PACIFIC NORTHWEST LNG

Project Description

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Pacific NorthWest LNG

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ACRONYMS AND ABBREVIATIONS

AGRU ..... acid gas removal unit
APCI ..... Air Product and Chemicals Inc.
BC ..... British Columbia
BC CDC ..... BC Conservation Data Centre
BC EAO ..... British Columbia Environmental Assessment Office
BCEAA ..... BC *Environmental Assessment Act*
Bcfd ..... billion standard cubic feed per day
C3MR ..... propane pre-cooled mixed refrigerent
CEAA 2012 ..... *Canadian Environmental Assessment Act, 2012*
CEA Agency ..... Canadian Environmental Assessment Agency
CMT ..... culturally modified tree
CSA ..... Canadian Safety Association
CO ..... carbon monoxide
CO_2 ..... carbon dioxide
CO_{2e} ..... carbon dioxide equivalent
COSEWIC ..... Committee on the Status of Endangered Wildlife in Canada
CWH ..... Coastal Western Hemlock
CWHvh2 ..... Coastal Western Hemlock Very Wet Hypermaritime
DES ..... ex-ship delivery
FOB ..... free on board
GHG ..... greenhouse gas
H_2S ..... hydrogen sulfide
ha ..... hectare
Hg ..... mercury
LNG ..... liquefied natual gas
LPG ..... liquefied petroleum gas
MISC ..... Malaysia International Shipping Corporation Berhad
MOF ..... materials off-loading facility

MP ..... Member of Parliament

MTPA.....million tonnes per annum

MW ..... megawatt

NO_x ..... nitrogen oxide

PJ ..... petajoule

PM ..... particulate matter

ppm.....parts per million

Pre-FEED .....pre-front end engineering and design

PNW LNG.....Pacific NorthWest LNG Limited Partnership

PRPA..... Prince Rupert Port Authority

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

SO_2 ..... sulphur dioxide

SO_x .....sulphur oxide

t.....tonne(s) (metric)

t/d..... tonnes per day

TK ..... Traditional Knowledge

TU .....Traditional Use

UTM.....Universal Transverse Mercator

VOC..... volatile organic compounds

1 INTRODUCTION

1.1 The Nature and Location of the Project

Pacific NorthWest LNG Limited Partnership (PNW LNG) is proposing to construct and operate a liquefied natural gas (LNG) export facility within the District of Port Edward, British Columbia (BC). Pacific NorthWest LNG (the Project) would be located on Lelu Island within the lands and waters under the jurisdiction of the Prince Rupert Port Authority[1] (PRPA). The Project would convert natural gas from northeast BC into LNG for export to Pacific Rim markets in Asia. PNW LNG is principally owned by PETROLIAM NASIONAL BERHAD (PETRONAS). Japex Montney Ltd. recently acquired a ten percent interest in PNW LNG. PNW LNG would build the Project and manage the day to day operations of the LNG facility and marine terminal.

At full build-out the facility would receive approximately 3 billion standard cubic feet per day (Bcfd), or 8.5 x 10^7 cubic metres (m^3) per day, of pipeline grade natural gas, and produce up to 18 million tonnes per annum (MTPA) of LNG. The natural gas would be transported to the Project via a new pipeline from northeast BC. The pipeline is a separate project that would be constructed, owned and operated by Prince Rupert Gas Transmission Ltd. and assessed independently under the applicable regulatory regime.

Components of the Project include: a natural gas reception system, gas pretreatment, three 6 MTPA natural gas liquefaction trains, three full containment 180,000 m^3 LNG storage tanks, a marine terminal with a trestle, trestle control room, two LNG carrier berths, an off-load berth for propane and other materials, a bunkering facility, a materials off-loading facility (MOF), an access road and bridge, and pipeline and utility connections (e.g., water and sewer).

Natural gas is the primary option being proposed to power the liquefaction process and ancillary components of the Project. Other power supply options remain under consideration and are described in Section 2.3.3. It is anticipated that the Project will be constructed in two phases with the first phase having a design capacity of 12 MTPA of LNG with an additional 6 MTPA of capacity to be developed after the first two trains are operational. Construction would begin after a positive environmental assessment decision (i.e., the Project will not result in significant adverse environmental effects) and necessary regulatory permits, approvals, and authorizations are granted. Construction is expected to take approximately four years and the first phase of the Project is expected to be operational by late 2018.

[1] Wherever this document states that title to the land or waters are federally administered Crown land within the jurisdiction and administration of the PRPA, this is based on advice from the PRPA.

1.2 Proponent Contact Information

The contact information for the proponents is as follows:

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Proponent	Pacific NorthWest LNG Ltd.
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1.3 Overview of Consultation to Date

Consultation is a key element of the Project. PNW LNG's approach to consultation is to: begin engagement early; consult throughout the environmental assessment process; and, continue to engage First Nations, the public, and stakeholders throughout Project development and operations. PNW LNG has engaged individuals and groups within the following broad categories:

- First Nations
- Local government
- Community stakeholders
- Provincial government
- Federal government
- General public
- Business, industry, and labour groups
- Environmental non-governmental organizations

Complete lists of the First Nations, public, and stakeholder consultations completed to date are provided in Sections 6 and 7 and in Appendices A and B.

1.4 Other Relevant Information

1.4.1 Environmental Assessment Process

Federal Environmental Assessment

The Project is anticipated to require an environmental assessment under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The Project meets the criteria listed under subsections 2(a) and 13(d) under the Schedule of Physical Activities included in the *Regulations Designating Physical Activities* (SOR/2012-147), which state:

- 2(a) The construction, operation, decommissioning and abandonment of a fossil fuel-fired electrical generating station with a production capacity of 200 MW or more
- 13(d) The construction, decommissioning and abandonment, or an expansion that would result in an increase in production capacity of more than 35%, of a facility for the liquefaction, storage or regasification of liquefied natural gas, with a liquefied natural gas processing capacity of more than 3,000 t/d or a liquefied natural gas storage capacity of more than 50,000 t.

The Project exceeds the threshold listed in subsection 2(a) as it would include fossil fuel fired electrical and/or mechanical power generation options that would exceed the 200 MW threshold. The Project also exceeds the threshold listed in subsection 13(d). The Project would include the construction of a natural gas liquefaction facility with, at full build-out, a processing capacity of 49,315 t/d and a combined LNG storage capacity of approximately 248,000 t (depending on density) for all three tanks.

The Project would not be regulated under the *National Energy Board Act*, the *Canada Oil and Gas Operations Act*, or the *Nuclear Safety and Control Act*.

Provincial Environmental Assessment

The Project may also be subject to review under the BC *Environmental Assessment Act* (BCEAA). The Project meets or exceeds several of the thresholds listed under Part 4 (Energy Projects), Parts 8 and 14 (Transportation Projects) of the *Reviewable Projects Regulation.*

- **Part 4—Energy Projects:** The facility would incorporate a thermal electric power plant that would combust natural gas to create electricity. All of the power options under consideration exceed the 50 MW threshold listed in Table 7 (Electricity Projects) for new thermal electric power plant facilities.
- **Part 4—Energy Projects:** The Project's LNG storage capacity would, in total, be approximately 248,000 t (depending on density). This volume of LNG contains approximately 12 PJ of potential energy. This exceeds the 3 PJ potential energy threshold listed in Table 8 (Petroleum and Natural Gas Projects) for new energy storage facilities.

- **Part 8—Transportation Projects:** Construction of the LNG facility's marine terminal, MOF, trestle and berths, and sub-tidal bridge sub-structure will result in direct physical disturbance of more than 2 hectares (ha) of a combination of foreshore and submerged land. This exceeds the threshold in Table 14 (Transportation Projects) which states, "a new marine port facility, other than a ferry terminal, if construction of the facility entails dredging, filling or other direct physical disturbance of ≥ 2 ha of foreshore or submerged land, or a combination of foreshore and submerged land, below the natural boundary of a marine coastline or marine estuary".

The Pacific NorthWest LNG Project would be located on federal Crown land, terrestrial and sub-tidal, administered by a federal Port Authority (the PRPA). Environmental assessments for designated projects within areas of PRPA jurisdiction, to date, have been led by federal agencies. The Government of Canada (led by the CEA Agency) and the Province of British Columbia (led by the BC EAO) have developed a joint environmental assessment work plan specific to this Project. The intent of the work plan is to avoid unnecessary duplication of environmental assessment process. It allows for environmental assessment requirements specific to provincial legislation and interests to be addressed in addition to the scope of assessment set out in the Project's CEAA 2012 Environmental Impact Statement Guidelines issued by the CEA Agency on June 7, 2013.

It is anticipated that the focus of the British Columbia portion of the environmental assessment will focus on valued components not specifically addressed or only partially addressed in the July 7, 2013 federal Environmental Impact Statement Guidelines. To prevent unnecessary environmental assessment duplication or overlap, the CEAA 2012 Environmental Impact Statement and the BCEAA Environmental Assessment Certificate Application will be one report, not two.

1.4.2 Regional Study

The Project is not located in a region that has been subjected to a regional environmental study as defined in CEAA 2012.

2 PROJECT INFORMATION

2.1 General Description and Objectives

The Project is an LNG export facility that would convert processed natural gas into LNG for export to markets in Asia. The natural gas would be transported to the LNG facility via the Prince Rupert Gas Transmission Project pipeline from Progress reserves in the North Montney play region approximately 100 km northwest of Fort St. John, BC. The environmental assessment of the Prince Rupert Gas Transmission Project is ongoing under a separate environmental assessment process.

At full build-out the facility would receive approximately 3 Bcfd of pipeline grade natural gas and produce up to 18 MTPA of LNG[2].

LNG is natural gas that has been cooled to approximately -162°C, where it becomes a liquid and can be stored at atmospheric pressure. In this liquid form, LNG is reduced approximately 600 times and it can be transported in specially designed cargo ships (e.g., LNG carriers). Once delivered to markets, the LNG would be returned to a gaseous state and sent through pipelines for residential, commercial, and industrial uses. The use of LNG in Asian countries reduces, at least in some markets, reliance on other forms of non-renewable energy (e.g., burning coal and replacing nuclear power).

Components of the Project at full build-out include: natural gas receiving system, gas pretreatment, three 6 MTPA LNG liquefaction trains (starting with two trains in Phase 1 and expanding to three trains in Phase 2), three full containment 180,000 m^3 LNG storage tanks, turbines capable of generating up to 700 MW of power, a trestle and marine terminal capable of berthing and loading 217,000 m^3 Q-Flex LNG carriers (up to 315 m in length), a MOF, a bunkering facility, liquefied petroleum gas (LPG) ship-to-shore off-load facility and berth, an LPG storage tank, an access road and bridge, pipelines for connection to off-site water and sewer utilities and infrastructure required for safe, economical operation of the facility.

2.2 Provisions of the Regulations Designating Physical Activities

The provisions from the *Regulations Designating Physical Activities* that apply to the Project are summarized in Table 2-1.

Table 2-1: Applicable Provisions of the *Regulations Designating Physical Activities*

Section and Text of the Regulation	Relevance to the Project
2(a) The construction, operation, decommissioning and abandonment of a fossil fuel-fired electrical generating station with a production capacity of 200 MW or more.	This subsection of the Regulation is applicable. The two main power options under consideration would generate 380 MW or 700 MW of electricity. This exceeds the 200 MW threshold.
13(d). The construction, decommissioning and abandonment, or an expansion that would result in an increase in production capacity of more than 35%, of a facility for the liquefaction, storage or regasification of liquefied natural gas, with a liquefied natural gas processing capacity of more than 3,000 t/d or a liquefied natural gas storage capacity of more than 50 000 t.	This subsection of the Regulation is applicable. The Project will include the construction of a natural gas liquefaction facility with processing capacity of 49,315 t/d and a total LNG storage capacity of up to 248,000 t (depending on LNG density). Both of these values exceed the identified thresholds.

[2] The facility is expected to operate 365 days per year. Therefore the daily processing capacity is about 49,315 tonnes per day which exceeds the 3,000 tonnes per day threshold identified in section 13(d) of the Regulations Designating Physical Activities (SOR/2012-147) under the *Canadian Environmental Assessment Act*, 2012.

2.3 Project Components

The various components of the Project can be broadly grouped into three major categories:

- The LNG facility which includes the infrastructure needed to receive natural gas from the supply pipeline, gas pre-treatment, gas liquefaction, and LNG storage.
- The marine terminal which includes the trestle, trestle control room, berths, cryogenic piping, a bunker fuel facility and loading and off-loading arms required to load LNG carriers and off-take LPG and other materials.
- Supporting infrastructure (e.g., pipelines connecting to the mainland to deliver water and take away sewage and other liquid effluents) required to operate and maintain the Project.

The core components associated with each are identified in Table 2-2.

Table 2-2: Components of the Pacific NorthWest LNG Project

Infrastructure Category	Project Components
LNG Facilities	▪ Feed gas receiving and treatment equipment ▪ Three 6 MTPA liquefaction trains ▪ Gas-fired turbines capable of producing up to 700 MW of combined mechanical and electrical power ▪ Three 180,000 m^3 LNG storage tanks
Marine Terminal	▪ A 2.7 km long conventional trestle with control room, loading and off-loading equipment, cryogenic piping, and other supporting infrastructure ▪ Two LNG carrier berths ▪ LPG storage tank and import berth for LPG and other materials ▪ Bunker fuel storage and loading equipment
Supporting Infrastructure	▪ Water supply pipeline infrastructure ▪ Wastewater treatment system (for sewage and other liquid effluents) and associated pipeline connections to offsite facilities ▪ Nitrogen and compressed air equipment ▪ Fuel storage ▪ Administration and maintenance buildings ▪ A two-lane bridge connecting Lelu Island to the mainland ▪ Materials off-loading facility (MOF)

2.3.1 Gas Treating Process Overview

The natural gas entering into the LNG facility (also called feed gas) would be processed upstream and meet standard pipeline specifications. Table 2-3 provides the typical composition of the feed gas and LNG composition in Mol %. There will be some variability in the feed gas and LNG composition as it will be produced from more than one area of the Montney basin.

Table 2-3: Feed Gas and LNG Composition

Component	Average Feed Gas Composition (Mol %; Dry basis)	Resulting Average LNG Composition (Mol %; Dry basis)
Nitrogen	0.759	0.192
Methane (C1)	95.331	97.380
Ethane (C2)	2.273	1.706
Propane (C3)	0.649	0.477
i-Butane (i-C4)	0.104	0.081
n-Butane (n-C4)	0.135	0.112
i-Pentane (i-C5)	0.039	0.030
n-Pentane (n-C5)	0.029	0.020
CO_2	0.618	0.000
H_2S	<4 ppm	0.000

Before the natural gas can be liquefied, trace amounts of carbon dioxide (CO_2), hydrogen sulfide (H_2S), and minute amounts of mercury (Hg) and water need to be removed as they would either corrode aluminum-based cryogenic equipment and/or vessels or freeze during the liquefaction process. The components of the gas treatment infrastructure are:

- **Acid Gas Removal Unit (AGRU)**—The AGRU removes CO_2 and H_2S (together these are called “acid gas”) using an accelerated amine solvent. This is a standard treatment method used in many natural gas processing plants and LNG facilities internationally. The treated gas is then forwarded to the dehydration unit and acid gas is stripped from the solvent and sent to the thermal oxidizer where H_2S is oxidized to SO_2 (sulphur dioxide). Residue hydrocarbon in this stream is incinerated.
- **Dehydration Unit**—This process removes water from the gas stream to prevent freezing in the downstream refrigeration/liquefaction heat exchangers. The dehydration unit uses a combination of refrigeration and molecular sieve to absorb the water. The sieves are periodically regenerated by heating the unit to drive out the absorbed water. They have a lifecycle of approximately four years. Condensed wastewater from the sieve will be treated and disposed of in compliance with regulatory requirements.
- **Mercury Removal Unit**—In the event minute amounts of mercury are present in the natural gas stream, it is removed using metal oxide catalyst or sulphur impregnated carbon. Mercury presence is monitored and removed to ensure mechanical integrity of the aluminum based equipment in cryogenic section of the facility. Mercury is a regulated hazardous waste in BC; therefore; any handling, transport and eventual treatment and disposal of even minute amounts of mercury would be in full compliance with regulatory requirements.

2.3.2 Natural Gas Liquefaction Processes

After the natural gas has been treated, it would enter the liquefaction section of the facility where it would be chilled to approximately -162°C in successively colder heat exchangers that use nitrogen, propane, ethylene and methane as refrigerants (the final temperature is dependent on the mixture of methane, butane and propane in the LNG). First proven in 1917, there are now a number of processes for liquefying natural gas. Most use similar equipment with the primary difference being the refrigerants used to cool the gas. Key pieces of equipment include heat exchangers of various designs, compressors, expanders, and valves. Most of the energy transfer used to cool the gas takes place in different types of heat exchangers (e.g., fin, plate, or coil wounded).

The refrigeration cycle begins with refrigerant flowing into a compressor that compresses it to a pressure that will allow it to be condensed using ambient air or cooling water. It then passes through a condenser and an expansion valve where the pressure is then reduced in a series of stages, further dropping in temperature to a point where it can provide refrigeration to the natural gas. The cold refrigerant is then passed through the heat exchanger with the feed gas where the refrigerant is warmed and the gas is cooled.

There are currently two main liquefaction processes under investigation for use in the facility: the Air Product and Chemicals Inc. (APCI) propane pre-cooled mixed refrigerant (C3MR) process; and, the ConocoPhillips Optimized Cascade® process.

The APCI C3MR process uses a propane heat exchanger for pre-cooling the gas followed by mixed refrigerant cooling (nitrogen, ethylene, propane, butane mixture) to liquefy the gas as outlined in the block diagram in Figure 1. The ConocoPhillips Optimized Cascade® process sequentially uses propane, ethylene, and methane as refrigerants. Like the APCI C3MR process, propane is used to pre-cool the natural gas. The gas is cooled in an ethylene heat exchanger and finally in two steps to approximately -162°C and liquefied in the methane heat exchanger. This is outlined in the block diagram in Figure 2.

For both processes the natural gas is pre-cooled to -35°C using the propane refrigerant. In the APCI C3MR process, the pre-cooled gas flows into the main cryogenic heat exchanger where it is liquefied and sub-cooled to -162°C by mixed refrigerant. In the ConocoPhillips Optimized Cascade® process, the pre-cooled gas passes through a second heat exchanger that uses ethylene as the refrigerant, and then a third heat exchanger that uses methane as the refrigerant and brings the temperature down far enough to liquefy the gas and produce LNG (approximately -162°C).

Once the LNG has been produced, it would be directed to the LNG storage tanks.

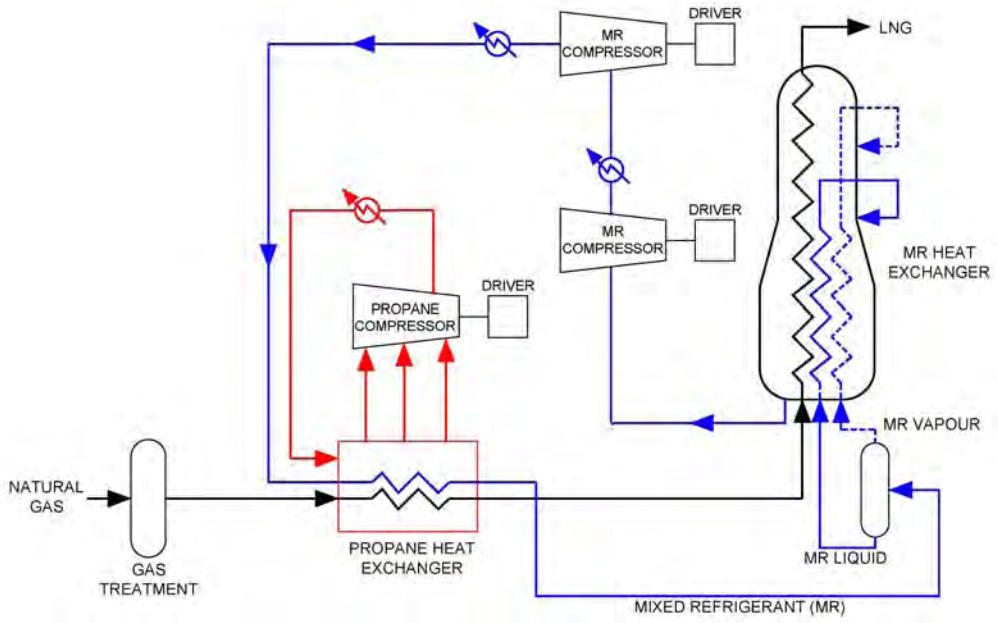

Figure 1: APCI C3MR Liquefaction Process Block Diagram Option 1

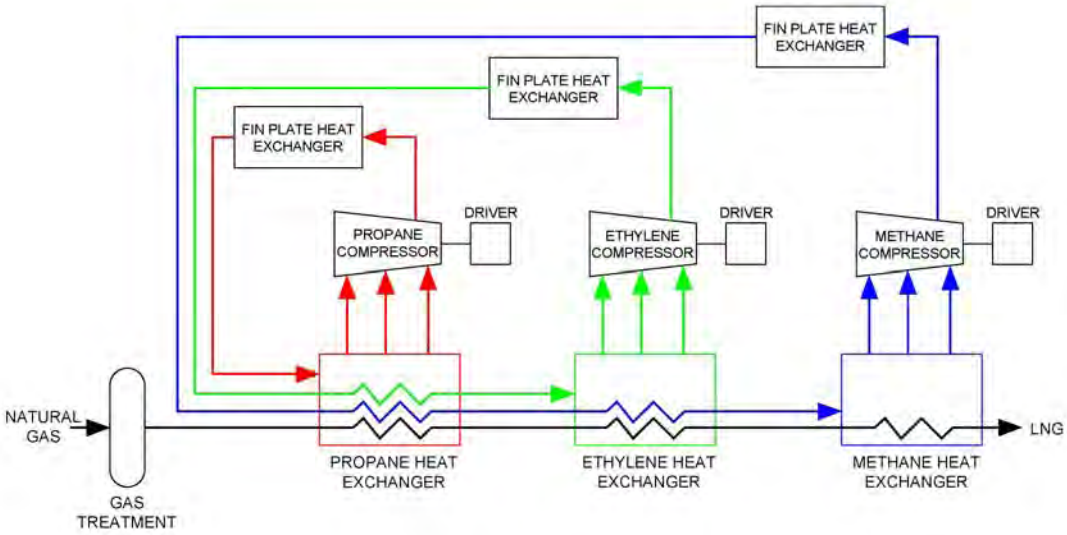

Figure 2: ConocoPhillips Optimized Cascade® Liquefaction Process Block Diagram

2.3.3 Power Supply

The Project will require a substantive amount of energy to cool the natural gas from gaseous state at ambient temperature into a liquid state at approximately -162°C. In addition to the liquefaction process, energy is also required to operate the balance of the plant units including non-process related infrastructure (e.g., administration complex, road lighting, etc.). At this point in facility design (e.g., early pre-front end engineering and design [Pre-FEED]), the estimated energy required to power three LNG trains and associated facility infrastructure is approximately 700 MW.

While the total energy requirement for the LNG facility would remain the same, the split between mechanical power and electrical power depends upon the choice of driver used for the compressors in the refrigerant circuits. In designs where gas turbines are used to mechanically drive the compressors, the electrical demand for the facility would be lower. To date, all large base-load LNG liquefaction plants worldwide produce their own energy. This is to ensure the reliability of energy supply and integrated development timing. There is currently only one LNG facility in the world driven by electric motor. Even in that case, the power supply for the facility is generated by gas-fired turbines developed as a component of that project.

BC Hydro has indicated that it does not have existing surplus electrical energy supply for the number of LNG export facilities currently proposed for BC, or existing transmission infrastructure to deliver surplus energy to the Prince Rupert area. The final choice of power supply for the Project (whether developed within the Project footprint or off-site by third parties) will consider a number of factors including: reliability of energy supply that allows the Project to meet LNG production requirements (e.g., volume and timing), cost, and potential effects on the environment. From a reliability perspective, 99% uninterrupted power supply is required for the safety and security of LNG production.

At this stage of Project planning and design, there are two primary options under consideration:

- **Option A—Mechanical Drive:** This option involves natural gas-fired turbines that use mechanical energy to power the liquefaction refrigerant compressor process. A separate set of natural gas-fired turbines coupled with waste heat recovery steam generators and steam turbines will provide natural gas powered electricity (e.g., combined cycle) to the balance of the facility. The total combined-cycle power that would be generated for the facilities is estimated to be 380 MW.
- **Option B—Electric Drive:** This option uses natural gas-fired turbines, coupled with waste heat recovery steam generators and steam turbines to generate electricity for the entire facility. The 700 MW of combined cycle electrical energy generated would power large electric motors which would in turn drive the liquefaction refrigerant compressor process and serve the rest of the electrical requirements of the facility.

In both options listed above, the power supply component of the Project could be managed by a third party provided the reliability and timing of the supply could be guaranteed.

There are additional power supply options that are also under consideration. For example, PNW LNG will consider designing the facility (under any of the previously outlined options) to allow

for connection to sources of renewable energy to power ancillary infrastructure, if these sources were to become available as a stable and reliable source of electrical energy supply. In addition, energy supply options may be staged over time. If an off-site option were to be pursued, the environmental effects may be evaluated under a separate environmental assessment process.

PNW LNG is engaged in discussions and studies with government, First Nations, and stakeholders to inform decision-making.

2.3.4 LNG Storage Tanks

The LNG will be stored at atmospheric pressure in three 180,000 m^3 full containment storage tanks (two to be constructed in Phase 1 and a third tank in Phase 2). The LNG storage tanks will meet or exceed Canadian Safety Association (CSA) standards and any applicable regulations and will incorporate best available technology. In general, the tanks would be composed of steel, a steel blend that consists of 9% nickel, and concrete. Tank dimensions are typically 80 to 90 m in diameter and 50 m in height with a wall thickness of 750 mm.

2.3.5 Marine Infrastructure

There are two major components to the marine infrastructure: (1) a MOF; and, (2) an access trestle and berths for berthing and loading LNG carriers, and for unloading LPG and other materials used in the facility.

The location of the trestle, berths, and associated infrastructure, minimizes encroachment on known environmentally sensitive marine areas (i.e., Flora Bank) and optimizes safe access for the LNG carriers with minimal disruption of boat traffic in and out of Porpoise Channel. The trestle is long enough so that no dredging is required at the berths in Chatham Sound.

Materials Off-loading Facility (MOF)

The MOF would be a pipe pile-supported wharf capable of berthing large roll-on roll-off barges and ships and located off Porpoise Channel in a small embayment on the north side of Lelu Island. It would allow large prefabricated pieces of equipment and heavy materials that cannot be transported via rail or road to be delivered to Lelu Island via water during construction. Dredging would be needed to deepen the embayment and to provide a safe ship-way into Porpoise Channel and, to develop sub-tidal infrastructure of the MOF. Limited blasting may be necessary depending on the seabed and associated substrate at the MOF location.

Trestle and Berths

The trestle and berths would be a conventional pile supported structure with concrete decking. The trestle will extend approximately 2.7 km from Lelu Island extending westward along the north edge of Flora Bank to waters more than 15 m deep near the western edge of Agnew Bank in Chatham Sound. The trestle would be wide enough to accommodate vehicles, the cryogenic piping, and related utility corridors to transport the LNG from the tanks to the loading arms on the berth and

provide utilities to the control room. The trestle would not be designed to accommodate any boat traffic passing beneath it due to safety concerns.

The berths would accommodate berthing of up to two Q-Flex LNG carriers up to 315 m long with LNG capacities of up to 217,000 m^3. A smaller berth is envisioned for off-load of the LPG and other materials from other ships. Berths would be equipped with mooring dolphins and energy absorbing fender units to absorb vessel berthing impacts. There would be up to three loading arms per berth for transferring the LNG onto the carriers and a vapour return arm for transferring boil-off gas back to the liquefaction trains.

The trestle would also house a storm water collection system, potable water and fire water distribution infrastructure, toilet, power supply, electrical substation, trestle control room, bunker fuel piping and associated infrastructure and lighting. LNG carriers would be loaded at 15,000 m^3 per hour and would typically be at berth for approximately 24 hours. The loading platform will also accommodate the unloading of LPG from ships for gas heating value control and liquefaction loop refrigerant.

2.3.6 Supporting Infrastructure

There are a number of other ancillary facilities associated with the construction and operation of the Project. These include:

- Administration, control, maintenance, and other ancillary buildings
- Water supply pipe from the Port Edward water system and a water distribution system
- Wastewater treatment systems (for sewage and other effluent [e.g., solvent contaminated water]) and a pipe connecting the facility to Port Edward's sewage treatment plant
- Firewater system
- Fuel storage facilities
- Two-lane bridge connecting Lelu Island to the mainland.

With the exception of the road access improvements, bridge, and the water and sewer utility connections to Port Edward, these supporting facilities are planned to be within the Project fence-line on Lelu Island. As the Project site is on an island, a bridge connection to the mainland is required. There are two bridge options being evaluated. The primary option under consideration would have the bridge cross directly over Lelu Slough from the mainland to the northeast portion of Lelu Island and would include an overhead crossing of CN railway track. The bridge would be supported by pipe piles to be installed in Lelu Slough. The bridge structure would also support the water pipeline, sewer pipeline, and an electrical utility conduit to connect to the mainland and the Port Edward utilities. The second option would provide access from Skeena Drive across the CN railway track and include a bridge to Stapledon Island and a second bridge from Stapledon Island to the southeast corner of Lelu Island.

2.3.7 Construction Camp Facilities

A temporary camp that could accommodate up to 3,000 people would be required for construction of the facility. The camp would be located on Lelu Island to reduce the need to transport workers between the camp and the site. It is also anticipated that locating the camp immediately adjacent to the worksite would reduce the impacts from a temporary influx of workers to the Port Edward area. The camp would likely be constructed and assembled using pre-manufactured modular units that would be shipped to site as complete units, or in the case of larger buildings, as packaged units. This would permit a timely deployment and assembly of the camp after the site preparation and utilities installation have been completed. Temporary equipment and materials such as power generation, desalinization facilities or tanks (truck and haul potable water systems), and distribution systems for potable water supply, a sewage and waste treatment system, a marine outfall, and fuel supply would be provided at the camp.

All camp accommodations and any associated infrastructure would comply with the safety, environmental, housing, catering, and associated requirements of WorkSafe BC, the Northern Health Authority, the BC Construction Camp Rules and Regulations, the BC Ministry of Environment, and any other local, Port, provincial, or federal regulations. General administrative personnel may be housed in Port Edward or Prince Rupert. This would reduce the size of the construction camp and could increase the indirect economic benefits to local communities.

2.4 Project Schedule and Activities

The planned schedule as well as the activities associated with the construction, operation and future decommissioning of the Project are described below. All Project construction and operations activities will be scheduled and completed in coordination and consultation with the PRPA and other appropriate regulatory authorities to be identified as Project engineering proceeds and the regulatory framework for the Project is further developed.

2.4.1 Schedule

The preliminary schedule aims for LNG export delivery to begin at the end of 2018. The approximate duration of key Project phases are:

- Environmental assessment and engineering design—2012 to 2014
- Permitting and environmental management plans—2014 to 2015
- Construction activities—2015 to 2018
- Operations and maintenance—2018 out to a minimum of 30 years (2048)
- Decommissioning, abandonment, and reclamation—sometime after 2048 when the Project has reached the end of its operational life or demand for LNG has ended.

An overview of the activities for each phase is described below.

2.4.2 Construction Activities

Construction activities would include:

- Tree removal, vegetation clearing, peat removal, and general site preparation
- MOF development and Lelu island heavy-haul road construction
- Construction camp and associated infrastructure development
- Facility construction and component installation
- Trestle and marine terminal construction
- Bridge and road construction to the mainland
- Post-construction clean-up and on-site grounds reclamation
- Commissioning.

The Project footprint would cover approximately 60% (i.e., 115 ha) of Lelu Island. This area is currently covered mainly by bog wetland and forest that would need to be cleared and graded. Vegetation removal will be minimized in riparian areas and removal of important, or archaeologically significant, culturally modified trees (CMTs) will be avoided where possible.

Prior to site preparation, the extent of the Project footprint, MOF landing site, trestle landing site, and bridge abutments would be surveyed and flagged. Avoidance areas (e.g., riparian areas, archaeologically significant CMTs, wildlife features, etc.) identified during environmental baseline studies would be fenced or flagged until approved mitigation measures could be employed.

Any merchantable timber on Lelu Island would be optimally harvested by local enterprises and removed from the site. Other non-merchantable trees and vegetation would be chipped. Large stumps and rocks would be removed from the cleared site. Organics (i.e., peat) may be piled and allowed to drain prior to being burned or disposed of at an appropriate disposal site off Lelu Island on the mainland.

The surface materials on Lelu Island are expected to be composed primarily of peat (muskeg) and organic soils, generally underlain by overburden (sand, gravels, and silts) overlying bedrock. Graders, bulldozers, backhoes and other earth moving equipment would be used to strip the surface materials and overburden. Overburden from the terminal site could be temporarily stockpiled on-site and as appropriate, transported to an approved disposal area. Sand and gravel would be salvaged and incorporated into the cut-fill balance where available. Dredged material may also be considered for fill areas if practical.

Following clearing and grading, site drainage would be incorporated into the site development. A stable, flat and safe work surface would be created with appropriate sediment control measures incorporated. Any exposed bedrock would be ripped mechanically or blasted. In areas where the existing elevation of the bedrock is below the final site grade, engineered fill would be used to bring the surface up to the finished grade.

Construction of the LNG terminal facilities would include excavating building sites, pouring foundations, constructing facility buildings and drainage systems, and installation of the

infrastructure. Foundation requirements are expected to be reinforced concrete slab-on-grade; however, this will be clarified following a detailed geotechnical investigation. The facility would be built as a combination of stick-built, constructed in-place (e.g., LNG storage tanks), and use of modular prefabricated units. Due to the volume of concrete needed for the foundations and LNG tanks, a concrete batch facility would be established on-site during construction phase.

Construction of the access road (as planned to date) involves an approved provincial highway connection to Skeena Drive south of the main settlement of Port Edward, an overhead CN Railway crossing, and a bridge to Lelu Island over Lelu Slough. Road construction practices would follow the general process of establishing a crown on the road using crushed rock and surfacing the road with asphalt. Drainage ditches and culverts would be used to collect and direct runoff and snowmelt.

The bridge connecting Lelu Island to Skeena Drive would be constructed using pipe piles and concrete abutments and steel or concrete bridge beams. The bridge would be two-lanes wide. Sufficient clearance would be provided beneath the bridge spans to allow safe passage for small boats at high tide and meet tsunami design clearance heights.

The safe maneuvering and berthing of construction barges would require dredging of the embayment area off Porpoise Channel and at the MOF berth face to provide the necessary under-keel clearance. Approximately 1,500,000 m^3 of material would be dredged using cutter suction dredging equipment. It is proposed that this material would be disposed-of at an ocean disposal site (e.g., Brown's Passage). Approval for disposal would be requested from Environment Canada under the *Canadian Environmental Protection Act*. In the event seabed alteration encounters bedrock, appropriately managed underwater blasting may be required in the MOF area.

The marine terminal will incorporate pipe pile supported trestle and berth structures. Piles would be driven through the sediments and anchored into the underlying bedrock. Where possible a vibratory hammer would be used to get the piles to the bedrock. Both the trestle and berths would consist of cast in place concrete caps, pre-stressed precast girders, and cast-in-place deck slabs. The deck slabs would be installed using marine equipment.

Waste materials from construction areas would be removed, transported, and recycled or disposed at approved disposal sites in compliance with any regulatory requirements. Undeveloped areas would be contoured and erosion control measures would be implemented. The facility would be commissioned once construction and installation is complete. The target date for LNG facility commissioning is Q4 of 2018.

2.4.3 Facility Operation and Maintenance

The facility would operate 24 hours per day. Facility maintenance would be conducted in a manner that would allow for LNG production to occur 365 days per year. LNG facility activities would include:

- LNG production and storage
- Loading of LNG carriers
- Off-loading of propane refrigerant and other facility materials
- Fueling of LNG carriers.

Routine inspections and maintenance of all systems would be completed on an ongoing basis. These would include:

- Maintenance of equipment to ensure safe and reliable operation
- Inspection of equipment and facilities to ensure the mechanical integrity is maintained
- Road and Project site maintenance
- Inspection and maintenance of safety, civil structures, and environmental monitoring devices.

2.4.4 Shipping

For the first phase of the Project (12 MPTA) it is estimated that there would be one LNG carrier every two days berthed at the terminal. At full build out (18 MPTA) this would increase to approximately one LNG carrier per day and 350 per year berthed at the terminal. There would be a variety of LNG carrier sizes that would use the marine terminal. The largest vessel that the terminal would be designed to accommodate is the Q-Flex LNG carrier. This carrier is up to 315 m in length and 50 m wide with a 12 m draught. The Q-Flex has capacity to ship up to 217,000 m^3 of LNG; its gross registered tonnage is 136,410 t with deadweight of 106,897 t.

The LNG carriers for the Project would use pre-established shipping routes into the Port of Prince Rupert in coordination with the Pacific Pilotage Authority and BC Coast Pilots. Deep sea vessel traffic heading for Prince Rupert harbour currently approach from the open waters north of the Haida Gwaii, through Dixon Entrance north of Stephens Island, following the deep sea shipping route into the PRPA. It is anticipated that the ships for this Project would approach along and exit via this route. Pilotage into the area past Dixon Entrance is compulsory for all vessels over 350 gross tonnes. The current pilot boarding station is located off Triple Island, at the eastern end of Dixon Entrance above Stephens Island, approximately 42 km from the Port. Accordingly, all LNG carriers would be “piloted” into the Port by the BC Coast pilots assisted by tugs; the size and number of which would be in compliance with PRPA policies and procedures.

The PRPA has established mooring locations in the Inner Harbour and Chatham Sound. They have also identified additional anchorages available outside the harbor limits for the potential use by LNG carriers; the use of anchorages outside of harbour limits would be at the discretion of the vessel and the pilot. Mooring locations in the vicinity of the Project can be found on the PRPA website (http://www.rupertport.com/operations/navigation).The shipping of the LNG product will be conducted separately from the operation of the LNG facility and marine terminal. The party responsible for the care and control of the LNG once it leaves the terminal will vary depending on the contractual arrangements made between PNW LNG and its customers. In cases of free on board delivery (FOB), PNW LNG will transfer the ownership of the LNG as it leaves the terminal and the LNG carrier is loaded. The buyer would be responsible for providing a vessel, either its own, or third-party owned. Thus, with an FOB arrangement, the care and control of the LNG would transfer from PNW LNG to the buyer/shipper as the LNG carrier is loaded. Alternatively, with ex-ship delivery (DES) agreements, PNW LNG would be responsible for transport of the LNG and retain ownership of it until it is delivered to the customer’s discharge port.

In both scenarios, PNW LNG or the buyer could make use of ships owned and operated by Malaysia International Shipping Corporation Berhad (MISC), which is another subsidiary of Petronas, or it could contract a third-party carrier. In all cases, companies other than PNW LNG would undertake shipping of the LNG. Depending on the contractual arrangements made between PNW LNG and its customers, either FOB or DES, the LNG may or may not be transported for the exclusive use of PNW LNG.

The viability of the Project is not dependent on a third-party LNG carrier service calling on the facility. At this time, it is expected that a portion of the LNG produced may be shipped by MISC to Malaysia and the remainder of the LNG produced sold to LNG off-take customers who may provide their own marine transportation of LNG to their markets.

2.4.5 Decommissioning and Abandonment

There are currently no LNG-specific regulations in place related to the decommissioning of an LNG export facility on federal lands. If rejuvenation of the facility is not a viable option at the end of the life of the facility (estimated to be a minimum of 30 years), a decommissioning and abandonment plan would be developed in consultation with the PRPA, applicable regulatory authorities, and local First Nations. Depending on laws and regulations in effect at that time, decommissioning might include:

- Dismantling/recycling of facility equipment and infrastructure
- Transporting and disposal or recycling of materials
- Preparation of that disturbed portion of Lelu Island for other industrial purposes or reclamation to restore ecological values.

PETRONAS (as PNW LNG's parent company) has international experience rejuvenating LNG facilities to extend the Project life. This would be considered near the end of the life of the facility.

2.5 Emissions, Discharges, and Waste

The LNG facility could potentially generate a variety of wastes, emissions and effluents over the life of the Project. Each of these wastes would be managed in compliance with the applicable regulatory regime and associated governmental requirements and conditions. This section describes the types of wastes expected to be generated by the Project during construction and operations and proposed measures for managing those wastes.

2.5.1 Construction

Potential waste materials during construction could include:

- Biomass waste (chipped vegetative material)
- Excavated overburden, organic material (e.g., peat), large boulders
- Dredged seabed material
- Vehicle and construction equipment emissions
- Construction wastes (wood, scrap metal, concrete, etc.)

- Sanitary wastewater (if a connection to sewage treatment facilities at Port Edward is impractical)
- Stormwater
- Hydrostatic test water
- Regulated hazardous materials (e.g., used oil or solvents).

2.5.1.1 Construction Emissions/Waste Management

All waste materials from construction areas will be managed in an environmentally safe manner. Although some materials may be used or stockpiled on-site, most will be removed, transported, recycled, or disposed at approved disposal sites in compliance with applicable legal requirements.

Vegetative matter and woody debris will likely be chipped, while other organics may be piled and drained prior to being burned or disposed of at an appropriate disposal site off Lelu Island. Overburden from the terminal site could be temporarily stockpiled on-site and as appropriate, transported to an approved disposal area on land. Sand and gravel would be salvaged and incorporated into the cut-fill balance where available. Consideration will be given to using the material dredged during Project construction for fill areas if practical, but the majority will likely require disposal at sea. Any ocean disposal plan will need to obtain approval from Environment Canada through the issuance of a permit under the *Canadian Environmental Protection Act*.

Construction-related air emissions would be managed by ensuring all construction equipment and vehicles are properly maintained and have required pollution control devices (e.g., catalytic converters). The current proposed approach for construction-related waste water and sewage management is to partially treat it at an on-site treatment plant prior to discharge to the Port Edward sewage system for further treatment and disposal.

Hazardous materials generated through the construction phase (e.g., hydrostatic test water that has any additives in it) would be recycled where an applicable program is regionally available or handled, administrated, transported, and disposed of at an approved facility. All contractors, subcontractors, and employees of the Project would be accountable for compliance with applicable regulations for the containment, handling, manifesting, and disposal of wastes and potentially hazardous materials.

2.5.2 Operations

During operations, the Project would generate a variety of emissions and wastes, including: air emissions, solid wastes, liquid wastes, and hazardous wastes.

2.5.2.1 Air Emissions

Emissions of air contaminants would include nitrogen oxide (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2), particulate matter (PM), and volatile organic compounds (VOC). The Project would also generate greenhouse gas (GHG) emissions through LNG processing and power generation.

Emissions originate from each LNG train and the common support utility facilities. Air emissions sources include combustion products from:

- Acid gas incinerators from each LNG train
- Gas-fired turbines used to power the facility
- Flares
- Back-up generators (for critical components in case of an emergency)
- LNG carriers.

Canada is a signatory to the International Convention for the Prevention of Pollution from Ships (MARPOL). Therefore emissions from the LNG carriers will comply with the regulations on emissions of sulphur oxide (SO_x) and NO_x in MARPOL Annex VI and applicable Canadian regulations. There would also be fugitive emissions from equipment (e.g., excavators, trucks, etc.) on the site and periodic emissions that originate from the routine maintenance and readiness testing of backup and emergency equipment items (e.g., emergency diesel generators, pumps, etc.).

As alternative liquefaction and power supply options are still being evaluated, only coarse air emissions estimates can be provided at this time. A preliminary engineered estimate of annual air emissions for a scenario with two trains operating at approximately 4 MPTA per train was used to extrapolate the following estimated emissions for the Project (three trains; 6 MPTA per train):

- 3,143 tonnes per year of NO_x
- 3,519 tonnes per year of CO
- 178 tonnes per year of SO_2
- 208 tonnes per year of total PM (PM_{10} and $PM_{2.5}$)
- 341 tonnes per year of VOCs
- 3,891,349 tonnes per year of CO_{2e}.

Further refined technology-specific estimates of air emissions will be generated through more detailed Pre-FEED engineering and as part of the environmental assessment.

2.5.2.2 Solid, Liquid, and Hazardous Wastes

Table 2-4 provides the liquid, solid, and hazardous wastes that would be generated in operations.

Table 2-4: Liquid, Solid, and Hazardous Wastes during Operations

Waste Category	Waste Type
Solid	▪ Domestic wastes (including food wastes from site personnel and LNG carriers berthing at the facility) ▪ Paper/cardboard waste (from administration and packaging) ▪ Wood and scrap metal from maintenance facility
Liquid	▪ Treated sanitary wastewater (sewage and grey water) ▪ Clean stormwater ▪ Contaminated stormwater or water contaminated in the LNG processes ▪ Water discharge from steam or condensate blow-down

Waste Category	Waste Type
Hazardous	▪ Solvent or hydrocarbon contaminated wastewater and surface runoff ▪ Mercury removed during the natural gas treatment process ▪ Waste catalyst and adsorbents ▪ Waste lubricating oils ▪ Spent solvents ▪ Waste biological treatment facility sludge (if sewage is treated on-site) ▪ Minor miscellaneous wastes included used cartridge filters, batteries, etc.

2.5.2.3 Operations Emissions/Waste Management

A variety of regulated management activities would be used for the responsible disposal of waste materials. Solid wastes would be recycled where an applicable program is locally available or disposed of at an approved landfill. It is envisioned that sewage and readily treatable liquid effluents (i.e., water contaminated by solvents) generated at the facility would be treated on-site and then piped and discharged to the Port Edward sewage treatment plant for further treatment and disposal. Stormwater would be collected in storage ponds, treated, and discharged to the ocean in compliance with regulations. Hazardous materials would be recycled where an applicable program is regionally available or handled, administrated, transported and disposed of at an approved facility. All contractors, subcontractors, and employees of the Project would be accountable for compliance with applicable regulations for the containment, handling, manifesting, and disposal of wastes and potentially hazardous materials.

Dispersion modeling will be used to estimate potential Project-related air emissions during the environmental assessment. The estimates will be compared to air quality objectives. GHG emissions will also be estimated and evaluated with respect to provincial and national guidelines or objectives.

2.6 Estimated Capital Cost and Employment

The estimated capital cost for the first phase of the Project is between $9 and $11 billion Canadian dollars. Construction would require a workforce of up to 3,500 people at the peak (approximately 11,500 person years of total employment). During the operational phase, the facility is estimated to employ 200 to 300 people over its estimated 30 years of operation (6,000 to 9,000 person years of employment) and create additional indirect jobs in the local community and elsewhere through suppliers of goods and services.

3 PROJECT LOCATION

3.1 Designated Project Location

3.1.1 Project Coordinates

The facility would be located on Lelu Island in BC (Figure 3) within the boundaries of the PRPA and within the District of Port Edward. Lelu Island is a small island (~192 ha) approximately 2 km from the town centre of Port Edward and 15 km southwest of City of Prince Rupert. The facility footprint would be approximately 115 ha and cover approximately 60% of the island. Lelu Island and its surrounding waters are located within the boundaries of the Port of Prince Rupert which is under the jurisdiction of the PRPA, a Canadian Port Authority under the *Canada Marine Act* and its regulations. The coordinates of the center of the facility would be:

- **Degrees – Minutes – Seconds**—Latitude 54°11'58.02"N/Longitude 130°17'19.81"W
- **Decimal Degrees**—Latitude 54.199451/Longitude – 130.288836°
- **Universal Transverse Mercator** (UTM)—415924 E/6006480 N (Zone 9).

3.1.2 Site Plan

A preliminary site plan is provided in Figure 4 and 5. This figure provides a schematic of the approximate scale of the proposed components and activities. It includes the general location of the facility, trestle, and marine terminal. The site plan would be refined as a result of engineering studies and ongoing consultation during the environmental assessment.

3.1.3 Maps of Project Components

Maps of the Project location can be found in Section 8. The figures provided include the following information:

- There are two unnamed mapped watercourses on Lelu Island (Figure 4). Lelu Island is adjacent to Porpoise Harbour and Porpoise Channel and within Chatham Sound (Figure 5).
- The linear and other transportation components in the area are shown on Figure 5 and Figure 6. These include the Prince Rupert Airport on Digby Island, the PRPA, the CN railway, electrical power transmission lines, highways, and roads.
- Known archaeological sites, existing and approved industrial facilities, and residential areas near the proposed Project location are shown on Figures 4 and Figure 5.
- The Project would be located within the claimed traditional territory of five First Nations who assert Aboriginal rights and/or title in the Prince Rupert Harbour area. They are: Metlakatla First Nation, Lax Kw'alaams First Nation, Gitxaala Nation, Kitselas First Nation, and Kitsumkalum First Nation. The Indian Reserves for each of these First Nations are shown on Figure 7.

- The Project would be located on federal lands within the boundary of the PRPA (as identified in the PRPA Letters Patent; Figure 6 and Figure 7). No National Parks or National Historic Sites are in the vicinity of the proposed Project.
- The Project would be within the District of Port Edward and within 2 km of the main settlement area. The closest Indian Reserve, a reserve of the Metlakatla First Nation, is approximately 10 km northwest of Lelu Island. The Project would be approximately 15 km south of the City of Prince Rupert (Figure 5).
- There are two historic cabin sites on Lelu Island, and one temporary residence that is in trespass. There are several permanent residences on the mainland within 1 km of the proposed Project site (Figure 5).
- The Project would be located adjacent to commercial and recreational fishing areas (Figure 5 and Figure 6).
- The marine terminal for the Project would be located within 1 km of the Kitson Island Marine Provincial Park (Figure 6).
- There are no Wildlife Areas or Migratory Bird Sanctuaries in the vicinity of the Project.

Photographs of the Project location are provided in Appendix C.

3.1.4 Legal Land Description

The land and waters to be used for the Project are primarily within the jurisdiction of PRPA, a Canada Port Authority listed under the *Canada Marine Act* and its regulations. The legal description of the principal land and water lots to be used for the Project are: District Lot Range 5, Coast District, unsurveyed water lot “E”, and two additional unsurveyed water lots at the location of the MOF and bridge. Stapledon Island, legally known as Block 4, District Lot 642, Range 5, Coast District, Plan 3010 and a mainland parcel known as All That Portion of Assigned Block A, District Lot 641, Range 5, Coast District, Plan 850 on Plan 1468 may also become part of the Project.

3.2 Land and Water Use

3.2.1 Land Use Designations (Zoning)

Lelu Island is within the District of Port Edward and is part of the Skeena Queen Charlotte Regional District. It is located within the jurisdiction of the PRPA. Lelu Island is identified in the PRPA 2020 Land Use Management Plan for future major industrial uses. The major industrial uses identified in the PRPA 2020 Land Use Management Plan include use as a marine terminal, bulk transfer facility, and other associated marine transportation uses. Potential for recreational use was also identified in the PRPA 2020 Land Use Management Plan.

The District of Port Edward Official Community Plan recognizes Lelu Island as an industrial use area.

3.2.2 Current Land Ownership

The primary site location is Lelu Island which is federally administered Crown land within the jurisdiction and administration of the PRPA. The Project also includes Water Lot "E", off the west-northwest corner of Lelu Island, and two water lots at the location of the MOF and the bridge. A portion of Stapledon Island, which may also be federally-administered Crown land (upon completion of a conveyance from Port Edward to the PRPA). Stapledon Island may be needed to provide road and bridge access to Lelu Island. A small parcel of private land (e.g., owned by CN Rail or others) would also be needed on the mainland where the proposed road to Lelu Island would connect to the provincial highway (e.g., Skeena Drive).

3.2.3 Land Use Plans

Lelu Island is currently undeveloped. Its future use is contemplated in the PRPA 2020 Land Use Management Plan. The PRPA 2020 Land Use Management Plan has identified Lelu Island for future major industrial uses. No other land use, water use, resource management or conservation plans have been identified to date.

In 2011, PRPA updated its prior land use management plan with the PRPA 2020 Land Use Management Plan. As part of the process in developing the PRPA 2020 Land Use Management Plan, PRPA consulted with the public and with Aboriginal communities in accordance with the requirements outlined in the *Canada Marine Act*.

The PRPA 2020 Land Use Management Plan divides the Port of Prince Rupert into two distinct planning districts, the Inner Harbour and Ridley Island/Outer Harbour. The Ridley Island/Outer Harbour Planning District includes Lelu Island. Lelu Island is currently undeveloped but has been identified for future major industrial uses, including marine terminal development.

3.2.4 Aboriginal Lands

The Project would be located on lands that are the subject of overlapping claims of Aboriginal rights and title. The claims have been asserted by five First Nations: the Metlakatla, Lax Kw'alaams, Gitxaala, Kitselas, and Kitsumkalum.

The five First Nations are Indian bands within the meaning of the *Indian Act*. They form part of a larger tribal group known as the Tsimshian Nation. Each of these five First Nations asserts that the entire Prince Rupert Port area lies within its traditional territory. Canada has taken the position, based on currently available information that the potential strength of these claims varies considerably from First Nation to First Nation.

Publicly available anthropological studies indicate that areas around the mouth of the Skeena River, and in adjacent lands and waters, were used historically by Aboriginal people for hunting, fishing, and harvesting of marine and terrestrial resources. Aboriginal usage of the area also included the cultural modification and harvesting of trees. Village sites and seasonal resource-gathering sites were also known to have existed in certain locations within the general area of the Port of Prince Rupert. During the development of PRPA's 2020 Land Use Plan, First Nations identified a number of

CMTs on Lelu Island. PNW LNG conducted an archaeological inventory on Lelu Island in August of 2012, and further CMTs were identified.

PNW LNG has initiated consultations with each of the First Nations for the purpose of assessing potential effects of the Project on their respective Aboriginal rights and interests. PNW LNG will continue to work with the five First Nations asserting claims in the area to understand their current and historic uses of Lelu Island and the surrounding marine environment. Existing studies may assist PNW LNG and the First Nations to assess the potential effects of the Project on lands and resources currently used for traditional purposes and to assist them in determining if further traditional use information may be required.

4 FEDERAL INVOLVEMENT—FINANCIAL SUPPORT, LANDS, AND LEGISLATIVE REQUIREMENTS

4.1 Financial Support

The federal government has not provided any financial support for the Project. PNW LNG does not plan to apply for federal funding for the LNG Facility.

4.2 Federal Land

The majority of the Project components would be located on Lelu Island with some components being on adjacent water lots. Other portions of the Project may be on the additional land mentioned in Section 3.1.4. Lelu Island and the water lots are federally administered Crown land within the jurisdiction and administration of PRPA. Rights to the federal land would be acquired by PNW LNG under a long term lease.

4.3 Legislative or Regulatory Requirements

Under CEAA 2012, all Projects that meet or exceed the thresholds described in the *Regulations Designating Physical Activities* may be subject to a federal environmental assessment. As described previously in s.2.2 of this document, the Project would exceed thresholds listed in both subsections 2(a) and 13(d) of the Regulation.

Other federal legislative or regulatory requirements that may apply to the Project are identified in Table 4-1.

Table 4-1: Preliminary List of Potential Federal Regulatory Requirements

Legislation/Regulation	Federal Authority	Description
Fisheries Act S.35 (2) authorization for the harmful alteration, disruption or destruction of fish habitat.	Fisheries and Oceans Canada	**Existing:** Authorization for harmful alteration, disruption or destruction of fish habitat for construction of Project components in the marine environment (e.g., temporary bridge and fill, permanent bridge sub-structure, marine trestle, MOF, etc.). **Future:** Additional or alternative authorizations may be required as changes to the *Fisheries Act* are enacted in new regulations.
Navigable Waters Protection Act S.5 (2) permit for works placed in or about a navigable water.	Transport Canada	Permit authorizing construction of Project components that would impact navigation (e.g., temporary bridge and fill, marine trestle, permanent bridge piles, MOF, sub-tidal infrastructure, etc.).
Canadian Environmental Protection Act S.127 (1) permit for disposal at sea.	Environment Canada	Permit authorizing disposal of excavated or dredged material at sea.
National Energy Board Act S.117 Export Licence	National Energy Board	Licence authorizing the export of liquefied natural gas.
PRPA lease and authorizations	PRPA	Lease to occupy and use PRPA-administered federal lands. Authorizations for site clearing, tree removal, and associated site preparation activities.

Provincial Regulatory Requirements

The development of an LNG Export Facility within a federally regulated Port Authority has not, to date, occurred in Canada. Canada through the Major Projects Management Office (Natural Resources Canada), the Canadian Environmental Assessment Agency, and Transport Canada (Policy Branch) are engaged with the Province of British Columbia to develop a regulatory framework agreement for the Project. That agreement will address the application of provincial regulatory requirements to the Project. It is anticipated that the Project will be regulated by the BC Oil and Gas Commission under existing and new regulations under the BC *Oil and Gas Activities Act*.

5 ENVIRONMENTAL EFFECTS

5.1 Environmental Setting

5.1.1 Geology and Geomorphology

Lelu Island is situated within the Hecate Lowland of the Hecate Depression in the Coastal Trough physiographic region (Holland 1976). This region is characterized by a rough topography composed

primarily of metamorphic rock from the Paleozoic and Mesozoic era. Bedrock in the area is predominantly a low-grade metamorphic rock composed of meta-sediments (schists) and gneisses associated with intruded igneous bodies. The schist is rich in mica, amphibole, graphite and chlorite. Rocky outcrops in the area indicate highly fractured rock with two or three major bedding and joint sets, giving rise to a block structure. Local intense folding of the rock is known to exist and to have structural controls in a north-northeast direction.

Lelu Island and its surrounding area are considered to be flat low plain that is mostly below 30 m elevation and is underlain by a variety of rocks. Many of these low areas, including Lelu Island are occupied by large expanses of muskeg with poor drainage.

Offshore sediments consist of normally consolidated silts and clays with lesser amounts of fine sand, with the thickness increasing away from the shoreline. The offshore subsoil is comprised of mica schist bedrock overlain by a thin and discontinuous dense glacial till and an extensive soft silty clay layer. The silty clay layer is expected to be very weak and compressible with very small shear resistance in the first 8 m.

Western Canada experiences higher than average seismic activity due to its location near some major plate tectonic boundaries (the Juan de Fuca Plate near Vancouver Island, the North American Plate, upon which most of Canada rests, and the Pacific Plate, near Haida Gwaii [formerly the Queen Charlotte Islands]). Movements along these boundaries can cause ongoing small earthquakes and, occasionally cause earthquakes large enough to cause damage to buildings and infrastructure.

5.1.2 Tides, Currents, and Bathymetry

The general ocean current pattern off of central BC is driven by a combination of tidal and non-tidal currents. The tidal currents are a dominant component of the surface flow, especially in summer when wind-driven and inertial currents are not as substantial and currents are weaker and more variable. Current speed and direction along the coast are strongly governed by the coastline and bathymetry and are driven by seasonal winds and freshwater discharge. Lelu Island is near the mouth of the Skeena River; spring and summer runoff brings freshwater to the ocean and influences the currents at that time of year.

The tides on the north coast are mixed, semi-diurnal, and have the greatest influence on water level. These large tides in the Port Edward area generate strong tidal currents that affect surface flow over shorter time periods. The tides range from -3.68 to 3.62 m above mean sea-level. The mean tidal current is 0.11 m/s and the maximum tidal current is 0.27 m/s.

Lelu Island is bordered by deep water in Porpoise Harbour (up to 25 m) to the north and Inverness Passage (up to 15 m) to the south. The water is shallow west of Lelu Island along Flora, Agnew, and Horsey Banks. Flora Bank is a shallow eel-grass bed (< 1 m deep); depths at Agnew and Horsey Bank are up to 4 and 6 m respectively. West of Agnew Bank approximately 2.7 km west of Lelu Island) there is a drop-off where the water depth increases to more than 15 m deep.

5.1.3 Climate

Lelu Island is within the Pacific climate region. This region is a thin coastal strip of west-facing slopes, uplands and indented fjords that extend no more than 150 km inland from the sea. Moist, warm air streams carried by westerly winds from the Pacific drop large amounts of rain or snow as the warm air is forced up the Coast Mountains and cooled. The Coast Mountains also restrict the westward flow of cold continental Arctic air masses located east of the Rocky Mountains, resulting in a more moderate winter climate along the west coast of BC than in the rest of Canada. The summer climate is warm, but cool relative to inland areas, and because the frequency and intensity of Pacific storms are reduced in the summer, precipitation is less than in the winter. The combination of cool and wet climatic conditions in the area supports lush and diverse vegetation typical of coastal temperate rainforests.

Prince Rupert is Canada's wettest city, with an average of 2,469 mm of rainfall and 126 mm of snowfall per year at the airport (2,594 mm total annual precipitation). Local residents of Port Edward advise that Port Edward receives less rain than Prince Rupert. October is the wettest month (average of 21 rainy days) and July the driest (average of 8 rainy days). The north coast experiences an average of 20 days of fog per year, compared to 110 days on the southern tip of Haida Gwaii. In the summer, Prince Rupert experiences average high temperatures of 15°C to 17°C and average lows of 7°C to 10°C. In the winter, average highs are 3°C to 5°C, with an average low of about 0°C. January is the coldest month, with an average daily temperature of 1°C, while August is the warmest month, with an average temperature of 13°C.

5.1.4 Air Quality

Existing air quality in the Port Edward area is generally good. Monitoring results from a recent environmental assessment completed in Prince Rupert (Stantec, 2009) concluded that of the substances generally considered when assessing air quality (i.e., CO, NO_x, SO_2, VOCs, H_2S, $PM_{2.5}$, PM_{10}) all monitored values were well within regulated ambient air quality parameters.

The region is located well away from other major industrial sources of air contaminants in BC. The primary influences on air quality in the area are the regional industrial emitters, including local terminals that accommodate industrial cargos and passenger traffic. These are within the boundaries of the Prince Rupert harbour, and include marine terminals, ferry terminals, and docks on Kaien Island, and industrial sites on Ridley Island.

5.1.5 Freshwater Aquatic Resources

The main freshwater habitat on Lelu Island is wetland, specifically *Sphagnum* bog. The water in bogs typically has a naturally occurring low pH (high acidity) and is generally considered unsuitable as fish habitat. Preliminary pH measurements on Lelu Island range from 3.4 to 4.5. Most fish species cannot tolerate water with a pH less than 5.0 (according to the BC Approved Water Quality Guidelines, a pH of 6 to 9 is needed to support fish). There are two mapped unnamed watercourses on Lelu Island; both will be impacted by the project and managed within the footprint. Based on the expected pH

levels of these watercourses, they are not expected to be fish-bearing; however, field studies will be completed to confirm their status.

5.1.6 Marine Resources

The marine environment in the Port Edward area is typical of the north coast of BC. Cold, nutrient-rich waters drive high primary production, which supports a diverse assemblage of invertebrates, fish, and marine mammals. Lelu Island is at the mouth of the Skeena River and its estuary. The Skeena River adds freshwater and nutrients to the surrounding waters contributing to the diversity of marine life in the area. The northern and western shoreline of Lelu Island is composed of bedrock, boulder, and cobble.

There are also several bays with a mix of cobble, gravel, sand, and mud. The southern shoreline is generally flatter and includes a mixture of low-lying rocks, flat gravel beaches, and mudflats toward the east. The eastern shore is comprised of a mix of rocky areas, muddy bays, and gravel beaches.

A noted area of marine environmental importance is Flora Bank, just west of Lelu Island and extending out to Kitson Island. Flora Bank supports eel grass habitats and provides other important habitats for a variety of other marine life.

The subtidal, intertidal, and foreshore areas of Lelu Island are typical of the rocky shores in the Port Edward Area and supports a diverse community of marine biota. Algal species include bull kelp (*Nereocystis luetkeana*), rockweed (*Fucus gardneri*), sea lettuce (*Ulva* spp.), and various understory kelps (e.g., *Laminaria* spp.). Common invertebrate species include barnacles (*Balanus* spp. and *Semibalanus* spp.), snails (*Littorina* spp. and *Nucella* spp.), limpets (*Lottia* spp.), and mussels (*Mytilus* spp.). Patches of eelgrass are present within mudflats. The seafloor in the Prince Rupert area is generally composed of fine-grained sediments such as mud, silt, and sand; some rock substrates are present. Common species that occur in areas with soft sediment bottom include: orange sea pens (*Ptilosarcus gurneyi*), spiny pink shrimp (*Pandalus eous*), Dungeness crab (*Metacarcinus magister*), and California sea cucumber (*Parastichopus californicus*).

Important marine fish habitats found in the Port Edward area include bull kelp beds (*Nereocystis luetkeana*) and eelgrass beds (*Zostera marina*). Bull kelp is a productive, canopy-forming kelp that provides high value habitat for a variety of marine organisms including juvenile salmon, Pacific herring and rockfish. Kelp canopies help to stabilize hydrodynamic conditions, slowing water movement and trapping zooplankton. Fish commonly use kelp canopies to feed on other fish and invertebrates and to escape predation by larger fish. Eelgrass beds are also productive habitats that provide important nursery habitat for a number of economically, culturally, and ecologically important species including juvenile salmon, Pacific herring, eulachon (oolichan), rockfish, and Dungeness crab. The soft sediment associated with eelgrass beds also support rich bivalve communities.

Over 300 species of marine fish inhabit the productive waters of the northeast Pacific Ocean, many of which occur within the Port Edward and Prince Rupert and area. Key species harvested for commercial, recreational and/or Aboriginal fisheries include: Pacific salmon (sockeye, Chinook, coho, pink and chum; *Oncorhynchus* spp.), halibut (*Hippoglossus stenolepsis*), Pacific herring

(*Clupea pallasii*), rockfish (*Sebastes* spp.), lingcod (*Ophiodon elongates*), Pacific cod (*Gadus macrocephalus*), sole, and eulachon (*Thaleichthys pacificus*). All of these species are expected to occur within the Prince Rupert area for at least part of their life histories.

Several species of marine mammals occur regularly in the Port Edward and Prince Rupert area including: humpback whale (*Megaptera novaeangliae*), northern resident killer whale (*Orcinus orca*), harbour porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Steller sea lion (*Eumetopias jubatus*) and harbour seal (*Phoca vitulina richardsi*). The northern resident killer whale is listed as Threatened under the federal *Species at Risk Act* (SARA) and the harbour porpoise is listed as Special Concern. The abundance of marine mammals in the Port Edward and Prince Rupert area generally increases during summer months coinciding with the seasonal abundance of migratory fish (e.g., salmon, eulachon, and Pacific herring).

5.1.7 Vegetation Resources

Lelu Island is within the Pacific Maritime ecozone which extends along the coast of BC northward to Alaska. The regional landscape is characterized by steep fjords and channels where mountains meet the ocean. Lelu Island is within the Very Wet Hypermaritime subzone of the Coastal Western Hemlock (CWHvh2) biogeoclimatic zone. The CWH receives, on average, more precipitation than any other region in BC and experiences cool summers and mild winters. In general, the CWH is characterized by low to mid elevation forests dominated by western hemlock (*Tsuga heterophylla*), Douglas fir (*Pseudotsuga menziesii*), and western red cedar (*Thuja plicata*).

Terrestrial ecosystem mapping completed for the Project shows that most (63%) of Lelu Island is wetland ecosystem. These wetland ecosystems include bog forest, bog woodland, and open blanket bog. The blanket bog/upland forest complex of Lelu Island is reasonably typical of the CWHvh2 that characterizes the outer portions of the north and central coast. Three blue-listed ecological communities occur on Lelu Island: Lanky moss (CWHvh2/04 – HwSs), skunk cabbage (CWHvh2/13 – CWSs), and tufted hairgrass-meadow barley (CWHvh2/Ed01).

Lelu Island does not support any plants listed in SARA and no provincially red or blue-listed plant species have been found to date.

5.1.8 Wildlife Resources

Information on wildlife and wildlife habitat in the region was collected from a number of sources including field guides, atlases, and peer-reviewed and grey literature (e.g., government reports). The CWH biogeoclimatic zone provides habitat for many seasonal and year-round resident wildlife species in the region. There are 225 known and potentially occurring bird, mammal, and amphibian species in the Port Edward and Prince Rupert area. Terrestrial mammals known to use Lelu Island include black-tailed deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), and American marten (*Martes americana*), and gray wolf (*Canis lupus)*. There have been 204 bird species recorded in the Port Edward and Prince Rupert area. Of those, 103 species have been recorded on Kaien and Ridley Island and in the surrounding waters. This includes marine birds, songbirds, and

raptors. A variety of avian species are known to use Lelu Island and the surrounding waters. Common species in the area include bald eagle (*Haliaeetus leucocephalus*), glaucous-winged gull (*Larus glaucescens*), pelagic cormorant (*Phalacrocorax pelagicus*), pigeon guillemot (*Cepphus columba*), chestnut-backed chickadee (*Poecile rufescens*), pacific wren (*Troglodytes pacificus*), Townsend's warbler (*Setophaga townsendi*), orange-crowned warbler (*Oreothlypis celata*), and Steller's jay (*Cyanocitta stelleri*).

There are five amphibians (the western toad [*Anaxyrus boreas*], coastal tailed frog [*Ascaphus truei*], rough skinned newt [*Taricha granulosa*], long-toed salamander [*Ambystoma macrodactylum*], and northwestern salamander [*Ambystoma macrodactylum*]) and two reptiles (common garter snake [*Thamnophis sirtalis*] and western garter snake [*Thamnophis elegans*]) that occur in the region. Northwestern salamander has been observed on Lelu Island.

Species at Risk

The BC Conservation Data Centre (BC CDC) lists rare wildlife species, including species designated as endangered or threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), SARA, NatureServe Global Status, and Canadian National General Status (Wild Species).

Twenty-four wildlife species of conservation concern have potential to use habitats on Lelu Island or the adjacent marine environment; 13 are listed on Schedule 1 of SARA (BC CDC 2012). This includes four Threatened species (northern resident killer whale, marbled murrelet [*Brachyramphus marmoratus*], northern goshawk, *laingi* subspecies [*Accipiter gentilis laingi*], olive-sided flycatcher [*Contopus cooperi*]) and nine species of Special Concern (harbour porpoise, ancient murrelet [*Synthliboramphus antiquus*], great blue heron, *fannini* subspecies [*Ardea herodias fannini*], peregrine falcon *pealei* subspecies [*Falco peregrinus pealei*], western screech-owl [*Megascops kennicottii*], short-eared owl [*Asio flammeus*], rusty blackbird [*Euphagus carolinus*], band-tailed pigeon [*Patagioenas fasciata*], coastal-tailed frog, and western toad).

Several species of conservation concern (including federally and provincially-listed species) have been detected on nearby Kaien Island and Ridley Islands (Bird Studies Canada 2012; JWA 2008; Stantec 2010; 2011; 2012). These include: California gull (*Larus californicus*), surf scoter (*Melanitta perspicillata*), western grebe (*Aechmophorus occidentalis*), pelagic cormorant *pelagicus* subspecies, great blue heron *fannini* subspecies, peregrine falcon, and western toad. Though grizzly bear and coastal tailed frog are known to occur within the North Coast Forest District they are unlikely to occur on Lelu Island due to their habitat requirements.

5.2 Potential Project-Related Changes to the Environment

The environmental impact statement would include an assessment of the factors listed in subsection 5(2) of CEAA with respect to any changes to the environment that are directly linked to, or necessarily incidental to, the key federal permits and approvals required for the project.

5.2.1 Fish, Fish Habitat, and Aquatic Species

The *Fisheries Act* and SARA define the marine plants, fish, fish habitat, and aquatic species that need to be considered during a federal environmental assessment. Certain Project-related activities such as dredging and disposal at sea, construction of the marine terminal infrastructure, wastewater discharges, and LNG vessel operations may adversely affect fish, fish habitat, or aquatic species. The key potential environmental effects include:

- Potential effects on fish, fish habitat, and water quality from the ocean disposal at sea of the dredged materials
- Sedimentation introduced into the marine environment from construction, soil erosion and changes to surface run-off patterns
- Increases to marine turbidity, suspended solids from pile driving, coring, dredging, or sub-sea blasting
- The permanent alteration or loss of fish habitat from: clearing a limited amount of riparian forest on Lelu Island, construction of the LNG vessel trestle and MOF, construction of the permanent bridge, stormwater or sewage outfalls, any dredging and, if necessary, controlled blasting including that needed for construction vessel turning basin.
- Potential impacts to Flora Bank, which supports a large eelgrass bed and provides important habitat to crab and juvenile salmon
- Underwater noise impacts on marine mammals, in particular the federal SARA-listed harbour porpoises and humpback whales, during pile driving and dredging
- Potential whale strikes by construction and LNG carriers causing mortality or injury
- Reduced marine water quality from effluent (e.g., stormwater and sewage) discharge.

5.2.2 Migratory Birds

Construction and operation of the facility has the potential to affect migratory birds, as defined in the *Migratory Birds Convention Act,* 1994*.* The key potential effects include:

- Loss of terrestrial habitat due to vegetation clearing on Lelu Island
- Reduction of use of adjacent habitats from noise during construction and operation of the facility
- Mortality of migratory birds during construction and operation of the facility
- Alteration of movement of marine birds in the waters adjacent to the trestle.

5.2.3 Federal Lands

The proposed Project would be located almost entirely on federally administered Crown land and waters under the jurisdiction and administration of the PRPA.

This section provides an overview of the key potential environmental effects of the Project that would occur as a result of carrying out the designated project on federal lands and waters. These effects, and others identified through further study and engagement, will be included in the environmental assessment.

5.2.3.1 Air Quality

Construction and operation of the Project would result in air emissions and has the potential to affect air quality. Emissions would result from the construction and operation of the facility, the LNG carriers, and their support vessels. The primary substances of interest are sulphur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), respirable particulate matter ($PM_{2.5}$), hydrogen sulphide (H_2S) and greenhouse gases (GHGs).

5.2.3.2 Acoustic Environment

Noise emissions from the construction and operation of the Project have the potential to affect the acoustic environment of the surrounding area (in particular, the settled area in Port Edward). In addition to the noise emissions from the facility the underwater acoustic environment could be affected by construction of the trestle and marine terminal and by shipping.

5.2.3.3 Navigable Waters

There are potential Project effects on navigable waters from the construction of the trestle, marine terminal and the temporary (construction) and the permanent bridge from the mainland to Lelu Island. This infrastructure and increase in vessel traffic (during construction and operations) could interfere with nearshore navigation. The Project could affect navigation in the shallow navigable nearshore waters between Lelu Island and the mainland. This area is known as Lelu Slough and is only navigable at high tide by shallow draft boats. At present, the PRPA have indicated that they discourage navigation through Lelu and Stapledon Sloughs due to safety concerns.

The construction and operation of the trestle will affect north-south navigation between Lelu Island and Flora Banks. These waters are used for recreational boating, as well as recreational, commercial and Aboriginal fishing. Changes in lighting at the terminal may also interfere with nighttime navigational aids.

5.2.3.4 Vegetation Resources

Construction of the Project would require vegetation clearing on Lelu Island. A small amount of vegetation might also be cleared on privately owned land (i.e., CN Rail) on the mainland to construct the road and bridge. Potential effects on vegetation include:

- Loss of rare and culturally significant plants
- Loss of rare plant communities
- Loss of wetlands.

Loss of wetland ecosystems is expected be an area of concern for this Project. Approximately 63% of Lelu Island is comprised of wetland ecosystems including bog forest, bog woodland, and open blanket bog. Project construction will likely affect wetland ecosystems. The *Federal Policy on Wetland Conservation* (Government of Canada 1991) of 'no net loss of wetland functions on all federal lands and waters' applies to Lelu Island because it is on federal lands. The bog ecosystems on Lelu Island provide several wetland functions, including wildlife habitat and carbon sequestration.

5.2.3.5 Wildlife Resources

Construction and operation of the facility has the potential to affect terrestrial species at risk, and other wildlife species (e.g., raptors). The key potential effects on wildlife resources are:

- Loss of terrestrial habitat due to vegetation clearing on Lelu Island
- Alteration of adjacent habitats from noise during construction and operation of the facility
- Risk of mortality of species at risk during construction and operation of the facility.

5.2.4 Transboundary Effects

The Project is not expected to result effects outside of British Columbia or Canada. The proposed Project location is more than 50 km from the United States border. Of the potential Project effects, air emissions from the facility would have the highest potential for trans-boundary effects; however, based on previous experience, air emissions are not expected to affect air quality more than 25 km from the Project site.

5.2.5 Potential Effects on Aboriginal People from the Project

PNW LNG has been advised by the PRPA, the Province and Transport Canada that there are five First Nations with overlapping claims that include the Project area. These First Nations are the Metlakatla, Lax Kw'alaams, Gitxaala, Kitsumkalum, and Kitselas. Each asserts Aboriginal rights and/or interests in and around the Prince Rupert Harbour area. No Métis communities have been identified in the vicinity of the Project to date.

The Project may affect potential Aboriginal rights to hunt, fish, gather resources, harvest trees, and historic marine navigation routes. Some CMTs may also be affected by the Project. Important marine resources traditionally used by Aboriginal people include: seaweed, halibut, salmon, eulachon (oolichan), shellfish, fish roe, seal, sea lions, and sea otter. Terrestrial resources were also used and included: tree bark, planks, berries, bird eggs, deer, elk, bear, and other animals.

Potential effects of environmental changes on Aboriginal people could include:

- Human Health
  - Degradation of air quality
  - Disturbance from acoustic emissions
  - Discharge of waste into the marine environment.
- Socio-economics
  - Disturbance from ambient light and effects on visual landscape values
  - Potential effects on use of traditional territories
  - Potential effects on historic marine navigation routes
  - Economic benefits for First Nations, including employment and contracting opportunities
  - Potential effects on tourism, business development, and recreational opportunities.

- Heritage Resources
  - Destruction of culturally modified tree (CMT) sites as a result of vegetation clearing and site grading.
- Marine, Wildlife, and Vegetation Resources
  - Potential effects on Aboriginal rights to hunt, fish, and gather resources due to effects of the Project on eelgrass beds, marine water quality, fish habitat, vegetation, terrestrial wildlife habitat, and shipping.

PNW LNG has also met with the Coastal First Nations, which is an alliance of First Nations on BC's North and Central Coast, including the Haida Gwaii. The Coastal First Nations include Wuikinuxv, Heiltsuk, Kitasoo/Xaixais, Nuxalk, Gitga'at, Haisla, Metlakatla, Old Massett, Skidegate, and Council of the Haida Nation. To date, the Coastal First Nations have raised concerns relating to shipping, power options for the Project, and the design of the LNG Facility.

Further information on Project-related engagement and consultation with Aboriginal groups is presented in Section 6.

6 ENGAGEMENT AND CONSULTATION WITH ABORIGINAL GROUPS

6.1 Potential Aboriginal Groups with an Interest in the Project

PNW LNG has been advised by the PRPA, the Province and Transport Canada that there are five First Nations with overlapping claims that include the Project area. These First Nations are the Lax Kw'alaams, Metlakatla, Gitxaala, Kitsumkalum, and Kitselas. Each of these First Nations assert Aboriginal rights and/or interests in and around the Prince Rupert Harbour area. The Coastal First Nations have also expressed interest in the Project. Table 6-1 provides information for each group.

Table 6-1: Contact Information for First Nations with a Potential Interest in the Project

First Nation	Contact Information
Metlakatla First Nation	**Address:** PO Box 459, Prince Rupert, BC V8J 3R2 **Telephone:** 250-628-3234 **Fax:** 250-628-9205
Lax Kw'alaams First Nation	**Address:** 206 Shashaak Street, Lax Kw'alaams, BC V0V 1H0 **Telephone:** 250-625-3293 **Fax:** 250-625-3246
Gitxaala Nation	**Address:** PO Box 149, Kitkatla, BC V0V 1C0 **Telephone:** 250-848-2214 **Fax:** 250-848-2238
Kitsumkalum First Nation	**Address:** PO Box 544, Terrace, BC V8G 4B5 **Telephone:** 250-635-6177 **Fax:** 250-635-4622

First Nation	Contact Information
Kitselas First Nation	**Address:** 2225 Gitaus Road, Terrace, BC V8G 0A9 **Telephone:** 250-635-5084 **Fax:** 250-635-5335
Coastal First Nations	**Address:** 1660-409 Granville Street, Vancouver, BC V6C 1T2 **Telephone:** 604-696-9889 **Fax:** 604-696-9887

6.2 Aboriginal Consultation Activities to Date

PNW LNG has initiated consultations with a number of First Nations respecting the Project. A summary of the dates, means of consultation, and discussion topics can be found in Appendix A.

6.3 Key Issues identified By First Nations (to Date)

The following list provides a high-level overview of key issues that First Nations have raised to date about the proposed Project. This list of issues will be updated throughout the environmental assessment and may include new issues or refine the issues described here.

Issue 1—Location and Length of the Trestle

The length of the trestle and potential effects on fishing and marine navigation (e.g., local small vessel traffic) are issues for First Nations. PNW LNG will continue to work with First Nations on the design and location of the trestle.

Issue 2—Archaeology

First Nations have expressed an interest in collecting information on archaeological sites and artefacts on Lelu Island, and mitigating potential impacts on them. PNW LNG will notify First Nations, and consult with them as appropriate, in relation to further archaeological work or archaeological impact assessment that may be proposed for Lelu Island, and will provide them with copies of any related reports or inventories.

Issue 3—Cumulative Impacts

First Nations are concerned about cumulative effects of the Project and have said that the scope of the cumulative effects assessment should include other LNG facilities and associated pipelines that have been planned for the north coast.

Issue 4—Emissions from LNG Facility

The potential impact of emissions from the LNG facility on vegetation, wildlife, and human health, is an issue of concern for First Nations. First Nations are also concerned about the potential generation of greenhouse gases by the power sources for the Project.

Issue 5—Marine Response to Emergencies in International Waters

First Nations have expressed concerns regarding shipping and the safety of LNG carriers. PNW LNG will continue to work with First Nations to increase the level of understanding regarding the safety and safety-related navigational attributes of LNG carriers, and to seek their views in developing appropriate marine emergency response guidelines.

Issue 6—Impacts to Fishing

First Nations have expressed concern regarding the potential effects from the proposed marine terminal on fishing activities and the current way of life on the northwest coast. Specific concerns have been raised about potential effects on Aboriginal harvesting of seaweed, eulachon, salmon (Chinook, coho, chum), halibut, cod, and crab.

6.4 Current use of Lands and Resources for Traditional Purposes

To date, no Project-specific Traditional Use or Traditional Knowledge (TU/TK) studies have been undertaken. PRPA has provided PNW LNG with existing studies and information that have assisted in understanding current and historic Aboriginal activities in the general Project area. PNW LNG intends to discuss with the five identified First Nations with claims in the area whether, and on what terms, further TU/TK information could be collected.

6.5 Ongoing and Proposed Consultation

PNW LNG proposes to engage in discussions with First Nations on an on-going basis throughout the environmental assessment process to determine potential effects on specific Aboriginal rights and interests, and to identify appropriate mitigation, accommodation, and compensation measures.

The engagement plan for each First Nation will be guided by how that community wants to be engaged, the issues raised, and the areas of priority for each community. Some of the engagement methods that are proposed to be used during the engagement process with First Nations include:

- **Information sessions**— PNW LNG will communicate regularly with First Nations to ensure that they are kept up to date on the status of the Project. These updates will include environmental studies, technical feasibility studies, and any major design changes. Updates will be provided in writing and in meetings.
- **Technical sessions**— PNW LNG will offer sessions to First Nations on specific areas of interest (e.g., trestle placement, emissions, archaeology, marine issues, etc.). These sessions will be offered individually or collectively to First Nations depending on the preference of each community, and will occur on an on-going basis throughout the environmental assessment process as issues arise. Sessions will be tailored to the specific interests of each community, and PNW LNG will make appropriate technical staff available to answer questions and address concerns on specific issues.

- **Open houses**— PNW LNG will offer open houses and will deliver sessions as appropriate in each community. Open Houses may be targeted to the entire community or could be delivered to specific interested parties (i.e., elders, youth, fishers, etc.) who may have a specific interest in a certain area of the Project.
- **Formal discussion**—As appropriate, PNW LNG will endeavour to engage with First Nations to determine mitigation, accommodation, and compensation measures to address identified impacts to asserted Aboriginal rights. PNW LNG is engaging each of the First Nations in discussions relating to potential impacts of the Project on claims of Aboriginal title, with the goal of obtaining their support for the Project.
- **Other**—To ensure that information about the Project is effectively communicated and collected from First Nations and their members, PNW LNG will employ other forms of interaction and discussion with First Nations—such as trade fairs, conferences, community events—where appropriate.

7 PUBLIC AND STAKEHOLDER CONSULTATION

Public and stakeholder consultation is a key element of the Project. The proposed approach is to: begin engagement early; consult throughout the environmental assessment process; and, continue to engage the public and stakeholders throughout Project development and operations.

Stakeholder engagement will be focused in the Prince Rupert and Port Edward area. Stakeholders with an interest in the Project will be proactively identified and be provided with opportunities to participate and provide input. PNW LNG have committed to listen openly to all input and to report on how that input was addressed.

There will be ongoing notification to the public and stakeholders and a Project website (www.pacificnorthwestlng.com) with updates and background materials available. To date, key topics of interest have been: Project infrastructure, employment opportunities, environmental impacts, economic benefits and LNG safety.

Engagement with government agencies has also begun including outreach to the Government of BC and Government of Canada.

7.1 Potential Stakeholders with Interest in the Project

A list of stakeholders that may be interested and potentially affected by the Project is provided in Table 7-1. This list is based on proactive identification and a record of individuals and groups that have been engaged in the early stages of the Project.

Table 7-1: List of Potential Stakeholders

Stakeholders that May be Interested and Potentially Affected by the Project
Associations
BC Chamber of Commerce
Prince Rupert and Port Edward Economic Development Corporation
Prince Rupert Chamber of Commerce
Tourism Prince Rupert
Canadian Association of Petroleum Producers
Communities
District of Port Edward
District of Kitimat
City of Prince Rupert
Skeena Queen Charlotte Regional District
BC Provincial Government
Government Ministries
BC Office of the Premier
Members of the Legislative Assembly
BC Ministry of Aboriginal Relations and Reconciliation
BC Ministry of Energy, Mines and Natural Gas
BC Ministry of Environment
BC Ministry of Finance
BC Ministry of Forests, Lands and Natural Resources
BC Ministry of Jobs, Tourism and Skills Training
BC Ministry of Labour, Citizens' Services and Open Government
BC Ministry of Transportation and Infrastructure
Climate Change Secretariat
Deputy Ministers' LNG Committee
Cabinet Operations
Government Agencies/Crowns
BC Environmental Assessment Office
BC Hydro
BC Oil and Gas Commission
Northern Health Authority
Alberta Provincial Government
Alberta Energy

Stakeholders that May be Interested and Potentially Affected by the Project
Federal Government
Government Departments
Office of the Prime Minister
Aboriginal Affairs and Northern Development
Citizenship and Immigration Canada
Environment Canada
Finance Canada
Fisheries and Oceans Canada
Foreign Affairs and International Trade—Global Business Opportunities Bureau
Foreign Affairs and International Trade—Invest in Canada Bureau
Foreign Affairs and International —South, Southeast Asia and Oceania Bureau
Prince Rupert Port Authority
Pacific Pilotage Authority
Canadian Environmental Assessment Agency
National Energy Board
Natural Resources Canada
Transport Canada
Industry Canada
Major Projects Management Office
Members of Parliament (MP)
Federal Government MPs
Federal Opposition MPs
Community Stakeholders
Landowners
BC Coast Pilots
Rod and Gun Club
Northwest Community College
Foggy Point Fishing Charters
Hecate Strait Employment Development Society
K.T. Industrial Development Society
Prince Rupert Adventure Tours
Prince Rupert Airport Authority
Prince Rupert Royal LePage
Prince Rupert Yacht Club
Progressive Ventures Construction

Stakeholders that May be Interested and Potentially Affected by the Project
SMIT Marine Canada Inc.
Maher Terminals
Environmental Associations
Clean Energy BC
T. Buck Suzuki
World Wildlife Fund – Prince Rupert
Labor Groups and Associations
Canadian Association of Petroleum Producers
Business Council of British Columbia

7.2 Public and Stakeholder Consultation to Date

7.2.1 Stakeholder Consultation

Initial public and stakeholder engagements/activities have included:

- Identification of 39 stakeholder groups and 315 individual stakeholders
- Five meetings held with community groups
- Four meetings with individual landowners
- 116 meetings with government, including the regulator
- The engagements formats included:
    - Two open houses with 70 participants
    - City Council meetings
    - Phone calls
    - Formal group meetings
    - One-on-one meetings.

A complete list of the stakeholder engagement activities conducted up to November 15, 2012 is found in Appendix B.

7.2.2 Community Relations Activities

Landowners

Consultation measures have been made to identify individual property owners that may be interested or affected by the Project on the mainland. Land title searches and direct advice from current land owners and senior municipal officials were used to identify interested parties.

As a result, three property owners were contacted and provided with preliminary information about the Project.

Website

A preliminary Project website (www.petronasprogresslng.com) with updates and historic materials available was launched in September 2012. A further update was made when the Project name, Pacific NorthWest LNG (www.pacificnorthwestlng.com), was announced in early December. The site includes information on the Project, images describing the facility, Project benefits, and Project details. In addition, story boards and comment form used during the public open houses have been posted on the website.

Public Inquiry Program

The public can contact Project representatives via email: info@pacificnorthwestlng.com and by phone (866-931-2201).

7.3 Key Comments

Key topics of interest and comments made to date from stakeholders and the public include the following.

Infrastructure

- Location and design of the trestle, bridge, and road access
- Navigation issues with respect to marine infrastructure
- Connection with transmission pipeline from northeast BC
- Design of LNG export terminal
- Marine related topics included water access and view, dredging, and potential degradation of Flora Bank and the Skeena estuary.

Jobs/Education/Local Business

- Potential jobs and economic benefits
- Interest by local business in how they can get involved
- Interest in types of long-term and construction jobs and training solutions.

Environmental Impacts

A wide variety of environmental topics were referenced including:

- Impacts on marine life and protection of the marine environment and the Skeena estuary
- Cumulative effects
- Air and water emissions
- Waste management (including any hazardous waste)
- Environmental assessment timelines and process.

LNG Process and Safety

- LNG terminal safety procedures
- Properties of LNG.

LNG Market

- Global LNG market
- Final destination for LNG.

7.4 Ongoing and Proposed Engagement Activities

Engagement with the public, stakeholders, and government is planned to continue throughout planning, construction, and operations of the Project. During the EA, the proposed approach to consultation will include the following.

Regional and Local Government Engagement

Ongoing consultation is planned with the council of the District of Port Edward and City of Prince Rupert. This may include full public presentations and one-on-one updates with the Mayor and senior officials as requested and advised. A Project briefing is planned with the Board of the Skeena – Queen Charlotte Regional District in early 2013.

Property and Landowner Consultation

Following initial introductions and outreach to property and landowners ongoing consultation is planned to provide additional detailed design information on the Project as it is developed.

Environmental Assessment—Regulator Led

The CEA Agency will lead public consultation as part of the environmental assessment process. The public will be invited to provide comment on the:

- Project Description
- Environmental Impact Statement Guidelines
- Environmental Impact Statement Summary
- Draft Environmental Assessment Report.

Additional Stakeholder and Public Consultation—Proponent Led

PNW LNG plans to undertake issue-specific consultation on key topics with potential effects on specific groups or stakeholders. This consultation will be proactive and targeted and will involve identifying and proactively engaging with key stakeholders.

Early Design Consultation

Consultation on the Project design is planned prior to submission of the Environmental Impact Statement. Consultation methods could include feedback forms, online materials, one-on-one

meetings, or open houses. The information collected during this consultation will supplement information previously received.

Community Relations

PNW LNG proposes to continue ongoing two-way communication with the community and public throughout the life of the Project. This will be focused in the communities of Port Edward and Prince Rupert and will also include the broader BC public and business community. PNW LNG has opened a small Project office in Vancouver which is expected to grow to up to 200 people by end of 2015. A community office is planned to open in Port Edward or Prince Rupert before the end of 2013.

Consultation Notification and Reporting

A public and stakeholder tracking database is being used to track consultation and engagement activities, key issues, and responses to requests. Notification methods to stakeholders and the public may include:

- Newspaper ads
- Email to identified stakeholders and those that have requested updates
- Web promotion
- Social media promotion
- Open house ad on Project website
- Email notifications through the Chamber of Commerce.

Throughout the Project review, consultation summary reports will be developed detailing engagement, contacts, key topics discussed and how input was considered.

8 MAPS

Please see the following pages.

- City or Town
- Project Location
- Provincial Road or Highway
- River or Stream
- Waterbody

Pacific Northwest LNG

Project Location

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 16-JAN-13	PROJECTION: BC ALBERS
FIGURE ID: 123110537-002	DATUM: NAD 83
DRAWN BY: K. POLL	CHECKED BY: A. POMEROY

PREPARED BY: Stantec

PREPARED FOR: Pacific NorthWest LNG

FIGURE NO: **3**

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Archaeological Site
Project Component
Railway
Road
Watercourse

Pacific Northwest LNG

Project Plot Plan

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information. Imagery date: 2009.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 16-JAN-13	PROJECTION: UTM - ZONE 9
FIGURE ID: 123110537-006	DATUM: NAD 83
DRAWN BY: K. POLL	CHECKED BY: A. POMEROY

PREPARED BY: Stantec

PREPARED FOR: Pacific NorthWest LNG

FIGURE NO: **4**

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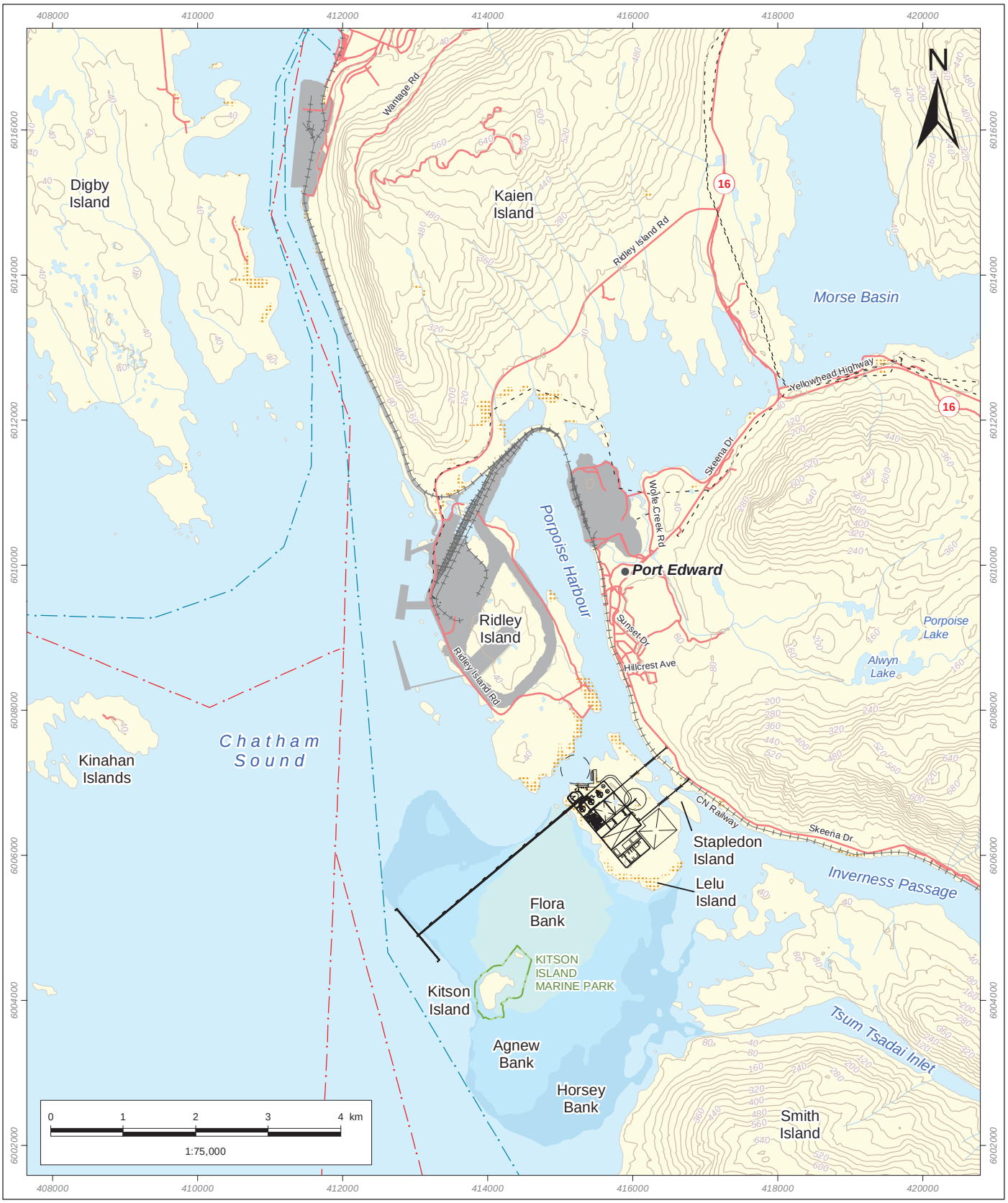

City or Town
Contour (m)
Electrical Power Transmission Line
Ferry Connection Segment
Project Component
Railway
River or Stream
Road
Shipping Route
Archaeological Site
Protected Area
Waterbody

Shoals

Agnew Bank
Flora Bank
Horsey Bank

Pacific Northwest LNG

Project Plot Plan and Surrounding Area

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Canadian Hydrological Service (CHS), 1995.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data

DATE: 16-JAN-13	PROJECTION: UTM - ZONE 9
FIGURE ID: 123110537-003	DATUM: NAD 83
DRAWN BY: K. POLL	CHECKED BY: A. POMEROY

PREPARED BY: Stantec

PREPARED FOR: Pacific NorthWest LNG

FIGURE NO: **5**

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Airport
City or Town
Pilotage Station
Electrical Power Transmission Line
Ferry Connection Segment
Highway
Railway
River or Stream
Shipping Route
Commercial Fishing Area
Indian Reserve
Lelu Island
Prince Rupert Port Authority Boundary
Protected Area
Waterbody

Pacific Northwest LNG

Lelu Island and Surrounding Area

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 16-JAN-13
FIGURE ID: 123110537-001
DRAWN BY: K. POLL
PROJECTION: UTM - ZONE 9
DATUM: NAD 83
CHECKED BY: A. POMEROY

PREPARED BY: Stantec
PREPARED FOR: Pacific NorthWest LNG
FIGURE NO: 6

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- Airport
- City or Town
- Project Location
- Electrical Power Transmission Line
- International Boundary
- Highway
- Railway
- Indian Reserve
- Prince Rupert Port Authority Boundary
- Protected Area

Pacific Northwest LNG

Indian Reserves and Protected Areas in North Coast of BC

Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 16-JAN-13	PROJECTION: UTM - ZONE 9
FIGURE ID: 123110537-004	DATUM: NAD 83
DRAWN BY: K. POLL	CHECKED BY: A. POMEROY

PREPARED BY: Stantec

PREPARED FOR: Pacific NorthWest LNG

FIGURE NO: 7

1/16/2013 - 11:10:43 AM V:\active\123110537\gis\figures\project_description\mxds\fig_123110537-004_fn_overview.mxd

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APPENDIX A

Summary of Aboriginal Engagement

Pacific NorthWest LNG

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Table A-1: Summary of Aboriginal Engagement up to November 2, 2012

Aboriginal Group	Date	Means of Consultation	Discussion Topics
Kitselas	11/2/2012	Meeting	Introduction to Project.
Kitsumkalum	10/24/2012	Meeting	Kitsumkalum community review, Environmental Assessment and Impact Benefit Agreement negotiations, protocol, potential issues, response to other questions raised by Kitsumkalum.
Metlakatla	10/23/2012	Meeting	Update on Project, LNG review, Environmental Assessment discussions, trestle, power (electrical drives), and training opportunities.
Metlakatla	10/16/2012	Phone call	Call with representative regarding scheduling meeting on October 23, 2012 after LNG 101 presentation. Also brief discussion regarding Framework Agreement.
Coastal First Nations	10/4/2012	Meeting	Marine navigation issues.
Coastal First Nations and Metlakatla	10/3/2012	Meeting	Next steps.
Kitsumkalum	10/3/2012	Email	Provide documents as requested by Kitsumkalum. Documents include PNW LNG backgrounder, PowerPoint presentation with Project information.
Kitsumkalum	9/28/2012	Email	Confirm meeting in Terrace on October 11, 2012 to provide Project information.
Gitxaala	9/27/2012	Email	Response letter dated September 25, 2012 regarding Project update and scheduling community information session
Lax Kw'alaams	9/26/2012	Meeting	Letter of Agreement of September 27, 2012, capacity funding, names of parties to the Framework Agreement, regulatory consultation Memorandum of Understanding, and Impact Benefit Agreement Memorandum of Understanding communication protocol, timing of meetings, list of substantive issues for negotiation, Project information request list.
Gitxaala	9/25/2012	Letter (via mail)	Response to Gitxaala letter dated June 22, 2012 regarding engagement protocol with Gitxaala. Letter provides Project status update and a request from PNW LNG to schedule meeting to provide Council and community with general info about LNG facilities. Also mention open houses being scheduled.
Kitsumkalum	9/24/2012	Email	Email with respect to Kitsumkalum representations and discuss scheduling community open houses.
Lax Kw'alaams	9/12/2012	Meeting	Discussions related to a Framework for a Commercial Agreement.
Metlakatla	9/11/2012	Email	Offer to meet in early October with PETRONAS officials coming to Canada to give overview and

Aboriginal Group	Date	Means of Consultation	Discussion Topics
			answer general questions about the industry. Also advise that Open Houses being planned for fall 2012.
Metlakatla	9/6/2012	Email	Email correspondence requesting contact info for legal representation and schedule meeting to begin discussions.
Lax Kw'alaams	9/5/2012	Meeting	Introduction to legal representation.
Lax Kw'alaams	8/12/2012	Email	Email correspondence regarding process for moving forward.
Coastal First Nations	7/3/2012	Meeting	General discussing regarding power supply.
Lax Kw'alaams	6/28/2012	Meeting	PRPA interactions with and history of Lax Kw'alaams, non-participation in BC Treaty process, Tuck Inlet Road as potential part of Impact Benefit Agreement.
Coastal First Nations	6/26/2012	Meeting	Marine navigation and power proposals, and an engagement protocol.
Lax Kw'alaams	6/25/2012	Meeting	Trestle layout, approaches to First Nations engagement, power, status of the Joint Venture, Lelu site selection, jobs/training.
Gitxaala	6/22/2012	Letter	Letter from Gitxaala as follow-up to June 19, 2012 meeting.
Gitxaala	6/19/2012	Meeting	Introductions and presentation.
Metlakatla	6/19/2012	Meeting	Introductions and presentation.
Lax Kw'alaams	6/18/2012	Meeting	Introductions and presentation with Lax Kw'alaams Business Manager.
Coastal First Nations	6/7/2012	Meeting	Introductions, Project overview.
Coastal First Nations	6/6/2012	Meeting	Broad discussion on regional shipping concerns.
Gitxaala	5/24/2012	Meeting	Introductions.
Metlakatla and Lax Kw'alaams	5/24/2012	Meeting	PRPA facilitated introductions to Future Projects Protocol Coastal Tsimshian.
Coastal First Nations	5/23/2012	Meeting	Regional ship traffic issue, electric power supply.
Coastal First Nations	4/13/2012	Meeting	Follow-up to previous meeting on February 28, 2012, electrical power for LNG.
Coastal First Nations	2/28/2012	Meeting	Introductions, Project overview.

APPENDIX B

Summary of Stakeholder Engagement

Pacific NorthWest LNG

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Table B-1: Stakeholder Engagement Activities Conducted up to November 14, 2012

Date	Type	Organizations	Topics
11/14/2012	Email	Prince Rupert Yacht Club	Introduction
11/14/2012	Event	Government of BC	LNG-Related, Power Solutions
11/13/2012	Event	Canadian Energy Summit	Power Solutions
11/12/2012	Meeting	Prince Rupert Port Authority	First Nations Topics
11/09/2012	Meeting	BC Hydro	Power Solutions
11/09/2012	Phone	Northwest Community College	Labour/Jobs
11/08/2012	Meeting	BC Government	Stakeholders
11/06/2012	Open House	Open House—Prince Rupert	Trestle, Environmental—Marine, Environmental—Terrestrial, Upstream Labour, Power Issues, Safety topics, Operational, Initial Project Overview, Stakeholders
11/05/2012	Open House	Open House—Port Edward	Trestle, Environmental—Marine, Environmental—Terrestrial, Upstream Labour, Power Issues, Safety topics, Operational, Initial Project Overview, Stakeholders
11/05/2012	Meeting	Canadian Environmental Assessment Agency	Regulatory
11/05/2012	Meeting	Canadian Environmental Assessment Agency	Regulatory
11/03/2012	Email	BC Hydro	Power Solutions
11/02/2012	Email	BC Hydro	Power Solutions
11/02/2012	Meeting	National Energy Board of Canada	Regulatory
10/31/2012	Meeting	Prince Rupert Port Authority	Regulatory, Port-related
10/30/2012	Meeting	Business Council of British Columbia	LNG-Related
10/29/2012	Phone	District of Port Edward	Operational
10/24/2012	Meeting	Prince Rupert Chamber of Commerce	Initial Project Overview
10/24/2012	Meeting	Prince Rupert Port Authority	Stakeholders
10/23/2012	Meeting	NDP MLA—BC	Initial Project Overview
10/23/2012	Meeting	Prince Rupert Adventure Tours	Environment - Marine, Local Business, Stakeholders
10/22/2012	Meeting	Maher Terminals	Initial Project Overview

Date	Type	Organizations	Topics
10/18/2012	Meeting	Canadian Environmental Assessment Agency	Initial Project Overview
10/17/2012	Meeting	Environment Canada	Initial Project Overview
10/17/2012	Meeting	NDP Federal	Initial Project Overview
10/17/2012	Meeting	Natural Resources Canada	Initial Project Overview
10/16/2012	Meeting	Office of the Prime Minister	Initial Project Overview
10/16/2012	Meeting	Minister of Transport, Infrastructure and Communities	Initial Project Overview
10/16/2012	Meeting	Department of Foreign Affairs and International Trade—South, Southeast Asia and Oceania Bureau, Department of Foreign Affairs and International Trade—Global Business Opportunities Bureau, Department of Foreign Affairs and International Trade, Department of Foreign Affairs and International Trade—Invest in Canada Bureau	Initial Project Overview
10/16/2012	Meeting	Natural Resources Canada	Initial Project Overview
10/11/2012	Meeting	BC Environmental Assessment Office, BC Oil and Gas Commission	Regulatory, Update—General
10/10/2012	Meeting	Government of Canada	Initial Project Overview, Update—General
10/10/2012	Meeting	Clean Energy BC	Power Solutions, Operational
10/09/2012	Meeting	Tourism Prince Rupert	Stakeholders, Initial Project Overview
10/09/2012	Meeting	Foggy Point Fishing Charters	Initial Project Overview, Stakeholders
10/09/2012	Meeting	Landowners	Initial Project Overview, Landowner Interests
10/09/2012	Meeting	District of Port Edward	Local Government, Initial Project Overview
10/04/2012	Meeting	BC Ministry of Aboriginal Relations and Reconciliation	First Nations Topics
10/03/2012	Email	BC Hydro	Power Solutions
10/02/2012	Meeting	Pacific Pilotage Authority, BC Coast Pilots, Prince Rupert Port Authority	Marine Topics, Trestle
10/12/2012	Meeting	BC Hydro	Power Solutions
09/28/2012	Meeting	Government of BC	Initial Project Overview
09/28/2012	Speech/ Presentation	Deputy Minister's LNG Committee	Initial Project Overview, Other
09/27/2012	Speech/ Presentation	Prince Rupert Port Authority	Port-related, Marine Topics, Safety

Date	Type	Organizations	Topics
09/27/2012	Social	Prince Rupert Port Authority	Other
09/27/2012	Email	BC Hydro	Power Solutions
09/22/2012	Email	BC Hydro	Power Solutions
09/22/2012	Meeting	Prince Rupert Airport Authority	Initial Project Overview
09/21/2012	Meeting	Landowners, District of Port Edward	Introduction, Landowner Interests, Initial Project Overview
09/21/2012	Meeting	District of Port Edward, Landowners	Initial Project Overview, Introduction
09/21/2012	Meeting	District of Port Edward	Initial Project Overview
09/21/2012	Meeting	Prince Rupert Chamber of Commerce	Initial Project Overview
09/21/2012	Meeting	Prince Rupert Port Authority	Marine Topics, Safety
09/21/2012	Meeting	City of Prince Rupert, District of Port Edward, Prince Rupert and Port Edward Economic Development Corporation	Initial Project Overview
09/20/2012	Meeting	District of Port Edward	Stakeholders, Initial Project Overview
09/20/2012	Meeting	BC Ministry of Jobs, Tourism and Innovation	Initial Project Overview
09/20/2012	Meeting	District of Port Edward	Stakeholders
09/20/2012	Meeting	BC Ministry of Energy and Mines	Meeting Logistics
09/20/2012	Meeting	BC Oil and Gas Commission	Regulatory
09/19/2012	Meeting	Canadian Environmental Assessment Agency Vancouver	Stakeholders
09/19/2012	Meeting	Canadian Environmental Assessment Agency Vancouver	Stakeholders
09/18/2012	Meeting	Landowners	Landowner Interests
09/14/2012	Email	BC Hydro	Power Solutions
09/14/2012	Email	BC Hydro	Power Solutions
09/13/2012	Meeting	Prince Rupert and Port Edward Economic Development Corporation, District of Port Edward	Meeting Logistics
09/11/2012	Email	BC Hydro	Power Solutions
09/10/2012	Phone	Prince Rupert Port Authority	Update—General
09/10/2012	Meeting	BC Ministry of Energy and Mines	LNG-Related

Date	Type	Organizations	Topics
09/10/2012	Phone	Prince Rupert and Port Edward Economic Development Corporation, District of Port Edward	Meeting Logistics
08/16/2012	Meeting	Environment Canada, Prince Rupert Port Authority, Fisheries and Oceans Canada, Canadian Environmental Assessment Agency, Transport Canada—Marine	Trestle, Regulatory, Environment—Marine, Environment—Terrestrial
08/16/2012	Meeting	BC Oil and Gas Commission	Port-related, Regulatory
08/16/2012	Email	BC Hydro	Power Solutions
08/15/2012	Email	BC Hydro	Power Solutions
08/14/2012	Phone	Ministry of Transportation and Infrastructure	Other, Operational, Transportation
08/14/2012	Meeting	District of Port Edward	Initial Project Overview
08/08/2012	Meeting	BC Ministry of Forests, Lands and Natural Resources, BC Ministry of Energy and Mines	Other
08/08/2012	Meeting	BC Ministry of the Environment	Introduction, Initial Project Overview
08/08/2012	Meeting	BC Ministry of Energy and Mines	Initial Project Overview, Power Solutions
08/07/2012	Meeting	Natural Resources Canada	Update—General
08/02/2012	Meeting	BC Hydro	Power Solutions
08/01/2012	Meeting	Prince Rupert Port Authority	Port-related, Regulatory
07/30/2012	Phone	BC Government	Update—General
07/19/2012	Meeting	Liberal MLA—BC	Initial Project Overview
07/19/2012	Social	BC Office of the Premier, BC Ministry of Labour, Citizens' Services and Open Government	Introduction
07/19/2012	Meeting	Canadian Environmental Assessment Agency	Initial Project Overview
07/18/2012	Meeting	Environment Canada, Fisheries and Oceans Canada, Transport Canada—Marine	Initial Project Overview, Regulatory
07/18/2012	Email	Prince Rupert Port Authority	Meeting Logistics
07/18/2012	Email	BC Hydro	Power Solutions
07/12/2012	Meeting	Federal Ministry of Citizenship, Immigration and Multiculturalism	Introduction
07/12/2012	Meeting	Alberta Energy	Introduction

Date	Type	Organizations	Topics
07/12/2012	Meeting	BC Ministry of Energy and Mines	Initial Project Overview
07/12/2012	Meeting	BC Ministry of Aboriginal Relations and Reconciliation	First Nations Topics, Power Solutions
07/12/2012	Meeting	BC Ministry of Environment—Climate Action Secretariat	Power Solutions
07/12/2012	Phone	District of Kitimat	Update—General
07/12/2012	Meeting	Natural Resources Canada	Introduction
07/11/2012	Meeting	BC Ministry of Aboriginal Relations and Reconciliation	First Nations Topics
07/11/2012	Phone	BC Ministry of Energy and Mines	Update—General
07/11/2012	Meeting	BC Ministry of Forests, Lands and Natural Resources	Crown Land
07/06/2012	Meeting	BC Ministry of Aboriginal Relations and Reconciliation	First Nations Topics
07/05/2012	Meeting	BC Ministry of Environment—Climate Action Secretariat	GHG
07/03/2012	Meeting	Prince Rupert Port Authority	First Nations Topics
07/01/2012	Email	BC Hydro	Power Solutions
06/28/2012	Phone	BC Office of the Premier	Other
06/28/2012	Phone	BC Office of the Premier	Other
06/28/2012	Phone	NDP MLA—BC	Other
06/28/2012	Email	BC Environmental Assessment Office, BC Ministry of Forests, Lands and Natural Resources	Update—General
06/28/2012	Email	Canadian Environmental Assessment Agency Vancouver	Update—General
06/26/2012	Email	Canadian Environmental Assessment Agency	Other
06/25/2012	Email	BC Ministry of Aboriginal Relations and Reconciliation	First Nations Topics
06/25/2012	Email	Prince Rupert Port Authority	Port-related
06/25/2012	Phone	Prince Rupert Port Authority	Port-related
06/22/2012	Meeting	BC Ministry of Forests, Lands and Natural Resources, BC Environmental Assessment Office	Introduction, Initial Project Overview
06/22/2012	Meeting	BC Oil and Gas Commission	Update—General
06/22/2012	Meeting	BC Ministry of Aboriginal Relations and Reconciliation	First Nations Topics

Date	Type	Organizations	Topics
06/20/2012	Phone	BC Oil and Gas Commission	Initial Project Overview, Introduction
06/20/2012	Meeting	BC Hydro	Power Solutions
06/15/2012	Meeting	BC Environmental Assessment Office, Prince Rupert Port Authority	First Nations Topics
06/14/2012	Email	BC Oil and Gas Commission	Update—General
06/14/2012	Phone	BC Oil and Gas Commission	Update—General
06/12/2012	Phone	BC Ministry of Forests, Lands and Natural Resources	Update—General
06/12/2012	Email	BC Ministry of Forests, Lands and Natural Resources	Update—General
06/12/2012	Phone	BC Hydro	Power Solutions
06/11/2012	Email	BC Ministry of Forests, Lands and Natural Resources	Update—General, First Nations Topics
06/11/2012	Phone	BC Ministry of Forests, Lands and Natural Resources	First Nations Topics, Update—General
06/09/2012	Email	Prince Rupert Port Authority	Other
06/04/2012	Meeting	Prince Rupert Port Authority	Operational, Introduction
06/04/2012	Meeting	Prince Rupert Port Authority	Operational
06/04/2012	Meeting	Prince Rupert Port Authority	Introduction
05/31/2012	Phone	Prince Rupert Port Authority	Operational
05/25/2012	Meeting	Transport Canada – Vancouver	Initial Project Overview
05/24/2012	Meeting	Canadian Environmental Assessment Agency	Update—General
05/23/2012	Meeting	BC Ministry of Energy and Mines	Update—General
05/23/2012	Meeting	BC Environmental Assessment Office	Regulatory
05/05/2012	Email	BC Hydro	Power Solutions
02/05/2012	Email	BC Hydro	Power Solutions
30/04/2012	Email	BC Hydro	Power Solutions
27/04/2012	Email	BC Hydro	Power Solutions
04/23/2012	Email	BC Ministry of Energy and Mines	Update—General
04/23/2012	Phone	BC Ministry of Energy and Mines	Update—General
04/12/2012	Email	BC Oil and Gas Commission	Update—General

Date	Type	Organizations	Topics
04/12/2012	Phone	BC Oil and Gas Commission	Update—General
04/11/2012	Meeting	BC Ministry of Forests, Lands and Natural Resources	Update—General
04/04/2012	Phone	BC Ministry of Forests, Lands and Natural Resources	Crown Land
04/04/2012	Email	BC Ministry of Forests, Lands and Natural Resources	Crown Land
03/30/2012	Meeting	BC Ministry of Environment, BC Hydro	Power Solutions
03/29/2012	Meeting	BC Ministry of Energy and Mines, BC Ministry of Forests, Lands and Natural Resources	Power Solutions
03/29/2012	Meeting	BC Environmental Assessment Office	Regulatory
03/22/2012	Meeting	BC Ministry of Energy and Mines	Initial Project Overview
03/09/2012	Meeting	NEB—Calgary	Operational
03/07/2012	Phone	BC Ministry of Energy and Mines	Power Solutions
03/07/2012	Phone	Prince Rupert Port Authority	Regulatory
03/04/2012	Phone	BC Ministry of Aboriginal Relations and Reconciliation	Regulatory, First Nations Topics
03/04/2012	Email	BC Ministry of Aboriginal Relations and Reconciliation, Prince Rupert Port Authority	Regulatory
02/29/2012	Meeting	Prince Rupert Port Authority	Operational
02/24/2012	Meeting	BC Oil and Gas Commission	Operational
02/23/2012	Meeting	BC Ministry of Forests, Lands and Natural Resources	Regulatory, Update—General
02/23/2012	Meeting	BC Oil and Gas Commission, BC Ministry of Aboriginal Relations and Reconciliation, Prince Rupert Port Authority, BC Ministry of Forests, Lands and Natural Resources, BC Environmental Assessment Office	Regulatory, Update—General
02/22/2012	Meeting	Canadian Environmental Assessment Agency Vancouver	Initial Project Overview, Regulatory
02/16/2012	Phone	BC Ministry Forests, Lands and Natural Resource Operations	Crown Land
02/15/2012	Email	BC Ministry of Forests, Lands and Natural Resources	Crown Land
02/15/2012	Phone	BC Ministry of Forests, Lands and Natural Resources	Crown Land
02/15/2012	Phone	BC Government	Regulatory, Update—General
02/15/2012	Phone	BC Government, BC Ministry of Forests, Lands and Natural Resources	Marine Topics

Date	Type	Organizations	Topics
02/15/2012	Email	BC Government, BC Ministry of Forests, Lands and Natural Resources	Marine Topics
02/10/2012	Email	BC Oil and Gas Commission	Crown Land
02/10/2012	Email	BC Oil and Gas Commission	Crown Land
02/10/2012	Phone	BC Oil and Gas Commission	Crown Land
01/31/2012	Phone	Natural Resources Canada	Regulatory
01/30/2012	Email	BC Ministry of Aboriginal Relations and Reconciliation	First Nations Topics, Pipeline
01/30/2012	Phone	BC Ministry of Aboriginal Relations and Reconciliation	Pipeline, First Nations Topics
01/26/2012	Meeting	BC Ministry of Jobs, Tourism and Innovation	Initial Project Overview
01/26/2012	Meeting	BC Environmental Assessment Office, BC Ministry of Jobs, Tourism and Innovation, BC Ministry of Energy and Mines, BC Government, BC Oil and Gas Commission, BC Ministry of Aboriginal Relations and Reconciliation, BC Ministry of Forests, Lands and Natural Resources	Regulatory, Update—General
01/24/2012	Email	BC Environmental Assessment Office	Regulatory
01/24/2012	Phone	BC Environmental Assessment Office	Regulatory
01/18/2012	Email	BC Ministry of Forests, Lands and Natural Resources	First Nations Topics
01/16/2012	Email	BC Oil and Gas Commission	Archaeological Issues
01/16/2012	Phone	BC Oil and Gas Commission	Archaeological Issues

APPENDIX C

Photographs

Pacific NorthWest LNG

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Photo C-1: Aerial photograph of Lelu Island, Ridley Island, and Kitson Island and the surrounding area at a historic low tide in 2009

Photo C-2: Western point of Lelu Island illustrating characteristic complex rocky intertidal habitat in the vicinity of the proposed trestle

Photo C-3: Shoreline and intertidal habitat on northwest corner of Lelu Island in the vicinity of the proposed MOF

Photo C-4: The shoreline along the western side of Lelu Island adjacent to Flora Banks

Photo C-5: Bog forest habitat found throughout Lelu Island

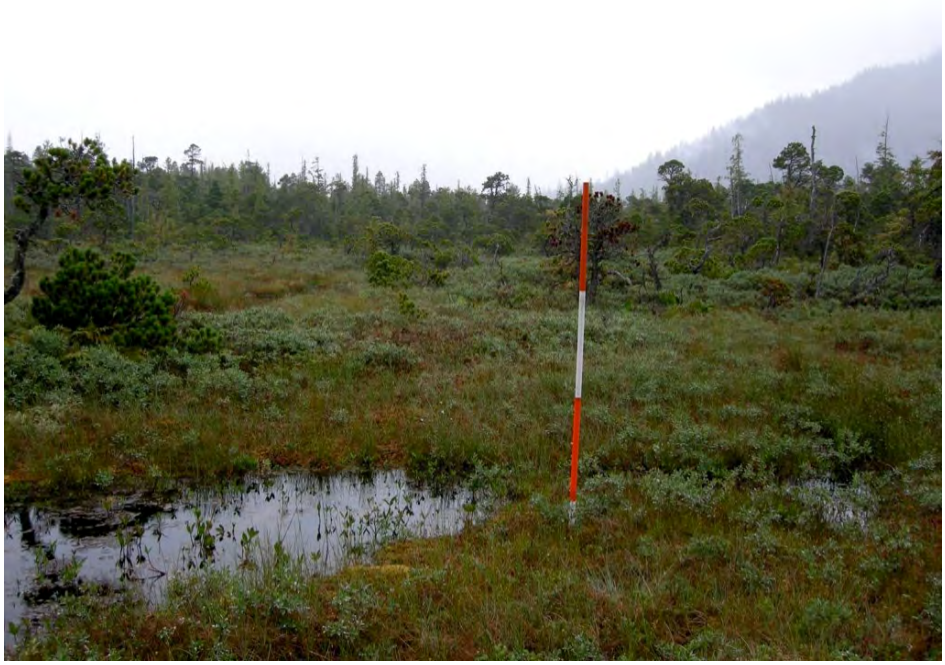

Photo C-6: Slope/blanket bog habitat found on Lelu Island