

PACIFIC NORTHWEST LNG

Project Description Executive Summary

Prepared for:

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Project No.:

1231-10537

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1 GENERAL INFORMATION

The proponent, Progress Energy Canada Ltd. (Progress), a wholly owned subsidiary of Petroliaam Nasional Berhad (PETRONAS), is proposing to construct and operate a liquefied natural gas (LNG) facility within the District of Port Edward, British Columbia (BC). Progress would build the Project and manage the day to day operations of the LNG facility and marine terminal. The Pacific Northwest LNG Project (the Project) would be primarily located on Lelu Island within the lands and waters under the jurisdiction of the Prince Rupert Port Authority¹ (PRPA). The Project would convert natural gas from northeast BC into LNG for export to Pacific Rim markets in Asia.

Contact Information

The contact information for the proponent is as follows:

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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.

Consultation Efforts

In an effort to introduce the Project and to identify potential interests and concerns, Progress has initiated consultation efforts with a range of 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; and, environmental non-governmental organizations.

Provincial Regulatory Requirements

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), and Part 8 (Transportation Projects) of the BC *Reviewable Projects Regulation*. To meet the requirements of BCEAA, the environmental assessment would also need to consider the potential environmental, economic, social, heritage, and health effects of the Project.

Regional Study

The Project is not located in a region that has been subjected to a regional environmental study as defined in the *Canadian Environmental Assessment Act, 2012* (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 a third-party pipelines (TransCanada Pipelines Ltd.). Approval of the third-party pipeline will proceed 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 million tonnes per annum (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 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).

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*.

Provisions in the *Regulations Designating Physical Activities*

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.	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.	The Project will include the construction of a natural gas liquefaction facility with processing capacity of 49,315 tonnes/day and a total LNG storage capacity of up to 248,000 tonnes (depending on LNG density). Both of these values exceed the identified thresholds.

2.2 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 liquid propane gas (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	<ul style="list-style-type: none"> ▪ 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 m³ LNG storage tanks
Marine Terminal	<ul style="list-style-type: none"> ▪ 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

Infrastructure Category	Project Components
Supporting Infrastructure	<ul style="list-style-type: none"> ▪ Water supply pipeline infrastructure ▪ Wastewater treatment system (for sewage and other liquid effluents) and associated pipeline connections to offsite facilities ▪ Fuel storage ▪ Nitrogen and compressed air equipment ▪ Administration and maintenance buildings ▪ A two-lane bridge connecting Lelu Island to the mainland ▪ Materials off-loading facility (MOF)

Gas Treating Process

Before the natural gas can be liquefied, trace amounts of carbon dioxide (CO₂), hydrogen sulfide (H₂S), 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 include: acid gas removal unit, dehydration unit, and mercury removal unit.

Natural Gas Liquefaction Process

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. Key pieces of equipment include heat exchangers of various designs, compressors, expanders, and valves.

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

Power Supply

The Project will require approximately 700 MW to power three LNG trains and associated facility infrastructure. There are currently two primary power supply 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 would provide electricity 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.

There are additional power supply options that are also under consideration. Progress is engaged in discussions and studies with government, First Nations, and stakeholders to inform decision-making.

LNG Storage

The LNG will be stored at atmospheric pressure in three 180,000 m³ full containment storage tanks. The tanks would be approximately 80 to 90 m in diameter and 50 m tall and composed of steel and concrete.

Materials Off-loading Facility (MOF)

The MOF would be a wharf located off Porpoise Channel in a small embayment on the north side of Lelu Island. It would be capable of berthing large barges and ships to allow large prefabricated pieces of equipment and heavy materials to be delivered to Lelu Island 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.

Trestle and Berths

The trestle and berths would be a conventional pile supported structure with concrete decking. The trestle would extend westward from Lelu Island, approximately 2.7 km along the north edge of Flora Bank. It would be wide enough to accommodate vehicles and the cryogenic piping and related utility corridors. The trestle would not be designed to accommodate any boat traffic passing beneath it due to safety concerns.

The LNG carrier berths would be in Chatham Sound beyond Agnew Bank. They would accommodate two 217,000 m³ capacity LNG carriers up to 315 m long. The berths would have 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. LNG carriers would typically be at berth for approximately 24 hours.

Supporting Infrastructure

There are a number of other ancillary facilities associated with the construction and operation of the LNG facility. 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 oily other effluent [e.g., solvent contaminated water]) and a pipe connecting to the mainland and the Port Edward sewage treatment facility
- Firewater system
- Fuel storage facilities
- A two-lane bridge connecting Lelu Island to the mainland.

The primary access option under consideration would involve a bridge over Lelu Slough from the mainland to the northeast portion of Lelu Island and 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.

Construction Camp Facilities

A temporary camp for up to 3,000 people would be required for construction of the facility. The camp would be located on Lelu Island and include temporary equipment and materials such as power generation, potable water systems, waste treatment systems and fuel supply.

2.3 Project Schedule and Activities

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 planning 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.

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
- 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 facility footprint would first be cleared and graded. Any merchantable timber on Lelu Island would be harvested and other non-merchantable trees and vegetation would be managed

appropriately. Earth moving equipment would then be used to strip the surface materials and overburden. Following clearing and grading, a stable, flat work surface would be created with appropriate site drainage and sediment control measures. Construction of the LNG terminal facilities would include excavating building sites, pouring foundations, constructing facility buildings and drainage systems, and installation of the infrastructure.

The two-lane bridge(s) connecting Lelu Island to Skeena Drive would be constructed using pipe piles and concrete abutments and steel or concrete bridge beams. It would be built with sufficient clearance beneath the bridge spans to allow safe passage for small boats at high tide and meet tsunami design clearance heights.

Approximately 1,500,000 m³ of material would need to be dredged from the embayment area off Porpoise Channel and at the MOF berth to allow for the safe maneuvering and berthing of construction barges. 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. 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.

The facility would be commissioned once construction and installation is complete. The target date for LNG facility commissioning is Q4 of 2018.

Operations and Maintenance Activities

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.

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 m³ 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 Progress and its customers. In cases of Free On Board delivery (FOB), Progress 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 Progress to the buyer/shipper as the LNG carrier is loaded. Alternatively, with Ex-Ship Delivery (DES) agreements, Progress would be responsible for transport of the LNG and retain ownership of it until it is delivered to the customer’s discharge port.

Decommissioning Activities

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:

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

2.4 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.

Construction Waste Management

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).

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.

The majority of the marine sediment material dredged during Project construction 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*.

The current proposed approach for construction-related wastewater and sewage management is to completely treat the effluent at an on-site treatment plant and then discharge it to sea. Hazardous materials would be recycled where an applicable program is regionally available or handled, administrated, transported and disposed of at an approved facility.

Operations Waste Management

Air Emissions

Air 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 and/or drive refrigerant compressors, as applicable
- Flares
- Back-up generators (for critical components in case of an emergency)
- LNG carriers.

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 two train ~4.0 MPTA/train scenario was used to extrapolate estimated emissions for the Project (three train; 6 MPTA/train):

- 3,143 tonnes per year of oxides of nitrogen (NO_x)
- 3,519 tonnes per year of carbon monoxide (CO)
- 178 tonnes per year of sulphur dioxide (SO₂)
- 208 tonnes per year of total particulate matter (PM₁₀ and PM_{2.5})
- 341 tonnes per year of volatile organic compounds (VOCs)
- 3,891,349 tonnes per year of carbon dioxide equivalent (CO_{2e}).

Liquid, Solid, and Hazardous Wastes

Table 2-3: Liquid, Solid, and Hazardous Wastes during Operations

Waste Category	Waste Type
Solid	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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
Hazardous	<ul style="list-style-type: none"> ▪ 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.

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.

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.

2.5 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. During the operational phase, the facility is estimated to employ 200 to 300 people over its estimated 30 years of operation and create additional indirect jobs in the local community and elsewhere through suppliers of goods and services.

3 PROJECT LOCATION

Geographic Coordinates

The facility would be located on Lelu Island (Figure 1) within the boundaries of the Port of Prince Rupert 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 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).

Site Plan

A preliminary site plan showing the general layout of the main Project components (e.g., LNG facility, trestle, and marine terminal) is provided in Figure 2. The facility footprint would be approximately 115 ha (approximately 60% of Lelu Island).

Figures 2, 3, 4, and 5 provide an overview of the following features in relation to the Project:

- Watercourses and waterbodies
- Linear and other transportation components in the area

- Known archaeological sites
- Nearby communities and residential areas
- Indian reserves in the Prince Rupert Harbour area
- Boundary of the Port of Prince Rupert (NOTE: No National Parks or National Historic Sites are in the vicinity of the Project)
- Adjacent commercial and recreational fishing areas
- Provincial park (Kitson Island Marine Park; NOTE: No Wildlife Areas or Migratory Bird Sanctuaries in the vicinity of the Project).

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.

Land and Water Use

The Project would be located primarily on Lelu Island, the adjacent Water Lot “E” and two water lots at the location of the MOF and the bridge, that are federally administered Crown holdings within the jurisdiction and administration of the PRPA. Lelu Island is outside of the boundaries of the City of Prince Rupert but within the District of Port Edward and 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.

A portion of Stapledon Island, which (upon completion of a conveyance from Port Edward to the PRPA) may also be federally-administered Crown land. Stapledon Island may be needed to provide road and bridge access to Lelu Island. A small parcel of private (e.g., CN Rail or other land owners) would also be needed on the mainland where the proposed road to Lelu Island would connect to the provincial highway (e.g., Skeena Drive).

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. Progress has initiated consultations with each of the First Nations for the purpose of assessing potential impacts of the Project on their respective rights and interests and intends to continue these discussions in order to better understand their current and historic uses of Lelu Island and the surrounding marine environment.

4 FEDERAL INVOLVEMENT

No federal financial support for the Project is proposed or anticipated. 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 Progress under a long term lease.

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, 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
<i>Fisheries Act</i> 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, trestle, MOF, sub-tidal infrastructure, etc.). Future: Additional or alternative authorizations may be required as changes to the <i>Fisheries Act</i> are enacted in new regulations.
<i>Navigable Waters Protection Act</i> 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, trestle, permanent bridge piles, MOF, sub-tidal infrastructure, etc.).
<i>Canadian Environmental Protection Act</i> S.127 (1) permit for disposal at sea.	Environment Canada	Permit authorizing disposal of excavated or dredged material at sea.
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.

5 ENVIRONMENTAL EFFECTS

5.1 Environmental Setting

Geology and Geomorphology

Lelu Island is considered to be flat low plain, mostly below 30 m elevation, that is underlain by a variety of rocks and 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.

Tides Currents and Bathymetry

Lelu Island is near the mouth of the Skeena River and its estuary; spring and summer runoff brings freshwater to the ocean and influences the currents at that time of year. The 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.

Climate

Lelu Island is within the Pacific climate region. This region is characterized by a moderate winter climate with large amounts of rain or snow. The summer climate is warm, but cool relative to inland areas, and with less precipitation than in the winter.

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). 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.

Air Quality

Existing air quality in the Port Edward area is generally good. The primary influences on air quality in the area are the regional industrial emitters, including local terminals that accommodate industrial cargos and passenger traffic. 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, SO₂, VOCs, H₂S, PM_{2.5}, PM₁₀); all monitored values were well within regulated ambient air quality parameters.

Freshwater Aquatic Resources

The main freshwater habitat on Lelu Island is wetland, specifically *Sphagnum* bog. The water in bogs typically has a low naturally occurring pH (high acidity) and is generally considered unsuitable as fish habitat. There are two unnamed watercourses on Lelu Island which would be impacted by the Project and managed within the footprint. Based on the predicted pH levels of these watercourses, they are not expected to be fish-bearing; however, field studies will be completed to confirm their status.

Marine Resources

The marine environment in the Port Edward area is characterized by cold, nutrient-rich waters which drive high primary production and support a diverse assemblage of invertebrates, fish, and marine mammals. The Skeena River adds freshwater and nutrients to the surrounding waters contributing to the diversity of marine life in the area.

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.). 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*). Key marine fish species expected to occur within the Prince Rupert area for at least part of their life histories 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*).

Several species of marine mammals also 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*).

Vegetation Resources

Lelu Island is within the Very Wet Hypermaritime subzone of the Coastal Western Hemlock (CWHvh2) biogeoclimatic zone. 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 indicates

that most (63%) of Lelu Island is wetland ecosystem. These wetland ecosystems include bog forest, bog woodland, and open blanket bog.

Wildlife Resources

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

A number of wildlife species listed under the federal *Species At Risk Act* (SARA) have the potential to use habitats on Lelu Island or the adjacent marine environment, including: marbled murrelet (*Brachyramphus marmoratus*), northern goshawk, *laingi* subspecies (*Accipiter gentilis laingi*), olive-sided flycatcher (*Contopus cooperi*), 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. Two marine mammals that occur regularly in the area, the northern resident killer whale and the harbour porpoise, are also listed under SARA. In addition, several provincially listed (red or blue) species may also be present, including: California gull (*Larus californicus*), surf scoter (*Melanitta perspicillata*), western grebe (*Aechmophorus occidentalis*), and pelagic cormorant *pelagicus* subspecies. Lelu Island does not support any plants listed in SARA and no provincially red or blue-listed plant species have been found to date.

5.2 Potential Project-Related Changes to the Environment

Fish, Fish Habitat, and Aquatic Species

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 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 *Species at Risk Act*-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.

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.

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.

Air Quality—Construction and operation of the Project would result in air emissions and that has the potential to affect air quality. Emissions would result from construction and operation the facility, the LNG carriers, and their support vessels. The primary substances of interest are sulphur dioxide (SO₂), oxides of nitrogen (NO_x), carbon monoxide (CO), respirable particulate matter (PM_{2.5}), hydrogen sulphide (H₂S) and greenhouse gases (GHGs).

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.

Navigable Waters—The construction of the marine components of the Project (e.g., trestle, marine terminal, and access bridge) and the increase in vessel traffic could interfere with marine navigation. The Project could affect navigation in the shallow navigable nearshore waters between Lelu Island and the mainland as well as the 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.

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 or Stapledon Island to construct the road and bridge. Potential effects on vegetation include the loss of: rare and culturally significant plants, rare plant communities, and 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. The *Federal Policy on Wetland Conservation* (Government of Canada 1991) of 'no net loss of wetland functions on all federal lands and waters' would apply to Lelu Island. The bog ecosystems on Lelu Island provide several wetland functions, including wildlife habitat and carbon sequestration.

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, and risk of mortality of species at risk during construction and operation of the facility.

Trans-boundary Effects—The Project is not expected to result in any environmental effects outside of British Columbia or Canada.

Potential Effects on Aboriginal People

The Project may affect potential Aboriginal rights to hunt, fish, gather resources, harvest trees, and use historic patterns of marine navigation. Some culturally modified trees 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.

The potential effects on Aboriginal people resulting from Project-related environmental changes could include:

- Human Health
 - Degradation of air quality and 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 use of historic patterns of navigation
 - 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.

6 ENGAGEMENT AND CONSULTATION WITH ABORIGINAL GROUPS

Progress has initiated discussions with each of the five First Nations that assert Aboriginal rights and/or interests in and around the Prince Rupert Harbour area (Metlakatla, Lax Kw'alaams, Gitxaala, Kitsumkalum, and Kitselas). The key issues that First Nations have raised to date about the proposed Project include:

- Location and length of the trestle—potential effects on fishing and marine navigation.
- Archaeological sites and artifacts on Lelu Island.
- Cumulative effects—including other LNG facilities and natural gas pipelines.
- Emissions from the LNG facility—potential effects to vegetation, wildlife, and human health.
- LNG carrier safety—including marine response to emergencies in international waters.
- Impacts to fishing and traditional marine harvesting activities.

Progress 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. Throughout all stages of the Project development, Progress intends to continue to communicate regularly with First Nations to ensure that they are kept up to date on the status of the Project.

The engagement plan for each First Nation will be guided by its community's preferences and areas of interest. Potential engagement measures that may be used include: information sessions, technical sessions, open houses, formal discussion or others. Progress will offer sessions to First Nations on specific areas of interest (e.g., trestle placement, emissions, archaeology, marine issues, etc.) and will offer open houses in each community. To ensure that information about the Project is effectively communicated and collected from First Nations and their members, Progress will employ other forms of interaction and discussion with First Nations as appropriate.

To date, no Project-specific Traditional Use or Traditional Knowledge (TU/TK) studies have been undertaken. PRPA has provided Progress with existing studies and information that have assisted in understanding current and historic Aboriginal activities in the general Project area. Progress 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.

Consultation with Aboriginal groups is ongoing and Progress will continue to endeavour to work with these groups and respond to their concerns.

7 PUBLIC AND STAKEHOLDER CONSULTATION

Progress proposes to begin public and stakeholder consultation early, consult throughout the environmental assessment process, and continue consultation 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 provided with opportunities to participate and provide input. Progress has committed to listen openly to all input and to report on how that input was addressed.

Progress has opened a Project office in Vancouver and a community office is planned to open in Port Edward or Prince Rupert in 2013. There will be ongoing notification to the public and stakeholders and a Project website (www.pacificnorthwestlng.com) with updates and background materials available. As well, the public can contact Project representatives via email: info@petronasprogresslng.com and by phone (778-370-1366).

To date, Progress has initiated engagement with local government, provincial government, federal government, Crown corporations, business associations, local landowners and other stakeholders. Key topics of interest have been related to: Project infrastructure, employment opportunities, environmental impacts, economic benefits and LNG safety.

During the EA, the proposed approach to consultation will include the following:

- **Regional and Local Government Engagement**—Further consultation is planned with the council of the District of Port Edward and City of Prince Rupert and the Queen Charlotte Regional District.
- **Property and Landowner Consultation**—On-going 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.
- **Additional Stakeholder and Public Consultation—Proponent Led**—Progress 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.
- **Community Relations**—Continuation of ongoing communication with the community and public throughout the life of the Project.
- **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.

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: 18-JAN-13
 FIGURE ID: 123110537-002
 DRAWN BY: K. POLL

PROJECTION: BC ALBERS
 DATUM: NAD 83
 CHECKED BY: A. POMEROY

PREPARED BY:



PREPARED FOR:

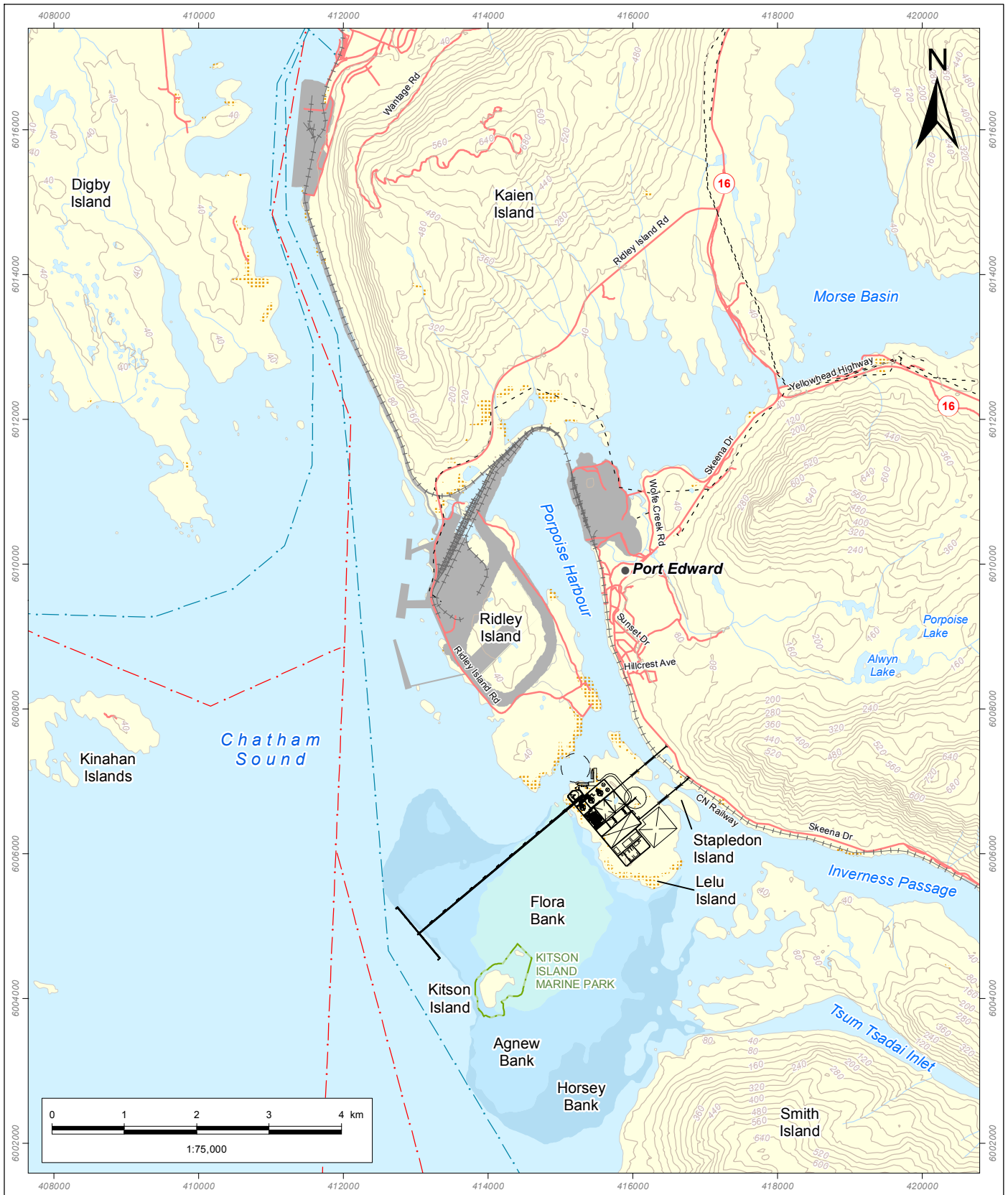


FIGURE NO:

1



<ul style="list-style-type: none"> Archaeological Site Project Component Railway Road Watercourse 	Pacific Northwest LNG Project Plot Plan		PREPARED BY:
	<small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information. Imagery date: 2009.</small> <small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small>		PREPARED FOR:
	DATE: 18-JAN-13 FIGURE ID: 123110537-006 DRAWN BY: K. POLL	PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: A. POMEROY	FIGURE NO: <div style="font-size: 24pt; font-weight: bold; text-align: center;">2</div>



<ul style="list-style-type: none"> ● City or Town — Contour (m) - - - Electrical Power Transmission Line · · · Ferry Connection Segment — Project Component +++ Railway — River or Stream — Road 	<ul style="list-style-type: none"> — Shipping Route ● Archaeological Site ■ Protected Area ■ Waterbody Shoals ■ Agnew Bank ■ Flora Bank ■ Horsey Bank 	<p align="center">Pacific Northwest LNG</p> <p align="center">Project Plot Plan and Surrounding Area</p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Canadian Hydrological Service (CHS), 1995.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data</small></p>	<p>PREPARED BY:</p> <p align="center"></p> <p>PREPARED FOR:</p> <p align="center"></p> <p>FIGURE NO:</p> <p align="center">3</p>
<p>DATE: 18-JAN-13</p> <p>FIGURE ID: 123110537-003</p> <p>DRAWN BY: K. POLL</p>	<p>PROJECTION: UTM - ZONE 9</p> <p>DATUM: NAD 83</p> <p>CHECKED BY: A. POMEROY</p>		



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<ul style="list-style-type: none"> Airport City or Town Pilotage Station Electrical Power Transmission Line Ferry Connection Segment Highway Railway River or Stream 	<ul style="list-style-type: none"> Shipping Route Commercial Fishing Area Indian Reserve Lelu Island Prince Rupert Port Authority Boundary Protected Area Waterbody 	<p>Pacific Northwest LNG</p> <p>Lelu Island and Surrounding Area</p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p> <table style="width: 100%; border: none;"> <tr> <td style="border: none;">DATE: 18-JAN-13</td> <td style="border: none;">PROJECTION: UTM - ZONE 9</td> </tr> <tr> <td style="border: none;">FIGURE ID: 123110537-001</td> <td style="border: none;">DATUM: NAD 83</td> </tr> <tr> <td style="border: none;">DRAWN BY: K. POLL</td> <td style="border: none;">CHECKED BY: A. POMEROY</td> </tr> </table>	DATE: 18-JAN-13	PROJECTION: UTM - ZONE 9	FIGURE ID: 123110537-001	DATUM: NAD 83	DRAWN BY: K. POLL	CHECKED BY: A. POMEROY
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FIGURE ID: 123110537-001	DATUM: NAD 83							
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<ul style="list-style-type: none"> Airport City or Town Project Location Electrical Power Transmission Line International Boundary Highway Railway Indian Reserve Prince Rupert Port Authority Boundary Protected Area 	<p>Pacific Northwest LNG</p> <p>Indian Reserves and Protected Areas in North Coast of BC</p> <p><small>Sources: Government of British Columbia; Government of Canada, Natural Resources Canada, Centre for Topographic Information.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p> <table border="1" style="width: 100%;"> <tr> <td>DATE: 18-JAN-13</td> <td>PROJECTION: UTM - ZONE 9</td> </tr> <tr> <td>FIGURE ID: 123110537-004</td> <td>DATUM: NAD 83</td> </tr> <tr> <td>DRAWN BY: K. POLL</td> <td>CHECKED BY: A. POMEROY</td> </tr> </table>	DATE: 18-JAN-13	PROJECTION: UTM - ZONE 9	FIGURE ID: 123110537-004	DATUM: NAD 83	DRAWN BY: K. POLL	CHECKED BY: A. POMEROY	<p>PREPARED BY:</p> <p>PREPARED FOR:</p> <p>FIGURE NO:</p> <p style="font-size: 24pt; font-weight: bold; text-align: center;">5</p>
DATE: 18-JAN-13	PROJECTION: UTM - ZONE 9							
FIGURE ID: 123110537-004	DATUM: NAD 83							
DRAWN BY: K. POLL	CHECKED BY: A. POMEROY							