediment quality guidelines to protect fish, but below the probable effects level, above which adverse effects could exist.

#### *Exposure to noise*

The Application states that there would be 3 primary sources of noise:

- Construction and operation noise associated with the proposed Project facility on Lelu Island;
- Noise from increased vehicle traffic and construction equipment during construction and operation phases; and
- Noise from LNG carriers and the marine facility will be emitted during the operation phase.

Noise has the potential to affect stress and annoyance levels in people, particularly at nighttime.

The Application states that noise levels are generally below the threshold to affect terrestrial and marine wildlife. The Application states that annoyance levels among humans in response to noise generated during construction would be within levels acceptable under Health Canada guidelines, and operations would be within levels acceptable under the BC OGC's *LNG Facilities Regulation*.

#### *Exposure to light*

The Application states that during construction and operation phases, light would be generated from vehicles, equipment, facility lighting, and marine vessels. Human receptors that could be affected by light include residents of Port Edward.

The Application states that lighting effects are mostly related to marine birds, and could cause an increase in mortality. Lighting effects that could cause a nuisance to humans would occur primarily in residential areas in Port Edward near Lelu Island. The areas

located directly across from Lelu Island to the north and east are only sparsely populated. Overall, the Proponent found that the level of nighttime lighting from the proposed Project would be similar to that of urban streets and would not result in reported incidences of light nuisance by local residents.

According to the Application, the mitigation measures proposed to address expected effects on air quality, marine resources, acoustic environment and ambient light VCs would reduce the Project's potential effects on the Human and Ecological Health VC.

### **9.1.3 Potential Project Effects and Proposed Mitigation Identified During Application Review**

During the Application Review, the Working Group and the public raised concerns about the potential effects of the proposed Project on human and ecological health. The key issues and the responses of the Proponent and/or EAO are summarized below.

The BC Ministry of Health, MOE and Health Canada expressed concern that the Proponent had possibly underestimated country food consumption rates for the RAA, inaccurately described the potential for dioxin and furan bioaccumulation and biomagnification, and underestimated the probability of vertebrates and humans being exposed to these dioxins and furans. Lax Kw'alaams First Nation also raised concerns that consumption rates used in the Proponent's assessment did not reflect the actual consumption rates of the Coast Tsimshian. The Working Group also expressed concerns about the concentrations of contaminants in the marine sediment assumed in the Application, both at the dredge site and the disposal at sea site.

The Proponent submitted an updated HHRA that provided more analysis to support the Proponent's conclusions in the Application, which did not change the Proponent's original conclusions.

The recently submitted design mitigation of the marine terminal substantially reduces these effects. The Proponent proposed a design mitigation of the marine terminal that:

- Reduces the dredge volume from about 7.7million m<sup>3</sup> to about 690,000 m<sup>3</sup>;
- Volume of marine sediment for disposal at sea is reduced from about 7.7million m<sup>3</sup> to about 200,000 m<sup>3</sup>; and
- Duration of dredging would be reduced from about 27 months to 6 months.

This design mitigation substantially reduces the total amount of dioxins and furans that may be disturbed and re-suspended during dredging and disposal at sea, and effects would mostly occur at the MOF.

In light of the concerns raised during the Application Review, EAO believes that additional management strategies are warranted and has proposed a condition requiring the Proponent to develop and implement a tissue sampling program that would assess toxin concentrations in marine country foods. The Proponent would

implement the program at the beginning of dredging, with follow-up monitoring 3 months and 1 year after the completion of dredging activities.

The Ministry of Health also expressed concern about the Proponent's assessment of the potential effects of short-term high exposure to increased air emissions on people with respiratory sensitivities such as asthma.

The Proponent provided a full HHRA as a response to Working Group comments. The Proponent stated that conservative health-based air quality objectives had been applied (selected from among those set by the provincial and federal governments, the US EPA, and the World Health Organization).

Northern Health and Ministry of Health had concerns regarding the air quality baseline conditions presented in the Application, and that the thresholds used are not protective of human health.

The Proponent stated that in the full HHRA, a revised model for the air quality baseline, project only, Application and cumulative scenarios are presented. The revision includes the inclusion of CALPUFF air dispersion modelling data points in the entire region of Port Edward and Prince Rupert, rather than specific receptor points that were presented in the Section 19 of the Application (pertaining to health). The HHRA also applies the requested ambient air quality objectives from the US EPA and World Health Organization, in addition to provincial and federal ambient air quality objectives.

During Application Review, the Proponent proposed to relocate the accommodation camp to the Port Edward and/or to the Prince Rupert general area. This would result in an increase in noise from increased traffic during the construction period, but would eliminate the noise generated from diesel generators to supply power to the camp.

#### **9.1.4 Characterization of Residual Project Effects**

After considering all relevant proposed mitigation measures, EAO concludes that the proposed Project would result in the following residual adverse effects on human and ecological health:

- Inhalation exposures to air emissions of CACs; and
- Ingestion exposures to dioxins and furans that are in the tissues of marine country foods.

Summarized below is EAO's characterization of the expected residual effects of the proposed Project on human and ecological health, as well as EAO's level of confidence in the effects determination (including their likelihood and significance).

Criteria	Assessment Rating	Rationale
Context	<p><b>Air Quality:</b> Moderate to high resilience</p> <p><b>Country Foods:</b> Moderate resilience</p>	<p>Occurs in a fragile ecosystem with sensitive receptors and the level of baseline disturbance can be a contributing factor to changes in human and ecological health.</p> <p><b>Air Quality:</b> Currently good air quality and all CACs below AAQOs and US NAAQS.</p> <p><b>Country Foods:</b> Marine environment used for country food harvest. There are dioxins and furans in the marine sediment from historic industrial activities.</p>
Magnitude	<p><b>Air Quality:</b> Low</p> <p><b>Country Foods:</b> Low to moderate</p>	<p><b>Air Quality:</b> The concentration ratios in Prince Rupert for all CACs would be below AAQOs for human health, and therefore have negligible health risks.</p> <p><b>Country Foods:</b> The source of potentially contaminated country foods would be limited to the local areas and health effects, if any, would be limited to those people harvesting country foods within that area.</p>
Extent	LAA	<p>Residual effects of the proposed Project on human and ecological health are restricted to within the LAA.</p> <p>Exposure to CACs of humans would occur in the Port Edward and Prince Rupert area</p> <p>The total area of dioxin and furan contaminated substrate that could be disturbed and re-suspended during dredging would be approximately 7 ha, resettling mostly within a 500 m radius and up to 3 km, and is expected to occur over a six-month period.</p>
Duration	<p><b>Air Quality:</b> Long-term</p> <p><b>Country Foods:</b> Medium to long-term</p>	<p><b>Air Quality:</b> The duration of the effects of the proposed Project on air quality would be the life of the proposed Project (30+ years).</p> <p><b>Country Foods:</b> It is anticipated that biological uptake of contamination in marine organisms that are regularly harvested for human consumption could occur during construction, a period of approximately 6 months, after which exposure would stop. Contaminants may persist in marine foods post-construction. A health effect detected as a result of the consumption of contaminated marine</p>

		foods may last longer than the physical work or activity.
Reversibility	Reversible	<p><b>Air Quality:</b> Residual effects of CAC exposure cease when project operations cease.</p> <p><b>Country Foods:</b> Marine organism contamination would persist.</p>
Frequency	<p><b>Air Quality:</b> continuous</p> <p><b>Country Foods:</b> Single event to continuous</p>	<p><b>Air Quality:</b> Changes to air quality would be continuous during construction and operations with effects during operations higher.</p> <p><b>Country Foods:</b> Contamination of marine foods would occur once during dredging, whereas the consumption of potentially contaminated marine foods could occur over the course of the subsequent years. The frequency of harvesting potentially contaminated seafood would decrease over time, as the individuals harvested reach the end of their lifecycle. Potential for human health impacts would correspond with harvesting for a period of years following construction, and contaminated organisms could be harvested and consumed at any point during their lifetime.</p>
Likelihood	Likelihood of residual effects to human health is low for air quality and low to moderate for country foods due to existing contaminants and harvesting practices.	
Significance	Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of an EA Certificate), EAO is satisfied that the proposed Project is not likely to have significant adverse residual effects on human and ecological health.	
Confidence	<p>There is a high level of confidence in the likelihood and significance determination for CAC exposure, based on CACs being within AAQOs.</p> <ul style="list-style-type: none"> <li>• There is a moderate level of confidence in the likelihood and significance determination for country foods, based on members of the working group expressing uncertainties in the results in the Application. However, the volume of the dredge has been substantially reduced from the original assessment, further reducing the possibility of effects. Additionally, EAO proposes a Condition (Condition #3) that would require the Proponent to develop a tissue sampling program to assess toxin concentrations in marine country foods. The condition would be developed in consultation with EAO and PRPA, and consistent with any monitoring program developed in consultation with DFO. The Proponent would be required to implement the program at the commencement of dredging associated with the Construction of marine infrastructure and for one year after the completion of those activities.</li> </ul>	

### **9.1.5 Cumulative Effects Assessment**

*Air quality effects on human and ecological health* – The Application has determined through air dispersion modelling that increases in CO, PM<sub>10</sub> and PM<sub>2.5</sub> as a result of the proposed Project would be negligible. The highest increases in concentration ratio would be for SO<sub>2</sub> and NO<sub>2</sub>. The major influences on air quality would come from the Fairview Terminal Phase I, Fairview Terminal Phase II, BC and Alaska Ferries and the Northland Terminal.

The Application has concluded in the cumulative effects assessment that maximum concentrations of CACs where people are located would not exceed any applicable AAQOs.

*Sediment quality effects on ecological health* –The Prince Rupert Gas Transmission (PRGT) proposed project would be dredging and trenching along the southwest of Lelu Island, and would not spatially overlap with the MOF dredge. Dredging and trenching for that project is expected to be of short duration near Lelu Island.

The Application has concluded that the potential for cumulative effects on sediment quality – and subsequently on country foods – would be negligible and considered not significant because there is no spatial overlap of dredging between the two projects.

EAO concludes that the cumulative effects associated with the Project would not alter human and ecological health within the RAA, and would likely be of low magnitude and not significant.

### **9.1.6 Conclusions**

Considering the above analysis and having regard to the conditions identified in the TOC (which would become legally binding as a condition of the EA Certificate), EAO is satisfied that the proposed Project would not likely have significant adverse effects on human and ecological health.

## 10 Accidents and Malfunctions

During the construction or operation of the proposed Project, unplanned events could arise from accidents or malfunctions associated with Project activities, resulting in impacts to environmental, social, health, heritage or economic values.

This section identifies possible unplanned events, describes the potential impacts of each event and provides a summary of key mitigation measures proposed to address each event. Key issues raised during Application Review are presented and EAO's conclusion on the significance of the risk posed by accidents or malfunctions.

During review of the Application, Working Group members, including Aboriginal Groups, were actively engaged in considering questions related to potential risks associated with the proposed Project. Responses and clarifications were provided by the Proponent during meetings and through written questions-responses within the Working Group tracking table and associated technical memos and are summarized in this section.

The potential occurrence of unplanned events was assessed in the Application using a risk-based approach, according to the likelihood and consequence of the occurrence. The Application considers several worst-case scenarios for each of the potential unplanned events.

Due to the scope of the environmental assessment set out in the Section 11 Order of the Act, EAO primarily focussed the assessment in consideration of its potential effects beyond PRPA lands.

Additionally, the OGC is responsible for the LNGFR that regulates the design, construction, operations and decommissioning of Liquefied Natural Gas Facilities within British Columbia. The *LNGFR* was enacted under the authority of Section 111(2) of the OGAA. Some key elements of LNGFR that relate to the EA are: regulation of facility emissions; waste and water discharge permits; noise, vibration and light; and flaring and venting limits. The LNGFR also covers the more technical aspects of engineering design, hazard analysis, safety & loss management; risk assessment, and emergency response. Aspects of the regulation will apply to the proposed Project.

The potential accidents and malfunctions considered in this assessment include:

- Emergency flaring and LNG facility shutdown;
- Explosion or fire;
- Fuel or hazardous material spill;
- LNG spill (at the storage or loading facilities); and
- Marine vessel allision (vessel striking another fixed vessel or object), grounding or collision (between two moving vessels), or collision with a marine mammal.

The Application assessed how potential accidents and malfunctions could affect a range of (VCs for each scenario (as shown in Table 10-1 of the Application, reproduced here).

Table 10-1: Potential interaction of Project accidents and malfunctions scenarios with VCs

Accidents and Malfunctions Scenario	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 Land and Resources for Traditional Purposes
▪ Emergency flaring and LNG facility shutdown	✓	✓	✓	✓		✓						✓		✓		
▪ Explosion or fire	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
▪ Fuel or hazardous material spill at the storage or loading facilities (from mobile equipment or storage vessels) to the marine or terrestrial environment	✓				✓	✓	✓	✓	✓	✓				✓	✓	✓
▪ LNG release at the storage or loading facilities to the marine or terrestrial environment	✓	✓				✓		✓	✓	✓				✓		✓
▪ (a) Marine vessel allision with the LNG terminal or grounding causing a ship-sourced LNG or hazardous materials release to the marine environment	✓	✓				✓		✓	✓	✓				✓		✓
(b) Marine vessel collision with another vessel causing a ship-sourced LNG or hazardous materials release to the marine environment	✓	✓				✓		✓	✓	✓				✓		✓
(c) Marine vessel collision with a marine mammal								✓								

The Proponent provided information regarding proposed Project design measures to reduce the risk associated with possible accidents and malfunctions. Those measures include:

- Installing engineering controls and protection barriers (e.g., valves, alarms, detectors, emergency shutdown systems) on facility infrastructure;
- Adopting spill prevention and containment measures (e.g., valves, cryogenically stable materials, primary and secondary containment, berms, impoundments areas, drainage systems);
- Adopting fire prevention and protection measures (e.g., fire-resistant materials, fire-rated control mechanisms, a fire water monitor, firefighting equipment and personnel);
- Using vessel pilots and tugs;
- Installing cargo containments systems on LNG carriers; and
- Implementing and enforcing safe work procedures.

The Proponent would be required to produce Project-specific ERP that is in accordance with applicable legislation. Preparation and implementation of an environmental ERP is required under the federal Environmental Emergencies Regulations (1999). The OGC also requires oil and gas operators to have a current ERP to “ensure a quick, effective and appropriate response to emergencies in order to protect the public, company, and

contract personnel from fatalities and irreversible health effects and the environment from damage.”

### **10.1.1 Emergency Flaring and LNG Facility Shutdown**

In the event that an emergency shutdown of all three production trains at the LNG facility is required, this would result in the need for emergency flaring of feed gas for up to one hour. The likelihood of this scenario is low. Emergency flaring and LNG facility shutdown is expected to be uncommon and irregular. Emergency flaring is the routing of the gas stream to one or more flare stacks to prevent a volatile accumulation of gases that could harm humans or the environment. This can occur when a fire, loss of containment, or gas leak has been detected; when a pressure safety valve lifts; or when an emergency shutdown button is triggered. Since the gas intake line valves are closed in an emergency situation, emergency flaring is a short-term event and would generally last for less than one hour.

The primary concern with this scenario would be effects on air quality. The Application reports that emergency flaring of feed gas results in the release of air contaminants in the form of CO with negligible amounts of unburned hydrocarbons, particulates, NO<sub>x</sub>, SO<sub>2</sub>, and H<sub>2</sub>S. The Application states that emissions would be well below provincially acceptable maximum thresholds. The volume of SO<sub>2</sub> and other hazardous emissions that could be released during a one-hour worst-case emergency flaring and shutdown scenario (for all three trains) would likely be short term (under an hour), and below the ambient air quality objectives for 1-hour and 24-hour periods.

Due to the large volume of gas released by the flaring in this potential scenario, the event would cause increased noise and light in the local area, but the effects are expected to be short term in duration. The main flare has been relocated to the south of Lelu Island (furthest from human settlements) to mitigate potential human disturbance associated with increases in ambient light from emergency flaring that may occur during nighttime.

Another effect would be the potential for increased bird mortality as a result of flaring, in particular if the flaring were to occur at night or during foggy weather or during a migration event. However, the low likelihood of this scenario occurring means that flaring is expected to pose a negligible effect on regional bird populations.

Key mitigations proposed to address effects from emergency flaring and shutdown include:

- Installing engineering controls and protection barriers (e.g., valves, alarms, detectors, emergency shutdown systems) on facility infrastructure;
- Retention of a 30 m vegetation buffer around Lelu Island, would further limit light dispersal that could affect humans and birds;
- Use of flare system design to reduce emissions and noise effects, such as minimum destruction efficiency of 99.53% and two stacks; and

- Use of a derrick-supported, multi-riser elevated stack, consisting of warm, cold, and spare flares, for more safety for project personnel.

### 10.1.2 Explosion or Fire

The Application assesses the implications of an explosion or fire occurring at the facility and the LNG carrier. According to the Proponent, major accidents at LNG facilities are rare. LNG is not stored under pressure, LNG is not explosive, and LNG vapour is not explosive in an unconfined environment. Flammable materials associated with the proposed Project that would present a potential risk include natural gas, multi-component refrigerant gas (ethane, propane, and butane), acetylene, and liquid fuels (e.g. hydrocarbon condensate, diesel, petrol, and gasoline). Natural gas is lighter than air, and dispersion from the source of an LNG spill could cause a vapour cloud. As a result of mixing and dilution of the natural gas vapour cloud in the air, it is unlikely to be of a concentration that would combust if ignited. The magnitude of effects associated with an explosion or natural gas-fuelled fire depends on factors such as the volume of LNG available for combustion and the duration of availability, atmospheric conditions dictating the movement and dispersion of the vapour cloud (particularly wind speed and direction, temperature, humidity, and precipitation), proximity of the incident to personnel and sensitive resources, and the effectiveness of emergency response activities.

Fires and explosions could also be associated with an LNG carrier. Normally fires or explosions on an LNG carrier would not lead to loss of containment. However, should an explosion occur that leads to an LNG tank failure, it could result in LNG release from one or more cargo tanks. In this scenario, the LNG would be ignited close to the vessel so dispersion of a flammable gas vapour cloud would not be anticipated.

The Application states that an explosion or fire resulting from a release of natural gas would not likely extend beyond the boundaries of the LNG facility due to on-site containment and the surrounding channels – or beyond the immediate vicinity of an LNG carrier.

The risks posed by an explosion or fire at the facility could affect human health and safety. The EA evaluated the risk to individuals in nearby communities from an explosion as unlikely. The neighbouring communities of Port Edward and Prince Rupert fall outside the maximum flammable hazard zone. Terrestrial wildlife, near the event may be subject to injury (e.g., burns) or mortality. Fish in the immediate vicinity of a rapid-phase transition (a type of powerful explosion caused by the rapid warming of LNG) could also die. However, given that the area affected would likely be limited to the facility area, these deaths or injuries would unlikely have population-level effects. Commercial, recreational and Aboriginal fishers and other marine resource users may avoid these marine resource areas because of the perceived risks. This could lead to a drop both in current use for traditional purposes and in fishing by commercial, recreational and Aboriginal fishers. A fire or explosion would result in the emission of air contaminants equivalent to emergency flaring but over a shorter duration.

In the event of an explosion on an LNG carrier, there would be the potential for acoustic effects on marine organisms, particularly marine mammals, as a result of the blast. The Application reports that such effects are unlikely given that the timing would have to coincide with the presence of a marine mammal in the immediate vicinity. Fish mortalities from the shockwaves are likely, but it is unlikely that this would result in population-level effects on fish species.

Prevention is the primary mitigation measure, and that a systematic approach would be established for identifying potential risks and preventing and managing fire and explosion hazards. In general, the safe containment and handling of the LNG product is the central design principle of the entire facility. The Application lists the fire prevention and protection measures to be incorporated during detailed design, and describes the proposed emergency response approach. Key mitigations proposed to address effects from explosions and fires include:

- Fire prevention measures incorporated during detailed design such as confinement or diversion at potential spill sources using curbs, dikes, and trenches and systems to prevent or limit releases (e.g., fire-safe valves, remote operable valves, minimum flanges, small bore connections, and minimal use of sight glasses for visual observation of liquid levels in pipes/vessels to minimize potential failure points);
- Construction design that allows for natural ventilation and dispersion of potential vapour clouds;
- LNG carriers would be equipped with suitable fire detection systems and automatic fire fighting, in addition to manual firefighting response by trained vessel staff; and
- The LNG carriers for this proposed Project would use gas vapour from the LNG boil-off as fuel for the machinery, resulting in no operational venting of gas from the boil-off, which thereby reduces the risk of fire or explosion.

### **10.1.3 Fuel or Hazardous Material Spill**

The Application includes an assessment of the implications of a worst case scenario fuel or hazardous material spill (other than of LNG, which is discussed below). The Application lists types of chemicals that would be present during the construction and operations phases of the proposed Project, and summarizes the potential effect of those substances on human and ecological health if an accidental release were to occur.

A spill of fuel could potentially affect vegetation, soil or sediment, water and wildlife. The severity of the effect would depend on the material spilled, the quantity, and the location on the site. The Proponent determined that a fuel or hazardous material spill would likely be contained within the industrial facility footprint, which would be designed to exclude wildlife and contain very little vegetation. In a worst case scenario, a spill could occur into a watercourse on Lelu Island, with subsequent migration to the surrounding marine environment. This is unlikely to occur given implementation of mitigation measures.

Regulator concerns associated with a spill, leading to fishery closures, could result in reduced access to marine resources, which could affect fishing by commercial, recreational and Aboriginal fishers.

Key mitigations proposed to avoid and mitigate effects from fuel or hazardous material spills include:

- Fuel and hazardous waste storage tanks will be designed and operated as per legal requirements and specifications such as the BC *Environmental Management Act* (2003), the BC Fire Code (2006), the National Fire Code of Canada (2010), the recommendations included in the *Field Guide to Fuel Handling, Transportation and Storage* (BC MOE 2002), and the *Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products* (Canadian Council of Ministers of the Environment 2003);
- Secondary containment systems would be designed such that they have a volumetric capacity of 110% of the tank capacity for an aboveground storage tank system that consists of a single tank (CCME 2003);
- Drainage systems would be in place for contaminated water or effluent collection; and
- Storage of hazardous materials and refueling and maintenance areas would be prohibited less than 100 m from water bodies and other sensitive habitats.

#### **10.1.4 LNG Spill (at the Storage or Loading Facilities)**

LNG spills associated with the terminal storage or loading facilities could originate from leaks within the upland storage facility, along the loading line, or at the loading arm that connects to the berthed vessels receiving the LNG. These releases could affect the terrestrial or marine environments. A possible accident or malfunction scenario would involve the release of LNG from onsite storage tanks or from a location in the liquefaction train. However, as LNG facilities must be designed with containment facilities (such as dikes, berms, or impounding walls) that have sufficient capacity to contain a variety of design spills, it is unlikely that the effects would reach beyond the facility itself.

The designs of LNG tanks and LNG carriers make it extremely unlikely that a spill would occur from a tank or a carrier.

The Application reports that a credible worst case scenario would involve rupture of the loading line at the marine terminal. This could occur if the berthed vessel suddenly pulled away from the trestle or drifted off from its mooring during loading operations. A powered emergency release coupler protection system would be in place to limit the volume of LNG released; however, if this did not function properly, emergency shutdown is assumed to take four minutes.

While unlikely to occur, the Application reports that an LNG spill would cause localized freezing, followed by a vapour cloud extending 1,700–1,850 m from the spill. The vaporized cloud generated by an LNG spill would consist almost entirely of methane. The effects of an LNG spill would be the release of GHG emissions, injury and mortality of plants, animals and aquatic biota at the local level. LNG is non-toxic and evaporates rapidly under ambient environmental temperatures, therefore it would cause no long-term environmental or human health effects and a spill would not result in soil contamination.

Similar to a fuel or hazardous material spill (discussed above), concerns about the viability of fish populations following an LNG spill could result in regulators reducing access to marine resources, which could in turn affect marine resource use for traditional, commercial and recreational purposes.

Key mitigations proposed to avoid and mitigate effects from an LNG spill include:

- LNG tanks would be fully contained within a primary and secondary containment system; and
- Protection barriers (e.g., high and low temperature alarms, level and pressure controls, and emergency shutdown systems) would be incorporated to enable immediate isolation of a system in the event of a serious LNG leak. For example, powered emergency release coupler protection would be used at the vessel loading arm to limit the volume of LNG released in the event of an accident or malfunction.

### **10.1.5 Marine Vessel Allision, Grounding or Collision**

The Application assesses the implications of an LNG carrier striking the marine terminal or another vessel, becoming grounded, or colliding with a marine mammal. Such incidents could result from human error, mechanical malfunction, or coincidental timing (in the case of a collision between a vessel and marine mammal). The Application reports that with eight major development projects proposed for the area, the marine traffic is forecast to increase by 318% over 2009 levels, with the proposed Project expected to account for 19% of the total annual large vessel traffic in the area.

Large vessels near the terminal will be moving slowly, and under the control of tugs and pilots, therefore an allision with the terminal is considered very unlikely to occur and unlikely to result in damage.

LNG vessels have an excellent safety record, with only two serious groundings having occurred in the last 30 years worldwide, neither of which resulted in any cargo loss due to the use of double hulls. The Application states that the majority of the sailing route for LNG carrier transit to and from the terminal is open and deep, making it largely free of navigational hazards. However, navigational challenges may be encountered in Brown Passage between the Tree Nob Group and Hanmer Rocks, and in the approach to the Triple Island Pilot Boarding Station. A powered grounding may result from navigational

errors, propulsion or steering failure, or emergency manoeuvres to avoid collision with another vessel.

Groundings of a vessel or collisions with another vessel could result in the release of fuel or an LNG product. The release of fuel is more likely to occur and could potentially cause harm to the environment, particularly marine birds. An LNG spill from a carrier is extremely unlikely to occur. Should a loss of LNG containment occur, it is estimated that the vapour cloud from such a release could extend 1,700 m from the spill site. If the release rate from the spill were high enough, an explosion could occur.

LNG vessels calling on the proposed Project terminal would approach Prince Rupert Harbour in designated shipping routes from the open ocean north of Haida Gwaii to the pilot station at Triple Island where they would be guided by pilots and the Coast Guard Marine Communications and Traffic System to avoid collisions with other vessels, hazards of grounding, and where information is available, interaction with marine mammals or concentrations of fishing vessels.

Of the marine mammals present, humpback whale populations would be the most vulnerable to a lethal accidental collision with an LNG carrier in transit. Vulnerability of various marine mammals to vessel strikes is described in Section 22.8.1.3 of the Application.

Key mitigations proposed to avoid and mitigate effects from vessel collision, grounding or collisions include:

- Vessels would transit to and from the pilot station at reduced speeds to lessen the likelihood of serious injury to large cetaceans from a vessel collision;
- LNG carriers approaching the terminal would be under the control of tugs and pilots;
- LNG vessels used for the proposed Project would conform to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, which specifies design and construction standards; and
- Adherence to regulatory requirements.

The Proponent has also opted to participate in the Technical Review Process of Marine Terminal Systems and Transshipment Sites (TERMPOL), as established by Transport Canada. The TERMPOL process is intended to improve upon elements of a project that could pose a threat to a ship's hull and cargo containment system, and the environment in the vicinity of the vessel while it is navigating in Canadian waters (Transport Canada 2001). The Proponent may identify additional mitigation measures that relate to vessel collisions, collision, or grounding as a result of the outcomes of the TERMPOL review.

### **10.1.6 Issues and Concerns Raised During Application Review**

A concern was raised about the potential effect of explosion or fire on freshwater aquatic resources and if any accident/malfunction causing an emergency would have an effect on community infrastructure (traffic, community service like fire, ambulance, etc.)

The Proponent responded that effects on freshwater aquatic resources on Lelu Island would not occur due to the infilling of freshwater during construction. The Proponent clarified that Tier 2 or 3 emergency responses would affect infrastructure and services. Potential effects on this VC are assessed for the fire or explosion scenario which is the only scenario where escalation to a tier 2 or 3 emergency response is considered credible.

In response to further questions related to the information provided in the Accidents and Malfunctions section of the Application during Application Review, the Proponent prepared technical memos including 'Marine LNG Spill' and 'LNG Carrier Explosion' (June 23, 2014).

Concerns were raised about the potential effects of flaring on migratory birds. In response the Proponent developed a technical memo titled 'Potential Effects of Project Lighting on Songbirds, Marine Birds and Bats' (June 23, 2014).

In response to concerns raised about the potential for cumulative effects of accidents and malfunctions and the federal requirement under CEAA 2012, the Proponent prepared a technical memo titled 'Cumulative Effects Assessment and Significance Determination for Accidents or Malfunctions' (June 23, 2014).

### **10.1.7 Conclusions**

Project design measures and other mitigation would be used to lessen the likelihood and reduce the severity of any accident or malfunction.

Prior to the commencement of construction activities, the Proponent would be required to develop ERPs to address preparedness, prevention and response to an accident or malfunction on the proposed Project throughout the construction and operational phases.

Considering the scope of assessment being focussed primarily on potential effects beyond PRPA lands, the combination of the proposed Project design measures, implementation of ERPs and the ongoing federal regulatory processes, EAO is satisfied that accidents and malfunctions are unlikely to pose significant risk to environmental, social, economic, health or heritage VCs associated with the Project.

## **11. Assessment of the Environment's Effects on the Project**

Environmental processes assessed with respect to their potential to affect the proposed Project and result in effects to Valued Components include:

- Precipitation
- Fog and visibility
- Wind, tides and storms
- Seismic activity and tsunamis
- Climate change (changes in sea level rise, storm frequency and intensity)

The Application states that environmental events or effects which could impact on the Project would be any that result in:

- A substantial delay in construction (e.g., more than one season);
- A long-term interruption in service (e.g., loading LNG carriers);
- Damage to infrastructure that compromises public safety; and/or
- Damage to infrastructure that would not be economically and technically feasible to repair.

The Proponent has indicated that the proposed Project would be designed to prevent or reduce the severity of adverse environmental effects of the environment. The Proponent has committed to various mitigation strategies that would be applied through design criteria and an EMP.

The assessment of effects of the environment on the proposed Project is within the federal agency jurisdiction for this proposed Project. The federal regulatory process is ongoing, and EAO notes that the federal process may have more specific findings, recommendations and identify specific mitigations regarding effects of the environment.

## 12. Summary of Environmental and Operational Management Plans and Follow-up Programs

A number of the proposed Conditions discussed above and documented in the TOC related to the establishment of various EMPs. Technical Working Group tracking tables can be found at the following location:

[http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic\\_project\\_doc\\_index\\_396.html](http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_index_396.html)

These EMPs would be an important part of the Proponent's strategy for avoiding or mitigating adverse effects from the construction, operation, decommissioning and potentially refurbishment of the proposed Project.

The Application outlined the following stand-alone plans that would be developed before the start of construction works:

- Air Quality and Greenhouse Gas Management Plan
- Noise, Vibration, and Ambient Light Management Plan
- Emergency Response Plan
- Transportation Management Plan
- Marine and Freshwater Resources Management Plan
- Vegetation Management Plan
- Waste Management Plan
- Blasting Management Plan
- Pile Driving Management Plan
- Dredging Management Plan
- Archaeological and Heritage Resources Management Plan
- Environmental Monitoring Management Plan
- Accommodation Plan

Some of the above plans would be required by provincial and federal agencies or authorities, including OGC and the PRPA. EAO has made air quality, transportation and social economic management plans Conditions of an EA Certificate.

## PART C – ABORIGINAL GROUPS CONSULTATION

### 13. EAO Consultation Process: Overview

The Government of British Columbia is legally obligated to consult and, if necessary, accommodate asserted or established Aboriginal rights including title, or treaty rights (“Aboriginal Interests”) that may be impacted by provincial decisions. In *Haida Nation v. British Columbia (Minister of Forests)*, 2004 SCC 73 (*Haida*), the Supreme Court of Canada established that the Crown is required to consult with Aboriginal Groups<sup>15</sup> with respect to Crown-authorized activities that might affect Aboriginal Interests, and that the extent (or level) of the consultation is proportionate to preliminary assessments of the following factors:

- Strength of the case for the claimed Aboriginal rights (including title) that may be adversely affected; and
- Seriousness of the potential impact of contemplated Crown action or activity on Aboriginal Interests.

The extent (or level) of the Crown’s obligation to consult is described in the *Haida* case as lying on a spectrum from notification to deep consultation. The EA process is not a rights determining process in relation to asserted Aboriginal rights and title. Instead, a key objective of the EA process is to identify potential adverse effects of proposed projects on asserted Aboriginal Interests and explore measures to avoid, mitigate or otherwise appropriately address such effects.

On September 17, 2013, EAO issued a Section 11 Order which specified the consultation activities that both EAO and the Proponent would undertake with all Aboriginal Groups potentially affected by the proposed Project.

At the initial stages of EA for the proposed Project, EAO relied primarily on the proximity of the proposed Project to an Aboriginal Group’s asserted traditional territory to determine whether an Aboriginal Group would be included on Schedule B or C.

Aboriginal Groups in Schedule B of the Section 11 Order were consulted at the deeper end of the consultation spectrum, and were provided the following opportunities:

- Participation in the Working Group;
- Participation in meetings to identify and discuss both Aboriginal Interests that may be affected by the proposed Project and potential measures to avoid, mitigate, address or otherwise accommodate impacts;
- Review and comment on key documents, including the draft VC document, the draft AIR, the draft Section 11 Order, the Proponent’s Application for an EA

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<sup>15</sup> “Aboriginal Groups” means those Aboriginal entities identified on Schedule B of the Section 11 Order which defines the scope of the Project, scope of the assessment and review procedures issued by EAO September 17, 2013.

- Certificate, EAO's draft Assessment Report including Part C; Aboriginal Consultation Report and the Proponent's Aboriginal Consultation Reports; and
- Submission of a document outlining the Aboriginal Group's views on the Assessment Report to be included in the package of materials sent to Ministers when the proposed Project is referred for decision.

On November 5, 2013, EAO issued a Section 13 Order to include Gitga'at First Nation in Schedule C of the Section 11 Order. Gitga'at First Nation was consulted at a lower level on the consultation spectrum, and was provided the following opportunities:

- Notification of key milestones – such as the issuance of the AIR, acceptance of the Application for review, timing of public comment periods (including open houses), referral of the final Assessment Report to Ministers and the resulting decision;
- Invitation to meet with EAO to discuss any Aboriginal Interests in the proposed Project area; and
- Invitation to review and comment on the draft Assessment Report including this Part C Aboriginal Consultation Report and other draft referral materials.

Procedural aspects of consultation were delegated to the Proponent, set out in a draft Section 11 Order (Part G) that was shared with Aboriginal Groups and described the requirements and activities expected of the Proponent in assisting the Crown to discharge its duty to consult potentially affected Aboriginal Groups. The Section 11 Order required the Proponent to develop and implement an Aboriginal Consultation Plan, and to report on its activities in two separate Aboriginal Consultation Reports. Aboriginal Groups were provided opportunity to review and comment on each of these documents prior to submission to EAO. Although procedural aspects of consultation were undertaken by the Proponent, the assessment of the adequacy of consultation and accommodation remained the responsibility of EAO.

EAO has considered all comments received from Aboriginal Groups, including relevant information provided by Aboriginal Groups during the Application Review. This includes, for all but Lax Kw'alaams First Nation, TUS information. Metlakatla First Nation and Gitxaala Nation also provided socio-economic reports, and Gitxaala Nation provided a VC report.

During all stages of the EA, issues, comments and concerns raised by Aboriginal Groups in relation to the proposed Project were forwarded to the Proponent for tracking and response. Input from Aboriginal Groups was received through participation in Working Group meetings, teleconferences, direct meetings with EAO and/or the Proponent and written correspondence (letters or emails).

EAO reviewed the adequacy of the Proponent's responses to all comments received from Aboriginal Group representatives in the Working Group in the Issues Tracking Table. EAO required the Proponent to update the Issues Tracking Table as appropriate until EAO considered the responses were adequate. In addition, EAO arranged specific Working Group meetings and offered to meet with Aboriginal Groups to review

responses and any additional concerns of Aboriginal Groups. Tracking Tables were shared with and made available to Aboriginal Groups throughout the EA. A final Tracking Table is posted on EAO's ePIC website.

A draft of this entire Report was provided to Aboriginal Groups on October 14, 2014. Comments from Aboriginal Groups on the draft Assessment Report received by EAO until October 22, 2014, were considered in this Assessment Report.

### 13.1 *Tsilhqot'in Nation v. British Columbia*

On June 26, 2014, the *Tsilhqot'in Nation v. British Columbia* (*Tsilhqot'in*) decision was released by the Supreme Court of Canada. The decision clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation at 1846 (the time of assertion of European sovereignty). In addition the case set out considerations for government when consulting Aboriginal Groups regarding potential impacts on asserted Aboriginal title claims.

As is typical for significant legal cases such as these, government is taking some time to examine the implications including the legal, policy and public interest considerations. The proposed Project was at day 94 of the 180 day Application Review period when the *Tsilhqot'in* decision was released.

As a result of the *Tsilhqot'in* decision, EAO:

- Reassessed the strength of claimed Aboriginal title overlapping the proposed Project on the basis of the tests set out in the *Tsilhqot'in* decision, for the purpose of confirming appropriate level or depth of consultation;
- Included the results of that reassessment in this report as it relates to each Aboriginal Group with asserted title claims overlapping the proposed Project;
- Sought Aboriginal Groups perspectives on both the preliminary assessments of strength of Aboriginal claims and seriousness of impacts, as well as proposed accommodations through the provision of a draft version of this report; and
- Considered other approaches being taken by government that may be relevant to the accommodation for potential impacts to Aboriginal Interests.

The Aboriginal Groups who were assessed as potentially having moderate-to-strong Aboriginal title claims overlapping the proposed Project (post-*Tsilhqot'in*) were already included on Schedule B of the Section 11 Order prior to the *Tsilhqot'in* decision and were consulted at a deeper consultation level throughout the EA.

After re-assessing the strength of claim to Aboriginal title for each Aboriginal group who asserted a title claim, the EAO determined that the level of consultation it was currently undertaking was appropriate for each group, and did not need to be modified as a result of the *Tsilhqot'in* decision.

As noted above, EAO is not a body for determining rights, including rights to Aboriginal title, nor does EAO have all of the necessary information to make such a determination. For the purposes of this Report, EAO's assessment of whether Aboriginal Groups may have a *prima facie* claim to Aboriginal title was intended solely to inform the level of consultation required for each Aboriginal Group.

## 14. Aboriginal Groups Consulted

EAO consulted the following Aboriginal Groups:

- Lax Kw'alaams First Nation
- Metlakatla First Nation
- Gitxaala Nation
- Kitselas First Nation
- Kitsumkalum First Nation
- Gitga'at First Nation

These six Aboriginal Groups potentially affected by the proposed Project are part of what is termed collectively as the Tsimshian culture, which has been identified ethnographically and linguistically as consisting of the *Nine Allied Tsimshian Tribes*, *Interior (Canyon) Tsimshian*, and *Southern Tsimshian* groups.

In light of comments from Aboriginal Groups, EAO is using the term *Nine Allied Tsimshian Tribes* to refer to Lax Kw'alaams First Nation and Metlakatla First Nation.

The Tsimshian are among the most extensively described Aboriginal Groups in North America. The work of early ethnographers – described in more detail below – provides a rich body of research, including territorial maps, oral histories, and detailed descriptions of traditional resource harvesting, socio-political organization, and language, relations among neighbouring Aboriginal Groups, and cultural practices and customs. Appendix C1 includes a detailed bibliography of references utilized by EAO to inform its understanding of Tsimshian culture, history and use and occupation of lands and resources potentially affected by the proposed Project.

During the 19<sup>th</sup> century several historical events altered traditional Tsimshian settlement patterns. These included: dramatic depopulation by epidemic diseases; the establishment of the Hudson's Bay Company Fort Simpson trading post in 1831; and the founding of the missionary William Duncan's model village of Metlakatla in 1862.

The salient socio-political entities of the Tsimshian include the house (*wa.lp*), clan, tribe and nation. Inter-weaving these entities are the linkages of common ancestry and kinship ties developed through marriage, trade and inter-tribal alliances. The inter-connecting web of economic and political relations between houses was expressed, traditionally, through a seasonal round of resource harvesting activities, intermarriage and feasting.

The combined territories of the *wa.lps* that composed a tribe typically encompassed a watershed or similarly defined geographic areas. Among the Tsimshian, these regions and associated territories were: the *Nine Allied Tsimshian Tribes* whose territories include the lower Skeena River and mainland coast from the mouth of the Skeena River to the mouth of the Nass River; the *Southern Tsimshian*, whose territories span the archipelago of islands south of the Skeena River and several watersheds along the

Douglas Channel; and, the Interior Tsimshian, whose territories include the Kitsumkalum River watershed and an area of the Skeena River east and west of the Kitselas Canyon.

### 14.1 *Wa.lps*

Traditionally, the Nine Allied Tsimshian Tribes lived in large, semi-permanent winter villages consisting of multiple related groups known as “houses,” “house-groups” or *wa.lps* (singular: *wa.lp*).

A *wa.lp* is described by anthropologists as a corporate lineage that held exclusive ownership rights to specific places and tracts of land, and the associated rights to access and harvest resources at those locations. A *wa.lp* is an independent socioeconomic unit of traditional Tsimshian social and political life and each house has an individual leader (*Sm’oogyet*) who inherits both a name and associated rights of the house’s territory.

The leader of the most powerful house in a tribal village usually had leadership responsibilities for the community, with the authority derived from the status of the house-group. Each *wa.lp* is part of a network of *wa.lps* that shares a matrilineal connection to a common ancestral group. These affiliated matrilineal groups are called clans, crest-groups or *Bupdeex* (singular: *pdeex*), and traditionally formed the organizing structure of village residence. A Tsimshian person belonged (and belongs today) to one of four clans:

- *Ginhada* (raven)
- *Gispuwidha* (killer whale)
- *Laxsgiik* (eagle)
- *Laxgibuu* (wolf)

Each *wa.lp* owned its own hunting and fishing grounds, and the combined territories of the *wa.lps* in its composite, constituted the tribal territory. The territory held by a *wa.lp* was understood in Tsimshian culture to be owned in a proprietary sense, a concept that was at the foundation of the Tsimshian geopolitical system. As summarized by Halpin and Seguin:

[e]ach house owned fishing, hunting and gathering territories and localities, which it exploited under the direction of the house chief (the man, and in exceptional circumstances, the woman, who bore its highest-ranking name). The house owned crest, songs, names, and other privileges, also under control or stewardship of the chief. The transfer of the right to use natural resources to another house by gift or through seizure in payment of a debt was fairly common. Matters of mutual interests, such as defense, were discussed with the chiefs of their houses in the village. Each interacting

group of chiefs had an established rank order, which determined their rights to precedence in both political and ceremonial events<sup>16</sup>.

Rights of access to *wa.lp* territories were strictly defined even among relatives. For instance, an individual had the right to use territory of the maternal house to which he or she belonged by birth, but could only use territory of the paternal house during the father's lifetime and/or with permission from its chief.

A son could hunt, fish, trap, or take anything he desired from any area where his father had hereditary rights. After his father's death a man discontinued the practice or asked permission of the father's successor; permission which was seldom denied. The right of sons stemmed from the fact that they grew up in their father's household, hunted and fished with him and learned many of their skills from him. Many adolescent boys took up residence with uncles, but permanent affiliation with their own lineages dated from marriage. A man could invite his sons-in-law, his father-in-law or his wife's brothers to hunt or fish with him as guest. If they visited the areas without invitation they were regarded as trespassers<sup>17</sup>.

## 14.2 Adawx

Inalienable and exclusive title of each *wa.lp* to its territories and associated resources is fundamental to Tsimshian society and laws. The traditional legal system that provides validation to the ownership and rights, acquired or inherited, of *wa.lp* territories, and which regulates rights of access and resource use is described in *adawx*, the oral histories of each *wa.lp*.

The *adawx* contain descriptions of the ancient migrations of the *wa.lp*'s ancestors, how they came to acquire territory, and the major events that transpired in the history of the *wa.lp*, including extreme natural events, epidemics, wars, the arrival of new-comers, and the establishment of trading relations. The *wa.lp* crests, which are often depicted on longhouse fronts, crest poles and ceremonial regalia similarly depict events in the history of a *wa.lp* as described in the *adawx*.

It was, and remains, the responsibility of each house leader, or *Sm'oogyet*, to ensure the *adawx* and associated rights of their *wa.lps* are transmitted through generations of Tsimshian. Formally, *adawx* are narrated during feasts as a means to publically validate and confirm the history of the *wa.lp* and its title to specific territories. Knowledge of the names of geographic features and historical origins within the territories is considered an element of proof of ownership within the traditional Tsimshian legal system. As described by Martindale and Marsden, the Tsimshian *adawx*, is not only the formal legal system of recording and preserving historical knowledge, it is "a record of oral histories

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<sup>16</sup> Halpin and Seguin 1990:274.

<sup>17</sup> Garfield 1966:17.

and testimonies of territorial ownership and rights dating back to the last ice age, when the first Tsimshian settlements appeared”.<sup>18</sup>

Alienation of rights to territory, within the traditional Tsimshian legal system, can only occur as a result of a *wa.lp*'s inability to perform its ceremonial responsibilities, or is relinquished as compensation – for a crime against a member of another *wa.lp*, or as a component of a peace process following a conflict between tribes.

This understanding of the importance of the *adawx*, and its relationship to each *wa.lp*'s and tribe's connection to and ownership of specific territories and resources has informed EAO's preliminary assessment of the strength of overlapping claims to the area of the proposed Project by the six Tsimshian Aboriginal Groups who were consulted throughout the course of the EA. This assessment is discussed in later sections of this report, which along with the assessment of potential impacts on Aboriginal Interests informed the scope of consultation and accommodation with each of the Aboriginal Groups for the proposed Project.

### 14.3 Traditional Use of Land and Resources

For most Tsimshian groups, life before contact with non-native explorers, traders and settlers revolved around the harvesting of seasonally available food. Each *wa.lp* left its winter village during the spring to occupy small seasonal camps sites, collecting different resources as they became available and returning to the same winter village in the late fall or early winter. This seasonal movement is often described as a “seasonal round” by anthropologists.

In the late winter and early spring, Tsimshian families would collect and process eulachon along the Nass River. Eulachon grease was (and remains) a highly prized and nutrient-rich commodity that was traded along the Nass and Skeena Rivers and into the BC Interior via well-established trade routes that are commonly referred to as “grease-trails.” Eulachon were either dried or rendered into grease, and then transported back to the winter village for storage. Eulachon oil was both a nutritious condiment and a valuable trade commodity which made the Tsimshian among the wealthiest groups on the Northwest Coast.

The Nass River eulachon fishery typically occurred from February to April, after which the Tsimshian returned to the hunting and fishing grounds of their respective *wa.lps*.

From May through late August fishing was the primary activity, beginning in May with halibut and cod fishing. Seals and sea lions were also hunted during this time, and women gathered as many as 20 different varieties of seaweed, along with herring spawn on kelp and hemlock, and cedar bark for winter weaving. In June, the eggs of

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<sup>18</sup> Martindale and Marsden 2011:32.

marine birds such as sea gulls and oyster catchers were gathered, along with shellfish such as abalone, cockles and clams during the low summer tides.

By early summer, Tsimshian moved to their seasonal camps at traditional fishing sites as salmon gathered at the river mouths to begin their spawning migration. These sites were strictly controlled by individual *wa.lps* and managed by chiefs. The harvesting of the five species of salmon that spawn in the Skeena River and its tributaries represented the main economic activity within the Tsimshian's seasonal round. At least eleven technologies were utilized by the Tsimshian for catching salmon, including: the use of gaffs, dipnets, gillnets, tidal traps, nettle fibre seine nets, trolling, weirs and several different varieties of traps. Salmon was eaten fresh or smoked to preserve for future consumption.

Summer was also a time for gathering edible plants and berries, including salmonberries, huckleberries, black and red currants, soapberries, and high bush cranberries which were dried or stored in grease for winter consumption. Generally, Tsimshian women gathered plants, which, in addition to the many varieties of berries also included roots and tubers and medicinal plants such as devil's club, licorice fern, hemlock bark and fireweed.

Salmon fishing, processing and storage occupied the Tsimshian until October, at which time the tribes returned to their winter villages. Fall was the season when men hunted deer, bear, mountain goat, moose, ducks and geese.

From November to February the winter was spent in the permanent winter villages of each tribe. Fairly intensive subsistence activities including the gathering of marine invertebrates such as clams, mussels, cockles from beaches and inter-tidal areas occurred during the winter, along with fishing of species such as ling cod, black cod, halibut, snapper, octopus, prawns, shrimp and crab. Trapping of fur-bearing species like muskrat, mink, lynx, beaver and fox also took place in winter, along with game hunting of both terrestrial and marine mammals. Winter was the season for the culturally important ceremonial feasts, marriages and for the validating of *adawx*.

#### 14.4 The Nine Allied Tsimshian Tribes

Before the time of contact, ten Tsimshian groups relocated their winter villages on the Skeena River to village sites in the Prince Rupert Harbour. Nine of these Tsimshian tribes survived: *Giluts'aaw*, *Ginandoiks*, *Ginaxangiik*, *Gispaxlo'ots*, *Gitando*, *Gitlaan*, *Gits'iis*, *Gitwilgyoots*, and *Gitzaxlaal*. These tribes had their winter villages in the vicinity of Prince Rupert Harbour, and seasonal fishing and hunting territories on the lower Skeena River and at the mouth of the Nass. The Lax Kw'alaams First Nation and Metlakatla First Nation are understood to have descended from these Nine Allied Tsimshian Tribes, each of which had their own individual territories, harvesting areas and villages.

The mainland shore of Chatham Sound, Prince Rupert Harbour, and the lower Skeena valley are all part of the territories understood to have been, from the extensive

ethnographic and archaeological record, occupied and used by the Nine Allied Tsimshian Tribes at the time of contact. Following European settlement in the region, these Nine Allied Tsimshian Tribes coalesced into a single common entity that later separated into two separate groups: Lax Kw'alaams First Nation and Metlakatla First Nation. These two groups are referred to as the "Nine Allied Tsimshian Tribes." For purposes of this Assessment Report, EAO will refer to Lax Kw'alaams Nation and Metlakatla First Nation as the "Nine Allied Tsimshian Tribes."

In 1834, the nine surviving tribes of the Nine Allied Tsimshian Tribes relocated their winter villages to Fort Simpson, which had been established at the ancient Nine Allied Tsimshian Tribes camping site called *laxlgu'atoems* (Lax Kw'alaams). Traditional trading and subsistence patterns were altered in the post-contact period with the presence of Hudson's Bay Company trading posts, and later, seasonal work at the canneries that became established on the northwest coast. The Hudson's Bay Company had established a fort at the Nass in 1831, and then subsequently moved the fort to the present site of Port Simpson in 1834.

A smallpox epidemic occurred in the Prince Rupert area in 1836, which reduced the Nine Allied Tsimshian Tribes population by as much as a third, from 4,238 to 2,825 in 1837<sup>19</sup>.

In 1862, when William Duncan established his model village, he selected an old Nine Allied Tsimshian Tribes site in Metlakatla Passage. Members of various Nine Allied Tsimshian Tribes, and other Tsimshian groups, including members of present-day Gitxaala Nation and Gitga'at First Nation, relocated to Metlakatla Mission, which by 1879 had grown to a population of 1,100, most of whom were Lax Kw'alaams members from Fort Simpson attempting to escape the smallpox epidemic. Due to internal disputes with the other missionaries, Duncan relocated his community to Alaska in 1887 and called it New Metlakatla.

## 14.5 Southern Tsimshian First Nations

The Gitxaala Nation, along with Gitga'at First Nation and Gidestsu Nation are classified by ethnographers as Southern Tsimshian, distinguished from the Nine Allied Tsimshian Tribes by dialect and the territories occupied by the Southern Tsimshian *wa.lps*. Southern Tsimshian spoke a distinct dialect, *Sguuks* or *Sguumxs*, which was nearly extinct by the 1970s<sup>20</sup>. Traditionally, the Southern Tsimshian did not hold territories on the Skeena River or at Prince Rupert Harbour<sup>21</sup>.

Both Gitxaala Nation and Gitga'at First Nation challenged the linguistic distinctions noted by most ethnographers and linguists such that the "Coast Tsimshian" term has

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<sup>19</sup> Boyd (1985)

<sup>20</sup> Halpin and Seguin 1990:267

<sup>21</sup> Halpin and Seguin 1990:274; Garfield 1939:176; 1966; 1990

been used by different linguists and ethnohistorians in different way to include different groups. EAO has revised its Assessment Report to avoid the confusion caused by using the term “Coast Tsimshian” based on comments received from Gitxaala Nation and Gitga’at First Nation.

Porcher Island is understood to be, from the extensive ethnographic record, the northern limit of Gitxaala Nation traditional territory. The core of the Gitxaala Nation’s traditional territory is concentrated in the coastal archipelago south of the Skeena River. The Gitxaala Nation did have a eulachon fishing station on the Nass River, and are believed to have had seasonal camping sites where they stopped on their way to and from the Nass River. However, only one of these camps has been positively identified on Telegraph Passage, south of the Skeena River.

The Gitga’at First Nation, unlike the Nine Allied Tsimshian Tribes of the lower Skeena River and Prince Rupert Harbour, did not relocate to Fort Simpson in the 1830’s, but they did move to William Duncan’s model village of Metlakatla in the 1860’s-80’s. Subsequently the tribe established a new winter village at Hartley Bay in 1887.

#### 14.6 Canyon Tsimshian

The Kitselas First Nation and Kitsumkalum First Nation are identified by ethnographers as the Interior, or Canyon Tsimshian. While their ancestors travelled to the coast to trade and socialize, and to harvest eulachon at the Nass River each spring their winter villages and resource harvesting areas were located around the Skeena River canyon and Kitsumkalum River drainage and they were not among the Nine Allied Tsimshian Tribes with villages in the Prince Rupert Harbour. They spoke a distinct dialect of the Tsimshian language. In these ways, they are distinguished from the Nine Allied Tsimshian Tribes.

#### 14.7 Ethnographic Information Sources

The historical record for the Tsimshian is particularly rich, in large part due to their location relative to the early fur trade. The first recorded visits to Tsimshian territory were by James Colnett and Jacinto Caamaño whose fur trade-inspired expeditions reached the northwest coast in 1787 and 1792 respectively.

Captain George Vancouver’s expedition travelled through Southern Tsimshian and Nine Allied Tsimshian Tribes territories in 1793, recording settlements and describing the indigenous occupants, but without identifying specific groups by name.

The Hudson’s Bay Company trading post at the Nass was established in 1831 and its journals span from that date until 1866, providing detailed descriptions of life at the fort, including observations on the economic and social life of the Tsimshian.

Missionary activity began in Tsimshian territory with the arrival of Reverend William Duncan in 1857, who maintained his mission village at Metlakatla between 1862 and

1887, and who kept a detailed person record of his observations of life amongst the Tsimshian.

It is, however, the field research of Marius Barbeau and his assistant, William Beynon that offers the most extensive archive of documented oral history of the Tsimshian.

Over a period of research that spanned 1915 to 1950, Beynon recorded extensive notes, including of the *adaxw* of each *wa.lp*, their origins, crests, names, and important information about the territories and resources held by each *wa.lp*. Barbeau also trained and worked extensively with William Beynon, a fluent speaker of the Tsimshian language, *Sm'algyax*.

Beynon recorded the testimonies of elders from numerous Tsimshian *wa.lps*, producing a rich documentation of lineage histories, territories and hereditary names and crests, and a large number *adawx*.

EAO relied quite extensively on the materials contained in the Barbeau and Beynon collections – largely microfilmed copies of Barbeau and Beynon's field notebooks, including maps with Tsimshian place names recorded by Beynon through his communications with Tsimshian elders.

EAO also utilized the research and publications of many other authors including Susan Marsden, author of reports for Gitxaala Nation (2011) and Gitga'at First Nation (2012). The work of Majorie Halpin and Margaret Seguin was also utilized, in particular their 1990 article on the Tsimshian for the *Handbook of North American Indians*. Halpin's 1973 doctoral dissertation, *The Tsimshian Crest System*, provides a detailed analysis of Tsimshian social organization, names, and ritual and symbolic culture. Andrew Martindale's 2003 article, *A Hunter-Gatherer Paramount Chieftdom: Tsimshian Developments Through the Contact Period*, offers a scholarly investigation of relevant historical documents, *adawx*, and archaeological data. John Cove's *Detailed Inventory of the Barbeau Northwest Coast Files* was an important complementary source of information on the materials from the Barbeau collections.

It is worth noting that the Metlakatla, Gitxaala, Kitselas, and Kitsumkalum First Nation's TUS reports utilized many of the same key ethno-historic references as EAO relied upon in its assessment of strength of claim, history and context of the Tsimshian culture and traditional practices.

The ethno-historic and archaeological sources used by EAO together with the information provided by Aboriginal Groups – in their comments during the EA, and the TUS and socio-economic reports which were submitted to EAO – provides an extensive description of Tsimshian traditional harvesting activities, valued resources, ceremonial life and customs, and relationship with the physical environment of the region.

EAO acknowledges that Gitxaala Nation and Gitga'at First Nation significantly disagree with conclusions drawn by EAO based on the ethnographic and historic sources in

informing EAO's strength of claim assessments. The Gitxaala Nation and Gitga'at First Nation provided submissions of additional information to EAO in support of their asserted claims to the Prince Rupert area, which EAO reviewed thoroughly; EAO's consideration of this information is discussed in section 19 of this Report.

## 15. EAO-Led Consultation Activities with Aboriginal Groups

This section provides an overview of consultation activities undertaken by EAO.

### 15.1 Capacity Funding

Capacity funding was provided by EAO to Aboriginal Groups in Schedule B to assist with their participation in consultation discussions and Working Group meetings during both the Pre-Application and Application Review phases of the EA.<sup>22</sup>

In addition, the Proponent offered funding to Aboriginal Groups to: participate in regulatory processes; gather Project-based information such as TUS to inform the Application; and, to understand the potential impacts to Aboriginal Interests posed by the proposed Project. Lax Kw'alaams First Nation, Kitselas First Nation, Kitsumkalum First Nation and Metlakatla First Nation all accepted the Proponent's funding offers. Gitxaala Nation did not cash the payments that were offered by Proponent for capacity. These capacity funding payments were prior to conclusion of EA Agreements between the Proponent and Aboriginal Groups.

### 15.2 Working Group Activities

EAO coordinated Working Group engagement with CEAA. Aboriginal Groups were kept fully informed of the EA process throughout the review. In addition, Aboriginal Groups on Schedule B were invited to participate in the Working Group activities, comment on EA documents, and meet with EAO staff as outlined below.

1. EAO invited the five Schedule B Aboriginal Groups originally identified in the Section 11 Order to participate in the Working Group, along with federal, provincial and local government agencies.

During the Pre-Application stage of the EA, four Working Group meetings were held.

- An all-day introductory Working Group meeting in Prince Rupert on May 6, 2013, at which time the Proponent presented information about the proposed Project, its components, candidate VCs, and assessment field programs. EAO and CEAA presented information about the coordinated EA and how each EA process would be conducted. Working Group members had opportunities to ask questions and seek information from both the Proponent and regulatory agencies;

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<sup>22</sup> For each Aboriginal Group in Schedule B, \$5,000 was provided by EAO during the Pre-Application phase and \$10,000 during Application Review.

- An all-day technical sub-Working Group meeting was held on July 30, 2013, in Vancouver focussed on Marine Issues and included presentations by Transport Canada on LNG shipping, marine safety, and associated regulatory matters related to marine shipping and LNG terminal operations. Working Group members had opportunities to ask questions and seek information from subject matter experts, provincial and federal regulators, and Proponents;
- An all-day technical sub-Working Group meeting was held on August 1, 2013, in Vancouver that focussed on Air Quality, including methodologies for assessing effects of LNG emissions on local air quality. Working Group members had opportunities to ask questions and seek information from subject matter experts, provincial regulators (MOE), and Proponents; and
- Working Group meeting (by conference call). Proponent provided a PowerPoint presentation detailing the information presented in the development of the draft AIR. Working Group had opportunities to comment, ask questions and seek clarification the information presented.

During the Application review stage of the EA, six Working Group meetings were held.

- An all-day Working Group meeting on the Application was held in Prince Rupert April 8, 2014. Proponent provided an overview of information presented in the Application. Provincial and federal agencies, Proponent consultants and subject matter experts were in attendance to address questions and clarify information;
- A sub-Working Group conference call was held on May 7, 2014, to focus on discussions around socio-economic effects assessment and proposed mitigation measures;
- An all-day Working Group meeting was held on June 9, 2014, in Vancouver focussed on Marine Resources: Dredging and Disposal at Sea, Navigation and Human Health;
- An all-day Working Group meeting was held on June 10, 2014, focussed on Marine Resources: Fisheries, Marine Mammals, Marine Birds and species at risk;
- A half-day Working Group meeting was held on June 12, 2014, focussed on Air Quality; and
- An all-day Working Group meeting was held on October 16, 2014, focussed on discussion of the October 6, 2014, Addendum provided by the Proponent.

2. EAO provided Aboriginal Groups with an opportunity to review and provide comments on the key documents of the EA. As a matter of practice, EAO (or, in some cases, CEAA) provided meeting summaries from Working Group meetings for their review and comment. During the Pre-Application stage, which began in

September 2013 and ended on March 25, 2014, EAO provided the following documents for comment:

- Section 11 Order, which contains EAO's instructions to the Proponent on the scope, procedures, methods and consultation requirements of the EA. Through the issuance of the Section 11 Order, EAO formally directed the Proponent to consult with the participating Aboriginal Groups listed on Schedule B;
- The draft AIR, which outlines the issues to be addressed by the Proponent during the EA and the information that the Proponent must include in their Application, including the VCs and study boundaries; and
- Screening of the Application, to evaluate whether the Application contained the information required by the AIR and could be accepted for technical review by the Working Group.

During the Application Review stage, which began on March 25, 2014, and ended on November 5, 2014, EAO provided the following documents for review and comment:

- The Project Application, containing information required by the Terms of Reference for the draft AIR and EIS, including Aboriginal Groups' information, the results of the baseline studies, an assessment of potential impacts of the proposed Project, and the proposed avoidance and mitigation measures;
- Issues Tracking Table, which contains the comments and questions raised by Aboriginal Groups' representatives during the review of the Application, and the Proponent's responses;
- Draft TOC and CPD; and
- EAO's draft Assessment Report to the responsible Ministers.

Relevant comments from Aboriginal Groups were fully considered by EAO, and incorporated into the final versions of documents as appropriate. Comments on key issues received on the Application from Aboriginal Groups, along with the EAO's responses and the Proponent's responses are summarized in this Report. Detailed comments are contained in the Working Group issues Tracking Table, which has been updated and shared with the Working Group throughout the EA.

### 15.3 Government-to-Government Consultation

EAO provided the opportunity for government-to-government consultation to each of the participating Schedule B and Schedule C Aboriginal Groups to discuss their views on potential impacts of the proposed Project on their Aboriginal Interests. EAO expressed a willingness and desire to meet in person with all Aboriginal Groups throughout the EA process, and participated in the following meetings:

### **15.3.1 Pre-Application Meetings (May 2013—March 25 2014):**

- Metlakatla First Nation: May 6, 2013; November 19, 2013 (Prince Rupert);
- Gitxaala Nation: September 6, 2013 (Vancouver);
- Kitsumkalum First Nation: November 13, 2013 (Terrace);
- Lax Kw'alaams First Nation; June 10, 2013; September 27, 2013; October 29, 2013; February 25, 2014 (Vancouver); and Gitga'at First Nation October 30, 2013 (Vancouver).

### **15.3.2 Application Review Meetings (April 2014—November 2014):**

- Lax Kw'alaams First Nation: June 11, 2014 (Vancouver);
- Metlakatla First Nation: April 7, 2014 (Prince Rupert); October 21, 2014;
- Kitsumkalum First Nation: April 8, 2014 (Prince Rupert);
- Kitselas First Nation: October 22, 2014; and
- Gitxaala Nation: October 17, 2014 (Vancouver); October 23, 2014 (Prince Rupert); October 30, 2014 (Vancouver<sup>23</sup>).

## **15.4 Formal Correspondence**

In addition to numerous e-mails, telephone and other in-person communication, EAO received and responded to numerous letters from Aboriginal Groups regarding the EA for the proposed Project.

## **15.5 First Nations Workshops**

### **15.5.1 November 28, 2013 Workshop in Terrace**

The Province organized regional technical workshops with Aboriginal Groups, including a regional workshop in Terrace held on November 28, 2013. The workshop was intended to provide a forum to discuss Aboriginal representatives' questions and concerns. Workshop invitees included Aboriginal Groups represented on EA Working Groups, including Aboriginal Groups representatives on the Working Group, and provincial government staff from the EAO, OGC, MOE, FLNR, the Ministry of Aboriginal Relations and Reconciliation (MARR), and the Ministry of Natural Gas Development (MNGD).

Participants from Aboriginal Groups in this workshop included Kitselas First Nation, Kitsumkalum First Nation, Metlakatla First Nation and Gitga'at First Nation.

The objectives of the workshop were to provide:

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<sup>23</sup> The primary topic of discussion at this meeting was EAO's assessment of Gitxaala Nation's strength of claim and the use of ethno-historic information by EAO in relation to oral evidence provided by Gitxaala Nation as part of the assessment of the proposed Project.

- An overview of proposed natural gas projects, including pipelines and liquefaction facilities;
- An overview of the relevant regulatory processes and government initiatives related to these proposed projects, how Aboriginal Groups can participate in these processes, and how these processes consider stewardship issues; and
- An opportunity for Aboriginal Groups representatives to identify key issues of concern for further discussion.

EAO presented information to the workshop participants on the EAO process, including the opportunities for Aboriginal Group's to comment on key documents, how procedural aspects of consultation are delegated to proponents, EAO capacity funding, VC selection, and how potential impacts on Aboriginal Interests are assessed in the EAO process.

The workshop also included break-out group discussion on key topics of concern for Aboriginal Groups, including:

- Cumulative effects;
- Fish, wildlife and habitats;
- Shipping and effects to marine environment;
- Air quality;
- Capacity;
- Socio-economic effects; and
- Other issues of concern to Aboriginal Groups.

Following the November workshop, EAO distributed copies of the workshop proceedings and presentations to the Aboriginal Groups.

### **15.5.2 LNG Shipping Workshops**

A number of provincial government agencies, including EAO and MARR organized and facilitated two workshops dedicated to LNG marine shipping on September 6, 2013, and March 27, 2014. The purpose of these workshops was to provide an opportunity for Aboriginal Groups potentially affected by proposed LNG marine shipping to hear from key provincial and federal regulatory agencies, and to identify regional issues associated with LNG shipping through technical discussions.

In addition to EAO and MARR, the agencies that participated included MNGD, OGC, MOE, Transport Canada, Pacific Pilotage Authority, CEAA, Canada Coast Guard, and PRPA.

Coastal First Nations<sup>24</sup> (CFN) was instrumental in identifying topics of interest to Aboriginal Groups, and also presented at both workshops. Representatives from Lax Kw'alaams First Nation, Metlakatla First Nation, Kitselas First Nation, Kitsumkalum First Nation and Gitxaala Nation attended the March 27, 2014, workshop. Also participating and providing presentations on project-specific technical information were representatives from several LNG project proponents, including THE PROPONENT.

Key topics discussed at these LNG shipping workshops included the following:

- Regulatory context/waterway management;
- Permitting and authorizations;
- Provincial and federal marine spill prevention, preparedness and response;
- Marine safety;
- TERMPOL<sup>25</sup> review process;
- Ballast water;
- Ship emissions;
- Vessel waste;
- Light and noise;
- Whale strikes;
- Geographic response planning;
- Places of refuge;
- Role of Pacific Pilotage Authority; and
- Role of PRPA.

It is important to note that many of these issues were raised by Aboriginal Groups during the EA process. The LNG shipping workshops provided additional opportunities for Aboriginal Groups to ask questions of relevant regulatory agencies and to discuss issues of common concern.

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<sup>24</sup> EAO understands that CFN, for purposes of engagement with BC on LNG shipping, represents the following Aboriginal Groups: Gitga'at First Nation, Haida Nation, Heiltsuk Nation, Kitasoo Indian Band, Metlakatla First Nation, Nuxalk Nation, Wuikinuxv Nation.

<sup>25</sup> TERMPOL is a voluntary review process that examines marine transportation, navigation and safety. The Proponent conducted a TERMPOL review for the Proposed Project.

## 16. Proponent-Led Consultation Activities with Aboriginal Groups

As part of the Section 11 Order (Part G), EAO directed the Proponent to undertake procedural aspects of consultation during the EA. In addition to describing the procedural steps to be fulfilled by the Proponent, EAO also referred the Proponent to the EAO's *Guide to Involving Proponents when Consulting First Nations in the Environmental Assessment Process* (December 2013).

From 2012 to 2014, the Proponent used a number of communication and information sharing methods including meetings, site visits, telephone calls, email and written communication, as well as an invitation for a hosted tour of the Petronas LNG facility in Bintulu, Malaysia<sup>26</sup>. The Proponent-led engagement activities involved:

- Information sharing on the proposed Project regarding fish and fish habitat, marine shipping, water quality (sediment contaminants), air quality (greenhouse gas and other emissions), heritage (traditional use and archaeology), and cumulative effects impacts;
- Engagement on socio-economic issues including studies;
- EA agreements for capacity funding to support ongoing engagement and involvement in the regulatory process;
- Traditional land use studies (TLUS);
- Traditional Ecological Knowledge studies; and
- Engagement on business and skills training opportunities.

Before submitting its EIS/Application for an EA Certificate, the Proponent provided Aboriginal Groups on Schedule B of the Section 11 Order with reports on topics such as:

- Draft Aboriginal Consultation Report I;
- Summary of Procedural Consultation Activities with Aboriginal Groups September 4, 2014;
- Pre-FEED designs of the MOF, the jetty/trestle and berths;
- Marine resources with a focus on habitats in the foreshore and inter-tidal areas;
- Archaeological inventories, including CMTs, on Lelu Island and on the mainland;
- Bog and peat deposits on Lelu Island;
- LELU Island geology;
- Bathymetry of the marine areas in and around Lelu Island;
- Contaminated Site Phase I Site Investigation;
- Marine vessel movements;
- Terrestrial ecosystem and vegetation analyses;
- Bird surveys;

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<sup>26</sup> Two members of Kitsumkalum First Nation's Band Council toured the Petronas Bintulu LNG facility in May 2014.

- Wildlife observations;
- Sediment sampling results;
- Geotechnical and geophysical assessments on Lelu Island and in the marine footprint areas;
- Addendum to the Application describing design mitigations; and
- Draft Aboriginal Consultation Report II.

To assist Aboriginal Groups to participate in studies and field programs, and to provide capacity support to prepare documents, reports and review technical information throughout the EA process, the Proponent has negotiated Project agreements with Aboriginal Groups listed on Schedule B of the Section 11 Order. Table 16-1 provides a summary of the status of Project EA agreements between the Proponent and each Aboriginal Group.

*Table 16-1: Status of Project EA agreements between the Proponent and each Aboriginal Group consulted*

	Aboriginal Group	Project EA Agreement Term Sheet Tabled	Status of Project EA Agreements
1	Gitxaala Nation	Yes	complete
2	Kitselas First Nation	Yes	complete
3	Kitsumkalum First Nation	Yes	complete
4	Lax Kw'alaams First Nation	Yes	incomplete <sup>27</sup>
5	Metlakatla First Nation	Yes	complete
6	Gitga'at First Nation	Yes	complete

The Proponent's Aboriginal Consultation Plan and Reports have enabled EAO to understand the Proponent's consultation efforts to date and the perspectives of Aboriginal Groups related to those efforts.

### 16.1 Impact Benefit Agreements

The Proponent is engaged in on-going negotiations with Metlakatla First Nation, Lax Kw'alaams First Nation, Kitsumkalum First Nation, Kitselas First Nation and Gitxaala

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<sup>27</sup> The Proponent provided interim capacity funding to Lax Kw'alaams First Nation in 2013. The Proponent has also offered to negotiate an EA Agreement with Lax Kw'alaams First Nation that would provide capacity funding. On June 5, 2014, the Proponent wrote to Lax Kw'alaams First Nation to confirm that it would reimburse Lax Kw'alaams First Nation for all documented and reasonable expenses associated with the EA Process. Lax Kw'alaams First Nation has not responded to this offer as of the writing of this report.

Nation on Impact Benefit Agreements, and will continue those discussions towards agreements with those potentially affected Aboriginal Groups.

## 17. Common Concerns Raised by Aboriginal Groups

This section summarizes common concerns raised by Aboriginal Groups throughout the EA process, and EAO's responses to those concerns.

### 17.1 Environmental assessment timelines, number of projects, and capacity of Aboriginal Groups to participate in the assessment process

In February 2013, two LNG related projects were in the early stages of consideration by EAO. By February 2014, there were four LNG-related pipelines and three export facility projects in northern BC in various stages of review by EAO, as well as an amendment request for a Certified project. These projects, in addition to upstream natural gas development, mining, forestry and other natural resource development proposals in northern BC have resulted in increased consultative activity with Aboriginal Groups.

EAO heard concerns expressed by all the Aboriginal Groups identified on schedule B of the Section 11 Order about the volume and pace of the work that made it challenging for them to effectively participate in the EA. To address these concerns, EAO:

- Offered a VC Guidance training session in the summer of 2013 for Aboriginal Groups across northern BC, to provide a deeper knowledge base to participate in and understand how EAO conducts EAs;
- Encouraged proponents and Aboriginal Groups to discuss capacity funding to enable Aboriginal Groups to be engaged in technical review, community dialogue, and identification of information requirements, project reviews and responses to key documents throughout the Project review (EAO understands that funding was offered to all Schedule B Aboriginal Groups and in most cases provided for project engagement by the Proponent to Aboriginal Groups);
- Provided grant funding in lump sum amounts to Aboriginal Groups, based on all proposed projects related to LNG rather than smaller amounts being provided for each proposed project, to enable more effective use of funds for each Aboriginal Group;
- Appointed a First Nations LNG Lead to support both project-specific consultation, and strategic-level regional workshops for Aboriginal Groups;
- Organized several regional meetings with Aboriginal Groups to discuss all the proposed LNG projects together – addressing regulators roles and the regulatory process, broad government policy matters and initiatives – and to give Aboriginal Groups the opportunity to express their concerns on all the projects in a common forum;
- Worked to ensure that Working Group meetings, public open houses and public comment periods were scheduled in advance to avoid overlap, provided notice to make it easier for those with an interest in multiple projects to participate in meetings about this Project; and

- Shared and updated a schedule of all LNG project-related Working Group meetings with Aboriginal Groups.

EAO has adopted a planned approach to the multiple proposed LNG-related projects to ensure specific project EAs are conducted in the context of proposed LNG development. This approach enables Aboriginal Groups, communities and stakeholders in northern BC to have opportunities to participate in both project-specific EAs and the discussion of cross-project potential impacts and benefits.

This approach includes a Memorandum of Understanding between EAO and the OGC that:

- Streamlines project reviews to the extent practicable to avoid duplication of work for participants in the EA process;
- Coordinates Aboriginal Groups' engagement to address strategic and operational questions at the same time;
- Coordinates consultations including the sharing of strength of claim information, key concerns brought forward by Aboriginal Groups and responses from EAO provided during Project review; and
- Ensures the compliance and enforcement regime is robust throughout regulatory review and, if approvals are granted, that enforcement action is effective.

Each of these initiatives is intended to support Aboriginal Groups, communities, stakeholders and public engagement in the review of proposed LNG-related projects by bringing a strategic lens to project specific reviews.

## 17.2 Adequacy of the effects assessment including Valued Component selection and baseline study methodology

In the Pre-Application stage, EAO invited Aboriginal Groups to comment on the selection of candidate VCs that would be assessed in the proposed Project EA. During Application evaluation and review, EAO heard from several Aboriginal Groups who expressed concern about the adequacy of the effects assessment, including VC selection and baseline study methodology. For example, Gitxaala Nation proposed including additional VCs that included Aboriginal spirituality and governance. Consideration of Gitxaala Nation's proposed VCs and other issues raised by specific Aboriginal Groups is discussed in more detail in later sections of this Assessment Report.

EAO made effort to explain how Aboriginal Interests would be assessed in the EAO process. This included several, direct written responses to Aboriginal Groups, and Working Group discussions on the assessment of potential adverse effects on Aboriginal Interests. EAO also provided a presentation on the assessment of effects on Aboriginal Interests during the November 28, 2013, Workshop in Terrace, referenced

above, and attended by representatives of four of the six Aboriginal Groups on the Project EA Working Group<sup>28</sup>.

The discussions undertaken by EAO in response to questions and concerns raised by Aboriginal Groups regarding the assessment of Aboriginal Interests included a detailed description of the relationship between the selection and assessment of VCs in Part B (referred to as the assessment of bio-physical impacts on those VCs), and the assessment of potential adverse effects on Aboriginal Interests in Part C of this Report.

One of the objectives of including Aboriginal Groups in the selection and early discussion regarding candidate VCs was to ensure that Aboriginal Groups' interests were reflected in the VCs in the measurable parameters to be assessed in Part B. Appropriate issues scoping and VC selection are outlined in EAO's *Guideline for the Selection of Valued Components and Assessment of Potential Effects* (2013), and is an important document with regard to ensuring effective assessment of impacts to Aboriginal Interests. Working Group meetings included discussion on the selection of candidate VCs, associated sub-components, and measurable parameters. Section 4 of the Proponent's Application describes the rationale for the inclusion or exclusion of specific VCs.

To ensure the EA is able to appropriately consider the priorities and values of Aboriginal Groups, EAO asked Aboriginal Groups to reflect on and comment on the VCs identified early in the EA process. EAO considered the comments received from Aboriginal Groups regarding candidate VCs, and also considered the following questions to inform its assessment and guide its conclusions on potential adverse effects to Aboriginal Interests:

- Does the VC (or sub-component) pertain to Aboriginal Interests? (For example, the Marine Environment VC relates to the asserted or proven Aboriginal right to harvest marine resources for food, social and ceremonial purposes; an adverse effect on Marine Resources could have an associated adverse effect on an Aboriginal Group's Aboriginal Interest, such as fishing, hunting marine mammals or gathering shellfish or marine vegetation);
- Is the VC itself or the potential adverse effect of particular concern to Aboriginal Groups?
- Is the proposed mitigation to address adverse effects on a VC effective in mitigating the associated effect on an Aboriginal Interest?

EAO appreciates that Aboriginal Groups may view a strictly bio-physical assessment, while strongly linked to the assessment of potential effects on Aboriginal Interests, as not reflecting, or as capable of reflecting, the totality of cultural connections between the affected VC and the Aboriginal Group. For this reason, EAO has made genuine efforts to understand not only the traditional culture of the potentially affected Aboriginal Groups at the time of contact and 1846 which inform the section 35 constitutional basis

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<sup>28</sup> All six Aboriginal Groups were invited to attend by EAO. Gitxaala Nation and Lax Kw'alaams First Nation did not attend.

of Aboriginal rights and title, but also the contemporary importance of Aboriginal culture to the identity and well-being of Aboriginal Groups in the regional setting.

Part C of this Report and the associated analysis is intended to identify and cross-reference, where relevant, information from the Part B assessment of effects, in combination with other qualitative and quantitative information obtained through consultation with Aboriginal Groups in order to assess the seriousness of potential impacts on the Aboriginal Interests of each potentially affected Aboriginal Group.

Through extensive review of ethno-historic literature—which, for the Tsimshian, is particularly rich—combined with comments received throughout the EA, and careful review and consideration of the TUS and socio-economic reports, where they were provided by Aboriginal Groups on schedule B of the Section 11 Order, EAO has attempted to look comprehensively and sensitively at the manner in which the proposed Project may potentially affect Aboriginal Groups' Aboriginal Interests.

For the purposes of determining the appropriateness of the information in the Application, EAO was satisfied that the Proponent's Application contained the information as set out in the AIR. In addition, along with other important conditions, EAO set out a proposed condition to require the Proponent to update EMPs presented in the Application to reflect a number of comments made by Aboriginal Groups. The proposed condition also requires the Proponent to share those plans with Aboriginal Groups. The plans would be implemented, and would continue to be updated prior to and during construction based on site-specific considerations.

### 17.3 Cumulative Effects

Aboriginal Groups expressed concerns about the inadequacy of cumulative effects assessment of past, present and reasonably foreseeable industrial activity in their traditional territory. Specifically, many Aboriginal Groups sought a cumulative effects assessment of their territory, relative to their respective Aboriginal Interests. Throughout the review, EAO set out to address Aboriginal Groups' concerns regarding cumulative effects as it related to assessing the seriousness of impact of the proposed Project on Aboriginal Interests.

EAO considered the potential cumulative impacts of multiple proposed LNG Projects, along with past, current and reasonably foreseeable future projects, on Aboriginal Interests when assessing the seriousness of impacts on Aboriginal Interests. EAO drew on relevant information provided by the Proponent regarding cumulative effects assessment of VCs, as well the potential impacts of a proposed Project on Aboriginal Interests. Cumulative effects are examined and assessed in each VC section of Part B of this Report.

Gitxaala Nation wrote to EAO on March 17, 2014, requesting that a class assessment be conducted in relation to proposed LNG projects in British Columbia. EAO responded on May 2, 2014, stating that EAO had considered and implemented a strategic

approach to the multiple EAs for proposed LNG projects which had the effect of addressing many of the issues raised by Gitxaala Nation, including those steps and activities outlined in section 17.1 above.

#### 17.4 Synchronous Permitting

Aboriginal Groups have raised issues regarding synchronous permitting including the short timeframes required to respond to the OGC permit application requests, lack of capacity to respond to such requests and concern that permits will be issued before an EA Certificate is potentially issued by EAO.

Synchronous permitting is a component of the Memorandum of Understanding between the OGC and EAO. It is a flexible approach, giving proponents the opportunity to have both the EA and permitting processes proceed in tandem. This creates timeline efficiencies with the permitting processes if an EA Certificate is issued.

While synchronous permitting has similar attributes to *concurrent permitting*, the former proceeds without legislated timelines for decisions on the permits subsequent to any issuance of an EA Certificate. A permit for a pipeline or facility (and associated authorizations) could not be issued by the OGC in advance of an EA Certificate, but the permit applications can be considered simultaneously.

The synchronous permitting process does not lessen opportunities for Aboriginal Groups to participate and comment on permit applications that are before the OGC.

The OGC will rely on the information developed and shared in the EA process to understand any broader concerns raised by Aboriginal Groups that could necessarily inform permitting decisions and required consultation with Aboriginal Groups.

#### 17.5 Benefit Discussions and Other LNG-Related Initiatives

The Province, led by MARR, has approached Aboriginal Groups with asserted interests in the Prince Rupert and Kitimat area potentially affected by this, and other LNG-related projects, to discuss initiatives that would provide economic, employment and skills training related to the proposed Project.

##### **17.5.1 Economic Benefits**

The Province, led by MARR, has approached Aboriginal Groups with asserted interests in the Prince Rupert and Kitimat area potentially affected by this, and other LNG projects, to discuss initiatives that would provide benefits related to the proposed projects.

The engagement between BC and Aboriginal Groups identified in schedules B and C of the Section 11 Order for the proposed Project is being coordinated with engagement on the broader scope of the LNG initiative and includes:

- LNG Engagement Framework Agreements (EFA) providing capacity funding and outlining topics for discussion, including LNG export facilities, have been concluded with the Lax Kw'alaams First Nation (January 2014), Metlakatla First Nation (October 2013), Kitsumkalum First Nation (December 2013), Kitselas First Nation (October 2013), and Gitxaala Nation (February 2014) and the CFN group, which includes Metlakatla First Nation and Gitga'at First Nation<sup>29</sup>. The resulting engagements on the LNG export facility projects are in their preliminary stages as interests are identified to inform the scope of the negotiations. To assist Aboriginal Groups' engagement in these on-going discussions, the Province has provided \$150,000 to each of the above-referenced Aboriginal Groups. The Province has also provided capacity funding and will engage separately with Gitga'at First Nation to discuss specific issues related to LNG projects and Gitga'at First Nation interests.
- In September 2014, MARR initiated scoping discussions to inform the development of detailed offers for benefits agreements with each Aboriginal Group in respect of LNG development within the Aboriginal Groups' asserted traditional territories. The Province has proposed considerable benefits opportunities, including financial and in a number of cases, land opportunities to Aboriginal Groups in relation to the proposed Project. Further detail regarding these discussions with Lax Kw'alaams First Nation and Metlakatla First Nation is discussed in sections 19.1 and 19.2 respectively. EAO also understands that there are active discussions between the Province and Kitselas First Nation regarding benefits related to LNG and that the Province has had an initial scoping discussion with Gitxaala Nation and Kitsumkalum First Nation regarding benefits related to LNG. These economic benefits are in addition to any economic benefit arrangements with the Proponent and each individual Aboriginal Group. However, no such agreements have been concluded.

### **17.5.2 Employment and Skills Training**

Aboriginal Groups commented on the construction phase of the proposed Project, and specifically how their communities could benefit from employment and training, outcomes of which could maximize local employment and reduce the number of outside workers and the associated potential socio-economic effects of that workforce.

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<sup>29</sup> In August 2013 the Province of BC, through MARR, signed a Regional LNG Development Agreement to address engagement between the Coastal First Nation and British Columbia on a range of topics including: GHG, marine shipping, carbon offsets, renewable energy and economic benefits.

First Nations are a key element of the province's workforce. A number of Provincial and Federal programs exist to assist First Nations in addressing training requirements associated with the current and potential future workforce needs associated with LNG-related proposals. As economic benefit negotiations advance, the Province will be engaging Aboriginal Groups affected by LNG development to supplement community-related skills training requirements.

These initiatives are additional measures developed outside of the regulatory process, that are intended to help address the impacts of LNG development, including the proposed Project, on Aboriginal Groups' interests. Employment, training and procurement opportunities are also components of the Proponent's Impact Benefits Agreement negotiations on-going with the potentially affected Aboriginal Groups.

## 18. Summary of Potential Impacts on Aboriginal Interests

The sections below summarize impacts on Aboriginal Interests based on EAO and Proponent engagement efforts with Aboriginal Groups. They include key issues and concerns raised by Aboriginal Groups, potential impacts of the Project on Aboriginal Interests, and EAO's responses.

In assessing potential proposed Project adverse effects on Aboriginal Groups' Aboriginal Interests, including their ability to continue accessing marine and terrestrial resources, utilize traditional harvesting areas and navigate within the waters of their asserted traditional territories, EAO considered the following sources:

- Ethno-historic information related to traditional use of areas within Prince Rupert Harbour and in proximity to the Proposed Project;
- Information provided by Aboriginal Groups during the EA, including comments captured in the Issues Tracking Table;
- Comments raised by Aboriginal Groups through direct consultation with EAO;
- Issues raised by Aboriginal Groups and described in the Proponent's Aboriginal Consultation Reports;
- Information provided in the Proponent's Application and Addendum;
- Information provided by Aboriginal Groups in TUS and socio-economic reports where those reports were provided;
- Relative importance of the Project area in terms of productivity, diversity and abundance of traditionally harvested resources;
- Level of existing development in the region; and
- Relative importance of the Project area in relation to Aboriginal Groups' asserted marine territories.

### 18.1 General Impacts of the Proposed Project

#### **Marine Offloading Facility**

For the MOF, approximately 690,000 m<sup>3</sup> of material over an area of approximately 5.4 ha would be dredged. Maintenance dredging at the marine terminal is anticipated every two to five years. The dredged material would be disposed of at location(s) at sea, which would require Environment Canada approval. Other activities that have potential effects of the proposed Project are pile driving, shipping, and ship berthing during the construction phase. The MOF is described in more detail in the Proponent's Application in section 2.2.4.1.

#### **Construction Camp and Utilities**

The Proponent's Application (2.3.1.2) described a construction work camp on Lelu Island, initially to house 500 workers, and expanded to accommodate up to 4,500 workers at peak construction. In the October 6, 2014, Addendum to the Application, the Proponent has removed the worker camp from Lelu Island to a location(s) in Port Edward or Prince Rupert area that would be owned and operated by

a third party service provider. This change has resulted in avoiding trenching of utility pipes through Lelu Slough, and a reduction in emissions from diesel generators no longer required to power the camp.

Due to the fact that the exact location(s) of the worker accommodation camp is not known at this time, and because it would be owned and operated by a third party, EAO scoped the potential bio-physical effects of the off-site worker camp infrastructure out of the EA through a Section 13 Order issued on October 2, 2014. All the Aboriginal Groups identified on the Section 11 Order for the proposed Project were notified of this amendment. EAO continued to focus its assessment on the potential adverse social, economic and health effects of the work force required during the construction phase of the proposed Project, and, through a proposed EA Certificate SEEMP condition that would lead to management activities aimed at mitigating the potential social and economic effects from PNW, particularly focused on infrastructure and services pressures during construction.

### **Bridge and Access Road**

The proposed Project would include a bridge across Lelu Slough connecting Lelu Island to Skeena Drive. This bridge is described in the Proponent's Application (2.3.1.2) as the first construction activity that would occur. The bridge would be a multi-span continuous bridge on a raised vertical alignment, and would include an overhead CN Railway crossing. Lelu Slough is currently only navigable at high tide by shallow draft vessels<sup>30</sup>. The bridge height is designed to allow vessel traffic under the bridge for vessels up to the size of gillnetters. There is a potential for small vessel traffic to be affected or limited during the construction and operation phases of the proposed Project.

### **Pioneer Dock**

Prior to construction of the MOF and Lelu Island bridge access, a pioneer dock would be required for initial off-loading of construction equipment. The dock would consist of floating barges secured with piles. Marine traffic through Porpoise Channel would be affected by increased vessel traffic as a result of vessels accessing the dock.

### **LNG Production Facility and Storage**

The LNG facility would require site clearing of most of the approximately 190 ha of land on Lelu Island, with the exception of a 30 m buffer of mature forest around the perimeter of the island. The impacts would be long term, and wetland function on Lelu Island would likely not be reversible, however, a wetland compensation plan would be required, resulting in no net loss of wetland habitat. Aboriginal Group's ability to exercise Aboriginal Interests would be precluded during the construction and operational phases of the proposed Project, and would not be expected to be available for traditional pursuits upon completion of the proposed Project. Future uses for industrial purposes would likely be more compatible for this site.

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<sup>30</sup> Approximately 6% of total marine traffic observed in Porpoise Channel during the field studies travel through Lelu Slough.

### **Marine Terminal and Associated Infrastructure**

The Application described an original jetty/trestle and marine terminal design including a 2.4 km traditional pipe-pile supported trestle across Flora Bank. The original proposed Project Application described a total dredge program for the marine terminal infrastructure of approximately 7 million m<sup>3</sup> of sediment covering an area of 84.6 ha, and an associated disposal at sea program to dispose of the majority of the dredged material.

Dredging would have direct and indirect impacts to Flora and Agnew banks, with many marine species highly dependent on the habitat that these banks provide during critical life stages, including: juvenile salmon (Pink, Chum, Coho, Chinook, Sockeye, and Steelhead); eulachon larvae and juveniles; juvenile Pacific herring; juvenile English sole; Starry flounder (all life stages); and Dungeness crab (all life stages).

As a result of the potential adverse effects identified during the EA, the Proponent proposed design modifications to the jetty/trestle infrastructure to eliminate the need for dredging and other in-water construction impacts to Flora Bank and to avoid or reduce a range of potential adverse effects including loss or damage to fish habitat, effects of direct and indirect mortality to fish and marine mammals, adverse changes in water quality, reduction in potential impacts to marine navigation during the construction phase, and reduction in the overall amount of dredged material requiring disposal at sea.

The Proponent described these modifications to the marine infrastructure in an Addendum to the Application dated October 6, 2014.

The modified design for the marine terminal and berths include approximately 100 ha of marine infrastructure that includes a 2.7 km combination clear span cable suspension bridge (1.6 km) and traditional pipe pile jetty (1.1 km) from Lelu Island to Chatham Sound. The construction of the marine infrastructure potentially effects Aboriginal Groups' ability to access fishing, hunting and gathering sites within the Project area due to the presence of vessels and barges during the Construction Phase, and safety and exclusion zones during the operational phase of the proposed Project.

### **Differences Between Potential Construction Phase Effects and Potential Effects of LNG Facility Operations**

The primary aspects of the proposed Project that have the potential to impact Aboriginal Interests, including traditional uses of the land, during the Construction Phase of the proposed Project include:

- Precluding or inhibiting an Aboriginal Group's access to lands and waterways where fishing, hunting of marine mammals and gathering activities occur in the immediate vicinity of the proposed Project;

- Destroying or reducing productive capacity of areas of fish, animal or plant habitat such that these areas no longer support the exercise of harvesting activities;
- Impacting cultural sites or locations described by Aboriginal Groups as being of sacred or spiritual significance;
- Changes to Aboriginal Groups' diet of traditional foods and related potential effects on community health and well-being;
- Visual and aesthetic effects; and
- Increased pressure on traditional resources from increased recreational fishing due to influx of workers to the region.

**During the Operation Phase of the proposed Project the potential impacts on Aboriginal Interests include:**

- Inhibiting access from LNG shipping to Aboriginal Groups' access to lands and waterways where fishing, hunting of marine mammals and gathering activities occur;
- Changes to behaviour of marine mammals from LNG carriers and tugs, and direct mortality to marine mammals from ship strikes;
- Accidents and malfunctions resulting in spills, ship collisions, groundings;
- Potential effects of air emissions on vegetation, terrestrial wildlife habitat and fresh water fish; and
- Visual impacts to culturally important viewsapes.

**18.2 Potential Impacts on Aboriginal Interests**

EAO sought input from each Aboriginal Group on the nature and scope of their Aboriginal Interests and how they might be impacted by the proposed Project. A summary of the potential impacts is provided below. Responses to the full set of concerns are described in the two iterations of the Aboriginal Consultation Reports, Issues Tracking Table which has been regularly updated and shared with the Working Group throughout the EA, as well as in each Aboriginal Groups' section of this Report (section 19 below).

With respect to assessing the seriousness of potential impacts on Aboriginal Interests, EAO considered relevant factors, including:

- The location of each Aboriginal Group's traditional territory;
- Past, present, and anticipated future Aboriginal uses of the proposed Project area and its surroundings, including the frequency and timing of such uses by each Aboriginal Group;
- The baseline conditions of selected VCs, including those associated with the exercise of Aboriginal Interests, incorporating consideration of other development in the local or regional area that may contribute to the current condition of the VCs;

- The impact of the proposed Project on the current exercise of Aboriginal Interests;
- Mitigation measures proposed to avoid or minimize adverse effects to corresponding Aboriginal Interests;
- Residual and cumulative effects of the proposed Project on VCs associated with the exercise of Aboriginal Interests (e.g. fish, vegetation, water quality);
- The extent to which the proposed Project could affect each Aboriginal Group's access to, and use of the proposed Project area to exercise Aboriginal Interests;
- The relative importance of the proposed Project area and its surroundings to the exercise of each Aboriginal Group's Aboriginal Interests, including any special characteristics or unique features of that area; and
- The relative availability of other areas in reasonable proximity, within the traditional territory of each Aboriginal Groups, where the meaningful exercise of Aboriginal Interests could reasonably occur.

### 18.3 Potential Impacts on Specific Aboriginal Interests in the Marine Environment

#### **18.3.1 Fishing**

All of the Aboriginal Groups consulted during the EA expressed concerns related to the potential adverse effects of the proposed Project on the Aboriginal right to fish marine fish species, including salmon, eulachon, herring, halibut, cod, and other ground fish such as snapper, flounder and sole, and crab, prawns and shrimp.

For the assessment of potential effects to marine resources, the spatial boundaries of the RAA and LAA were the same and includes the PDA, three potential shipping routes (between the terminal and Triple Island Pilot Station), plus an approximate 10 km buffer on either side of the potential shipping routes and extending south to Arthur Pass between Smith and Porcher Islands. These areas were identified by all Aboriginal Groups consulted during the EA as marine resource harvesting locations, and overlap with asserted marine territories.

The LAA contains a rich diversity of marine fish important to Aboriginal Groups' traditional marine resource harvesting and diet. These include all five species of Pacific salmon; Pacific herring, eulachon, Pacific halibut, octopus, and a variety of rockfish.

Temporal boundaries discussed in the Application included the timing of important ecological events in the life cycle of potentially affected species, including feeding, migration, and spawning; and, periods of peak productivity. Spring and summer were identified as the most important seasons for fish in the study area, and includes the migration of juvenile salmon from the Skeena into transitional zones of eelgrass habitat in coastal waters where the juvenile salmon seek food and refuge from predators during adaptation to marine conditions.

Eulachon migration into the Skeena Rivers from offshore waters begins in March and April. Temporally, these periods – beginning with eulachon in March and late spring and summer with salmon – align with the seasonal round of traditional Tsimshian marine harvesting activities.

The Application identified the following potential effects on marine resources including fish and fish habitat:

- Change in sediment or water quality;
- Change in fish habitat;
- Direct mortality or physical injury to fish; and,
- Change in behaviour of fish.

Concerns expressed by Aboriginal Groups in relation to potential effects on fishing include the following:

- Impacts to marine ecosystems and fish and fish habitat and marine vegetation, particularly the sensitive habitat on Flora Bank;
- Impacts on fish life cycles, migration and fish habitat (species of specific interest include salmon, eulachon, and ground fish), particularly Skeena River fisheries;
- Adverse changes in behaviour of fish;
- Impacts of marine infrastructure;
- Dredging, including toxicity of disturbed sediments;
- Disposal at sea, including toxicity of disturbed sediments;
- Adverse changes in sediment or water quality affecting Aboriginal diet;
- Direct injury or mortality to fish from construction activities;
- Cumulative effects on marine resources;
- Interference by vessel traffic during construction phase and LNG shipping during operation phase; and,
- Effectiveness of proposed marine habitat offset measures.

The assessment of the Marine Resources VC as described in section 5.6 of Part B of EAO's assessment report identified the following potential adverse effects to fish and fish habitat:

### **Total Suspended Solids (TSS)**

Change in sediment or water quality – through project construction activities, and vessel maneuvering and maintenance dredging during operations. Activities have potential to increase TSS levels which can reduce light penetration for plant growth and affect gills and other sensitive tissues of fish.

### **Change in fish habitat**

Project activities expected to result in quantifiable changes to fish habitat include: dredging, blasting, excavation of intertidal and sub tidal habitats within the MOF area; pile installation; and, sediment deposition from vessel manoeuvring at the berths during operations. Pile installation for the marine terminal, MOF, the pioneer dock, and

installation of sewage pipes along the seabed between Lelu Island and the mainland (under the bridge) would also result in changes to fish habitat.

### **Direct mortality or physical injury to fish**

Fish mortality or physical injury could occur during construction activities by burial, crushing or blasting. Fish could sustain auditory injury from underwater noise associated with impulsive (pulse) sounds such as blasting and pile driving. Pressure waves can rupture fish swim bladders or other internal organs, causing injury or potential mortality. During operations, vessel maneuvering causing sedimentation may cause fish burial.

Mitigation measures described in the Application to avoid or reduce adverse effects to fish or fish habitat (including marine mammals) caused by project activities are as follows:

- Hard multi-faceted shoreline protection material would be used where needed (e.g., at the trestle abutment) to promote colonization by marine biota;
- Habitat offsetting would be implemented to achieve no net loss of productivity;
- The outer limits of foreshore construction areas (the MOF, marine terminal, bridge and pioneer dock) would be demarcated to avoid habitat damage outside of these areas;
- DFO's Blasting Guidelines would be implemented including enforcing a safety radius of 500 m;
- Blasting would be conducted within DFO least-risk timing windows;
- Dungeness crabs would be relocated from construction zones. Material from the dredge area that is suitable for construction or habitat compensation would be used, where possible;
- Implement a Pile Driving Management plan as outlined in section 13.5.4.2 of the Application that would incorporate vibratory methods of pile installation with the use of a bubble curtain to reduce noise effects;
- Implement a Blasting Management Plan including management measures for both terrestrial and underwater blasting (section 24.4.8); and,
- Vibratory methods of pile installation with the use of a bubble curtain to reduce noise effects.

### **18.3.2 Hunting Marine Mammals**

All Aboriginal Groups consulted during the EA expressed concerns about potential adverse proposed Project effects on marine mammals. Several species of marine mammals are resident or seasonally present in the LAA. Species of conservation concern by COSEWIC and SARA observed in the Project area include humpback whale, northern resident and Bigg's killer whale, and harbour porpoise. Other common species are Dall's porpoise, Pacific white-sided dolphin, and harbour seal. Less common species include sea lions, other species of whales, and sea otters.

The Application identified the following potential effects on marine mammals and their habitat:

- Change in sediment or water quality;
- Change in habitat;
- Direct mortality or physical injury to marine mammals; and
- Change in behaviour of marine mammals.

Concerns expressed by Aboriginal Groups in relation to potential effects on marine mammals include the following:

- Impacts to marine ecosystems habitat;
- Adverse changes in behaviour of marine mammals;
- Impacts of marine infrastructure;
- Dredging, including toxicity of disturbed sediments;
- Disposal at sea, including toxicity of disturbed sediments;
- Adverse changes in sediment or water quality;
- Direct injury or mortality to marine mammals (ship strikes on marine mammals);
- Interference with Aboriginal Groups' ability to access marine mammal hunting sites due to LNG shipping and exclusion/safety zones;
- Interference by vessel traffic during construction phase and LNG shipping during operation phase; and
- Cumulative effects on marine resources.

Mitigation measures incorporated in the Application to avoid or reduce adverse effects changes to marine mammals caused by project activities are as follows:

- DFO's Blasting Guidelines would be implemented including enforcing a safety radius of 500 m, and ensuring marine mammals are not present in the safety radius prior to blasting;
- Blasting would be conducted within DFO least-risk timing windows;
- Marine mammal observation program during pile driving and blasting;
- Vibratory methods of pile installation with the use of a bubble curtain to reduce noise effects.

### **18.3.3 Gathering Shellfish and Marine Vegetation**

The LAA contains a rich diversity of invertebrates important to Aboriginal Groups' traditional marine resource harvesting and diet. These include Dungeness crab and Pandalus shrimp, prawns; various species of shellfish, including barnacles, mussels, cockles, limpets, geoducks, periwinkles and clams. As many as 20 species of sea weed are recorded as gathered by Aboriginal Groups and include kelp and eel grass. Aboriginal Groups described the areas near Lelu Island as harvesting sites for a variety of fish and other marine resources, including crab, shrimp and prawns. Specific effects on each Aboriginal Group will be discussed further in this report, and based on concerns received from those Aboriginal Groups throughout the EA.

Stephens Island is noted as a site for shellfish, sea weed and bird egg gathering, and a general fishing area for some Gitxaala Nation members.

The Application identified the following potential effects on marine resources including shellfish and marine vegetation:

- Adverse changes in sediment or water quality;
- Sedimentation;
- Acidification of marine vegetation from air emissions;
- Loss of habitat;
- Disposal at sea, including toxicity of disturbed sediments;
- Reduced access to shellfish and marine vegetation gathering sites;
- Interference by vessel traffic during construction phase and LNG shipping during operation phase and related navigation safety concerns; and
- Increased pollution from shipping and vessel anchoring.

The Aboriginal Groups consulted during the EA expressed concern regarding the potential adverse effects of the Project on the Aboriginal right to gather marine resources, including shellfish and marine vegetation for subsistence, social and ceremonial purposes. These concerns are also noted in the TUS information provided by Aboriginal Groups.

Potential effects to Skeena River fisheries and the eel grass habitat at Flora Bank were key concerns of Aboriginal Groups throughout the EA. Potential effects on fish and fish habitat were identified through consultation with Aboriginal Groups and through discussions with DFO and Environment Canada.

Dioxins and furans are present at low levels in sediment within the LAA as a result of historic discharges of effluent from the former Skeena Cellulose pulp mill located at Watson Island, approximately 3 km from Lelu Island. The assessment of potential effects to marine biota of contaminant re-suspension during the construction phase deemed that there would be no predicted toxicological risks to aquatic life. For a more detailed discussion of the sediment sampling and analysis of residual effects of historic contaminants see section 13 of the Proponent's Application.

#### **18.3.4 EAO Response to Aboriginal Interests Associated with Fishing, Hunting and Gathering Effects in the Marine Environment**

EAO considered the following key factors in assessing the potential impacts of the proposed Project on an Aboriginal Group's Aboriginal Interest associated with the marine environment:

- The avoidance or mitigation to potential adverse effects on Aboriginal Interests associated with fishing, hunting marine mammals and gathering marine vegetation and shellfish resulting from the jetty reconfiguration described in the Addendum to the Proponent's Application (the "Addendum"), dated October 6, 2014.
- As a result of the Assessment, and the identification of potential adverse effects to the marine environment, the Addendum is the Proponent's major design modification intended to avoid and reduce potential effects. The Addendum

described a new marine terminal and berth configuration of approximately 100 ha of marine infrastructure that includes a 2.7 km combination clear span cable suspension bridge (1.6 km) and traditional pipe pile jetty (1.1 km) from Lelu Island to Chatham Sound.

- These design modifications were presented to Aboriginal Groups by the Proponent<sup>31</sup>, including discussions with representative of the Skeena Fisheries Commission<sup>32</sup> during the week of September 22, 2014, and were the subject of discussion with the Working Group on October 16, 2014. Prior to submitting the Addendum, the Proponent sought discussion with Aboriginal Groups to obtain input and understanding of the Aboriginal Groups' views on the design modifications to address key concerns about potential effects to marine resources by Aboriginal Groups throughout the EA.
- The Proponent's proposed changes to the design and construction of the jetty and marine terminal are a direct result of the identification of potential adverse effects to marine resources, and, in particular the use of marine resources by Aboriginal Groups as identified during consultation throughout the EA.

The construction of the marine infrastructure potentially effects Aboriginal Groups' ability to access fishing, hunting and gathering due to the presence of vessels and barges during the construction phase, and safety and exclusion zones during the operational phase of the Project.

The reduced effects of the jetty reconfiguration mitigation include the following:

- Overall dredging reduced by more than 7 million m<sup>3</sup>, from approximately 7.7 million m<sup>3</sup> to 690,000 m<sup>3</sup> (at the MOF);
- Reduction in removal, transportation and disposal at sea of dredged sediment from 7.7 million m<sup>3</sup> to approximately 200,000 m<sup>3</sup> (remaining 490,000 m<sup>3</sup> is rock that will be re-used for Project construction);
- Duration of the in-water construction period reduced from 27 months to 6 months<sup>33</sup>;
- Number of barge movements reduced from 2,555 to 85;
- No armouring of sea bed required at marine berth;
- No breakwaters required; and
- Trenching of utility (water and sewer) pipes through Lelu Slough no longer required.

In addition to the avoidance and reduction in potential adverse effects to marine resources described above, the Proponent's commitments to mitigate construction-related effects outlined in section 13 of the Application include the following:

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<sup>31</sup> These discussions are detailed in the Proponent's Addendum to Aboriginal Consultation Report 2 (ACR 2), dated October 6, 2014.

<sup>32</sup> Skeena Fisheries Commission has explicitly provided technical advice to Lax Kw'alaams Nation on matters related to potential adverse effects on salmon and salmon habitat.

<sup>33</sup> This estimate is dependent on weather conditions during the construction period

### 18.3.5 Mitigations to address adverse changes in sediment or water quality

- A 30 m vegetation buffer will be retained around Lelu Island, except at access points to reduce erosion and control sediment related to land-based construction to reduce TSS inputs into the marine environment;
- TSS and turbidity will be monitored during in-water construction activities;
- Adjustments to in-water construction activity based on any exceedances of TSS or turbidity to applicable water quality guidelines;
- Implementation of additional water quality change mitigations based on monitoring, including silt curtains;
- Dredging will be conducted using methods and/or equipment that reduce sediment spill;
- Beneficial re-use of sediment;
- Arrivals and departures of LNG carriers will be avoided at low water slack tide; and
- Use of alternative tug propulsion systems.

Additional Factors considered relating to potential adverse effects are provided under each individual Aboriginal Group's section of this Assessment Report. The following general factors were taken into consideration by EAO in assessing potential adverse effects of the proposed Project on Aboriginal Groups' Aboriginal Interests associated with harvesting of marine resources:

- The assessment of potential effects of the proposed Project on Aboriginal Groups' Aboriginal Interests associated with fishing, hunting and gathering of marine resources is informed by the analysis of potential residual effects on fish and fish habitat and water quality as characterized in the Marine Resources VC in section 5.6 of Part B of this report;
- Marine resource harvesting sites, as identified during consultation with Aboriginal Groups, and in the TUS reports provided by Aboriginal Groups, that overlap with or are in proximity to the proposed Project were considered in relation to past, present and anticipated future use of the area for those marine harvesting activities;
- EAO considered the effectiveness of the Proponent's proposed mitigation measures to avoid or reduce potential adverse effects to marine resources. This includes the design modifications to the jetty/trestle and marine berths described in the Addendum to the Proponent's Application and described above;
- The majority of works would have long-term impacts to the exercise of Aboriginal rights on Lelu Island;
- The timelines for construction would involve site preparation as early as 2015, with the majority of Phase 1 construction works undertaken in 2016 to 2019; and
- Other uses of Lelu Island and adjacent marine infrastructure area would be inhibited or precluded during the construction phase, and altered or inhibited during operation phase.

In addition to the above and other mitigation measures described in Section 13 of the Proponent's Application, the Proponent will be required to follow any applicable provincial or federal regulations and permit requirements associated with in-water works and near shore construction. These include the following:

- DFO Blasting Guidelines which ensures that marine mammals are not present in the safety radius prior to blasting;
- Blasting will occur within DFO least-risk windows to reduce mortality to fish;
- Vibrator hammers and bubble curtains will be used whenever feasible to reduce under water noise and potential changes in fish and marine mammal behaviour;
- LNG vessels and tugs will not exceed a speed of 16 knots within the LAA to reduce potential for ship strikes on marine mammals;
- LNG vessel speed will be reduced to 6 knots when approaching Triple Island Pilot Station to reduce ship strikes on marine mammals;
- A Pile Driving Management Plan will be implemented that outlines low noise techniques and a marine mammal observation program to further avoid or reduce in-water construction effects to marine resources;
- Proponent commitments along with applicable provincial and federal regulations and permit requirements, including any required Habitat Offset Plans; and
- Any additional mitigation measures required under by DFO and OGC including, OGAA, federal *Fisheries Act*, and *Navigation Protection Act*.

If an EA Certificate is issued and the proposed Project proceeds to permitting, the Proponent would be required to complete any additional baseline and field studies to fulfill permitting requirements.

- Proposed Conditions of the EA Certificate include:
  - Continued engagement by the Proponent of Aboriginal Groups regarding the development of the EMP, Socio-Economic Effects Management Plan, and in refinements of other plans prior to required submissions to regulators as required by regulatory authorities;
  - A fish tissue sampling program to validate assessment of potential human health effects of re-suspended sediments from dredging on the consumption of marine foods;
  - The maintenance of a minimum 30 m buffer around the perimeter of Lelu Island;
  - Development and implementation of a Socio-Economic Effects Management Plan;
  - Development and implementation of an air quality monitoring program;
  - Plans would also be updated prior to and during construction based on site-specific conditions, and specifically include:
    - Construction and Operations EMP and its component plans;
    - Traffic Impact Assessment;
    - Traffic Management Plan;
    - Traffic Safety Plan;
    - Vegetation Buffer Management Plan;

In response to concerns raised by Aboriginal Groups and comments on the draft Assessment Report, EAO proposes several specific conditions related to the marine environment, including development and implementation of the following plans:

- A fish tissue sampling program for flounder and crab to assess toxin concentrations and validate assessment of potential human health effects of contaminants in re-suspended sediments on marine foods.

In addition, the Proponent would be required to continue to implement the EAO-approved Aboriginal Consultation Plan for all phases of the proposed Project, including information sharing, discussion of site-specific mitigation measures, the development of specific environmental management plans, and any compensation plans developed to meet regulatory requirements.

EAO recognizes that further information and analysis regarding impacts to marine resources is ongoing in the federal review process. However, for the purpose of meeting the Crown's duty to consult and accommodate pursuant to the *Haida* framework in relation to the decision under the Act, EAO is of the view that there is sufficient information at this stage of the regulatory review being conducted by the Province, to inform the assessment of seriousness of impacts on Aboriginal Interests associated with marine resources and to inform accommodations appropriate to this stage.

EAO also recognizes that should the ongoing assessment of impacts on marine resources by CEAA indicate additional impacts not considered by EAO, there will be opportunities to accommodate those additional impacts through the CEAA process.

In consideration of the above Project mitigation measures, and in particular the design modifications to the marine infrastructure, subsequent provincial and federal regulatory requirements, and the conditions proposed by EAO, EAO predicts the residual effects from the proposed Project are not expected to cause significant adverse effects to fish and fish habitat including shellfish, marine mammals and marine vegetation.

A more detailed assessment of potential effects of the proposed Project on fish and fish habitat is contained in the Application in Section 13; the Addendum Section 3; and section 5.6 of Part B of the Assessment Report.

#### 18.4 Shipping

Aboriginal Groups expressed concerns regarding the potential adverse effects on their ability to access preferred marine resource harvesting locations during the construction and operation phases of the proposed Project. Aboriginal Groups commented on concerns regarding how vessels and barges employed to construct the jetty and marine terminal, and the MOF may restrict movement and safe navigation in around Lelu Island, including Chatham Sound, Porpoise Channel and Lelu Slough. Aboriginal Groups also commented on the potential effects from the movement of LNG carriers and escort tugs during operation of the facility and marine terminal, including how safety

and exclusion zones and general vessel traffic could interfere with access to marine resource harvesting sites.

In their report entitled “*Impact Assessment of LNG and Other Development on the Metlakatla First Nation*”, Metlakatla First Nation noted that:

In the Prince Rupert area, shipping is a key environmental concern, both due to past and present terminal development and shipping activity and future planned growth in this industry<sup>34</sup>.

Metlakatla First Nation also note in their report that existing shipping routes overlap with many key traditional harvest areas. Gitxaala Nation raised concerns regarding the potential for LNG shipping to require Aboriginal fishers to travel further offshore and around Kitson Island to reach Inverness Passage, resulting in increased exposure to and risk from rough weather conditions, rather than the more direct and less exposed route through Porpoise Channel.

In the section of the *Gitxaala Socio-Economic Report* (July 2014), entitled Travel Routes and Access to Traditional Territories, Gitxaala Nation mention the preferred route of their community members en route to and from Port Edward and Prince Rupert is near the shores of Lelu and Ridley Islands, particularly during rough weather<sup>35</sup>.

Increased fuel costs and lost productive fishing time were noted in comments from Aboriginal Groups. Anchored vessels are noted as a concern to Aboriginal Groups, potentially creating further impediments to fishing and other marine resource harvesting activities, as was the effect of the proposed Project on the ability of vessels to navigate under the trestle and under the bridge that would connect Lelu Island and Skeena Drive (across Lelu Slough).

The specific Aboriginal Interests potentially affected by LNG marine shipping include:

- Decrease (real and perceived) in safety when accessing resource gathering areas;
- The Aboriginal right to fish species (such as eulachon, salmon and ground fish) and marine mammals;
- the Aboriginal right to gather marine resources such as shellfish and marine vegetation;
- The ability to navigate and access traditional harvesting areas, including the impacts to access created by Marine safety exclusion zones;
- Cumulative effects of increased marine traffic;
- Impacts on fish and fish habitat that could affect food security and food quality;

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<sup>34</sup> 2014:83

<sup>35</sup> This comment was also raised by Bruce Watkinson, Gitxaala technical representative, and fisherman, and recorded by EAO during Working Group discussions in the pre-application stage of the EA.

- Avoidance of traditional harvesting locations due to increased marine traffic; and
- Accidents and malfunctions, including spills from LNG vessels and the associated effects to fish and other marine resources.

The Proponent described the following mitigation measures and commitments in section 15 of the Application to avoid or reduce potential adverse effects on Marine Use and Navigation:

- LNG carriers, tugs and barges will not exceed a speed of 16 knots within the LAA;
- LNG carrier speed will be reduced to 6 knots when approaching the Triple Island Pilot Boarding Station;
- A Marine Communications Plan will be implemented to identify measures to inform mariners of project construction activities, communication protocols (notices to mariners and notices to shipping), and project-related safety procedures;
- Lighting will be designed to reduce fugitive light that might impact mariners or effect the behaviour of fish and marine mammals;
- Navigational aids will be installed where required to enhance navigational safety;
- Navigational charts will be updated to show MOF, trestle and berth locations;
- Clearance of 11 m above highest high water for gillnetters to navigate beneath the Lelu Island bridge and the trestle;
- Escort vessels will be used to confirm routes are clear and safe for LNG carriers;
- Tugs will be used to ensure the safe transit and docking of LNG carriers;
- Traffic management and routing options will be further assessed to assist small vessel navigation; and
- Limits on environmental conditions will be established to ensure operations can be safely conducted.

#### **18.4.1 EAO Response to Effects of LNG Shipping on Aboriginal Groups' Access to Fishing, Hunting and Gathering**

EAO considered:

- The potential effect of precluding or inhibiting Aboriginal Groups' access to marine harvesting areas during the construction and operation phases of the proposed Project;
- Potential increase in recreational boaters during construction phase;
- Diversion of marine traffic into other areas that could impact Aboriginal Groups' access to resource harvesting sites;
- The geographic size of the areas potentially affected during construction and by LNG shipping in relation to Aboriginal Groups' asserted traditional territories;

- The time-limited construction phase, and
- Mitigation measures described in the Application and Addendum.

EAO notes that construction works in the waterways are subject to approval by Transport Canada. LNG shipping is also subject to federal regulation under the *Navigation Protection Act*, *Canada Shipping Act*, and Canadian Ballast Water Control and Management Regulation, along with PRPA's administrative authority under the Canada *Marine Act* within the boundaries of the Port in Prince Rupert Harbour.

EAO's analysis acknowledges that vessel traffic during the construction phase may alter navigation and present a temporally limited effect on navigation within the proposed Project area. Some restrictions for safety during operation may also result in loss of access to some areas currently used for crabbing and fishing, however, those areas are relatively small proportionate to available productive areas.

Overall such safety restrictions do not suggest that these effects would represent a serious impact to Aboriginal Groups' ability to harvest marine resources. Considering the above mitigation measures, Proponent commitments, and regulatory requirements, EAO concludes that the impact from LNG shipping on Aboriginal Groups' Aboriginal Interests to fish, hunt marine mammals and gather shellfish and marine vegetation would be minor.

### 18.5 Air Quality

The potential adverse effects of air emissions during both the construction and operation phases of the proposed Project include potential effects from acidic deposition (acidification effects to soil and vegetation) and eutrophication (acidic deposition on fresh water bodies affecting fish and other fresh water aquatic life). The potential of acidic deposition on direct mortality and loss of habitat were assessed. The potential human health effects from emissions were also raised as concerns by Aboriginal Groups during the EA.

The specific Aboriginal Interests potentially affected by changes in air quality include:

- Fishing (e.g. trout, sucker and white fish);
- Hunting of terrestrial wildlife; and
- Gathering of food and medicinal plants.

Aboriginal Groups' concerns expressed during consultation regarding air quality are summarized as:

- Quality of facility air emissions;
- Potential effects on human health and the environment;
- Questions regarding dispersion modelling and assessment methods; and
- Impacts of GHGs.

Overall, Prince Rupert and Port Edward currently have good air quality; all measureable parameters are below the most stringent applicable air quality objectives. There are localized higher levels of NO<sub>2</sub> west of Prince Rupert associated with marine-based activities, but are currently below air quality objectives.

Section 6 of the Proponent's Application identified that adverse air quality effects would result from activities associated with different proposed Project components. The main sources of air emissions during the construction phase would include ground disturbance, site clearing, operation of heavy construction equipment, and the delivery of equipment and supplies to the project site.

Following commissioning, the primary emissions sources during routine operations would include land and marine project activities. Land-based emissions would be produced by gas compressor drivers, thermal oxidizers and flares. Marine-based sources of air emissions would include LNG carriers and a team of assist tugboats.

The Proponent stated that the primary air quality effect is the potential increase in airborne concentrations of SO<sub>2</sub>, (NO<sub>2</sub>, CO, particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>), H<sub>2</sub>S and volatile organic compounds VOCs (contaminants that readily evaporate into the air), collectively known as CACs.

### **18.5.1 EAO Response to Effects of Air Quality on Aboriginal Groups' Aboriginal Interests**

Section 6 of the Proponent's Application and section 5.1 of Part B of EAO's Assessment Report describe the following mitigation measures to reduce potential effects on air quality:

- Proposed Design that would incorporate the MOE's BAT policy (2012) to reduce air emissions. Control technologies would focus on managing NO<sub>x</sub> emissions. PM<sub>2.5</sub> emissions are expected to be managed through smokeless flare technology. CO and hydrocarbon emissions (e.g., VOCs) would be reduced by optimizing combustion;
- Thermal oxidizers to oxidize H<sub>2</sub>S, other sulphur compounds, and waste VOCs extracted from the natural gas;
- Institute and maintain best management practices for its processing systems (i.e., the use of treated feed gas as fuel for power generation);
- Implement a natural gas leak detection program;
- LNG carriers and assist tugs would use low-sulphur fuel in compliance with applicable marine emission standards;
- Dust associated with the use of facility roads would be reduced by using dust suppressants, and surface paving;
- Vehicle and off-road equipment would use low-sulphur fuel when available, and would undergo regular tuning and maintenance; and
- Vehicle idling times during all project phases would be kept to a minimum.

In addition, the Project would be subject to permit emissions limits and requirements. The proposed Project would require a waste discharge permit under the BC *Environmental Management Act* to authorize emissions of CACs. Provincial and federal AAQOs guide permit development, and provide the framework for evaluating observed or predicted air contaminant concentrations.

The Proponent would also be required, through an EA Certificate condition, to develop and implement an air quality and acidic deposition monitoring program that would determine the appropriate level of air monitoring, and soil and water sampling and reporting requirements at permitting to ensure potential effects from emissions are monitored and that data is available to the public. In the event that MOE establishes a regional air quality and deposition monitoring program within the local airshed, the EA Certificate holder would be required to participate in it.

Considering the above-noted mitigation measures, permit requirements and EA Certificate conditions, EAO concludes that the effects of changes in air quality on Aboriginal Groups' Aboriginal Interests would be negligible.

### 18.6 Ambient Light and Visual Quality

The specific Aboriginal Interests potentially affected by changes in ambient light and visual quality include:

- Fishing (e.g. eulachon, salmon and ground fish);
- Hunting of marine mammals and terrestrial wildlife; and
- Gathering marine resources (e.g. shellfish and marine vegetation and terrestrial plants).

Aboriginal Groups' concerns expressed during consultation regarding ambient light and visual quality are summarized as:

- Visual impacts of shipping and Project facilities;
- Impacts of ambient light from shipping and Project facilities, including marine infrastructure; and
- How visual quality impacts may affect human health and quality of life.

#### **18.6.1 EAO Response to Effects of Ambient Light on Aboriginal Groups' Aboriginal Interests**

Section 9 of the Proponent's Application ranked the potential effect of ambient lighting during construction as low due to the majority of construction activities occurring during the daytime hours. Project-related lighting during night-time hours would be limited.

During operations, the following proposed Project components have the potential to interact with the environment:

- The operation of the LNG facility and supporting infrastructure on Lelu Island;
- The marine terminal; and
- LNG carriers.

The Proponent describes the following mitigation measures to reduce effects of ambient light to interact with the environment:

- Retaining a 30 m mature vegetation buffer around Lelu Island to reduce effects of increased light;
- Construction lighting would be selected to reduce light spill and would include shielded fixtures where practical;
- A centralized lighting control system would be used to selectively turn lights off when not required; and
- Design principles such as LEED guidelines would be used where applicable.

Overall, considering the above-noted mitigations EAO concludes that the effect of ambient lighting and visual quality on Aboriginal Groups' Aboriginal Interests would be negligible.

### 18.7 Terrestrial Wildlife, Vegetation and Wetland Resources

The specific Aboriginal Interests potentially affected by changes in terrestrial wildlife and vegetation and wetland resources include:

- Hunting terrestrial wildlife; and
- Gathering food and medicinal plants.

Aboriginal Groups' concerns expressed during consultation regarding Terrestrial Wildlife and Vegetation and Wetland Resources are summarized as:

- Wildlife and marine bird avoidance of key habitat;
- Reduction of habitat;
- Impacts of marine infrastructure and lighting on birds;
- Lack of information on wetland habitat compensation plans;
- Impacts of marine vessel traffic on seabirds and their movements;
- Effects of light and flaring on birds;
- Impacts on freshwater ecosystems and vegetation due to decreased air quality; and
- Introduction of invasive, non-native plant species that could out-compete native plants.

### **18.7.1 EAO Response to Effects on Aboriginal Groups' Ability to Hunt Terrestrial Wildlife and Gather Terrestrial Plants**

The primary potential effects of the proposed Project on Aboriginal Groups' ability to hunt terrestrial wildlife and gather food and medicinal plants would be due to noise disturbance, direct mortality and destruction or reduction in productive capacity of areas of habitat supporting species traditionally harvested by the Aboriginal Groups.

The site clearing and construction of the LNG production facility on Lelu Island represents the greatest potential effect on habitat and thus on terrestrial wildlife and plants from direct mortality and loss of habitat due to the removal of trees, shrubs and other vegetation. There would be permanent or long term disturbance of vegetation and wetlands on Lelu Island, including removal of existing timber, shrubs and ground cover that is currently protective habitat for wildlife. Food and medicinal plants traditionally harvested on Lelu Island by Aboriginal Groups would not be available as a result of site clearing and construction.

Large and medium-sized terrestrial mammals have high mobility and would likely avoid interaction with site clearing and construction activities. The proposed Project is expected to have negligible effect on movement patterns of terrestrial species occupying habitats on the mainland portion of the RAA. There exists a relative abundance of species and productive habitat within the region.

Mitigation measures to avoid or reduce effects to terrestrial wildlife are described in section 11 of the Proponent's application and include:

- A 30 m vegetation buffer will be maintained around the perimeter of Lelu Island;
- Clearing activities will occur outside of the breeding season for terrestrial birds, amphibians and bats, and will avoid the breeding period for raptors;
- Bird surveys will be conducted in advance of clearing and buffers will be established around active nests;
- Relevant sections of the BC *Wildlife Act* will be adhered to if raptor nests are identified within clearing limits;
- Permanent fencing would be erected around the facility; and
- Wildlife education and training would be provided to construction workers.

Of the 24 shrubs species documented as used by Aboriginal Groups, ten were observed during the Proponent's field surveys: Alaska blueberry, black crowberry, blueberries, bog cranberry, devil's club, juniper, Labrador tea, red huckleberry, salal, and salmonberry. Of the ten species of herbs and one fern known to be used by Aboriginal Groups, three were observed during the Proponent's field surveys, including bunchberry, hellebore, skunk cabbage and licorice fern.

Mitigations outlined in section 10 of the Proponent's Application include:

- Development of a Wetland Compensation Plan, including use of traditional use species for planting wherever practical (yet to be developed);

- Mitigation practices implemented during construction to prevent the introduction and spread of invasive plants and noxious weeds; and
- A Species at Risk Discovery Contingency Plan would be developed and followed.

As noted in section 5.4 of Part B of EAO's Assessment Report, management of vegetation and wetland resources on federal lands occurs primarily through the federal SARA and the Federal Policy on Wetland Conservation, and through compliance with the *Forest Act*, the *BC Weed Control Act* and the BC Weed Control Regulation.

The residual effect on traditional use plants as a direct result of the Project, although long-term is low in magnitude and reversible. Considering the relative abundance of traditional use plants across the region, and the above-referenced Wetland Habitat Compensation Plan, residual effects on traditional use plants is not expected to be significant.

The residual effects of the proposed Project on vegetation, as predicted in section 10 of the Proponent's Application, and based on ecological community modelling and habitat suitability models, indicates that the residual effects on traditional use are expected to be adverse, but low in magnitude and limited to the PDA. No residual effects are anticipated as a result of noxious weeds and invasive plants as a result of the proposed Project. The Proponent has also committed to incorporating traditional food and medicinal plants into a Wetland Habitat Compensation Plan wherever possible.

Overall, EAO considers the proposed Project's effects on Aboriginal Groups' ability to hunt terrestrial wildlife and gather food and medicinal plants would be negligible.

## 18.8 Potential Impacts to Archaeological and Heritage Resources

Aboriginal Groups raised concerns during the EA regarding potential proposed Project effects, during the construction phase, on archaeological and heritage resources. These potential effects are described below and relate to potential direct and indirect adverse effects:

- Impact to archaeological materials on Lelu Island and nearby areas, primarily the more than 600 CMTs on Lelu Island;
- Ensuring strategies are developed that will be followed to minimize the impact to archaeological values or where impacts are unavoidable, to mitigate their loss;
- Loss of archaeological materials is an impact that cannot be offset solely by gathering information about the values (such as CMTs); and
- Questions about methodology employed for archaeological inventories.

### **18.8.1 EAO Response to Potential effects on Archaeological and Heritage Resources**

During consultation, concerns were raised about disturbance or destruction of CMTs or other archaeological and historic sites and the potential for vessel wake to lead to the

destruction and alteration of heritage sites, archaeological sites or CMTs. Aboriginal Groups identified concerns about potential effects of the proposed Project on archaeological and heritage resources, in particular the more than 600 CMTs located in the PDA.

The majority of the PDA, including all of Lelu Island, are on federal land and therefore fall to federal authority and legislation. The CEAA "*Reference Guide on Physical and Cultural Heritage Resources*" (Canadian Environmental Assessment Agency 1996) details the kinds of considerations that are required for heritage resources as detailed in Section 5 of the CEAA 2012. Also, the federal "*Standards and Guidelines for the Conservation of Historic Places in Canada*" provide clear guidance on mitigating impacts to character-defining elements and heritage values of historic places.

For direct footprint effects on the archaeology and heritage resources VC, EAO relied on the CEAA's EA and conditions to manage residual effects because the federal government has clear regulatory authority. EAO assessed the indirect effects on this VC, and components that fall on private or provincial land, such as the bridge footings, that fall under provincial authority. Heritage and archaeology resources under provincial authority are protected under the *Heritage Conservation Act*.

The LAA includes the proposed PDA on Lelu Island, Stapledon Island, and the portion of the mainland southwest of Skeena Drive across from Lelu and Stapledon Islands.

The Proponent's wake effects study suggests that the height and frequency of wake waves generated by LNG carriers and associated escort tugs in this area are well within the range of naturally occurring wind and swell generated waves.

The Proponent stated that an archaeological and heritage inventory study within the intertidal areas of Lelu Island will be completed prior to construction. If archaeological or heritage features are found, mitigation measures described in section 20 of the Proponent's Application will be applied. These include:

- Systematic Data Recovery (SDR) studies for CMT sites would be conducted. This includes a systematic recording representative samples of CMT features, monitoring of removal of CMTs by First Nations representatives, and the production of a comprehensive report;
- Any work affecting archaeological or heritage sites will cease and qualified professional archaeologists will be retained to assess the site;
- Any affected sites would be scientifically excavated;
- Collection and analysis of artifacts, faunal remains, botanical remains and other archaeological remains;
- Collection and processing of carbon samples for dating;
- Analysis and interpretation of all recovered data;
- Cataloguing of all collected artifacts and their subsequent curation in an approved facility;
- Adherence to the BC Association of Professional Archaeologists and federal guidelines for archaeological resources by Parks Canada; and

- The Proponent has also developed an Archaeological Resources and Heritage Management Plan that would be implemented.

Overall, with consideration for the above-referenced mitigation measures and management protocols EAO concludes that the potential effects to Aboriginal Groups associated with archaeological and heritage resources would largely be confined to Lelu Island where the effects would be serious in relation to CMTs, and effects caused by LNG shipping throughout the remaining Project area would be negligible.

### 18.9 Potential Impacts on Socio-Economic and Community Health and Well-Being

Potential proposed project effects to Aboriginal Group's community health and well-being were raised throughout the EA, as captured in comments on issues tracking tables and in the socio-economic reports where provided.

All of the Aboriginal Groups consulted during the EA expressed concerns regarding potential effects of the proposed Project on matters relating to the potential direct and indirect effects to their communities as a result of impacts to community infrastructure and services primarily due to large numbers of workers required for the construction of the LNG facility who would be temporarily residing within the region.

The Aboriginal Groups' concerns regarding potential adverse socio-economic impacts ranged from concerns around the potential induced effects of increased recreational fishing as a result of influxes of workers to the region during the construction phase, to increased pressures on regional health care and community social services, again related to the presence of large numbers of workers during the construction phase of the proposed Project.

#### **18.9.1 EAO Response to Socio-economic Effects on Aboriginal Groups' Community Health and Well-being**

The LAA for the Community Health and Well-being VC included Aboriginal Group's communities of Lax Kw'alaams First Nation, Metlakatla First Nation, Kitkatla (Gitxaala Nation), along with the City of Prince Rupert and District of Port Edward. The RAA for assessing potential effects on the Community Health and Well-being VC included communities within the mainland portion of the Skeena Queen-Charlotte Regional District, including Hartley Bay (Gitga'at First Nation) and the administrative boundary of Northern Health Authority.

These concerns for potential effects on Aboriginal community health and well-being, while not dissimilar from general social and economic effects assessed during the EA, highlighted two important factors which the EAO considered in its conclusions on effects, mitigation measures and associated conditions:

- Aboriginal people comprise approximately 41% of the population of the LAA<sup>36</sup>; and
- Aboriginal people are over-represented, proportionate to the non-aboriginal population, within what may be described as the vulnerable sub-population.

The issues surrounding the reasons why Aboriginal Groups are more likely to be over-represented within the vulnerable sub-population involve a more extensive analysis than this report can provide, but include factors such as barriers to employment, legacy effects of the residential school system, and the pathologies associated with poverty, including alcohol and substance abuse. EAO understands that these are very real issues for Aboriginal communities, and acknowledges that they are matters that require sensitive and meaningful consideration.

Linked to these matters related to community health and well-being expressed by Aboriginal Groups during the EA, are concerns about the effect of the proposed Project, and in particular, the large influx of workers required during the construction phase, on increased drug trafficking, prostitution and organized crime activity.

The effects of changes in local demographics, increase in wealth of local community members and the associated attraction by criminally-motivated in-migrants not associated with the proposed Project were raised by Metlakatla First Nation, Kitselas First Nation and Gitxaala Nation in their socio-economic reports and comments, and echoed by other Aboriginal Groups in comments throughout the EA.

As noted in section 18 of the Application, the LAA already has higher rates than the provincial average for serious crimes and serious drug crimes, particularly for juveniles (12-17 years). Aboriginal Groups expressed concerns about how the existing issues may be exacerbated by LNG development, and what measures can effectively be applied to decrease risk to already vulnerable community members.

The Proponent has committed to, and EAO has included a condition requiring the Proponent to, develop a management plan for the worker accommodation camp. Included as a component of that plan, EAO requires the Proponent to manage the potential effects of its workers on community infrastructure and services.

In their report titled, *Impact Assessment of LNG and Other Development on the Metlakatla First Nation*, the Metlakatla First Nation described the importance of timely access to health care and emergency services for their community. Metlakatla First Nation identified three determinants of community health of highest concern: the physical health of Metlakatla First Nation individuals, crime and safety in relation to Metlakatla First Nation people, and social relations and sense of community. In their report, Metlakatla First Nation noted many of the same observations as exist in the baseline information presented in the Proponent's Application, specifically, higher rates

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<sup>36</sup> 2011 census data. Aboriginal people represent 51% of the population of Port Edward and 38% of the population of Prince Rupert. (Statistics Canada 2012).

of crime and alcohol consumption in the region relative to the rest of the province. Existing capacity levels for health care, emergency services and policing were highlighted as particular concerns for Metlakatla First Nation.

During the EA, Lax Kw'alaams First Nation, Gitxaala Nation and Kitsumkalum First Nation requested disaggregated data that would provide an accurate distinction of these social and economic differences between the Aboriginal and non-aboriginal population of the region. Such analysis requires a complex approach and given available data and challenges in collecting data from Aboriginal communities, EAO requested Aboriginal Groups to provide any relevant socio-economic data that might inform the EA. A limited amount of such data was provided by Metlakatla First Nation, Kitselas First Nation, and Gitxaala Nation, which EAO utilized in its assessment of potential social and economic effects. EAO also accepted that due consideration to mitigation measures specific to Aboriginal Groups' concerns were appropriate.

Mitigation measures proposed by the Proponent include providing health care services on site at the worker accommodation camp, and making available recreation facilities, and other amenities, and through policies for security, drug and alcohol and general interaction between the work camp and the wider community. The Proponent will monitor and report on the effectiveness of its mitigation measures. This information will be shared with other provincial agencies, local service providers and Aboriginal community leaders and administrators. Section 7.2 of Part B of this Report provides a more detailed description of the potential adverse effects of the proposed Project on community infrastructure and services.

Should an EA Certificate be issued, EAO proposes the SEEMP Condition that would lead to management activities aimed at mitigating the potential social and economic effects from PNW, particularly focused on infrastructure and services pressures during construction. The proposed condition is designed to ensure on-going dialogue and opportunities for adaptive management. This proposed Condition requires Proponent engagement with and input by Aboriginal Groups – along with relevant provincial agencies, and local governments and service providers – in the implementation of mitigation measures to address potential adverse effects on community services and infrastructure that may be relied upon by Aboriginal people within the region. This means Aboriginal Groups will have a meaningful place within the dialogue and actions that may be implemented by the Proponent, provincial government agencies and local health and social service providers.

In a salient example of how this approach can be implemented, Metlakatla First Nation, in their report, *Impact Assessment of LNG and Other Development on the Metlakatla First Nation*, provide a number of suggested additional mitigation opportunities that could be discussed in the context of adaptive measures relevant to the potential effects of LNG development in the region.

A suggestion included in Metlakatla First Nation's report is particularly worth noting: "[e]stablish programs to integrate incoming workers with the community and forge

relationships between in-migrants and locals<sup>37</sup>.” EAO notes that the Proponent has made commitments to employee education programs, and, as a condition of an EA Certificate, if issued, the Proponent would be required to seek input from Aboriginal Groups in the development of a socio-economic effects management plan.

The Government of British Columbia initiated discussions to ensure that Aboriginal Groups have an opportunity to benefit from employment opportunities associated with the Project and LNG development generally. These actions are described above in section 17.5.2 of this Report, and, in combination with the Proponent’s benefit agreements, are intended to maximize opportunities for Aboriginal Groups to benefit from LNG development.

As noted in section 18 of the Application, young Aboriginal people, both on and off-reserve, represent the largest potential workforce<sup>38</sup>. It is a goal of BC that LNG benefits improve quality of life for Aboriginal communities, and in ways that ultimately results in reducing social and economic vulnerabilities through increased education, skills training and employment – either direct employment, through contracting opportunities for Aboriginal businesses, and indirect employment from increased economic activity in the region. As part of the Province’s Jobs Blueprint, additional Aboriginal-focussed skills training opportunities will be developed.

Proponent mitigations, described in section 16.5.4.2 of the Application include:

- A Project Community Engagement Plan that will assist communities plan for an influx of workers and would include a community communication strategy and a process to address community grievances;
- A First Nations and community training and employment strategy to ensure Aboriginal Groups have access to training and employment opportunities provided by the Project, particularly long-term career opportunities during the operation phase of the Project;
- An ERP including mandatory LNG specific emergency response training;
- Recreation facilities will be provided at the construction accommodation camp to reduce demand on local community infrastructure; and
- A community crime prevention initiative will be implemented in collaboration with RCMP.

Overall, taking into consideration above measures proposed by the Proponent, the Province of BC, and the proposed EA Certificate SEEMP condition for the development and implementation of a socio-economic effects management plan, and considering the many potential benefits of the proposed Project for Aboriginal Groups, EAO concludes that the potential socio-economic effects of the proposed Project can be effectively managed. This would include involvement by Aboriginal Groups in longer term dialogue

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<sup>37</sup> (2014) section 11.8, page185.

<sup>38</sup> 29.6% of the on-reserve Aboriginal population is under the age of 15 (Statistics Canada 2007).

and information sharing with the Proponent, provincial agencies, local governments and local service providers.

## **19. Specific Issues Raised by Aboriginal Groups and EAO's Conclusions**

This section of the Aboriginal Consultation Report considers the information received from each Aboriginal Group through consultation efforts during the EA process, and summarizes the consultation and accommodation of potentially affected Aboriginal groups in relation to the proposed Project. Throughout that process, EAO has learned how Aboriginal Interests could be adversely affected by the proposed Project construction and operational activities if it were to be certified by Ministers. This section includes a consideration of the comments and input received from Aboriginal Groups during an approximately 18 month period from May 2013 to October 2014.

### **19.1 Lax Kw'alaams First Nation**

#### **Context**

- Lax Kw'alaams First Nation is made up of people from nine (originally 10) former Tsimshian tribes who, prior to contact, relocated their winter villages from the Skeena River to the Prince Rupert Harbour (which will be referred to as the Nine Allied Tsimshian Tribes). They eventually moved their winter villages that the Tsimshian people could take full advantage of trade opportunities with European fur traders. As the village grew and the nine tribes amalgamated, the community name became the Port Simpson Band. In 1986, the Aboriginal Group name officially changed to Lax Kw'alaams. The village of Lax Kw'alaams (also referred to as Port Simpson) is located on the Tsimpsean Peninsula approximately 30 km northwest of Prince Rupert, BC and is accessible by ferry, road, sea and air.
- Lax Kw'alaams First Nation consists of 78 reserves, settlement, and villages with an area of 11,898.7 ha located primarily along the Skeena River, Portland Inlet and Work Channel. Seven of the 78 reserves are shared with Metlakatla First Nation. As of September 2013, Lax Kw'alaams First Nation had a registered population of 3,646, with 668 of those members living on their own reserve, 68 living on other reserves, and 2,910 living off reserve. Lax Kw'alaams First Nation is governed under the Indian Act electoral system and has a Mayor, a Deputy Mayor, and 12 Councillors.
- As stated in the Interim Land and Marine Resources Plan of the Nine Allied Tsimshian Tribes of Lax Kw'alaams First Nation (Interim Land Use Plan), over 2,000 traditional sites have been identified. These sites include trap lines, fishing areas, hunting area, forest harvesting areas, berry-picking areas, areas where medicinal plants are gathered, village sites, shell middens, burial grounds, battle areas, areas with pictographs, petroglyphs, CMT or stone fish weirs, and places with which traditional place names are associated. Many of these areas are still used for traditional purposes such as forest harvesting, fishing and hunting.

## **Aboriginal Interests and EAO's strength of claim assessment and depth of consultation**

- EAO shared its preliminary assessment of the strength of claim with Lax Kw'alaams First Nation on December 20, 2013. EAO assessed Lax Kw'alaams First Nation as having a strong *prima facie* claim to Nine Allied Tsimshian Tribes Aboriginal rights to fish, gather, hunt and trap marine and terrestrial resources in the vicinity of the proposed Project, including in the Prince Rupert Harbour area.
- On June 26, 2014, the Supreme Court of Canada released its decision in *Tsilhqot'in*, which clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation as at 1846. EAO is of the view that Lax Kw'alaams First Nation has a strong *prima facie* claim to Aboriginal title to the land surrounding Prince Rupert Harbour area and the mouth of Skeena River, including project components proposed on Lelu Island. There is some overlap of use with other Tsimshian groups (Kitselas First Nation, Kitsumkalum First Nation, Gitxaala Nation and Gitga'at First Nation) in these areas, including for resource harvesting such as when travelling annually to and from the Nass River eulachon fishery. There is some uncertainty and conflicting claims regarding whether such use by other Tsimshian groups required permissions of the Nine Allied Tsimshian Tribes at the time of contact and at 1846; however, EAO is of the view that permission was likely required.
- Lax Kw'alaams First Nation wrote, in response to EAO's assessment of the duty to consult, a letter to EAO indicating disagreement with elements of the assessment of strength of claim, but did not disagree with the overall assessment of the required depth of consultation.
- Given the nature and locations of the proposed Project, and the potential impacts of the proposed Project on Lax Kw'alaams First Nation's Aboriginal interests as discussed below, EAO is of the view that the duty to consult Lax Kw'alaams First Nation lies toward the deeper end of the *Haida* consultation spectrum.
- Lax Kw'alaams First Nation is listed on Schedule B of the Section 11 Order.

### **Summary of consultation**

Lax Kw'alaams First Nation was invited to review and provide comments on the draft AIR, Section 11 Order, the Proponent's Aboriginal Consultation Plan and Reports, the screening of the Application and on the Application. Lax Kw'alaams First Nation was also provided with opportunities to attend Working Group meetings, workshops and to meet with EAO staff directly.

EAO provided \$10,000 in capacity funding to Lax Kw'alaams First Nation during the Application Review phase of the EA process to assist with costs associated with their participation in the environmental review. CEAA capacity funding for the Application Review phase was also offered to Lax Kw'alaams First Nation. The Proponent provided Lax Kw'alaams First Nation \$40,000 initial capacity funding, but, as of the time this report was prepared, the Proponent was unsuccessful in negotiating an EA agreement with Lax Kw'alaams First Nation.

Lax Kw'alaams First Nation provided input to the EA process through providing comments on the draft Section 11 Order, the draft Application Information Requirements, and through extensive comments on the Application, including over 550 comments as recorded on the Issues Tracking Table. The EAO met with Lax Kw'alaams First Nation on four occasions to discuss issues and concerns raised by Lax Kw'alaams First Nation.

During the EA, Lax Kw'alaams First Nation participated in archaeological surveys. The Proponent attempted to provide \$60,000 in funding to Lax Kw'alaams First Nation to complete a TUS, but Lax Kw'alaams First Nation declined to accept this funding and did not complete a TUS.

In addition to EAO-led consultation activities throughout the EA process, the Proponent invited Lax Kw'alaams First Nation to meet with them approximately 41 times, and the Proponent met with Lax Kw'alaams First Nation approximately nine times to discuss issues and concerns raised by Lax Kw'alaams First Nation. Issues raised by Lax Kw'alaams First Nation and the Proponent's responses are provided in the Issues Tracking Table. A summary of the Proponent's engagement activities with Lax Kw'alaams First Nation, as well as the Proponent's proposed mitigation to issues raised is provided in the Proponent's Aboriginal Consultation Report #2 (dated October 7, 2014).

Lax Kw'alaams Nation provided several letters to EAO and the Proponent with extensive comments and concerns during Pre-Application and Application Review, including:

- Potential effects of the proposed Project on Lax Kw'alaams First Nation's Aboriginal Interests including rights and title in and near the Tsimpsean Peninsula and the Prince Rupert Harbour area;
- Comments on the draft and final AIR noting the final AIR did not adequately address most of Lax Kw'alaams First Nation's comments;
- Lack of meaningful consultation regarding the Application Evaluation/Screening comments, expressing concerns including: the Application does not meet the final AIR; and repeated concerns that the final AIR was deficient and did not incorporate comments submitted by Lax Kw'alaams First Nation on the draft AIR;
- Application Review concerns including insufficient assessment of potential cumulative effects and impacts of the proposed Project on Lax Kw'alaams First Nation's Aboriginal Interests. Lax Kw'alaams First Nation's detailed Application Review comment are included in the Tracking Table;
- Concerns with the Conceptual Marine and Freshwater Habitat Offsetting Plan, including the timing of this report leading to insufficient time to review and provide comments;
- Concerns with respect to cumulative effects assessment and the level of development existing and proposed for the Prince Rupert Harbour area;

- Inadequate consideration of the residual and cumulative impacts of LNG development proposed in Lax Kw'alaams First Nation's territory; and
- Insufficient time for reviewing the Application and providing comments.

The Interim Land and Marine Resources Plan (LMRP) of the Nine Allied Tsimshian Tribes of Lax Kw'alaams First Nation (ATTL 2004) identifies areas of importance within Lax Kw'alaams First Nation's asserted traditional territory. In the absence of project-specific Traditional Land Use report, EAO has reviewed the Interim LMRP (2004) for additional information on Lax Kw'alaams First Nation's current and traditional land use within the proposed Project area.

### **Potential impacts of the proposed Project to Lax Kw'alaams First Nation's Aboriginal Interests**

The proposed Project would be sited within Lax Kw'alaams First Nation asserted traditional territory, and would require LNG carriers to pass through 40 km of Lax Kw'alaams First Nation asserted traditional territory.

### **Potential impacts to Aboriginal Title Claims**

As discussed above, EAO is of the view that Lax Kw'alaams First Nation has a strong *prima facie* claim to Aboriginal title to the land surrounding Prince Rupert Harbour area and the mouth of Skeena River, including project components proposed on Lelu Island. Components of the proposed Project that are located on Lelu Island include:

- Portion of bridge connecting Lelu Island to Skeena Drive;
- Suspension bridge tower on foreshore of Lelu Island,
- LNG facility, including LNG production units, storage tanks, administration buildings, which will affect all of the approximately 160 ha of Lelu Island;
- MOF; and
- Marine terminal, approximately 100 ha of marine infrastructure.

EAO has considered the following factors in assessing the potential impacts of the proposed Project to the Aboriginal title claim:

- There would be permanent or long term disturbance of vegetation and wetlands on Lelu Island, including removal of existing timber;
- All or many future uses of the land would be restricted given the nature of the proposed heavy industrial development proposed by the proposed Project;
- There is no contemplation of transfer of ownership of land to the Proponent. The Proponent would be granted a lease through the PRPA for the life of the proposed Project (proposed for 30 years and subject to extensions), providing for exclusive use and occupation by the Proponent. Other uses of the area would be precluded during that time.

In EAO's opinion, the proposed Project would have a serious impact on Lax Kw'alaams First Nation's asserted Aboriginal title. To address these potential impacts, EAO has

ensured that Lax Kw'alaams First Nation is meaningfully consulted and accommodated on the potential effects of this proposed Project, giving Lax Kw'alaams First Nation a role in considering the proposed use of these lands.

Furthermore, EAO is aware of active discussions with Lax Kw'alaams First Nation regarding potential benefits from at least three streams: from the Proponent, the PRPA and Federal Government, and the Province.

The Proponent has offered very significant financial benefits to continue over the lifetime of the project. The quantum and timing of payments are a complex set of issues subject to direct negotiations between the Proponent and Lax Kw'alaams First Nation – benefits that are connected to the economic value created by the proposed Project.

In addition to the Proponent's potential financial benefits, the Province notes that the Port has an agreement with Lax Kw'alaams First Nation for how new industrial projects, like the proposed Project, require a process of benefit-sharing negotiations to occur between Lax Kw'alaams First Nation and the Proponent. Beyond this agreed-to structure for benefit negotiations, which includes dispute resolution processes, the Port and Canada also have some specific additional direct benefits related to the proposed Project and involvement by Lax Kw'alaams First Nation in the Port. The particular details of these benefits are not publicly available at this time as they will be subject to further discussions by the Port with Lax Kw'alaams First Nation over the coming months and may include provision of economic development funding, direct employment and training, land, enhanced governance opportunities and revenue sharing in respect of a future project.

In addition to benefits from the Port and Canada, the Province is also making available considerable financial and land opportunities to Lax Kw'alaams First Nation in relation to the proposed Project. If an EA Certificate is issued and benefit agreements are concluded with the Province, financial payments could be available as soon as potential construction commences and would increase if the project becomes operational. Payments would continue with the operational life of the proposed Project.

Even though the proposed Project would be on federal lands, the Province is also prepared to transfer certain areas of land to Lax Kw'alaams First Nation and to Metlakatla First Nation in recognition of the importance of land ownership and development interests previously expressed by Lax Kw'alaams First Nation and Metlakatla First Nation. The quantum and location of the lands are subject to ongoing negotiations, and subject to identified milestones. That said, the Province is committed to certain principles aimed at addressing Lax Kw'alaams First Nation and Metlakatla First Nation interests, such as the lands being in locations identified by the two Aboriginal Groups around the Prince Rupert so that they could support ancillary commercial opportunities or LNG project development needs (e.g. infrastructure or work camp locations).

The totality of these benefit opportunities contribute to a significant economic package available separately to Lax Kw'alaams First Nation and Metlakatla First Nation. These opportunities are intended by the Proponent, Port, and Province to address the economic interests associated with Lax Kw'alaams First Nation and Metlakatla First Nation Aboriginal title claims.

### **Potential impacts to other Asserted Aboriginal Interests**

EAO's review of the project description and information for other similar projects suggested that the proposed Project may impact the Aboriginal Interests in the Project Development Area by potentially:

- Increasing air emissions, with potential effects from acidification on vegetation, fish, and wildlife;
- Affecting benthic and near shore marine life through shoreline modification, ship wake, and disturbance and/or removal of sediments during construction of the marine terminal; and
- Increasing marine traffic in the area and altering access to traditional fishing grounds.

### **Fishing**

Fishing is an important part of Lax Kw'alaams First Nation's culture. Lax Kw'alaams First Nation historically and presently relies heavily on harvesting a wide variety of fish species, shellfish, molluscs and other marine resources for their livelihood and sustenance. Fish are harvested throughout their traditional territory for food, social, spiritual and commercial purposes.

Lax Kw'alaams First Nation continues to use traditional fishing sites, primarily along and between the Lower Skeena and Nass Rivers, and the north end of the Grenville Channel. Skeena River salmon and Nass River eulachon fisheries remain important harvesting activities, and historically these fish species "dictated the movement of Coast Tsimshian peoples" (*Lax Kw'alaams Indian Band v. Canada 2008*).

Fish species harvested include: all five salmon species (sockeye, coho, chinook, chum and pink), steelhead, eulachon, herring, herring roe-on-kelp, halibut, ling cod, black cod, grey cod, red snapper, rock fish, abalone, octopus, sea urchin, sea cucumber, crab, clams, cockles, mussels, geoduck, shrimp and prawns. Freshwater fish species harvested include: rainbow trout, cutthroat trout and Dolly Varden.

Lax Kw'alaams provided extensive comments to EAO on the Application of the proposed Project regarding potential effects to fish and fish habitat in the marine and freshwater environment, as well as other potential effects related to fishing activities including construction effects on marine travel routes and access to fishing areas.

Key issues raised by Lax Kw'alaams First Nation regarding fishing include:

- Potential effects to fish, fish habitat and fish populations in the marine environment from marine pipeline construction and seabed modifications,

resulting in disruption to subsistence fishing activities during construction and operation;

- Potential injury or mortality to fish and effects to critical habitat for juvenile salmon in the Skeena estuary from dredging during the construction phase of the Project;
- Potential effects on marine navigation for fishing vessels and effects on fishing activities during construction, particularly around Lelu Island, Prince Rupert and Port Edward for Skeena River salmon fisheries;
- Uncertainty in the assessment of potential effects depending on construction timing for dredging, fisheries timing windows, potential effects to critical juvenile salmon habitat and potential cumulative effects associated with multiple proposed LNG projects, as well as existing and future industrial developments in the Prince Rupert area;
- Concerns of potential contamination to fish and crab from proposed dredging at and historically contaminated marine sediment from the historic Skeena Cellulose Pulp Mill effluent discharges;
- Modelling results and dredging mitigation plans for sediment re-suspension, dredge material disposal plans and uncertainty regarding the effectiveness of proposed mitigation;
- Potential human health risks, including perceived risks, associated with potential contamination and consumption of fish, crab and other seafood harvested in areas around Lelu Island and potential impacts on the asserted Aboriginal right to fish;
- Potential underwater noise effects from construction vessels and blasting activities with potential injury, mortality and behavioural disturbance to fish;
- Potential crab migration barrier effects from proposed marine pipelines to be laid directly on the seafloor in important crab harvesting areas in Chatham Sound;
- Potential effects to fish, fish habitat and fish populations including Skeena River salmon and Nass River eulachon from construction of watercourse crossings;
- Request for additional information on construction and post-construction environmental monitoring, including cumulative effects monitoring to ensure effectiveness of proposed mitigation and validation of the predicted effects in the Application;
- Alteration of fishing sites during construction and operation;
- Concern regarding effectiveness of proposed habitat offset plans; and
- Potential effects to marine and terrestrial wildlife and wildlife habitat.

Key areas for salmon harvesting include: the lower Skeena River and its tributaries, the Skeena estuary, Dundas Island, Stephens Island, Chatham Sound and several other areas throughout Lax Kw'alaams First Nation's traditional territory.

The primary site for eulachon harvesting is the Nass River estuary near Red Bluff and Fishery Bay.

Fishing for halibut occurs throughout Chatham Sound, primarily near Dundas Island which is located approximately 10-12 km west of the proposed Project. Dungeness crab

and other species are harvested throughout Chatham Sound including areas within 2 km of the proposed Project.

Section 18.3.1 of this report characterizes the potential impacts of the proposed Project on Aboriginal Groups' fishing activities.

EAO recognizes that further information and analysis regarding impacts to marine resources is ongoing in the federal review process. However, for the purpose of meeting the Crown's duty to consult and accommodate pursuant to the *Haida* framework in relation to the decision under the EA Act, EAO is of the view that there is sufficient information at this stage of the regulatory review being conducted by the Province, to inform the assessment of seriousness of impacts on Aboriginal Interests associated with marine resources and to inform accommodations appropriate to this stage.

EAO recognizes that should the ongoing assessment of impacts on marine resources by CEAA indicate additional impacts not considered by EAO, there will be opportunities to accommodate those additional impacts through the CEAA process.

In consideration of the Proponent's proposed mitigation measures to avoid or reduce adverse effects to the marine environment, the temporal nature of effects during construction and operations, existing federal regulations governing in-water construction activities, proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects on fish and fish habitat, current and traditional land use activities related to fishing—as discussed in section 18.3.1—the proposed Project is expected to have minor-to-moderate impacts on Lax Kw'alaams First Nation's asserted Aboriginal right to fish in the proposed Project area.

### **Navigation and Marine Resource Use**

As discussed in section 18.3 above, Aboriginal Groups expressed concerns regarding the potential adverse effects of the proposed Project on their ability to access preferred marine resource harvesting locations during the construction and operation phases of the proposed Project. Aboriginal Groups, including Lax Kw'alaams First Nation commented on concerns regarding how vessels and barges employed to construct the jetty and marine terminal, and the MOF may restrict movement and safe navigation in around Lelu Island, including Chatham Sound, Porpoise Channel and Lelu Slough.

Aboriginal Groups also commented on the potential effects from the movement of LNG carriers and escort tugs during operation of the facility and marine terminal, including how safety and exclusion zones and general vessel traffic could interfere with access to marine resource harvesting sites.

In consideration of the Proponent's mitigation measures, applicable marine safety protocols and communication protocols for mariners that would be implemented, EAO is of the view that the potential impacts of the proposed Project arising from shipping related impacts to the Lax Kw'alaams First Nation's ability to access marine mammal hunting and marine plant gathering sites be minor in the proposed Project area.

## Hunting

Hunting is practiced by many Lax Kw'alaams First Nation members within their traditional territory. The Nine Allied Tsimshian Tribes actively hunt a wide variety of species of game, marine mammals and waterfowl that include: elk, sheep, deer, mountain goat, mountain lion, bear, sea lion, seal, sea otter, ducks, geese and swans. Several species of fur-bearing animals hunted include: lynx, raccoon, hare, porcupine, mink, beaver, marmot, muskrat and fox.

The ATTL 2004 identifies several hunting areas within Lax Kw'alaams First Nation's asserted traditional territory. Detailed information on hunting sites and the approximate distances away from the proposed Project is not available to EAO.

Several islands (e.g., Ridley Island, Dundas Island, and Melville Island) are used by the Nine Allied Tsimshian Tribes for hunting various marine wildlife species. The majority of residual effects to the Nine Allied Tsimshian Tribes access to terrestrial wildlife hunting sites will occur on Lelu Island.

Lelu Island is predominantly characterized by forested and shrubby blanket bogs, with forested areas dominated by western red cedar, yellow cedar, western hemlock and shore pine. The Prince Rupert region provides seasonal and year-round habitat to approximately 359 terrestrial wildlife species, including 62 mammals, and 288 bird species. Lelu Island provides habitat for a variety of mammals, birds and amphibians. Mammals on Lelu Island include grey wolf, black-tailed deer<sup>39</sup>, Pacific marten, and red squirrel.

Marine mammals, including sea lions and seals are hunted throughout the winter and spring. Hunting for seals traditionally occurred in the winter on Dundas Island located approximately 10 km west of the proposed LNG marine shipping route in Chatham Sound. The majority of residual effects to Nine Allied Tsimshian Tribes' access to marine mammal hunting sites will occur on Lelu Island.

Lax Kw'alaams First Nation provided extensive comments throughout the EA. Key issues raised by Lax Kw'alaams First Nation regarding wildlife and hunting included:

- Potential effects to marine and terrestrial wildlife and wildlife habitat;
- Effects to wildlife populations through increased risk of mortality, sensory disturbance, reduced habitat availability, changes to species distribution and population dynamics, and alteration of movement patterns, particularly during the construction phase;
- Proposed mitigation measures including construction timing to mitigate potential effects to marine and terrestrial wildlife species;
- Construction timing and mitigation measures must be developed in consultation with Lax Kw'alaams First Nation;

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<sup>39</sup> Black-tailed deer were the most commonly observed species on Lelu Island during the baseline surveys (PNW Application 11-32).

- Potential access related effects during construction of the proposed Project, including temporary restrictions in marine navigation and marine travel routes important for access and use of hunting grounds;
- Potential underwater noise effects from construction vessels and blasting activities with potential injury, mortality and behavioural disturbance marine mammals (e.g., harbour seals, sea lions, humpback whales, northern resident killer whales, harbour porpoise);
- Disruption to hunting activities during construction and operation; and
- Alteration of hunting sites during construction and operation.

The Lax Kwaxl/Dundas and Melville Islands Conservancy located approximately 20 km west of the village of Lax Kw'alaams and over 60 km from the Lelu Island is an important ecological area, and current and traditional harvesting area, for wildlife including marine mammals (e.g. seals, sea lions), birds and other wildlife hunted by Lax Kw'alaams First Nation.

Other conservancy areas within Lax Kw'alaams First Nation's asserted traditional territory with important wildlife habitat, and current and traditional land use activities related to hunting include Ksgaxi/Stephens Island Group (about 25 km west of Lelu Island), Lucy Islands (24 km west of Lelu Island) and Rachael Islands, and Kinahan Islands (about 6.6 km west of Lelu Island).

The greatest effect to terrestrial wildlife from the proposed Project is the loss of habitat from site clearing and construction at Lelu Island. The residual effects of the proposed Project on terrestrial wildlife habitat, as predicted in section 11 of the Proponent's Application, and based on ecological community modelling and habitat suitability models, indicates a low probability that the change in availability of preferred habitat would affect the sustainability of regional wildlife populations.

Direct mortality to large and medium-sized terrestrial mammals is considered unlikely during the construction and operation phases due to those species' high mobility. The Proponent's Application proposes the following mitigation measures to avoid or reduce mortality to terrestrial wildlife:

- A 30 m vegetation buffer will be maintained around the perimeter of Lelu Island;
- Clearing activities will occur outside of the breeding season for terrestrial birds, amphibians and bats, and will avoid the breeding period for raptors;
- Bird surveys will be conducted in advance of clearing and buffers will be established around active nests;
- Relevant sections of the BC *Wildlife Act* will be adhered to if raptor nests are identified within clearing limits;
- Permanent fencing would be erected around the facility; and
- Wildlife education and training would be provided to construction workers.

During the EA Lax Kw'alaams First Nation requested that the LAA be expanded. The Proponent responded by explaining that LAAs for each VC include the geographic

areas within which potential environmental effects can be measured. The Proponent responded specifically to Lax Kw'alaams First Nation's request with regard to Terrestrial Wildlife and Marine Birds by ensuring that the LAA boundary took into account physical and sensory disturbances from the proposed Project, and ensuring that the boundary extends 1 km from the centerline of the proposed shipping routes.

In consideration of the Proponent's proposed mitigation measures and proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects on terrestrial wildlife and marine mammals, wildlife habitat and current and traditional land use related to hunting – as discussed in sections 18.3.2 and 18.7 - the proposed Project is expected to have minor impacts on Lax Kw'alaams First Nation's asserted Aboriginal right to hunt in the proposed Project area.

### **Gathering**

Traditional and current activities include gathering a variety of marine and terrestrial plants through Lax Kw'alaams First Nation's traditional territory.

The ATTL 2004 identifies several plant gathering areas within Lax Kw'alaams First Nation's asserted traditional territory. However, detailed information on plant gathering sites and the approximate distances away from the proposed Project is not available to EAO.

Marine plants harvested included seaweeds and kelp. Bull kelp and giant kelp are important marine plant species gathered for harvest of herring roe-on-kelp.

Seasonal berry picking, medicinal plant gathering and cedar and hemlock bark collecting are activities that are still practiced by Lax Kw'alaams members.

Species of berries typically harvested in the summer months include: salmonberries, gooseberries, elderberries, raspberries, bunchberries, high-bush cranberries, dwarf blueberries, black and red currants, soapberries and huckleberries. Food and medicinal plants harvested include licorice fern root, Hudson Bay tea, hemlock bark, jackpine sap and needles, fireweed, cow parsnip and devil's club.

The greatest effect to plants traditionally gathered from the proposed Project is the loss of plant habitat from site clearing and construction.

Section 10 of the Proponent's Application assessed the potential effects of the proposed Project on effects related to:

- Change in abundance of plant species of interest;
- Change in abundance or condition of ecological communities; and
- Change in wetland function.

Change in abundance of plant species and abundance or condition of ecological communities were predicted to change directly as a result of site clearing and

preparation, or indirectly as a result of the introduction of invasive non-native plant species, or altered abiotic conditions.

The LAA encompasses an area of approximately 254 ha and contains sixteen distinct plant communities, approximately 61% of which are classified as wetland. Three dominant communities cover 84% of the LAA and include:

- Western red cedar-western hemlock/salal upland forest (32%);
- Shore pine-yellow cedar/sphagnum bog (22%); and
- Western red cedar-yellow cedar/goldthread bog forest (21%).

Plant species identified as used traditionally by Aboriginal Groups for food or medicine and observed on Lelu Island include the following tree species: Hemlock, Amabilis fir, Pacific crabapple, Sitka spruce, western red cedar, and yellow cedar. Shrub species found on Lelu Island and documented as used by Aboriginal Groups include: Alaska blueberry, black cowberry, blueberries, bog cranberry, devil's club, juniper, Labrador tea, red huckleberry, salal and salmonberry. Three species of herb and one fern identified on Lelu Island and known to be used by Aboriginal Groups include: bunchberry, hellebore, skunk cabbage and licorice fern (10.3.2.4 of Proponent's Application).

The residual effects of the proposed Project on vegetation, as predicted in section 10 of the Proponent's Application, and based on ecological community modelling and habitat suitability models, indicates that the residual effects on traditional use are expected to be adverse, but low in magnitude and limited to the PDA. No residual effects are anticipated as a result of noxious weeds and invasive plants as a result of the Project. The Proponent has also committed to incorporating traditional food and medicinal plants into a Wetland Habitat Compensation Plan wherever possible.

While Lax Kw'alaams First Nation did not provide site-specific TUS information, it is likely that Lax Kw'alaams First Nation made use of Lelu Island for plant gathering activities, including gathering of the plant species noted as present on Lelu Island. Section 18.3.3 of this Report characterizes the potential impacts of the proposed Project on Aboriginal Group's gathering activities in the marine environment.

In consideration of the Proponent's proposed mitigation measures and proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects to vegetation, and current and traditional land use - as discussed in section 18.3.3 and 18.7 - the proposed Project is expected to result in minor impacts on Lax Kw'alaams Nation's gathering activities in the proposed Project area.

## 19.2 Metlakatla First Nation

### **Context**

- The First Nation community of Metlakatla is located about 7 km northwest of Prince Rupert, on the Tsimshian Peninsula. The community is only accessible by sea or air.
- Metlakatla First Nation is made up of people from nine (originally 10) former Tsimshian tribes, which will be referred to as the Nine Allied Tsimshian Tribes. By the time of contact, the Nine Allied Tsimshian Tribes had relocated their winter villages from the Skeena River to the Prince Rupert Harbour from the lower parts of the Skeena River, and were eventually based around the Fort Simpson Hudson's Bay Company trading post so that the Tsimshian people could take full advantage of trade opportunities with European fur traders.
- Metlakatla First Nation's traditional territory extends from coastal islands in eastern Hecate Strait to Lakelse Lake near Terrace, to Portland Canal and Observatory Inlet in the north to the headwaters of the Ecstall River in the south (MGC 2011). Metlakatla First Nation's traditional territory also includes lower portions and the mouth of the Skeena River and its tributaries.
- Metlakatla First Nation has about 3,464.4 ha of land on 16 reserves. Seven of these reserves are shared with Lax Kw'alaams Nation. As of September 2013, Metlakatla First Nation had a registered population of 860, with 85 members living on reserve and 775 members living off reserve. Metlakatla First Nation governance consists of one Chief and six Councillors according to Metlakatla's Custom Election Code.
- Traditionally seasonal rounds from village to winter/spring/summer/fall fishing camps dominated Tsimshian life. The harvest of salmon and eulachon were supplemented by hunting, trapping, foraging and shellfish gathering. During summer and autumn months, various plants were gathered for food, materials and medicines.

### **Aboriginal Interests and EAO's Strength of Claim Assessment and Depth of Consultation**

- EAO shared its preliminary assessment of the strength of claim with Metlakatla First Nation on December 20, 2013. EAO assessed Metlakatla First Nation as having a strong *prima facie* claim to Aboriginal rights to fish, gather, hunt and trap marine and terrestrial resources in the vicinity of the proposed Project, including in the Prince Rupert Harbour area.
- On June 26, 2014, the Supreme Court of Canada released its decision in *Tsilhqot'in*, which clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation as at 1846. EAO is of the view that Metlakatla First Nation has a strong *prima facie* claim to Aboriginal title to the land surrounding Prince Rupert Harbour area and the mouth of Skeena River, including project components proposed on Lelu Island. There is some overlap of use with other Tsimshian groups (Kitselas First Nation, Kitsumkalum First Nation, Gitxaala Nation and Gitga'at First Nation) in these areas, including for resource harvesting such as when travelling annually to and from the Nass River eulachon

fishery. There is some uncertainty and conflicting claims regarding whether such use by other Tsimshian groups required permission of the applicable Nine Allied Tsimshian Tribe at the time of contact and at 1846; however, EAO is of the view that permission was likely required.

- Metlakatla First Nation did not disagree with the overall assessment of the required depth of consultation.
- Given the nature and locations of the proposed Project, and the potential impacts of the proposed Project on Metlakatla First Nation's Aboriginal Interests as discussed below, EAO is of the view that the duty to consult Metlakatla First Nation lies toward the deeper end of the *Haida* consultation spectrum.
- Metlakatla First Nation is listed on Schedule B of the Section 11 Order.

### **Summary of consultation**

Metlakatla First Nation was invited to review and provide comments on the draft AIR, draft Section 11 Order, the Proponent's Aboriginal Consultation Plan and Reports, the screening of the Application and on the Application. Metlakatla First Nation was also provided with opportunities to attend Working Group meetings, workshops and to meet with EAO staff directly.

EAO provided \$10,000 in capacity funding to Metlakatla First Nation during the Application Review phase of the EA process to assist with costs associated with their participation in the environmental review. An EA Agreement between Metlakatla First Nation and the Proponent for capacity funding was executed on September 17, 2013.

Metlakatla First Nation provided input to the EA process through providing comments on the draft AIR, the Section 11 Order, and through extensive comments on the Application. EAO met with Metlakatla First Nation on three occasions to discuss issues and concerns.

During the EA, technical advisors to Metlakatla First Nation participated in some aspects of field studies for the proposed Project including monitoring of marine and near-shore marine borehole drilling and archaeological investigations and an Archaeological Impact Assessment of Lelu Island. Metlakatla First Nation completed a TUS and an Impact Assessment of LNG and Other Developments on the Metlakatla. The results of these studies were included in the Proponent's Addendum to the Aboriginal Consultation Report #2.

In addition to EAO-led consultation activities throughout the EA process, the Proponent met with Metlakatla First Nation approximately 15 times to discuss issues and concerns. Issues raised by Metlakatla First Nation and the Proponent's responses are provided in the Issues Tracking Table. A summary of the Proponent's engagement activities with Metlakatla First Nation, as well as the Proponent's proposed mitigation to issues raised is provided in the Proponent's Aboriginal Consultation Report #2.

The capacity funding provided by the Proponent facilitated Metlakatla First Nation's participation in field studies and funded a Metlakatla TUS and socio-economic report. Those reports, along with the comments provided by Metlakatla First Nation were extremely valuable in informing EAO's assessment of potential adverse Project effects on Metlakatla's Aboriginal Interests, as well as other matters of concern to Metlakatla's community.

Negotiation of an Impact Benefit Agreement occurred concurrent to the EA process. Metlakatla First Nation passed a Band Council Resolution approving the EA Agreement on August 22, 2013, which was concluded between Metlakatla First Nation and the Proponent on September 17, 2013.

Prior to concluding an EA Agreement with Metlakatla, the Proponent also provided Metlakatla First Nation's technical advisors the opportunity to participate in archaeological inventory surveys and to investigative geotechnical programs on Lelu Island and to the proposed Project site.

Metlakatla First Nation was also provided the opportunity to participate in the studies on marine intertidal and foreshore biological surveys, marine sediment sampling programs, country food baseline assessments, fresh water fisheries inventories, migratory bird surveys, archaeological investigations on the mainland, baseline soil and vegetation acidification surveys.

On March 18, 2013, the Proponent held an Open House in Metlakatla Village for representatives of the Metlakatla Stewardship Office and members of the community. The Proponent provided information on the proposed Project and its design to Metlakatla members.

Issues discussed included the design of the jetty trestle and marine terminal, proposed Project design features to avoid or offset potential environmental impacts, field study results from 2012 and an overview of field study programs for 2013.

EAO particularly appreciated the effort and involvement of the Metlakatla community in producing their TLUS and socio-economic reports. Throughout the EA, Metlakatla First Nation was exceptional in their responsiveness and overall engagement in the EA process.

### **Potential impacts of the proposed Project to Metlakatla First Nation's Aboriginal Interests**

The proposed Project would be sited within Metlakatla First Nation's asserted traditional territory, and would require LNG carriers to pass through 40 km of Metlakatla First Nation's asserted traditional territory.

## Potential impacts to Aboriginal Title Claims

As discussed above, EAO has made a preliminary assessment that Metlakatla First Nation has strong *prima facie* claims to Aboriginal title to the land surrounding the Prince Rupert Harbour area, including Lelu Island. Components of the proposed Project that are located on Lelu Island include:

- Portion of bridge connecting Lelu Island to Skeena Drive;
- Suspension bridge tower on foreshore of Lelu Island;
- LNG facility, including LNG production units, storage tanks, administration buildings, which will affect all of the approximately 160 ha of Lelu Island;
- MOF; and
- Marine terminal, approximately 100 ha of marine infrastructure.

EAO has considered the following factors in assessing the potential impacts of the proposed Project to the Aboriginal title claim:

- There would be permanent or long term disturbance of vegetation and wetlands on Lelu Island, including removal of existing timber;
- All or many future uses of the land would be restricted given the nature of the heavy industrial development by the proposed Project;
- There is no contemplation of transfer of ownership of land to the Proponent. The Proponent would be granted a lease through the PRPA for the life of the proposed Project (proposed for 30 years and subject to extensions), providing for exclusive use and occupation by the Proponent. Other uses of the area would be precluded during that time.

In EAO's opinion, the proposed Project would have a serious impact on Metlakatla First Nation's asserted Aboriginal title. To address these potential impacts, EAO has ensured that Metlakatla First Nation is meaningfully consulted and accommodated on the potential effects of this proposed Project, giving Metlakatla First Nation a role in considering the proposed use of these lands.

Furthermore, EAO is aware of active discussions with Metlakatla First Nation regarding potential benefits from at least three streams: from the Proponent, the Port of Prince Rupert (Port) and Federal Government, and the Province.

The Proponent has offered very significant financial benefits to continue over the lifetime of the project. The quantum and timing of payments are a complex set of issues subject to direct negotiations between the Proponent and Metlakatla First Nation – benefits that are connected to the economic value created by the proposed Project.

In addition to the Proponent's potential financial benefits, the Province notes that the Port has an agreement with Metlakatla First Nation for how new industrial projects, like the proposed Project, require a process of benefit-sharing negotiations to occur between Metlakatla First Nation and the Proponent. Beyond this agreed-to structure for benefit negotiations, which includes dispute resolution processes, the Port and Canada

also have some specific additional direct benefits related to the proposed Project and involvement by Metlakatla First Nation in the Port. The particular details of these benefits are not publicly available at this time as they will be subject to further discussions by the Port with Metlakatla First Nation over the coming months and may include provision of economic development funding, direct employment and training, land, enhanced governance opportunities and revenue sharing in respect of a future project.

In addition to benefits from the Port and Canada, the Province is also making available considerable financial and land opportunities to Metlakatla First Nation in relation to the proposed Project. If an EA Certificate is issued and benefit agreements are concluded with the Province, financial payments could be available as soon as potential construction commences and would increase if the proposed Project becomes operational. Payments would continue with the operational life of the proposed Project.

Even though the proposed Project would be on federal lands, the Province is also prepared to transfer certain areas of land to Metlakatla First Nation in recognition of the importance of land ownership and development interests previously expressed by Metlakatla First Nation. The quantum and location of the lands are subject to ongoing negotiations, and subject to identified milestones. The Province is committed to certain principles aimed at addressing Lax Kw'alaams First Nation's and Metlakatla First Nation's interests, such as the lands being in locations identified by the two Aboriginal Groups around the Prince Rupert so that they could support ancillary commercial opportunities or LNG project development needs (e.g. infrastructure or work camp locations).

The totality of these benefit opportunities contribute to a significant economic package available separately to Lax Kw'alaams First Nation and Metlakatla First Nation. These opportunities are intended by the Proponent, Port, and Province to address the economic interests associated with Lax Kw'alaams First Nation and Metlakatla First Nation Aboriginal title claims.

### **Potential impacts to other Asserted Aboriginal Interests**

EAO's review of the project description and information for other similar projects suggested the proposed Project may impact the Aboriginal Interests in the area by potentially:

- Increasing air emissions, with potential effects from acidification on vegetation, fish, and wildlife;
- Affecting benthic and near shore marine life through shoreline modification, ship wake, and disturbance and/or removal of sediments during construction of the marine terminal; and
- Increasing marine traffic in the area and altering access to traditional fishing grounds.

Metlakatla First Nation expressed the following concerns related to LNG shipping:

- Impacts on marine life due to an increase in marine traffic;
- Importance of the proposed Project area to Metlakatla resource gatherers;
- Access restrictions to fishing and marine resource harvesting areas;
- Disruption to fish and marine mammal migration routes;
- Environmental damage resulting from accidents and spills;
- Increased access to fishing sites and resources by non-aboriginals; and
- Diversion of marine traffic from the Project area to Metlakatla Pass.

## **Fishing**

Fishing is an important part of Metlakatla First Nation's culture. Like other Tsimshian tribes, Metlakatla First Nation historically and presently relies heavily on harvesting a wide variety of fish species, shellfish, molluscs and other marine resources for their livelihood and sustenance. Fish are harvested throughout their traditional territory for food, social, spiritual and commercial purposes.

Fish species harvested include: all five salmon species (sockeye, coho, chinook, chum and pink), steelhead, eulachon, herring, herring roe-on-kelp, halibut, ling cod, black cod, grey cod, red snapper, rock fish, abalone, octopus, sea urchin, sea cucumber, crab, clams, cockles, mussels, geoduck, shrimp and prawns. Freshwater fish species harvested include: rainbow trout, cutthroat trout and Dolly Varden.

Key areas for Metlakatla First Nation salmon harvesting include: the lower Skeena River and its tributaries, the Skeena estuary, Dundas Island, Stephens Island, Chatham Sound and several other areas throughout Metlakatla First Nation's traditional territory.

The primary site for eulachon harvesting is the Nass River estuary near Red Bluff and Fishery Bay.

Fishing for halibut occurs throughout Chatham Sound, primarily near Dundas Island which is located approximately 10-12 km west of the proposed Project. Dungeness crab and other species are harvested throughout Chatham Sound including areas within 2 km of the proposed Project.

Section 18.3.1 of this Report characterizes the potential impacts of the proposed Project on Aboriginal Groups' fishing activities.

EAO recognizes that further information and analysis regarding impacts to marine resources is ongoing in the federal review process. However, for the purpose of meeting the Crown's duty to consult and accommodate pursuant to the *Haida* framework in relation to the decision under the EA Act, EAO is of the view that there is sufficient information at this stage of the regulatory review being conducted by the Province, to inform the assessment of seriousness of impacts on Aboriginal Interests associated with marine resources and to inform accommodations appropriate to this stage.

EAO recognizes that should the ongoing assessment of impacts on marine resources by CEAA indicate additional impacts not considered by EAO, there will be opportunities to accommodate those additional impacts through the CEAA process.

In consideration of the Proponent's proposed mitigation measures to avoid or reduce adverse effects to the marine environment, existing federal regulations governing in-water construction activities, proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects on fish and fish habitat, current and traditional land use activities related to fishing — as discussed in section 18.3.1 — the proposed Project is expected to have minor-to-moderate impacts on Metlakatla First Nation's asserted Aboriginal right to fish in the proposed Project area.

### **Navigation and Marine Resource Use**

As discussed in section 18.3 above, Aboriginal Groups expressed concerns regarding the potential adverse effects of the proposed Project on their ability to access preferred marine resource harvesting locations during the construction and operation phases of the proposed Project. Aboriginal Groups, including Metlakatla commented on concerns regarding how vessels and barges employed to construct the jetty and marine terminal, and the MOF may restrict movement and safe navigation in around Lelu Island, including Chatham Sound, Porpoise Channel and Lelu Slough.

Aboriginal Groups also commented on the potential effects from the movement of LNG carriers and escort tugs during operation of the facility and marine terminal, including how safety and exclusion zones and general vessel traffic could interfere with access to marine resource harvesting sites.

In consideration of the Proponent's mitigation measures, applicable marine safety protocols and communication protocols for mariners that would be implemented, EAO is of the view that the potential impacts of the proposed Project arising from shipping related impacts to the Metlakatla First Nation's ability to access marine mammal hunting and marine plant gathering sites be minor in the proposed Project area.

### **Hunting**

Metlakatla First Nation's TLUS information describes, in general terms, the species of terrestrial and marine plants and wildlife that are considered important to Metlakatla First Nation's traditional harvesting and diet. The research supporting Metlakatla First Nation's interim (2013) TLUS commenced in February 2013 with archival research, interviews and ground-truthing up until November 2013. The final (2014) TLUS report provided by Metlakatla First Nation provides excellent information related to traditional use of resources and Traditional Ecological Knowledge, including site-specific information relating to Metlakatla First Nation use of Lelu Island and the surrounding area.

In their TLUS, Metlakatla First Nation identified the following land-based impacts of the proposed Project:

- Disturbances to animal migrations and habitat, in particular black-tailed deer;

- Construction noise and increased human traffic adversely affecting local terrestrial animal and bird populations;
- Increased predator access to deer populations due to site clearing;
- Changes to water quality in fresh water wetlands and bogs;
- Introduction of invasive plants and noxious weeds;
- Damage to rare and endangered plant species from Project construction;
- Damage to seasonal foraging habitats for birds and mammals;
- Loss of habitat for small fur-bearing animals, birds and amphibians from site clearing;
- Increased soil erosion in sloped areas due to site clearing;
- Changes to drainage patterns;
- Slope instability from site clearing;
- Increased risk of forest fires due to human activities;
- Reduction in the variety of wildlife feed;
- Increased vehicle traffic due to upgraded roads or new access roads; and
- Concerns related to spills of oil or chemicals.

In their report, *Impact Assessment of LNG and Other Development on the Metlakatla First Nation*, Metlakatla First Nation refer to potential for the proposed Project to change the quality of experience of traditional harvesting activities as a result of a more industrialized landscape. Associated changes to harvesting activities to avoid harvesting near industrial facilities was expressed by several Aboriginal Groups as a potential effect on the overall cultural experience, and also potentially an effect on changes to the Aboriginal Groups' diet. Increased pressure on resources, and risk perceptions about the quality of country foods were cited by Aboriginal Groups as concerns about the potential effects on community health and well-being.

EAO has relied upon Metlakatla's 2014 TLUS report along with other information sources to inform its understanding of Metlakatla First Nation traditional use within the proposed Project area, including what is understood from ethno-historic information to have been the seasonal round activities of the Nine Allied Tsimshian tribes.

Hunting is practiced by many Metlakatla First Nation members throughout their traditional territory. The Nine Allied Tsimshian Tribes hunt a wide variety of species of terrestrial wildlife, marine mammals and waterfowl, including: elk, sheep, deer, mountain goat, mountain lion, black bear, grizzly bear, sea lion, seal, sea otter, ducks, geese and swans. Several species of fur-bearing animals hunted include: lynx, raccoon, hare, porcupine, mink, beaver, marmot, muskrat and fox.

Metlakatla First Nation's Final TLU Report (DMCS and MFN 2014) provided additional information regarding terrestrial and marine wildlife species harvested by Metlakatla First Nation for food, material, ceremonial, medicinal, and trade purposes, and culturally and/or socially significant species.

- Terrestrial wildlife harvested for food include: beaver, big horned sheep, black bear, black-tailed deer, caribou, elk, fox, grizzly bear, groundhog, marten, mink, moose, mountain goat, mountain lion, muskrat, rabbit, red squirrel, and weasel;

- Terrestrial wildlife harvested for material purposes include: beaver, black bear, black-tailed deer, fox, grizzly bear, lynx, marten, mink, mountain goat, muskrat, porcupine, rabbit, raccoon, red squirrel, and weasel;
- Terrestrial wildlife harvested for ceremonial purposes include: beaver, black bear, fox, marten, mink, mountain goat, muskrat, porcupine, rabbit, red squirrel, and weasel;
- Terrestrial wildlife harvested for trade purposes include: beaver, big horned sheep, fox, groundhog, marten, mink, muskrat, rabbit, red squirrel, and weasel;
- Wolf was identified as being a culturally and/or socially significant species;
- Other wildlife species of interest to Metlakatla First Nation include: coyote, land (river) otter, marmot, and wolverine; and
- Marine mammals hunted include: seal, sea otter and sea lion.

The Metlakatla First Nation Final TLU Report (DMCS and MFN 2014) identified several specific traditional land use areas associated with hunting. Marine and terrestrial hunting areas were identified to include Chatham Sound and Lelu Island (DMCS and MFN 2014). Several islands (e.g., Lelu Island, Ridley Island, Dundas Island, and Melville Island) are used by Metlakatla First Nation for hunting various marine and terrestrial wildlife. Lelu Island provides important terrestrial and intertidal hunting areas for deer, waterfowl, and seal. Stephens Island, and Triple Island/Tree Knob Group are also identified as important resource gathering locations for Metlakatla First Nation.

Lelu Island is predominantly characterized by forested and shrubby blanket bogs, with forested areas dominated by western red cedar, yellow cedar, western hemlock and shore pine. The Prince Rupert region provides seasonal and year-round habitat to approximately 359 terrestrial wildlife species, including 62 mammals, and 288 bird species. Lelu Island provides habitat for a variety of mammals, birds and amphibians. Mammals on Lelu Island include grey wolf, black-tailed deer<sup>40</sup>, Pacific marten, and red squirrel.

Marine mammals, including sea lions and seals are hunted throughout the winter and spring. Hunting for seals traditionally occurred in the winter on Dundas Island located approximately 10 km west of the proposed LNG marine shipping route in Chatham Sound. The majority of residual effects to Metlakatla First Nation access to marine mammal hunting sites will occur on Lelu Island.

The Lax Kwaxl/Dundas and Melville Islands Conservancy located approximately 20 km west of the village of Metlakatla First Nation (and over 60 km northwest of Lelu Island) is an important ecological area, and current and traditional harvesting area, for wildlife including marine mammals (e.g. seals, sea lions), birds and other wildlife hunted by Metlakatla First Nation. Other conservancy areas with important current and traditional land use activities related to hunting within Metlakatla First Nation's asserted traditional

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<sup>40</sup> Black-tailed deer were the most commonly observed species on Lelu Island during the baseline surveys (PNW Application 11-32).

territory and in closer proximity to Lelu Island include: Ksgaxi/Stephens Island Group (about 25 km west of Lelu Island), Lucy Islands (24 km northwest of Lelu Island), Rachael Islands (18 km northwest of Lelu Island), and Kinahan Islands (6.3 km northwest of Lelu Island).

In the final TLU Report (DMCS and MFN 2014), Metlakatla First Nation provided several recommended mitigation measures related to Metlakatla First Nation hunting interests, including:

- Further discussions with the Proponent have begun, but need to be completed in order to accurately analyze proposed Project-specific impacts to traditional land use and access in order to develop impact-specific mitigation measures (DMCS and MFN 2014).

In comments received during consultation, Metlakatla First Nation recommended specific mitigation measures related to their asserted Aboriginal right to hunt, including:

- Noise restrictions at construction camps;
- Blasting restrictions in wildlife habitat during sensitive life cycle stages and for wildlife sensitive to noise;
- Clarification on whether the Proponent intends on committing to mitigation measures outlined in the Application;
- Ensure communication between proponents and the Metlakatla Stewardship Office regarding construction timing and how best to conduct proposed Project activities;
- Extend the applicable distance of the no wake zone in Metlakatla Pass;
- Establishment and enforcement of maximum boat speeds through Metlakatla Pass;
- Educate boat pilots on the timing of traditional harvests so that pilots can act appropriately when travelling near active harvesting areas; and
- Include information about traditional harvest practices and importance in any LNG employee training manuals and programs.

The greatest effect to terrestrial wildlife from the proposed Project is the loss of habitat from site clearing and construction at Lelu Island. The residual effects of the proposed Project on terrestrial wildlife habitat, as predicted in section 11 of the Proponent's Application, and based on ecological community modelling and habitat suitability models, indicates a low probability that the change in availability of preferred habitat would affect the sustainability of regional wildlife populations.

Direct mortality to large and medium-sized terrestrial mammals is considered unlikely during site clearing and construction of the proposed Project on Lelu Island due to those species' high mobility. The Proponent's Application proposes the following mitigation measures to avoid or reduce mortality to terrestrial wildlife:

- A 30 m vegetation buffer will be maintained around the perimeter of Lelu Island;
- Clearing activities will occur outside of the breeding season for terrestrial birds, amphibians and bats, and will avoid the breeding period for raptors;

- Bird surveys will be conducted in advance of clearing and buffers will be established around active nests;
- Relevant sections of the BC *Wildlife Act* will be adhered to if raptor nests are identified within clearing limits;
- Permanent fencing would be erected around the facility; and
- Wildlife education and training would be provided to construction workers

Section 18.3 of this Report characterizes the potential impacts of the proposed Project on Aboriginal Interests associated with the marine environment, including hunting of marine mammals, fishing and gathering activities.

In consideration of the Proponent's proposed mitigation measures and proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects on wildlife, wildlife habitat and current and traditional land use related to hunting — as discussed in section 18.3.2 and 18.7 — the proposed Project is expected to have minor impacts on Metlakatla First Nation's asserted Aboriginal right to hunt in the proposed Project area.

### **Gathering**

Traditional and current activities include gathering a variety of marine and terrestrial plants throughout Metlakatla First Nation traditional territory.

EAO has relied upon information provided by Metlakatla First Nation in their 2014 TLUS report, along with other information sources, including ethno-historic information, to inform its understanding of Metlakatla First Nation traditional use within the proposed Project area to have been the seasonal round activities of the Nine Allied Tsimshian Tribes.

The ATTL 2004 identifies several plant gathering areas within Metlakatla First Nation's asserted traditional territory. The Metlakatla TLUS documents a wide variety of food and medicinal plants of importance to the traditional diet of Metlakatla First Nation members. However, detailed information on plant gathering sites and the approximate distances away from the proposed Project is not available to EAO.

Metlakatla First Nation's current and traditional activities include gathering a variety of marine and terrestrial plants through their asserted traditional territory.

Seasonal berry picking, medicinal plant gathering and cedar and hemlock bark collecting are activities that are still practiced by the Metlakatla. Cedar wood and bark is used for making canoes, totem poles and for weaving. Several islands (e.g., Lelu Island, Ridley Island, Dundas Island, and Melville Island) are used by Metlakatla First Nation for berry picking and gathering food and medicinal plants.

Species of berries harvested in the summer months include: salmonberries, gooseberries, elderberries, raspberries, bunchberries, high-bush cranberries, dwarf blueberries, black and red currants, soapberries and huckleberries. Food and medicinal

plants harvested include licorice fern root, Hudson Bay tea, hemlock bark, jackpine sap and needles, fireweed, cow parsnip and devil's club.

Marine plants harvested included seaweeds and kelp. As a substrate for herring roe-on-kelp, both bull and giant kelp are important marine species gathered. Seaweed and kelp are harvested throughout Chatham Sound, and generally around Dundas Island, Stephens Island, Big Bay, Edye and other areas located in Chatham Sound.

As noted in Metlakatla's Final TLU Report (DCMS and MFN 2014), Lelu Island is an important berry picking, medicinal and food plant collecting area with a high density of TLU sites. Ridley Island, located approximately 3-5 km north of Lelu Island, is also an important plant gathering area.

All of the above-mentioned plant species are widely abundant and dispersed throughout the asserted traditional territory of the Metlakatla. No particularly important terrestrial or marine plants were identified within the area potentially affected by the proposed Project. Section 18.3.3 of this report characterizes the potential impacts of the proposed Project on Aboriginal Group's gathering activities.

The Proponent's Application proposes to maintain a 30 m vegetation buffer around the perimeter of Lelu Island.

The greatest effect to plants traditionally gathered from the proposed Project is the loss of plant habitat from site clearing and construction.

Section 10 of the Proponent's Application assessed the potential effects of the proposed Project on effects related to:

- Change in abundance of plant species of interest;
- Change in abundance or condition of ecological communities; and
- Change in wetland function.

Change in abundance of plant species and abundance or condition of ecological communities were predicted to change directly as a result of site clearing and preparation, or indirectly as a result of the introduction of invasive non-native plant species, or altered abiotic conditions.

The LAA encompasses an area of approximately 254 ha and contains sixteen distinct plant communities, approximately 61% of which are classified as wetland. Three dominant communities cover 84% of the LAA and include:

- Western red cedar-western hemlock/salal upland forest (32%);
- Shore pine-yellow cedar/sphagnum bog (22%); and
- Western red cedar-yellow cedar/goldthread bog forest (21%).

Plant species identified as used traditionally by Aboriginal Groups for food or medicine and observed on Lelu Island include the following tree species: Hemlock, Amabilis fir,

Pacific crabapple, Sitka spruce, western red cedar, and yellow cedar. Shrub species found on Lelu Island and documented as used by Aboriginal Groups include: Alaska blueberry, black cowberry, blueberries, bog cranberry, devil's club, juniper, Labrador tea, red huckleberry, salal and salmonberry. Three species of herb and one fern identified on Lelu Island and known to be used by Aboriginal Groups include: bunchberry, hellebore, skunk cabbage and licorice fern (10.3.2.4 of Proponent's Application).

The residual effects of the proposed Project on vegetation, as predicted in section 10 of the Proponent's Application, and based on ecological community modelling and habitat suitability models, indicates that the residual effects on traditional use are expected to be adverse, but low in magnitude and limited to the PDA. No residual effects are anticipated as a result of noxious weeds and invasive plants as a result of the proposed Project. The Proponent has also committed to incorporating traditional food and medicinal plants into a Wetland Habitat Compensation Plan wherever possible.

In consideration of the Proponent's proposed mitigation measures and proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects to vegetation, and current and traditional land use — as discussed in section 18.3.3 and 18.7 — the proposed Project is expected to result in minor impacts on Metlakatla First Nation's gathering activities in the proposed Project area.

## 19.3 Gitxaala Nation

### **Context**

- Gitxaala Nation is based at *Lach Klan*, also known as the village of Kitkatla on Dolphin Island located 45 km south of Prince Rupert. Lach Klan is accessible only by boat or float plane.
- Gitxaala Nation has 21 registered reserves, settlements, or villages with a total area of 1885.2 ha. Gitxaala Nation has a registered population of 1,912, with 1,443 members living off-reserve (423 on-reserve members).
- The Gitxaala Nation refer to themselves as *Git Lax Moon*, meaning “People of the Salt water”. Traditionally, the seasonal runs of salmon, herring and eulachon set the pattern for the yearly cycle of Gitxaala Nation economic activities. Gitxaala Nation also harvested a number of other resources, including marine mammals, various plant species including seaweed and the bark of several species of trees, seabird eggs, land mammals such as bear deer and goat, and shellfish. The harvesting and consumption of traditional foods continues to be very important to Gitxaala Nation people living at *Lach Klan* and elsewhere.
- Within their traditional territory, Gitxaala Nation assert Aboriginal title, Aboriginal rights to fish and gather marine resources, and associated rights of access and travel, governance over lands and waters, and rights to teach and pass on traditional activities to maintain Gitxaala Nation’s way of life (those interests characterized above as associated rights are often otherwise described as incidental to the right to fish and harvest marine resources).
- Gitxaala Nation is governed by a Council with a deputy Chief and five Councillors, under a custom electoral system.

### **Aboriginal Interests and EAO’s Strength of Claim Assessment and Depth of Consultation**

Gitxaala Nation’s asserted traditional territory is presented in the Strategic Land Use Planning agreement between Gitxaala Nation and the Province.

EAO understand that the proposed Project and associated shipping route is located outside of what was considered by ethnographers as within the pre-contact traditional territory of the Gitxaala Nation.

The “core” Gitxaala Nation traditional territory described by a number of ethnographers and early fur traders including Barbeau and Beynon as detailed in their notes and hand drawn maps, was a concentration of Gitxaala Nation house (*wa.lp*) territories and sites concentrated in the coastal archipelago south of the Skeena River<sup>41</sup>.

It is likely that Gitxaala Nation use of the lower Skeena River and adjacent coast only assumed a prominent and regular position in their annual round after William Duncan

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<sup>41</sup> Mitchell 1981:1; Malloy 1998:197; Beynon files 131:12; Marsden 1992:24-25, 2011:50; Garfield 1939:176.

established a model Christian community at Metlakatla in 1862. Several Gitxaala left their traditional home at *Lach Klan* on Dolphin Island to join the mission village.

In historic times, economic opportunities presented by canneries and other industries drew many Tsimshian to the Prince Rupert region, as well. As the Nine Allied Tsimshian Tribes who traditionally resided in that neighbourhood were experiencing settlement shifts and population changes for similar reasons, it is possible that some lineages found themselves in a position to share abandoned or underutilized resource sites with Gitxaala Nation relations who were now living in greater proximity.

While it is probable that Gitxaala Nation used campsites and harvested resources along the coast en route to or from the eulachon fishery on the Nass River each year, use of this area at the time of contact (1787) likely required the permission of one of the Nine Allied Tsimshian tribes. Sources indicate that the coastal areas were considered the territory of the Nine Allied Tsimshian tribes such that any use, including camping, in this coastal area would have likely required permission of the Nine Allied Tsimshian Tribes.

EAO's initial assessment is that the strength of claim to Gitxaala Nation Aboriginal rights to this area is weak to moderate.

Gitxaala Nation significantly disagrees with EAO's assessment of Gitxaala Nation's strength of claim to the Prince Rupert Harbour and area, and submitted a report, 12 statutory declarations, and a CD of ethno-historical sources to demonstrate that Gitxaala Nation have a strong claim to areas around the Prince Rupert Harbour.

EAO undertook a detailed analysis of these materials in relation to understanding Gitxaala land and traditional use at around the time of contact (understood to be 1787) to assess the claims to Aboriginal rights, and around 1846 to assess the claims to Aboriginal title. EAO acknowledges information provided by Gitxaala that Gitxaala occupied sites in the vicinity of Prince Rupert Harbour, largely beginning in the 1880s but with some references to members living in this area prior to that time; however, EAO considered this information in the context of all ethnohistoric information available, which includes recordings of other oral history, a majority of which suggest that Gitxaala may have started using the area on a regular and consistent basis at some point after 1846, including after the establishment of the mission village of Metlakatla in 1862.

On June 26, 2014, the *Tsilhqot'in* decision was released by the Supreme Court of Canada. The decision clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation at 1846. Based on the information reviewed and test for title as set out in *Tsilhqot'in*, EAO is of the view that Gitxaala Nation have a weak *prima facie* claim of Aboriginal title within or near those portions of the proposed Project in the vicinity of the Prince Rupert Harbour which overlaps with the asserted traditional territory of Gitxaala Nation as the evidence available suggests Gitxaala Nation use of these lands was for transitory purposes and at the permission of the other Nine Allied Tsimshian Tribes.

The Province has initiated discussions with Gitxaala Nation regarding financial and potentially other benefits in relation to the proposed Project.

### **Summary of Consultation**

Gitxaala Nation was invited to review and provide comments on the draft AIR, draft Section 11 Order, the Proponent's draft Aboriginal Consultation Plan and Reports, the screening of the Application, and on the Application. Gitxaala Nation was a member of the advisory Working Group, provided with opportunities to participate in technical discussions, and attend Working Group meetings, workshops, and to meet directly with EAO staff.

EAO provided Gitxaala Nation with \$5,000 in capacity funding during the Pre-Application phase of the EA for the proposed Project, and \$10,000 in capacity funding during the Application Review phase of the EA. The Proponent provided additional funding to Gitxaala Nation to support participation in field programs, and to prepare TUS and socio-economic reports to for consideration in the EA.

During the Pre-Application stage of the environmental assessment, Gitxaala Nation participated in four Working Group meetings (May 6, 2013; September 26, 2013; July 30, 2013; and, August 1, 2013). EAO met once with Gitxaala Nation during Pre-Application (September 6, 2013), and has a meeting confirmed for October 17, 2014.

During the Application review stage of the EA, Gitxaala participated in six Working Group meetings or workshops (March 27, 2014; April 8, 2014; May 7, 2014; June 9, 10, 12, 2014).

In addition, the Proponent met with Gitxaala Nation eight times during the EA.

In meetings October 24, 2014 and October 30, 2014 between EAO and Gitxaala Nation, Gitxaala Nation continued to emphasize to EAO its significant disagreement relating to the adequacy of consultation and accommodation, particularly regarding EAO's assessment of the strength of Gitxaala's claims of Aboriginal rights and title to the Prince Rupert Harbour area. Gitxaala Nation placed strong emphasis on their views that EAO has not sufficiently considered the oral evidence that has been provided relating to their claims in the Prince Rupert area, and that such evidence in relation to the proposed Project needs to be considered at face value, rather than allegedly being discounted by EAO.

EAO acknowledges the information provided in the Gitxaala statutory declarations derives from attestations of a Gitxaala presence in the vicinity of Prince Rupert, largely beginning in the 1880s but with some references to members living in this area prior to that time. EAO has considered this evidence in the context of the ethnohistorical record, which includes a recording of other oral history, a majority of which suggests that Gitxaala (like Gitga'at and Interior Tsimshian groups) may have started using the area on a regular and consistent basis at some point after 1846, including after the establishment of the mission village of Metlakatla in 1862.

There was discussion of the challenges related to the differing information regarding which group occupied and/or had control of specific sites within the Prince Rupert Harbour area, the time period when different groups used or occupied that area, and whether any such use or occupation was by permission of another group. Gitxaala raised concerns regarding EAO's reliance on Beynon's work, particularly where it attributes use, occupation or control of areas in the Prince Rupert Harbour area to the Nine Allied Tsimshian Tribes and not also to Gitxaala. EAO is of the view that all information needs to be considered. EAO noted that responses to these issues were conveyed in one of the two provincial October 28, 2014 memoranda provided to Gitxaala in advance of the meeting, which built on information previously shared by EAO in March, 2014.

EAO acknowledged that confusion has been created by use of the term "Coast Tsimshian" to represent the surviving nine Tsimshian tribes who previously had winter villages in the lower Skeena River and relocated their winter villages to Prince Rupert Harbour prior to contact. EAO understands that the Coast Tsimshian term has been used by different linguists, ethnographers and historians in different ways to include different groups. To avoid this confusion, EAO will use the term "Nine Allied Tsimshian Tribes" to refer to the surviving nine tribes who previously had winter villages in the lower Skeena River and relocated their winter villages to Prince Rupert Harbour prior to contact. References to Southern Tsimshian similarly have been revised.

Although Gitxaala were provided consultation opportunities at a deeper level by having been listed on Schedule B, Gitxaala raised the concern that its Aboriginal Interests were not appropriately accommodated because of EAO's assessment of its strength of claims.

There was a discussion of measures to mitigate or avoid impacts on Aboriginal Interests developed during the EA. A particular concern that Gitxaala raised was regarding the potential social and economic effects that Gitxaala members could experience.

EAO confirmed that the proposed EA Certificate SEEMP condition would include Gitxaala in relation to the proposed Project.

The SEEMP requires management activities aimed at mitigating the potential socio-economic effects from the proposed Project, particularly focused on infrastructure and services pressures during construction, including anticipated cumulative social and economic impacts relating to the proposed Project, and specific consideration for vulnerable populations.

This plan must be developed and approved in accordance with defined timelines outlined in the draft condition. It was noted that there is no distinction made among the Aboriginal Groups to be engaged in the development of this plan such that some would be engaged more than others. It was also noted that BC had an initial discussion with Gitxaala regarding benefits to Gitxaala related to LNG projects. BC does not direct

Proponents in relation to benefit negotiations, and had shared the summary of EAO's strength of claim assessments to inform delegated aspects of consultation.

Gitxaala emphasized its concerns regarding the timeline and requested a suspension of time limits pursuant to section 24(4) of the *EA Act* to allow for more consultation to address or reconcile Gitxaala's outstanding concerns. EAO acknowledged the request, but continues to be of the view that the consultation and accommodation process has been reasonable and adequate in the circumstances.

Other issues raised by Gitxaala Nation and the Proponent's responses are provided in the Issues Tracking Table. A summary of the Proponent's consultation activities with Gitxaala Nation and the Proponent's proposed mitigations to issues raised by Gitxaala Nation are provided in the Proponent's Aboriginal Consultation Report # 2 (ACR 2) and Addendum to ACR 2 which describes the proposed Project design modifications to avoid or mitigate potential adverse Project effects to Aboriginal Interests.

EAO received and considered comments from Gitxaala Nation in their letter dated November 3, 2014 regarding drafts of Parts B and C of this report.

### **Potential Impacts from the Proposed Project to Gitxaala Nation's Aboriginal Interests**

The proposed Project includes a route to be used by LNG carriers that would travel through approximately 20 km of the Gitxaala Nation's asserted territory.

EAO's review of the proposed Project description and information contained in the Proponent's Application, suggested that the proposed Project may impact the Gitxaala Nation's Aboriginal Interests in the area by potentially:

- Increasing air emissions, with potential effects from acidification on vegetation, fish, and wildlife;
- Affecting benthic and near shore marine resources through shoreline modification, ship wake, and disturbance and/or removal of sediments during construction of the marine terminal;
- Increasing marine traffic in the area and altering access to traditional fishing grounds; and
- Potential effects to Gitxaala Nation's community health and well-being.

### **Fishing**

During the EA, Gitxaala Nation expressed concerns related to the potential adverse effects of the proposed Project on the Aboriginal right to fish marine fish species, including salmon, eulachon, herring, halibut, cod, and other ground fish such as snapper, flounder and sole; marine mammals, including Hair and Pacific Harbour seals and sea lions for subsistence, social and ceremonial purposes.

The Aboriginal Groups consulted during the EA, including Gitxaala Nation, also expressed concern regarding the potential adverse effects of the proposed Project on the Aboriginal right to gather marine resources, including shellfish and sea weed.

These potential effects are noted in the Gitxaala Nation's TUS report. Potential impacts to Aboriginal Interests are described above in section 18.2 of this Report, in particular relating to the marine environment.

Concerns expressed by Gitxaala Nation in relation to potential effects on harvesting of Marine Resources include the following:

- Impacts to marine ecosystems and fish and fish habitat and marine vegetation, particularly the sensitive habitat on Flora Bank;
- Impacts on fish life cycles, migration and fish habitat (species of specific interest include salmon, eulachon, and ground fish), particularly Skeena River fisheries;
- Adverse changes in behaviour of fish and marine mammals;
- Impacts of marine infrastructure;
- Dredging, including toxicity of disturbed sediments;
- Disposal at sea, including toxicity of disturbed sediments;
- Adverse changes in sediment or water quality;
- Direct injury or mortality to fish and marine mammals;
- Cumulative effects on marine resources; and
- Effectiveness of proposed marine habitat offset measures.

### **EAO's Response**

EAO understands that Gitxaala Nation's marine resource harvesting activities require fish and marine mammal populations and associated habitats within the respective traditional territories of the Aboriginal Groups to support food (subsistence), social and ceremonial purposes.

The following factors were taken into consideration by EAO in assessing potential adverse effects of the proposed Project on Gitxaala Nation's Aboriginal Interests associated with harvesting of marine resources:

- The assessment of potential effects of the proposed Project on Gitxaala Nation's Aboriginal Interests associated with fishing, hunting and gathering of marine resources, including fish, marine mammals and invertebrates is informed by the analysis of potential residual effects on fish and fish habitat and water quality as presented in the Marine Resources VC characterized in Section 5.6 of Part B of this Report;
- Marine resource harvesting sites, as identified during consultation with Gitxaala Nation, and in the TUS reports provided by Gitxaala Nation, that overlap with or are in proximity to the proposed Project, were considered in relation to past, present and anticipated future use of the area for those marine harvesting activities;
- EAO considered the effectiveness of the Proponent's proposed mitigation measures to avoid or reduce potential adverse effects to marine resources. This includes the design modifications to the jetty/trestle and marine berths described in the Addendum to the Proponent's Application; and
- The Proponent's proposed changes to the design and construction of the jetty and marine terminal are a direct result of the identification of potential adverse

effects to marine resources, and, in particular the marine resources identified during consultation with Gitxaala Nation throughout the EA.

The avoidance or mitigation to potential effects on marine resources resulting from the information described in the Addendum to the Proponent's Application is described in section 18.3.4 of this Report.

In addition to the avoidance and reduction in potential adverse effects to marine resources described in the Addendum and captured in section 18.3.4 above, the Proponent's commitments to mitigate proposed Project construction-related effects are outlined in section 13 of the Application.

The Proponent will also be required to follow applicable provincial or federal regulations and permit requirements also described in section 18.3.5.

In consideration of the Proponent's proposed mitigation measures to avoid or reduce adverse effects to the marine environment and Proponent commitments; applicable provincial and federal regulations and permit requirements to reduce potential adverse effects to marine resources; the nature of the strength of Gitxaala Nation's Aboriginal Interest claims; existing federal regulations governing in-water construction activities; proposed conditions of any EA Certificate issued; and EAO's analysis of potential residual and cumulative effects on fish and fish habitat, current and traditional land use activities related to fishing— as discussed in section 18.3.1—the proposed Project is expected to have minor impacts on Gitxaala Nation's asserted Aboriginal right to fish in the proposed Project area.

EAO recognizes that further information and analysis regarding impacts to marine resources is ongoing in the federal review process. However, for the purpose of meeting the Crown's duty to consult and accommodate pursuant to the *Haida* framework in relation to the decision under the Act, EAO is of the view that there is sufficient information at this stage of the regulatory review being conducted by the Province, to inform the assessment of seriousness of impacts on Aboriginal Interests associated with marine resources and to inform accommodations appropriate to this stage.

EAO recognizes that should the ongoing assessment of impacts on marine resources by CEAA indicate additional impacts not considered by EAO, there will be opportunities to accommodate those additional impacts through the CEAA process.

### **Navigation and Marine Resource Use**

As discussed in section 18.3 above, Aboriginal Groups expressed concerns regarding the potential adverse effects of the proposed Project on their ability to access preferred marine resource harvesting locations during the construction and operation phases of the proposed Project. Aboriginal Groups commented on concerns regarding how vessels and barges employed to construct the jetty and marine terminal, and the MOF may restrict movement and safe navigation in around Lelu Island, including Chatham Sound, Porpoise Channel and Lelu Slough.

Aboriginal Groups also commented on the potential effects from the movement of LNG carriers and escort tugs during operation of the facility and marine terminal, including how safety and exclusion zones and general vessel traffic could interfere with access to marine resource harvesting sites.

Given the nature and location of the proposed Project, and EAO's assessment of Gitxaala strength of claim, EAO is of the view that the potential impacts of the proposed Project arising from shipping related impacts to the Gitxaala Nation's ability to access marine mammal hunting and marine plant gathering sites be minor in the proposed Project area.

### **Hunting**

Lelu Island is predominantly characterized by forested and shrubby blanket bogs, with forested areas dominated by western red cedar, yellow cedar, western hemlock and shore pine. The Prince Rupert region provides seasonal and year-round habitat to approximately 359 terrestrial wildlife species, including 62 mammals, and 288 bird species. Lelu Island provides habitat for a variety of mammals, birds and amphibians. Mammals on Lelu Island include grey wolf, black-tailed deer<sup>42</sup>, Pacific marten, and red squirrel.

Marine mammals, including sea lions and seals are hunted throughout the winter and spring. Hunting for seals traditionally occurred in the winter on Dundas Island located approximately 10 km west of the proposed LNG marine shipping route in Chatham Sound. The majority of residual effects to Nine Allied Tsimshian Tribes' access to marine mammal hunting sites will occur on Lelu Island.

Concerns related to wildlife, wildlife habitat and hunting as a result of the proposed Project including noted in comments from Gitxaala Nation include:

- Potential for effects on marine mammals and migrating fauna, including seasonal and temporary changes;
- Potential for effects on marine fauna used for sustenance, cultural, or commercial purposes;
- Potential for changes in wildlife due to construction and Project-related accidents;
- Concerns about construction activities at Lelu Island, and particularly areas in close proximity to Inverness Passage and the Skeena Estuary;
- Change in habitat;
- Change in species abundance;
- Change in wildlife behavior;
- Change in hunting areas;
- Change in access to hunting areas;
- Ability to harvest food and other resources;

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<sup>42</sup> Black-tailed deer were the most commonly observed species on Lelu Island during the baseline surveys (PNW Application 11-32).

- Effect of Project-related accidents on wildlife; and
- Perceived contamination of country foods from a spill.

In consideration of the Proponent's proposed mitigation measures and proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects to wildlife, wildlife habitat and current and traditional land use related to hunting—as discussed in section 18.3.2 and 18.7—the proposed Project is expected to have minor impacts on Gitxaala Nation's asserted Aboriginal right to hunt in the proposed Project area.

### **Gathering**

No particularly important terrestrial or marine plants were identified within the area potentially affected by the proposed Project. Section 18.3.3 and 18.7 of this report characterizes the potential impacts of the proposed Project on Aboriginal Group's gathering activities. The Proponent's Application proposes to maintain a 30 m vegetation buffer around the perimeter of Lelu Island.

The greatest effect to plants traditionally gathered from the proposed Project is the loss of plant habitat from site clearing and construction.

Section 10 of the Proponent's Application assessed the potential effects of the proposed Project on effects related to:

- Change in abundance of plant species of interest;
- Change in abundance or condition of ecological communities; and
- Change in wetland function.

Change in abundance of plant species and abundance or condition of ecological communities were predicted to change directly as a result of site clearing and preparation, or indirectly as a result of the introduction of invasive non-native plant species, or altered abiotic conditions.

The LAA encompasses an area of approximately 254 ha and contains sixteen distinct plant communities, approximately 61% of which are classified as wetland. Three dominant communities cover 84% of the LAA and include:

- Western red cedar-western hemlock/salal upland forest (32%);
- Shore pine-yellow cedar/sphagnum bog (22%); and
- Western red cedar-yellow cedar/goldthread bog forest (21%).

Plant species identified as used traditionally by Aboriginal Groups for food or medicine and observed on Lelu Island include the following tree species: Hemlock, Amabilis fir, Pacific crabapple, Sitka spruce, western red cedar, and yellow cedar. Shrub species found on Lelu Island and documented as used by Aboriginal Groups include: Alaska blueberry, black cowberry, blueberries, bog cranberry, devil's club, juniper, Labrador tea, red huckleberry, salal and salmonberry. Three species of herb and one fern

identified on Lelu Island and known to be used by Aboriginal Groups include: bunchberry, hellebore, skunk cabbage and licorice fern (10.3.2.4 of Proponent's Application).

The residual effects of the proposed Project on vegetation, as predicted in section 10 of the Proponent's Application, and based on ecological community modelling and habitat suitability models, indicates that the residual effects on traditional use are expected to be adverse, but low in magnitude and limited to the PDA. No residual effects are anticipated as a result of noxious weeds and invasive plants as a result of the proposed Project. The Proponent has also committed to incorporating traditional food and medicinal plants into a Wetland Habitat Compensation Plan wherever possible.

In consideration of the Proponent's proposed mitigation measures and proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects to vegetation, and current and traditional land use—as discussed in section 18.3.3 and 18.7—the proposed Project is expected to result in negligible impacts on Gitxaala Nation's gathering activities in the proposed Project area.

## 19.4 Gitga'at First Nation

### **Context**

Gitga'at First Nation is an Aboriginal group formerly based at Kitkiata Inlet on Douglas Channel and now located at Hartley Bay. Gitga'at First Nation has 15 registered reserves, settlements, or villages with a total area of 641.7 ha. Gitga'at First Nation has a registered population of 736, with 588 members living off-reserve in Prince Rupert and approximately 170 members living on reserve in Hartley Bay.

- The Gitga'at First Nation traditionally relied on a number of land-based and marine resources, including seaweed and plants; fish, octopus, and shellfish; birds; and mammals. Salmon, halibut, and cedar are particularly central to Gitga'at culture and way of life.
- Gitga'at First Nation is governed by a Village Council with one Chief and four Councilors, under a custom electoral system.

### **Aboriginal Interests, EAO's Strength of Claim Assessment and Depth of Consultation**

The Gitga'at First Nation, formerly based at Kitkiata Inlet on Douglas Channel, is understood to have relocated to William Duncan's model village of Metlakatla in the 1860-80s. This represented a significant cultural and economic change for Gitga'at, although it is also reported that the Gitga'at of Metlakatla continued to travel seasonally to their traditional fishing camps and food gathering locations. When Duncan moved his congregation to Alaska in 1887, many Gitga'at followed, but 30 individuals returned to their old territory, establishing a village in Hartley Bay, the site of a traditional fall camping site.

Gitga'at's asserted traditional territory is located south of the proposed Project area. During the Pre-Application stage of this EA, Gitga'at First Nation submitted correspondence to EAO asserting Aboriginal Interests in the Prince Rupert Harbour area. Although EAO recognizes Gitga'at's historical connection to the Prince Rupert Harbour area, Gitga'at's relocation to Metlakatla is understood to have started in the 1860s, which is subsequent to the time of European contact (1787) and the time of assertion of Crown sovereignty (1846) – the relevant time periods for the assessment of Aboriginal rights and title claims. In a letter from Gitga'at First Nation to EAO dated October 20, 2014, Gitga'at First Nation clarified that it is asserting only Aboriginal rights in the Prince Rupert area and not Aboriginal title.

Gitga'at may have close kinship ties with neighboring Aboriginal Groups, which may include the Nine Allied Tsimshian Tribes, such that individual Gitga'at members had access to resources beyond Gitga'at territory, including the Prince Rupert Harbour area. However, a number of sources indicate that, at the time of contact, the coastal areas were considered the territory of the Nine Allied Tsimshian Tribes, such that any use resource sites in the area by Gitga'at members would have drawn on kinship ties or required permission of, as well as perhaps offering compensation to, the lineage head of the appropriate Nine Allied Tsimshian Tribes *wa.lp*. This finding leads to a conclusion of a weak to moderate *prima facie* claim to Gitga'at Aboriginal rights in the Prince Rupert Harbour area.

Gitga'at First Nation disagreed with EAO's initial assessment of strength of claim, potential impacts, and the duty to consult. During the EA, Gitga'at First Nation provided evidence in the form of affidavits of Gitga'at elders describing Gitga'at First Nation members' connection to and use of the Prince Rupert Harbour area.

EAO reviewed the readily available ethnohistoric information on the use of the Prince Rupert harbour area at around the time of contact and 1846, including information regarding Tsimshian law, and the report that forwarded to EAO entitled "Gitga'at traditional use and occupancy study Prince Rupert region: preliminary results report"(Gitga'at TUOS).

The Gitga'at TUOS collates information from interviews with twelve Gitga'at First Nation Elders and knowledge holders, as well as from the ethnographic literature and historic documents, concluding that:

Tsimshian *adawk* document Gitga'at presence in, and ties to, the Prince Rupert region since earliest times. Interviews conducted for the project provide evidence of long term occupation and resource use in the Prince Rupert region. (p.29)

EAO approaches assessing the strength of a First Nation's claims to Aboriginal rights based on the criteria currently defined in case law, which require information supporting a First Nation's use of the area at around the time of European contact (1787).

*Adawk* narratives that describe use of the Prince Rupert Harbour area by Gitga'at ancestors in the distant past do not necessarily provide support to Gitga'at use of this area at around the time of contact where there is other extensive information indicating that this area was understood to be within the core of the territory of the Nine Allied Tsimshian Tribes, and subject to control of the *wa.lps* or house groups as described in Section 14.1 of this Report, such that any use of this area would likely be subject to the permission of that *wa.lps*. EAO acknowledges that Gitga'at disagrees with this view.

The Gitga'at First Nation TUOS identifies a number of habitation sites that interviewees stated were occupied by Gitga'at "long before the canneries were established on the Skeena River in the late nineteenth century" (p.30). However, this does not necessarily correlate that information with use at 1787. Given the significance of the dislocation caused by the Metlakatla Mission in 1863 and the small pox of 1836, it cannot be assumed that land use activities in the Prince Rupert Harbour area in the late 19<sup>th</sup> century represents a continuity of land use or occupation at 1787.

The Barbeau and Beynon records as well as more recent research by Campbell (2011) and Marsden (2012) describe the available evidence in great detail, but do not identify Gitga'at First Nation sites or territory in Prince Rupert Harbour. Of the TUOS sites mapped in the Gitga'at TUOS, a number of these sites have been documented elsewhere as belonging to the Gitwilgyots (one of the Nine Allied Tsimshian Tribes), with whom the Gitga'at First Nation has close kinship connections.

EAO's consideration of the potential impacts of the proposed Project on specifically Gitga'at First Nation's Aboriginal Interests is discussed below. Given the nature and location of the proposed Project relative to Gitga'at First Nation's asserted traditional territory, EAO has determined that the duty to consult Gitga'at First Nation lies at the lower end of the *Haida* consultation spectrum.

Gitga'at First Nation has been listed on Schedule C of the Section 11 Order for the proposed Project.

### **Summary of Consultation**

On October 30, 2013 EAO met with representatives of Gitga'at First Nation to discuss Gitga'at First Nation's letters to EAO and CEAA, who asserted Gitga'at First Nation Aboriginal rights in the Prince Rupert Harbour area, including the area of the proposed Project.

On November 5, 2013, a Section 13 Order was issued for the proposed Project that amended the Section 11 Orders to include Gitga'at First Nation on a Schedule C for notification.

Following the issuance of the Section 13 Order, EAO committed to provide Gitga'at First Nation notification at the following milestones, so that Gitga'at First Nation can be informed of the progress of the EA and have the opportunity to raise any issues to EAO for discussion:

- Issuance any other Section 13 Orders;
- Public comment period for the draft AIR;
- Approval of the final AIR document;
- When the Application has been accepted and the start of the review of the Application has commenced;
- Public comment period for the Application; and
- Decision on the Application.

Gitga'at First Nation provided comments to EAO on the draft AIR and on the Application, during the public comment periods, and during the Working Group review of EAO's draft Assessment Report. Gitga'at First Nation also provided a separate submission to EAO for inclusion in the referral package to Ministers.

In addition to the consultation opportunities provided to Gitga'at First Nation described above, the Proponent met with Gitga'at First Nation and provided capacity funding to support Gitga'at First Nation's review of information. The Proponent concluded an EA Agreement with Gitga'at First Nation on April 10, 2014 to support TUS and socio-economic reports.

### **Potential impacts of the proposed Project to Gitga'at First Nation's Aboriginal Interests**

The LAA is intended to capture the direct and indirect impacts from the proposed Project, while the RAA is intended to capture the area where the influence of other land uses and activities could overlap with proposed Project-specific effects and result in cumulative adverse effects.

EAO's review of the project description and information from Application suggested that the proposed Project may potentially impact the Gitga'at First Nation's Aboriginal Interests in the area by potentially:

- Increasing air emissions, with potential effects from acidification on vegetation, fish, and wildlife;
- Affecting benthic and near shore marine life through shoreline modification, ship wake, and disturbance and/or removal of sediments during construction of the marine terminal; and
- Increasing marine traffic in the area and altering access to traditional fishing grounds.

The effects of the proposed Project are expected primarily within the Project footprint and LAA, therefore, it is not expected that residual adverse effects on any of the bio-physical VCs would extend into Gitga'at First Nation territory. EAO notes Gitga'at First Nation's disagreement with EAO's conclusion on the potential impacts to Gitga'at First Nation in relation to the proposed Project.

EAO acknowledges the information provided by Gitga'at First Nation and EAO has given careful consideration to Gitga'at First Nation's comments, and in particular their

concern over potential adverse to their asserted Aboriginal Interests, including cumulative effects from multiple LNG developments and LNG shipping activities.

As noted in their correspondence of September 17, 2014, Gitga'at have expressed concerns related to LNG vessel traffic and access to harvesting locations, air quality, and the effects of accidents and malfunctions on marine resources and harvesting activities. As noted in earlier sections of this report, Gitga'at First Nation, as a member of the CFN organization, has participated in a variety of engagement activities related to LNG shipping. EAO acknowledges that Gitga'at First Nation has provided meaningful input into discussions with the Province of BC in relation to LNG shipping. That engagement continues.

### **Other matters of concern to Gitga'at First Nation**

EAO received comments from Gitga'at First Nation with respect to the proposed Project including potential changes in regional employment, population and income, increased housing costs, and effects on community health and well-being, including community infrastructure and services.

Taking into consideration the potential residual adverse effects from the proposed Project, the mitigation measures proposed, and the distance of the proposed Project to Gitga'at First Nation's community and traditional territory, EAO concludes that the proposed Project is not expected to result in impacts on Gitga'at First Nation's Aboriginal Interests in the proposed Project area.

### **19.5 Kitsumkalum First Nation**

- Kitsumkalum First Nation is located just west of the city of Terrace, east of the junction of the Kitsumkalum and Skeena rivers. Kitsumkalum has four registered reserves, settlements, or villages with an area of 597 ha.
- Kitsumkalum First Nation has a population of 729, with 302 living on reserve based on 2011 census information.
- Kitsumkalum First Nation is governed by a Band Council with one Chief and seven Councillors, under the Indian Act electoral system.

### **Aboriginal Interests and EAO's Strength of Claim Assessment and Depth of Consultation**

- The proposed Project includes a route to be used by LNG carriers that would travel through approximately 40-50 km of marine areas in the Kitsumkalum First Nation's asserted territory.
- Kitsumkalum First Nation asserts Aboriginal rights and title to coastal areas including the mouth of the Nass River, the Prince Rupert Harbour area, the mouth of the Skeena river, and Grenville Channel, and submitted to the Province a "Declaration of the Kitsumkalum Indian Band of the Tsimshian Nation of

Aboriginal title and rights to Prince Rupert Harbour and surrounding coastal areas” in October 2013.

- Prior to contact, Kitsumkalum people may have travelled along the coast to get to and from the annual eulachon fishery on the Nass River. Sources indicate that this route included the east side of Chatham Sound in the vicinity of the proposed Project. Sources also suggest that Kitsumkalum people likely harvested resources in the area, but that this would have likely required the explicit permission of and possibly compensation to the Nine Allied Tsimshian Tribes. Thus, with respect to any Kitsumkalum use of the coastal area, including the areas of the proposed Project. EAO’s assessment is that Kitsumkalum First Nation has a weak to moderate *prima facie* claim of Aboriginal rights to harvest resources.
- Kitsumkalum disagrees with EAO’s assessment and assert strong claims of Aboriginal rights and title to the coastal area, including area of the proposed Project. The Province conducted a thorough review of information provided by Kitsumkalum – detailed analysis of this information is captured in three separate memos developed by the Ministry of Justice’s Aboriginal Research Division, provided to Kitsumkalum by EAO on and May 9, 2014 and September 29, 2014.
- On June 26, 2014, the *Tsilhqot’in* decision was released by the Supreme Court of Canada. The decision clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation at 1846. Based on the information reviewed and test for title as set out in *Tsilhqot’in*, EAO is of the view that Kitsumkalum First Nation have a weak *prima facie* claim of Aboriginal title within or near those portions of the proposed Project in the vicinity of the Prince Rupert Harbour which overlaps with the asserted traditional territory of Kitsumkalum First Nation as the evidence available suggests Kitsumkalum First Nation use of these lands was for transitory purposes and at the permission of the other Nine Allied Tsimshian Tribes.
- It is recognized that the Kitsumkalum use of the lower Skeena River and adjacent coast is important to Kitsumkalum today, and had increased in importance to Kitsumkalum after several Kitsumkalum joined the Christian mission at Metlakatla established in 1862, and after the establishment of canneries and other industries in the Prince Rupert region.
- Given the nature and location of the proposed Project and the potential impacts of Kitsumkalum First Nation’s Aboriginal Interests as discussed below, EAO is of the view that the duty to consult Kitsumkalum First Nation lies at the lower end of the *Haida* consultation spectrum.
- Kitsumkalum First Nation is listed in Schedule B of the Section 11 Order.
- The Province is in discussions with Kitsumkalum First Nation regarding financial and potentially other benefits in relation to the proposed Project.

EAO’s review of the project description and information for other similar projects suggested the proposed Project may impact the Aboriginal Interests in the area by potentially:

- Increasing air emissions, with potential effects from acidification on vegetation,

- fish, and wildlife;
- Affecting benthic and near shore marine life through shoreline modification, ship wake, and disturbance and/or removal of sediments during construction of the marine terminal; and
- Increasing marine traffic in the area and altering access to traditional fishing grounds.

### **Summary of Consultation**

- Kitsumkalum First Nation was invited to review and provide comments on the draft Application Information Requirements, Section 11 Order, the Proponent's Aboriginal Consultation Plan and Reports, the screening of the Application and on the Application. Kitsumkalum First Nation was also provided with opportunities to attend Working Group meetings, workshops and to meet with EAO staff directly.
- EAO provided \$10,000 in capacity funding to Kitsumkalum First Nation during the Application Review phase of the EA process to assist with costs associated with their participation in the EA. MARR has also had an initial scoping discussion regarding the negotiation of a benefit agreement with Kitsumkalum.
- An Environmental Assessment Agreement was executed on April 3, 2014 between the Proponent and Kitsumkalum First Nation that provided capacity funding to Kitsumkalum and also provided funding for a TUS and Socio-Economic study.
- Kitsumkalum First Nation has participated in field studies for soil sampling and marine bird surveys in August 2012 and January 2013. Kitsumkalum First Nation completed a TUS report (July 30, 2014). The results of these studies were included in the Proponent's Addendum to the Aboriginal Consultation Report #2.
- In addition to EAO-led consultation activities throughout the EA process, the Proponent invited Kitsumkalum First Nation to meet with them 21 times, and the Proponent met with Kitsumkalum First Nation 7 times to discuss issues and concerns raised by Kitsumkalum First Nation. Issues raised by Kitsumkalum First Nation and the Proponent's responses are provided in the Issues Tracking Table. A summary of the Proponent's engagement activities with Kitsumkalum First Nation, as well as the Proponent's proposed mitigation to issues raised is provided in the Pacific NorthWest LNG Aboriginal Consultation Report #2.

### **Potential Impacts from the proposed Project to Kitsumkalum First Nation's Asserted Aboriginal Interests**

Kitsumkalum First Nation has identified potential adverse effects of the proposed Project on fish and fish habitat, access to fishing, effects on marine mammals and migrating fauna, and effects on important cultural sites in the marine environment.

#### **Fishing**

Kitsumkalum First Nation raised the following key concerns related to potential effects to fish, fish habitat and the marine environment:

- Concern for commercial fisheries;

- Damage to important harvesting areas;
- Access to fishing;
- Impacts to kelp and eel grass;
- Impacts to fish and invertebrates:
  - impacts to eulachon;
  - year round baseline data on fish presence, abundance, and habitat use should be collected and considered in the Application. There should be a fish health sampling program that continues during and after construction for the two pipeline and the facilities;
  - change in behaviour of fish, marine mammals or species at risk due to elevated TSS during construction phase dredging in the marine environment (avoidance of the construction area);
- Possible impacts for the destabilization of Flora Bank;
- The Marine Planning Partnership for the North Pacific Coast (MaPP) plans should be considered during the assessment of project effects
- Dredging and sedimentation:
  - effects on water quality;
  - contamination of seafood;
  - avoidance of areas by fish, marine mammals, and birds;
  - concerns with methodology of Application analysis of sedimentation;
  - concerns with content, consultation, and methodology of future monitoring;
  - Disposal at Sea criterion for dioxins and furans (toxic equivalency) is now available from Environment Canada and should be included in the assessment effects to marine sediment / water quality;
  - uncertainty as to the conclusion reached regarding the potential for dioxins and furans over ISQG TEL at the Lelu Island landfall water quality monitoring during trenching in the marine environment to ensure that water quality guidelines for TSS are not exceeded;
  - The use of silt curtains (unclear whether silt curtains will be used in the marine environment) and sheet piles has been proposed, but there is no discussion of the allowance for fish passage;
- Marine cumulative effects assessment:
  - Kitsumkalum disagrees with the assessment of potential cumulative effects on Water Quality in the marine environment because of the inappropriate choice of range of the RAA, the lack of detail to the mitigation measure and the uncertainty of the level of residual effects;
  - Kitsumkalum wants to see a regional level approach to the cumulative effects assessment of construction noise on fish and marine mammals; and
- Habitat offsets need to be discussed and reviewed with Kitsumkalum.

Marine foods are highly valued by Kitsumkalum First Nation members, who fish halibut and crab along the lower Skeena and the coast throughout the winter, and all freshwater, saltwater, and anadromous species in the Skeena River. Kitsumkalum First Nation identified an Aboriginal Interest in fishing more than 100 fish species;

Skeena salmon are particularly valued. Currently, Kitsumkalum First Nation has two commercial fishing vessels.

Several other areas have been identified as important fishing or harvesting sites by Kitsumkalum First Nation through the Interim TUS and the Marine Use Plan. These include:

- China Bar in the Skeena River - important holding ground for eulachon;
- Porpoise Harbour - clams historically collected on the side of the bridge to Kaien Island;
- Spa Xksuutks (Port Essington) at the mouth of the Ecstall River - an important commercial fishery for Kitsumkalum First Nation;
- Lax Spa Suunt (Arthur Island); and
- Lelu Island - an important juvenile and larval eulachon migration and rearing habitat, and an important salmon migration area.

EAO recognizes that further information and analysis regarding impacts to marine resources is ongoing in the federal review process. However, for the purpose of meeting the Crown's duty to consult and accommodate pursuant to the *Haida* framework in relation to the decision under the Act, EAO is of the view that there is sufficient information at this stage of the regulatory review being conducted by the Province, to inform the assessment of seriousness of impacts on Aboriginal Interests associated with marine resources and to inform accommodations appropriate to this stage.

EAO recognizes that should the ongoing assessment of impacts on marine resources by CEAA indicate additional impacts not considered by EAO, there will be opportunities to accommodate those additional impacts through the CEAA process.

In consideration of the above information, the Proponent's proposed mitigation measures and proposed conditions of any EAC issued, and EAO's analysis of potential residual and cumulative effects to fishing and other marine uses—as discussed in section 18.3.1 of this report—the proposed Project is expected to result in minor impacts to Kitsumkalum First Nation's asserted Aboriginal right to fish in the proposed Project area.

### **Navigation and Marine Resource Use**

As discussed in section 18.3 above, Aboriginal Groups expressed concerns regarding the potential adverse effects of the proposed Project on their ability to access preferred marine resource harvesting locations during the construction and operation phases of the proposed Project. Aboriginal Groups commented on concerns regarding how vessels and barges employed to construct the jetty and marine terminal, and the marine off-loading facility may restrict movement and safe navigation in around Lelu Island, including Chatham Sound, Porpoise Channel and Lelu Slough.

Aboriginal Groups also commented on the potential effects from the movement of LNG carriers and escort tugs during operation of the facility and marine terminal, including

how safety and exclusion zones and general vessel traffic could interfere with access to marine resource harvesting sites.

Given the nature and location of the proposed Project, and EAO's assessment of Kitsumkalum First Nation's strength of claim, EAO is of the view that the potential impacts of the proposed Project arising from shipping related impacts to the Kitsumkalum First Nation's ability to access marine mammal hunting and marine plant gathering sites be minor in the proposed Project area.

## **Hunting**

In the Kitsumkalum Community Marine Use Plan, Kitsumkalum First Nation identified an Aboriginal Interest in hunting marine mammals, waterfowl, deer, and goats. Marine mammals are hunted for sustenance, cultural, or commercial purposes.

Kitsumkalum First Nation stated general concerns related to wildlife, wildlife habitat and hunting as a result of the proposed Project including:

- Potential for effects on marine mammals and migrating fauna, including seasonal and temporary changes;
- Potential for effects on marine fauna used for sustenance, cultural, or commercial purposes;
- Potential for changes in wildlife due to construction and project-related accidents;
- Concerns about construction activities at Lelu Island, and particularly areas in close proximity to Inverness Passage and the Skeena Estuary;
- Change in habitat;
- Change in species abundance;
- Change in wildlife behavior;
- Change in hunting areas;
- Change in access to hunting areas;
- Ability to harvest food and other resources;
- Effect of project-related accidents on wildlife;
- Perceived contamination of country foods from a spill; and
- The need for a Kitsumkalum Traditional Use Study to inform the assessment of impacts to land and resources and Kitsumkalum use.

Kitsumkalum First Nation also raised specific questions and concerns about marine birds, in particular the Marbled murrelet. These concerns include:

- The impacts of disturbance and displacement for marine bird species that nest on cliffs or islands directly adjacent to the marine environment;
- Lack of linkage to any habitat offsetting for marine birds;
- The residual effects analysis should align with the *Recovery Strategy for the Marbled Murrelet in Canada*;
- Require a more comprehensive review of potential causes of mortality to address potential increases in risk of mortality; and
- Lack of spring and summer sampling of species diversity and distribution.

Settlement, government policies, and industrial development have resulted in significant alterations to Kitsumkalum First Nation's pre-contact hunting patterns. Historically, Tsimshian people hunted major land fauna, including mountain goats, mountain sheep, bears, porcupines, raccoons, eagles, marmots, caribou, cougars, hares and lynx; waterfowl (swans, geese, ducks); and sea lions and sea otters. The information available to EAO does not clarify which of these species are currently hunted by Kitsumkalum members.

Kitsumkalum First Nation identified concerns regarding construction activities and potential impacts to hunting activities regarding the approach to Lelu Island, Inverness Passage, and the Skeena Estuary.

In consideration of the above information, the Proponent's proposed mitigation measures and proposed conditions of any EAC issued, and EAO's analysis of potential residual and cumulative effects to hunting — as discussed in section 18.3.2 of this report as it particularly relates to marine mammals — the proposed Project is expected to result in negligible impacts to Kitsumkalum First Nation's asserted Aboriginal right to hunt in the proposed Project area.

### **Gathering**

Concerns raised by Kitsumkalum First Nation related to gathering included the potential for project-related accidents to affect gathering areas and vegetation including marine plants and marine flora used for sustenance, cultural, or commercial purposes).

The proposed Project is outside of Kitsumkalum's traditional territory but within their asserted harvesting area (approximately 2-4 km from the northwest boundary of their asserted traditional territory).

According to Kitsumkalum First Nation's TUS report, important gathering sites include the Skeena River, Ecstall River, Spa Xksuutks (Port Essington) and Casey Point. Ede Passage and Island Point on Porcher Island are key areas for harvesting kelp and seaweed.

Shoreline construction and the marine offloading facility could contribute to the localized loss or alteration of kelp and shoreline seaweeds of importance to Kitsumkalum First Nation. However, Lelu Island was not identified as a harvesting site for marine gathering.

In consideration of the Proponent's proposed mitigation measures and proposed conditions of any EA Certificate issued, and EAO's analysis of potential residual and cumulative effects to vegetation, and current and traditional land use—as discussed in section 18.3.3 and 18.7—the proposed Project is expected to result in negligible impacts on Kitsumkalum First Nation's gathering activities in the proposed Project area.

## 19.6 Kitselas First Nation

### **Context**

- Kitselas First Nation is located at the upper end of Kitselas Canyon on the Skeena River at Kitselas, just east of Terrace. Kitselas First Nation has 10 registered reserves, settlements or villages with an area of 1,885.2 ha.
- Kitselas First Nation has a registered population of 602, with 283 members living on reserve and 319 members living off reserve.
- Kitselas First Nation is governed by the Kitselas Band Council, made up of one Chief and five Councilors, under the *Indian Act* electoral system.

### **Aboriginal Interests and EAO's Strength of Claim Assessment and Depth of Consultation**

- Kitselas First Nation is listed in Schedule B of the Section 11 Order.
- The proposed Project is located within Kitselas First Nation's asserted harvesting area.
- Ethnographers described Kitselas First Nation traditional territory as centered on the Kitselas Canyon and noted that, at the time of contact, some Kitselas people may have taken a coastal route to get to and from the annual eulachon fishery on the Nass River. This coastal route is in the vicinity of the proposed Project. However, given that any resource harvesting would have required the explicit permission of and possibly compensation to the Nine Allied Tsimshian Tribes, EAO's preliminary assessment of the strength of prima facie claims of Kitselas Aboriginal rights to harvest resources in this area is weak to moderate.
- Although Kitselas First Nation did not respond directly to EAO's strength of claim assessment, they did respond to the Province's assessment (provided to Kitselas in a December 9, 2013 letter from MARR) through a series of submissions and reports received from December 2013 through February 2014 and discussed at a meeting March 25, 2014, arguing that Kitselas claims to the Prince Rupert Harbour area are strong.
- The Province undertook a detailed analysis of the report, including another review of the available ethnohistoric information. The review did uncover any information showing that Kitselas had a regular presence on the coast, or regularly harvested coastal resources in the Prince Rupert region before contact, at contact, or at 1846, and therefore did not change EAO's view of the strength of Kitselas rights in the Prince Rupert Harbour region. The review did, however, indicate that Kitselas travelled each year to the Nass River, which would have included using the coastal route as well as interior route, for the purposes of accessing the eulachon fishery each spring.
- On June 26, 2014, the Supreme Court of Canada released its decision in *Tsilhqot'in*, which clarified the test for Aboriginal title relating to the elements of sufficient and exclusive occupation as at 1846. Based on the information reviewed and test for title as set out in *Tsilhqot'in*, EAO continues to be of the

view that there is no information indicating sufficient or exclusive occupation that supports a *prima facie* claim of Aboriginal title by Kitselas First Nation within or near those portions of the proposed Project areas that overlap with the asserted traditional territory of the Kitselas First Nation. EAO's consideration of the potential impacts of the proposed Project on specifically Kitselas First Nation's Aboriginal Interests is discussed below.

- EAO has determined that the duty to consult Kitselas First Nation lies at the lower end of the *Haida* consultation spectrum.
- EAO also understand that there are active discussions between the Province and Kitselas First Nation regarding financial and potentially other benefits in relation to the proposed Project.

### **Summary of consultation**

Kitselas First Nation provided input to the EA process through:

- Active participation in Advisory Working Group meetings;
- Discussion and written correspondence with EAO

Kitselas First Nation also participated in biophysical field studies. They provided TUS and collected socio-economic baseline data. The results of these studies were included in the Proponent's final Aboriginal Consultation Report.

In addition to participation in the Working Group meetings and correspondence with EAO, the Proponent met with Kitselas First Nation on three occasions to discuss their interests during the EA.

EAO provided Kitselas First Nation with \$5,000 in capacity funding during the Pre-Application phase of the EA for the proposed Project, and \$10,000 in capacity funding during the Application Review phase of the EA.

### **Potential impacts from the proposed Project to Kitselas First Nation's Aboriginal Interests**

#### **Fishing**

Kitselas First Nation raised concerns surrounding the Aboriginal right to fish including:

- Concerns around dredging/trenching and tides, including sedimentation;
- Levels of metals and toxins in sediments and potentially transferring toxic compounds up through the food chain (e.g. Dungeness crab);
- Effects to fish and fish habitat (potential significant effects to critical salmon habitat);
- Soft sediment structure of Horsey, Agnew and Flora Banks at the outlet of Inverness channel - has the potential to seriously restrict commercial, recreational and traditional First Nations' fisheries;
- Concerns of scour potential at hard point of pipe in a delta/river mouth;

- Ability to harvest marine plants during construction;
- Absence of monitoring plan to test water quality and monitor sediments (dioxin and furans);
- Estuaries, salt marshes, and mud flats - specifically the Skeena Estuary delta; and
- Eelgrass habitats / (Flora Bank).

In their TUS report (July 28, 2014), Kitselas First Nation identified an interest in fishing crab, halibut, and grey cod. Smith Island was identified as an important site for harvesting sockeye salmon and crab, herring eggs, cockles, clams, and abalone. Eulachon fishing stations were identified at the Nass River and at Red Bluff. A fishing site for halibut and grey cod was found on Lucy Island, and other important marine sites were identified between the mouth of the Skeena River and the Nass, and at Dundas Island and Sandy Bay.

Kennedy Island was reportedly a harvesting area for crab and herring eggs and the mouth of the Skeena River and Metlakatla Pass were used in the winter as a harvesting site for cockles, clams, and mussels. The TUS also identified Arthur Island as important for harvesting a multitude of seafood, and Island Point, Stephen's Island and just outside Port Simpson for herring eggs. Several types of fish were caught in the waters between Lelu and Kinahan Islands.

In comments received by EAO, Kitselas First Nation identified potential adverse effects to their fishing interest that include effects to marine areas in proximity to Lelu Island, including Flora Bank, and the estuary of the Skeena River, which are used for traditional and commercial fishing activities. Kitselas First Nation further identified potential effects of increased nutrient flow from the Skeena River on Dungeness crab and *pandalus* shrimp at Lelu south and Lelu north. In addition, Kitselas First Nation identified potential adverse effects on the following Traditional Use Areas: Horsey, Agnew, and Flora Bank on Commercial, Recreational and Aboriginal (CRA) fisheries.

During consultation for the proposed Project, Kitselas First Nation provided comments on the Proponent's mitigation measures and identified specific mitigation measures:

- Avoid eelgrass beds if possible. If it is not possible, then remove eelgrass beds intact for replacement following the cessation of construction;
- Implement a comprehensive monitoring plan including sediment chemistry, marine water quality, and mobilization of sediment, benthic community structure, and toxicity;
- Create a Dungeness crab salvage protocol;
- Consult Kitselas First Nation in the development of any offsetting plans, sediment fate modeling for Lelu Island, TSS, turbidity, and contaminated sediment mitigation planning; and
- Create eulachon mitigation measures which suspend dredging during spawning seasons and should include out-migration of larvae.

A general assessment on dredging and marine impacts can be found in Section 5.6 of Part B of this report, including the manner in which the Proponent's proposed design modifications avoid or reduce adverse effects from dredging and disposal at sea, and the reduction of impacts on Aboriginal Groups' navigation and marine use activities as a result of reducing the in-water construction phase activities from 27 months.

Through the effects assessment process, it was determined that many of the above noted fishing areas fall outside of the Project LAA and would not be directly affected by proposed Project activities or physical works. Flora, Horsey, and Agnew Banks, are within Kitselas First Nation's harvesting area (though outside their territory territory), and may be temporarily impacted. The proposed Project footprint at Lelu Island, is approximately 2-4 km from the northwest boundary of their asserted traditional territory. Construction vessels and associated support vessels may disrupt navigability on marine waterways used to access Kitselas First Nation's fishing areas.

EAO recognizes that further information and analysis regarding impacts to marine resources is ongoing in the federal review process. However, for the purpose of meeting the Crown's duty to consult and accommodate pursuant to the *Haida* framework in relation to the decision under the *Environmental Assessment Act*, EAO is of the view that there is sufficient information at this stage of the regulatory review being conducted by the Province, to inform the assessment of seriousness of impacts on Aboriginal Interests associated with marine resources and to inform accommodations appropriate to this stage.

EAO recognizes that should the ongoing assessment of impacts on marine resources by CEAA indicate additional impacts not considered by EAO, there will be opportunities to accommodate those additional impacts through the CEAA process.

In consideration of the above information, the Proponent's proposed mitigation measures and proposed conditions of any EAC issued, and EAO's analysis of potential residual and cumulative effects to fishing and other marine uses—as discussed in section 18.3 of this report—the proposed Project is expected to result in minor impacts to Kitselas First Nation's asserted Aboriginal right to fish in the proposed Project area.

### **Navigation and Marine Resource Use**

As discussed in section 18.3 above, Aboriginal Groups expressed concerns regarding the potential adverse effects of the proposed Project on their ability to access preferred marine resource harvesting locations during the construction and operation phases of the proposed Project. Aboriginal Groups commented on concerns regarding how vessels and barges employed to construct the jetty and marine terminal, and the marine off-loading facility may restrict movement and safe navigation in around Lelu Island, including Chatham Sound, Porpoise Channel and Lelu Slough.

Aboriginal Groups also commented on the potential effects from the movement of LNG carriers and escort tugs during operation of the facility and marine terminal, including how safety and exclusion zones and general vessel traffic could interfere with access to marine resource harvesting sites.

Given the nature and location of the proposed Project, and EAO's assessment of Kitselas First Nation's strength of claim, EAO is of the view that the potential impacts of the proposed Project arising from shipping related impacts to the Kitselas First Nation's ability to access marine mammal hunting and marine plant gathering sites be minor in the proposed Project area.

### **Hunting**

Kitselas First Nation members hunted moose, blacktail and mule deer, mountain goat, caribou, black and grizzly bear, ruffed, spruce, and blue grouse, ptarmigan, Canada goose, and mallard duck. In addition, the TUS indicated that Kitselas First Nation members also hunted seal and sea lion. Deer were hunted in the area around Port Edward. Seal and sea lion were hunted from Port Essington to Smith Island to Port Edward. Between the mouth of the Skeena River and the Nass River, Kitselas Band hunted deer and hair seal.

Kitselas First Nation's TUS identified hunting areas in Metlakatla Pass, and on Smith Island and Kennedy Island. Smith Island was identified in the TUS as a harvesting area for seagull eggs, cockles, and clams, and for hunting seal, and straight across to the entrance of Eddy Pass. The TUS identified Work Channel as an important site for harvesting deer, as well as Digby Island.

The proposed Project is outside of Kitselas's traditional territory but within their asserted harvesting area (approximately 2-4 km from the northwest boundary of their asserted traditional territory).

In consideration of the above information, the Proponent's proposed mitigation measures and proposed conditions of any EAC issued, and EAO's analysis of potential residual and cumulative effects to hunting—as discussed in section 18.3.2 of this report—the proposed Project is expected to result in negligible impacts to Kitselas First Nation's asserted Aboriginal right to hunt in the proposed Project area.

### **Gathering**

In their TUS report, Kitselas First Nation identified an Aboriginal Interest in plant gathering. During consultation, they expressed concern about potential adverse effects and issues related to the ability to gather plants, particularly the limitations on access to plant gathering areas.

The TUS identified a berry harvesting site extending from Port Essington to Smith Island to Port Edward, a carving wood gathering site in the Prince Rupert coastal area, and a seaweed gathering site at the mouth of the Nass River. In addition, archaeological reports show Lelu Island as an important source of wood, with a presence of numerous CMTs dating back to the 1830s. The TUS also identifies the Prince Rupert area as an important area for collecting wood along the coast and a seaweed gathering site at the mouth of the Nass River.

Kitselas First Nation stated that members gather black hawthorn, blueberry, bunchberry, cloudberry, crabapple, bog cranberry, lowbush cranberry, highbush cranberry, crowberry, black and red currant, devil's club, elderberry, black gooseberry, hazelnut, huckleberry, lily of the valley, raspberry, soapberry, salal, Saskatoon, strawberry, and thimbleberry. According to the TUS, Kitselas First Nation gathered native copper boulders at Cathedral Peak, berries from Port Edward to Cassier as well as along the Work Channel Road.

The proposed Project is outside of Kitselas's traditional territory but within their asserted harvesting area (approximately 2-4 km from the northwest boundary of their asserted traditional territory).

In consideration of the above information, the Proponent's proposed mitigation measures and proposed conditions of any EAC issued, and EAO's analysis of potential residual and cumulative effects to gathering—as discussed in section 18.3.3 of this report — the proposed Project is expected to result in negligible impacts to Kitselas First Nation's gathering activities in the proposed Project area.

## 20. Weighing Impacts on Aboriginal Interests with Other Interests

The Crown has a responsibility to balance the potential impacts and accommodations on Aboriginal Interests with other societal interests, including the social, environmental and economic benefits of the proposed Project. This evaluation is an important component informing the Ministers' decision regarding the decision on whether to approve the proposed Project. In weighing the proposed Project benefits with the impacts on Aboriginal Interests, EAO holds the view that the following factors regarding the proposed Project are relevant to consider:

- Importance of the proposed Project to the local, regional, and provincial economy,
- Nature of the proposed Project;
- Resources or values that may no longer be available for future generations; and
- Benefits of the proposed Project to affected Aboriginal communities.

EAO has summarized the estimated proposed Project benefits during construction and operations in Section 2.3 of Part A of the Assessment Report.

### 20.1 Proposed Project Importance to the Provincial Economy

The B.C. government set its vision for an LNG industry in B.C. in September 2011 with the release of *Canada Starts Here: The BC Jobs Plan*. The government saw an opportunity for unprecedented economic growth and jobs for British Columbians and set a goal of three LNG facilities in operation by 2020.

According to the MNGD, LNG-related projects have the potential to bring tens of billions of dollars in investment to British Columbia between 2014 and 2022. As many as 100,000 jobs to construct and operate these plants could be created, injecting more than \$1 trillion into our province. This will lead to long term jobs and contracting opportunities for Aboriginal Groups and communities.

Looking at overall revenue projections for the industry, it is reasonable to assume that even the first two trains of the proposed Project would produce substantial provincial tax revenue over a 30-year time horizon. The economic potential of the proposed Project is significant and could lead to large gains in provincial GDP and job growth.

### 20.2 Resources or Values That May No Longer Be Available for Future Generations

Traditional subsistence activities, such as fishing, hunting and gathering may be altered as a result of construction and operations activities of the proposed Project, which could manifest through changes to local harvesting locations, behavioural alteration or sensory disturbance of environmental resources, or through increased public access to traditional harvesting areas and increased pressure on environmental resources.

The project components located on Lelu Island would create permanent or long-term disturbance of vegetation and wetlands and limit all or many future uses of this area given the nature of the heavy industrial development proposed by this project.

EAO is of the view that the Proponent has made efforts to demonstrably avoid or reduce adverse effects to VCs of high value to Aboriginal Groups, by making substantive modifications to the design of marine infrastructure and the associated construction activities required for the marine jetty and terminal in response to feedback from Aboriginal Groups.

### 20.3 Benefits of the proposed Project to Affected Aboriginal Communities

For Aboriginal Groups, the proposed Project would have the potential to provide important economic opportunities, including capacity-building initiatives to support employment, contracting and business development. These initiatives include:

- Identifying economic opportunities tailored and specific to each Aboriginal Group under agreements with the Proponent that would remain confidential;
- Provincial discussion of considerable benefits opportunities, including financial and in a number of cases, land opportunities to Aboriginal Groups in relation to the proposed Project; and
- Developing an Aboriginal Participation Strategy that would identify and attempt to match Aboriginal Groups' contracting capacity with work packages for Aboriginal businesses and workers, and be adjusted as the proposed Project advances. The Application defines the proposed Aboriginal Participation Strategy in more detail.

The Proponent has provided and would continue to provide economic benefits and to support capacity-building opportunities specific to Aboriginal Groups prior to and during the construction phase of the proposed Project. These opportunities include:

- Building Aboriginal business capacity through the use of directed procurement activities prior to and during the EA of the proposed Project as well as during construction. To date these activities have included supporting the environmental and socio-economic baseline studies and engineering fieldwork. During construction the Proponent will continue to maximize Aboriginal opportunities thru designated services to qualified Aboriginal businesses and individuals;
- Providing capacity funding to support meaningful participation in consultation activities with the Proponent and in the regulatory process;
- Providing capacity funding to optimize employment and contracting opportunities;
- Supporting workforce readiness programs with various post-secondary institutions including Aboriginal Skills and Employment Training organizations (ASET Holders) and local BC Colleges. These programs are focused on transferable skills and may include components like upgrading, life skills and safety certification;

- Supporting education legacy programs focused on long-term capacity building for Aboriginal and non-Aboriginal communities. Priorities of the programs are to enhance local education and respond to grassroots community needs. Partnering with local non-profit organizations to enhance the quality of life in local communities, including “life skills” training to address barriers to Aboriginal training and employment. Activities include supporting emergency response organizations, environmental initiatives and Aboriginal language programs; and
- The Proponent has sought to commence negotiating Project Agreements (IBAs) with Aboriginal groups that are affected by the proposed Project. The PA’s provide for short term and long term financial benefits including consideration of education and training, contracting and employment and socio-economic partnerships.

The resulting engagements on the export facility projects are in their preliminary stages as interests are identified to inform the scope of the negotiations.

The engagement with Aboriginal Groups on the proposed Project is coordinated with engagement on the broader scope of the LNG initiative and includes:

LNG Environmental Stewardship Initiative: In May 2014, the Province announced an ESI to be developed collaboratively with Aboriginal Groups affected by proposed LNG-related infrastructure, including Aboriginal Groups affected by the proposed Project. The Province initiated the proposed ESI in response to the environmental priorities that Aboriginal Groups have expressed through various LNG-related discussions, including negotiations that are occurring on economic benefits. The ESI is a proposal to collaboratively develop a long-term structure that can bring Aboriginal Groups, governments and the industry together to monitor, assess, research, maintain and restore important values on the land. Initial collaborative design workshops with Aboriginal Groups were held from September 8 through September 16, 2014, in Fort St. John, Prince George, Prince Rupert, and Smithers. The collaborative design process indicates interest in advancing the ESI concept as part of ongoing negotiations.

The Province will be responding to the recommendations from the first phased of design in October. In addition to being involved in the ongoing design of the ESI, all six of the aboriginal groups consulted by EAO on this proposed Project - Lax Kw’alaams, Metlakatla, Gitxaala, Kitselas, Kitsumkalum and Gitga’at – will be eligible to participate in environmental projects funded by the ESI.

Based on input from First Nations across the North and subject to the outcomes of phase one, there is an interest to explore process to continue ESI design as well as implement demonstration projects. Potential ESI demonstration projects being contemplated include enhanced environmental monitoring opportunities that complement or support environmental mitigation and monitoring plans developed by the Proponent or additional cumulative effects assessment of key values within the key watersheds. Further discussions with Aboriginal Groups on the next phase of ESI design as well as these potential projects are planned for November 2014.

Skills Training: Aboriginal Groups are a key element of the province's workforce. A number of Provincial and Federal programs exist to assist Aboriginal Groups in addressing training requirements associated with the current and potential future workforce needs associated with LNG-related proposals. As economic benefit negotiations advance, the Province will be engaging Aboriginal Groups affected by LNG development to supplement community-related skills training requirements.

## PART D – CONCLUSIONS

Based on:

- Information contained in the Application;
- The Proponent's and EAO's efforts at consultation with Aboriginal Groups, government agencies, including local governments, and the public, and its commitment to ongoing consultation;
- Comments on the proposed Project made by Aboriginal Groups, and government agencies, including local governments, as members of EAO's Working Group, and the Proponent's and EAO's responses to these comments;
- Comments on the proposed Project received during the public comment period, and the Proponent's responses to these comments;
- Issues raised by Aboriginal Groups regarding potential impacts of the proposed Project and the Proponent's responses and best efforts to address these issues;
- The design of the proposed Project as specified in Schedule A of the EA Certificate to be implemented by the Proponent during the construction and operations of the proposed Project; and
- Mitigation measures identified as Conditions in Schedule B of the EA Certificate to be undertaken by the Proponent during the construction and operations of the proposed Project.

EAO is satisfied that:

- The EA process has adequately identified and assessed the potential adverse environmental, economic, social, heritage and health effects of the proposed Project, having regard to the conditions, the mitigation measures, and the compensation provisions set out in the Schedule to the EA certificate;
- Consultation with Aboriginal Groups, government agencies, and the public has been carried out in good faith, that the process was appropriate and reasonable in the circumstances, and that efforts to consult with Aboriginal Groups will continue on an ongoing basis;
- Issues identified by Aboriginal Groups, government agencies and the public, which were within the scope of the EA, were adequately and reasonably addressed by the Proponent during the review of the Application;
- Practical means have been identified to prevent or reduce any potential negative environmental, social, economic, heritage or health impacts of the proposed Project such that no direct or indirect significant adverse effect is predicted or expected, with the exception of adverse effects to GHG emissions;
- The potential for adverse effects on the Aboriginal Interests of Aboriginal Groups has been avoided, minimized or otherwise accommodated to an acceptable level; and
- The provincial Crown has fulfilled its obligations for consultation and accommodation to Aboriginal Groups relating to the issuance of an EA Certificate for the proposed Project.

The provincial Minister of Environment and the Minister of Natural Gas Development will consider this Assessment Report and other accompanying materials in making their decision on the issuance of an EA Certificate to the Proponent under the Act.