Project Description Executive Summary

Aurora LNG Project

June 2014

Prepared for:
Aurora Liquefied Natural Gas Ltd.
Calgary, Alberta

AURORA LNG
nexen INPEX

PART A - PROJECT SETTING

1 INTRODUCTION

Aurora Liquefied Natural Gas Ltd. is proposing to construct and operate a liquefied natural gas (LNG) facility and marine terminal near Prince Rupert, BC, referred to as the Aurora LNG Project ("the Project") (Figure 1). Natural gas from northeast BC will be converted into LNG for shipment by LNG carrier to markets in Asia where it will be degasified and distributed.

Two alternate locations are currently being considered and assessed for the proposed LNG plant: Grassy Point and Digby Island. A description of these options is presented in Part B and Part C of this document, respectively. Aspects of the Project that are common to both potential site options are described in Part A and Part D of the document. Only one location will be selected for the Project based on an evaluation and assessment of the options.

2 PROPONENT INFORMATION

Aurora Liquefied Natural Gas Ltd. ("Aurora LNG") is a joint venture between Nexen Energy ULC, INPEX Corporation, and JGC Corporation.

Nexen, a wholly-owned subsidiary of CNOOC Limited, is an industry leader in the development of natural gas in northeast BC. The CNOOC Group, of which CNOOC Limited is a subsidiary, is a diversified energy holding company with interests in upstream, midstream and downstream natural gas businesses, including CNOOC Gas & Power Ltd. (CGPL). CGPL is currently the largest importer of LNG into China and plans to expand its LNG import capacity by 2020 to meet China's growing domestic demand.

INPEX has been supplying LNG to Japan, Korea, Taiwan and other Asian customers since 1977 through its LNG projects, and has developed strong relationships with Japanese and other Asian utility customers who make up the majority of the global LNG demand. As an industry leader in LNG in Asia, INPEX currently has working interests in seven LNG projects in the Asia-Pacific region.

JGC is a world-leading provider of engineering, procurement and construction services, having participated in more than 20,000 projects in over 70 countries. Since 1972, JGC has become one of the world's most experienced companies in the design and construction of facilities for the global LNG industry.

Legend

- Project Location Area
- Major Waterbodies
- City / Town
- Highway / Major Road

0 35 70 140 210 280 350
kilometre

0 20 40 80 120 160
Miles

1:8,000,000

N

Projection: UTM Zone 10
Datum: NAD 83

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GENERAL LOCATION OF THE PROPOSED PROJECT

Date: June 5, 2014

FIGURE 1

The contact information for the proponent is provided in Table 1.

Table 1 Contact Information

Proponent	Aurora Liquefied Natural Gas Ltd. (Aurora LNG)
Address	c/o Nexen Energy ULC 801 7th Ave SW Calgary AB T2P 2V7
Chief Executive Officer	Ron Bailey CEO, Aurora LNG
Principal Contacts	Darcy Janko Environment and Site Assessment Manager of Nexen Energy ULC 801 7th Ave SW Calgary AB T2P 2V7 Telephone: 403.699.5065 Email: darcy.janko@nexencnoocltd.com or questions@auroralng.com
Alternate Contact	Shannon Young Director of Regulatory, Stakeholder and Aboriginal Relations of Nexen Energy ULC 801 7th Ave SW Calgary AB T2P 2V7 Telephone: 403.699.4236 Email: shannon.young@nexencnoocltd.com or questions@auroralng.com
Website	www.auroralng.com
Fax	1.403.513.9866
Email	questions@auroralng.com

3 BACKGROUND INFORMATION

3.1 Project Overview

Major components of the Project will include:

- A natural gas receiving and LNG production facility (“LNG facility”)
- A marine terminal (“marine terminal”) capable of accommodating up to three LNG carriers at full build out
- Supporting infrastructure and facilities, including power supply, power generation, air and water utilities, haul road, waste and wastewater management, and a materials offloading facility (MOF)
- Temporary infrastructure and facilities, including construction camp, laydown area, and construction offices
- Operation of LNG carriers and other supporting marine vessels.

Natural gas will be transported to the Project via a third-party pipeline, which is yet to be determined.

Construction of the Project is anticipated to occur in phases, with the first phase having a design capacity of between 10 and 12 million tonnes per annum (mtpa) of LNG (two liquefaction trains), required storage tanks, and a marine terminal. The planned commissioning and first shipment of LNG is expected to occur in the 2021 to 2023 time frame. Full design build out will include potential expansion for an additional two trains and additional LNG storage, with a design capacity of between 20 mtpa and 24 mtpa LNG. The timing of subsequent phases to full build out will depend on a variety of factors such as LNG market conditions, project economics, and the labour market.

At full build out, the facility will receive approximately 104 million cubic metres per day (Mm^3/d) (3.7 billion standard cubic feet per day [Bcf/d] of natural gas, and produce up to 96 Mm^3/d of LNG. The Project will require approximately 160 to 320 LNG carrier (up to Q-Flex size) visits each year to transport the LNG to overseas markets.

3.2 Project Purpose and Rationale

Since 2000, global demand for LNG has increased at an annual rate of 7.6%, and is expected to nearly double the 2012 level of 250 million metric tonnes by 2030, with strong demand growth forecast to continue at least through 2020 (Ernst & Young 2012). The strong LNG demand growth has been driven largely by the Asia Pacific region, where demand is expected to increase by over 50% from 170 mtpa in 2012 to 260 mtpa by 2020.

Several large-scale LNG projects will be required to meet this demand, and BC is well positioned to compete in the international LNG market. The Project will play a key role in meeting the increased demand of the Asia Pacific markets, as well as other growth markets. It will be interconnected to western Canada through a network of new and existing pipeline systems, which will provide Aurora LNG with the flexibility to supplement proprietary resources with third-party sources.

The purpose of the Project is to connect natural gas resources in the Western Canadian Sedimentary Basin (WCSB) with the growing worldwide markets for LNG. Specifically, the Project will:

- Enhance the business capacity of the joint venture participants
- Meet increasing customer demand for LNG
- Provide benefits to BC and Canada through creation of employment and business opportunities, as well as through payment of taxes and royalties to the federal and provincial governments.

3.3 Project Capital Cost and Employment Estimates

The estimated capital cost for full build out of the Project is between $17 billion and $20 billion Canadian (in 2014 dollars).

During the initial phase, the Project will require a construction workforce of approximately 4,000 to 5,000 people, and will create approximately 20,000 person-years of direct employment. During the operation

phase, the Project will employ 200 to 400 people over its estimated 25 years of operation. The Project will also create indirect employment opportunities through suppliers of goods and services.

4 PROJECT SCHEDULE

The proposed timeline for the environmental assessment, construction, operation and decommissioning of the Project is summarized in Table 2. This preliminary schedule is aimed at having a final investment decision on the Project in 2017. Provided that an EA Certificate is issued and the necessary regulatory permits, approval and authorizations are granted (see Section 6), construction of Phase 1 will commence in 2017 and occur over a 5-year period. It is anticipated that operations will commence in 2023.

Table 2 Preliminary Project Schedule

Project Activity	Year
Geological, Engineering & Technical Studies	2014-2016
Field Studies & Environmental Assessment and Review Process	2014-2016
Final Investment Decision	2017
Construction of Phase I	2017-2022
Operations	2023-2048
Construction of Remaining Phase(s)	2023 - 2028
Decommissioning, Abandonment and Reclamation	after 2048 (after anticipated 25 years of operation)

At the end of the Project's operational life, decommissioning will occur in accordance with all applicable regulations at that time.

5 REGULATORY REQUIREMENTS

5.1 Environmental Assessment and Review Requirements

Aurora LNG expects that the Project will require an environmental assessment under *CEAA, 2012* and *BCEAA* as it meets the criteria of a "designated project" under the federal *Regulations Designating Physical Activities* and a "reviewable project" under the provincial *Reviewable Projects Regulation.*

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. Provisions that apply to the Project are summarized in Table 3.

Table 3 Applicable Provisions of the *Regulations Designating Physical Activities under CEAA 2012*

Section	Description	Project
2a	*The construction and operation, decommissioning and abandonment of a fossil fuel-fired electrical generating station with a production capacity of 200 MW or more*	The Project may involve construction and operation of a fossil fuel-fired electricity generating station with a production capacity of between 350 MW and 550 MW
14d	*The construction, decommissioning and abandonment of a new 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 55,000 t*	At full site build out, the LNG facility will have a design capacity of between 20 mtpa and 24 mtpa (between 54,795 t/d and 65,750 t/d), and a total LNG storage capacity of 540,000 m^3 (approximately 248,000 t) (depending on density) for all three tanks
27c	*The construction, decommissioning and abandonment of a marine terminal designed to handle vessels larger than 25,000 DWT unless the terminal is located on lands that are routinely and have been historically used as a marine terminal or that are designated for such use in a land-use plan that has been the subject of public consultation*	The LNG loading facility will be capable of accommodating Q-flex LNG carriers (109,500 DWT)

Aurora LNG also expects that the Project will require an environmental assessment under the *British Columbia Environmental Assessment Act* (*BCEAA*) as it exceeds some of the thresholds listed under Part 4 (Energy Projects) and Part 8 (Transportation Projects) of the BC *Reviewable Project Regulation*.

- Part 4, Energy Projects, Table 7 , Electricity Projects
- Part 4, Energy Projects, Table 8, Petroleum and Natural Gas Projects
- Part 8, Transportation Projects, Table 15, Transportation Projects

As the marine terminal of the proposed Digby Island site would be located on federal Crown Land administered by a federal port authority (Prince Rupert Port Authority), Aurora LNG expects that the Government of Canada (led by CEA Agency) and the Province of BC (led by the BC EAO) will develop a regulatory agreement to administer a coordinated federal/provincial environmental assessment of the Project in an effective and efficient manner.

5.2 Federal Involvement and Regulatory Requirements

The marine jetty on the proposed Digby Island site will be located on a water lot within the jurisdiction and administration of the PRPA. It is expected that the lot will be leased from the PRPA under a site lease agreement with Aurora LNG. No federal lands will be required if the Grassy Point site is selected for the Project.

No federal financial support for the Project is proposed or anticipated.

Key federal permits, licenses and authorizations that may apply to the Project are listed in Table 4.

Table 4 Major Federal Permits, Licenses and Authorizations

Permit, License and Approvals	Responsible Agency & Governing Legislation	Project Activities
Fisheries Act Authorization	Fisheries and Oceans Canada (DFO) *Fisheries Act* s. 35(1) *Application for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations*	Construction and operational activities may result in serious harm to fish (or fish habitat) that are a part of a commercial, recreational, or Aboriginal fishery or to fish that support such a fishery. These include facilities on the foreshore, offloading docks and the LNG berths, and temporary and permanent infrastructure in and around streams
Navigable Waters Protection Act Approval	Transport Canada *Navigation Protection Act*	Construction of marine terminal and the LNG berths
Certificates of Compliance	Transport Canada *Marine Transport Security Act* *Marine Transportation Security Regulations*	Operation of the LNG facility, marine terminal and carrier
Disposal at Sea Permit	Environment Canada *Canadian Environmental Protection Act* s.125(1) (b) *Disposal at Sea Regulations*	Potentially required for disposal of marine sediments dredged from the berth areas and MOF
Explosives Permit/License	Natural Resources Canada *Explosives Act* s. 7(1) *Explosives Regulations*	Transportation, storage and manufacture of explosives that will be used for blasting during site preparation
LNG Export License*	National Energy Board (NEB) *National Energy Board Act* s.117	Export of LNG outside of Canada to international markets
PRPA Lease	Prince Rupert Port Authority	Lease to occupy and use PRPA-administered federal land (for Digby Island site)

* Aurora Liquefied Natural Gas Ltd. (sole purpose corporation held by the Aurora LNG joint venture participants) submitted an application for a LNG export license to the NEB in November 2013. On May 2, 2014, the NEB granted approval of the export license.

5.3 Provincial Regulatory Requirements

Key provincial permits, approval and authorizations that may be required for the construction and operation of the Project are listed in Table 5.

Table 5 Major Provincial Permits, Licenses, and Approvals

Permit, License and Approvals	Responsible Agency and Governing Legislation	Project Activities
LNG Facility Permit	BC Oil and Gas Commission (BC OGC) *Oil and Gas Activities Act* s. 21 *Pipeline and Liquefied Natural Gas Facility Regulation*	Construction and operation of the LNG facility
License to cut timber	*Forest Act* s.47	Removal of timber from provincial Crown Land to clear sites for construction camp and ancillary construction facilities (e.g., laydown areas, warehouses)
Tenure on provincial Crown Land	BC OGC *Lands Act* s.39 and 40	Use of provincial Crown Land for the Project
Waste Discharge Permit	BC OGC BC Ministry of Environment (MoE) *Environmental Management Act* s.6(5)	Dredge disposal, wastewater discharge, facility air emissions, and waste discharges
Authorization for Sewage Facilities	BC MOE *Environmental Management Act* *Municipal Sewage Regulation, Sewerage System Regulation*	Sewage facilities for camp operations (threshold volume of 22,700 L/d)
Camp Permit	BC Ministry of Health *Public Health Act* *Industrial Camp Regulations*	Construction and operation of the construction camp
Heritage Inspection permits Heritage Investigation permits	BC FLNRO *Heritage Conservation Act* s.14	Archaeological surveys on provincial Crown Land to support the environmental assessment
Site Alteration Permit	BC FLNRO/BC OCG *Heritage Conservation Act* s.12	Systematic collection of heritage materials through excavations and/or measures to prevent damage or degradation of heritage resources (if found) on provincial Crown Land

6 SOCIO-COMMUNITY AND LAND USE SETTING

Both the Digby Island and Grassy Point sites are located within the Skeena-Queen Charlotte Regional District (SQCRD). The nearest communities include the City of Prince Rupert, the District of Port Edward, the Lax Kw'alaams community, Metlakatla, and smaller communities of Dodge Cove and Crippen Cove on Digby Island. Historically, the economy of the SQCRD has been dominated by forestry, fishing and other natural resource-based industries, which have declined over the past 15 years. However, the tourism and transportation sectors have experienced growth in recent years, including development of various ports and rail infrastructures and the addition of ferry services, as well as service industries that support tourism.

Prince Rupert is located about 30 km south of the Grassy Point site and 3 km east of the Digby Island site. It is the largest city in the SQCRD, with a population of approximately 12,500 people. It provides employment and commercial services for residents of the surrounding communities of Port Edward, Lax Kw'alaams, and Metlakatla. Community infrastructure and services include a hospital, fire department, schools, and a variety of recreational venues. Prince Rupert also has a deep-sea container port, BC and Alaska ferry service, and a cruise-ship dock. Key industries include forestry, fisheries, port services, and tourism.

The City of Prince Rupert has developed the Quality of Life Community Plan, which sets forth guiding principles for long-term investment and development in the municipality that emphasize social, environmental and economic values (City of Prince Rupert, 2007). The plan identifies key land use designations for land and water within the PRPA's jurisdiction.

The Lax Kw'alaams reserve and community is located approximately 5 km south of the proposed Grassy Point site, and 30 km north of the Digby Island site. This small community is referred to as both Lax Kw'alaams and Port Simpson. The Metlakatla Reserve (S1/2 Tsimpsean 2) is located on the northeastern end of Digby Island and on the southwestern portion of the Tsimpsean Peninsula, about 5 km from the proposed Digby Island site.

There are two small communities located on the east side of Digby Island: Dodge Cove and Crippen Cove. Each community has fewer than 100 residents. The Prince Rupert Airport, located on the northwest side of the island, services the local communities and is supported by a bus and ferry service.

6.1 Prince Rupert Port Authority

The PRPA is a federal body that operates the port under the *Canada Marine Act*. It is responsible for overall planning, development and management of the commercial port facilities within Prince Rupert Harbour. The jurisdiction of the PRPA includes the inner harbour of Prince Rupert, the waters surrounding Ridley Island, and the waters surrounding the southern half of Digby Island. The marine terminal and marine access for the proposed Digby Island site will be within waters governed by the PRPA.

The PRPA has prepared a land use management plan to guide its business development. Two main planning districts proximal to the Digby Island site include the 'Inner Harbour Planning District', and the 'Ridley Island / Outer Harbour Planning District'. Both districts plan for increased industrial development, such as rail services, transload facilities, various terminals, and marine support services. Although largely undeveloped at present, the PRPA has identified Digby Island as having long-term potential for industrial development (e.g., break bulk operations and major terminals), contingent on construction of a new bridge and road between Digby Island and the north shore. This transportation link is not within the scope of the proposed Project.

6.2 Other Planning Initiatives

There are two other planning initiatives that are potentially relevant to the Project: the North Coast Land and Resource Management Plan (LRMP) and the Pacific North Coast Integrated Management Area (PNCIMA).

The LRMP was initiated by the provincial government and First Nations as part of a strategic land use planning policy under the *Land Act*. It covers approximately 1.7 million ha of land on BC's north coast, including both the proposed Digby Island and Grassy Point sites. The purpose of the LRMP is to promote economic and environmental sustainability through an ecosystem-based management (EBM) approach that relies on traditional, local and scientific knowledge. The plan includes the establishment of protection areas and mechanisms to maintain healthy ecosystems and communities in the plan area. Several conservation and protected areas have been established under the plan. Current land use designations include protection areas, biodiversity areas, special forest management areas, and EBM operating areas. None of these overlap with either the Grassy Point or Digby Island sites. Since completion of the plan in 2004, land use objectives have been legally established to guide forest resource development, and full implementation of ecosystem-based management has been completed. In 2009, a new protected area designation was established to recognize the importance of specific areas to First Nations. There have been 115 new conservancies designated in the North and Central coast regions. Fifty-five (55) of the conservancy management plans were initiated in 2011, with the remainder to be underway or completed by 2014.

The PNCIMA is one of five Large Ocean Management Areas that have been identified by DFO as priority regions for marine planning. These areas have been identified as priority areas due to their high ecological, social and economic importance. The PNCIMA plan is an ecosystem-based management initiative that follows the general principles of Canada's *Ocean Act*, governing BC's northern marine waters. The PNCIMA initiative has identified 15 Ecologically and Biologically Significant Areas (EBSAs), and Important Areas (IAs) for marine vegetation and marine wildlife within their jurisdiction. Of these, one EBSA (Chatham Sound) and six IAs are located near the Grassy Point and Digby Island sites.

In addition, Canada and the US signed a bilateral Air Quality Agreement in 1991 with the purpose of addressing shared issues related to transboundary air pollution. The objective of this agreement is to control transboundary air pollution between the two countries through establishing and implementing specific objectives for limiting air emissions. For projects that have the potential to cause significant transboundary air pollution, the relevant jurisdiction is required to appropriately assess the project, provide notification to the other party, and implement mitigation measures as appropriate.

PART B – GRASSY POINT

7 GRASSY POINT SITE OPTION

7.1 Site Location

Grassy Point lies within the SQCRD and the North Coast Forest District. The proposed site for the Project is on the north end of the Tsimpsean peninsula, approximately 5 km north of the Lax Kw'alaams community, 30 km north of the City of Prince Rupert, and 15 km southeast of the US border (Figure 2). A number of other First Nations reserves are located near the proposed site.

The Project site is located on approximately 200-400 hectares (ha) of provincial Crown land. Coordinates for the approximate centre of the site are:

- Latitude/Longitude - 54°37'11.32"N/130°25'56.90"W
- Universal Transverse Mercator – Zone 9 East 407733.6 North 6053259.4

The marine terminal will be located at the north end of Grassy Point.

The nearest federal land to the proposed Project site is a reserve of the Metlakatla First Nation (Tymgowzan 12) which is located approximately 2.2 km away.

7.2 Land Ownership and Zoning

The Grassy Point area is composed of several land use zones. The northern finger of the Tsimshian peninsula has been placed under a map reserve. The proposed Project site lies within this map reserve. Aurora LNG has signed a Sole Proponent Agreement with FLNRO, which gives Aurora LNG exclusive access to pursue land tenureship for development of an LNG facility. The southern portion of the map reserve is designated for development of another LNG facility.

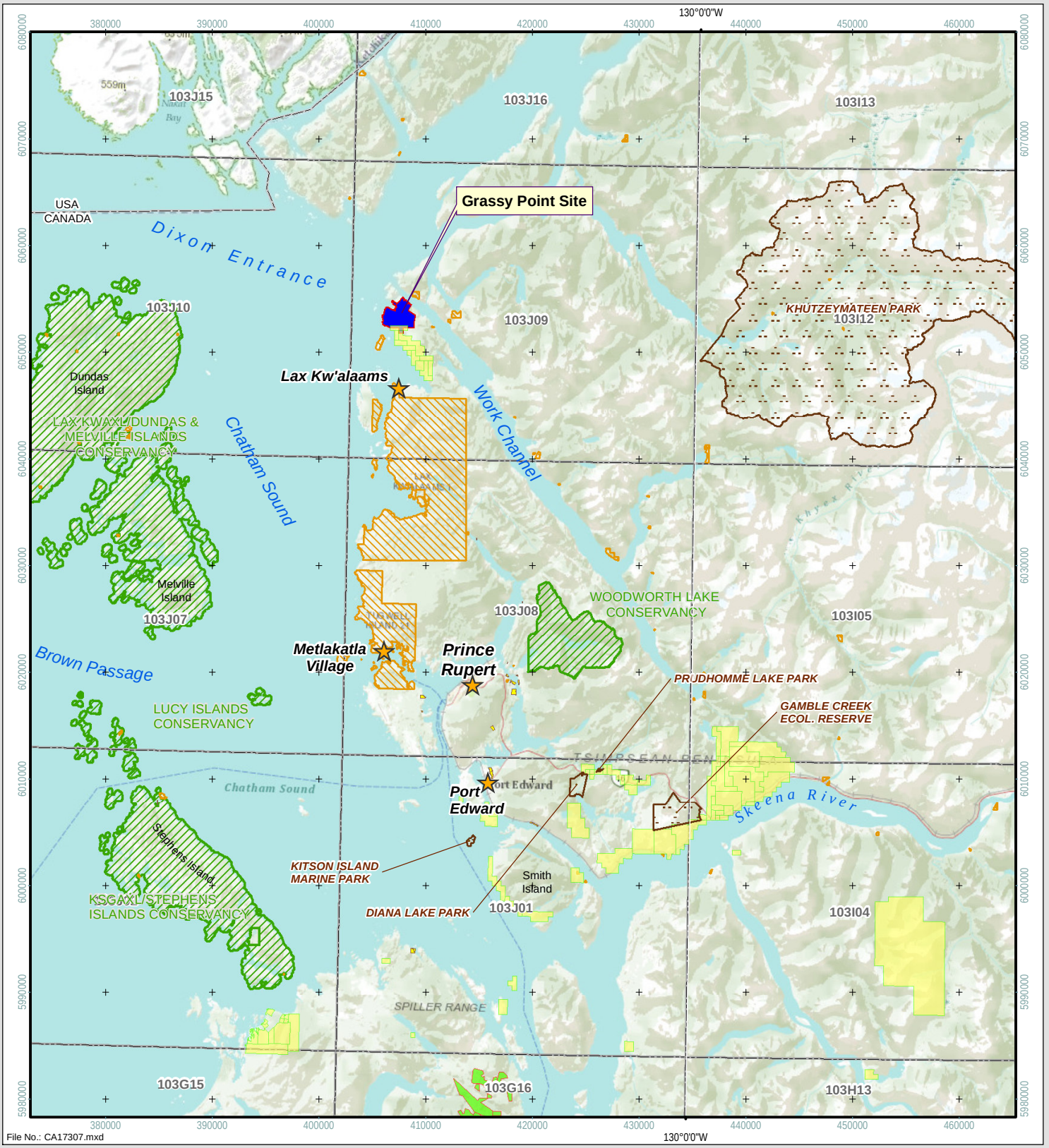
A block of private land and a mineral tenure lies immediately south of the Grassy Point site. A notation of interest has been placed on Dudevoir Passage, north of the site. Near the Lax Kw'alaams community, there are private lands, temporary permits, and licenses of occupation. The water surrounding Lax Kw'alaams is within a designated use area. The nearest identified permanent, temporary or seasonal residence is located in Port Simpson approximately 5 km south to the proposed project site.

There is a Marbled Murrelet Wildlife Habitat Area with special management requirements south of the Grassy Point site near Trail Bay. Zumtela Bay Conservancy lies south of the Grassy Point site. This conservancy is important to the Coast Tsimshian people, who have worked with government to establish management and strategic land use agreements.

The proposed Grassy Point site is a greenfield site with no development. At the timing of writing, the private land immediately south of the site has not been developed. No water lots have been identified around Grassy Point. A description of the lands proposed for the LNG facility site and marine terminal is provided in Table 6 and Figure 3.

Table 6 Lands Description for the Grassy Point Project

District lots in Grassy Point	District lots in Grassy Point	District lots in Grassy Point
PIN_SID: 2747330 Section 29, Township 1 Range 5 Coast District	PIN_SID: 2747330 Section 29, Township 1 Range 5 Coast District	PIN_SID: 2737670 Section 32, Township 1 Range 5 Coast District
PIN_SID: 2737670 Section 32, Township 1 Range 5 Coast District	PIN_SID: 2737670 Section 32, Township 1 Range 5 Coast District	PIN_SID: 2741420 Section 33, Township 1 Range 5 Coast District
PIN_SID: 2735720 Section 21, Township 1 Range 5 Coast District		
PIN_SID:2747200 Section 28, Township 1 Range 5 Coast District		
PIN_SID: 2741420 Section 33, Township 1 Range 5 Coast District		



Legend

- Aurora LNG - Grassy Point
- First Nations Reserve
- Protected Areas
- Mineral & Placer Tenure
- Woodlot Licence
- Conservation Areas
- Urban Centre

0 2 4 8 12 16 20
kilometre

0 1.25 2.5 5 7.5 10
Miles

1:500,000

N

Projection: UTM Zone 9
Datum: NAD 83

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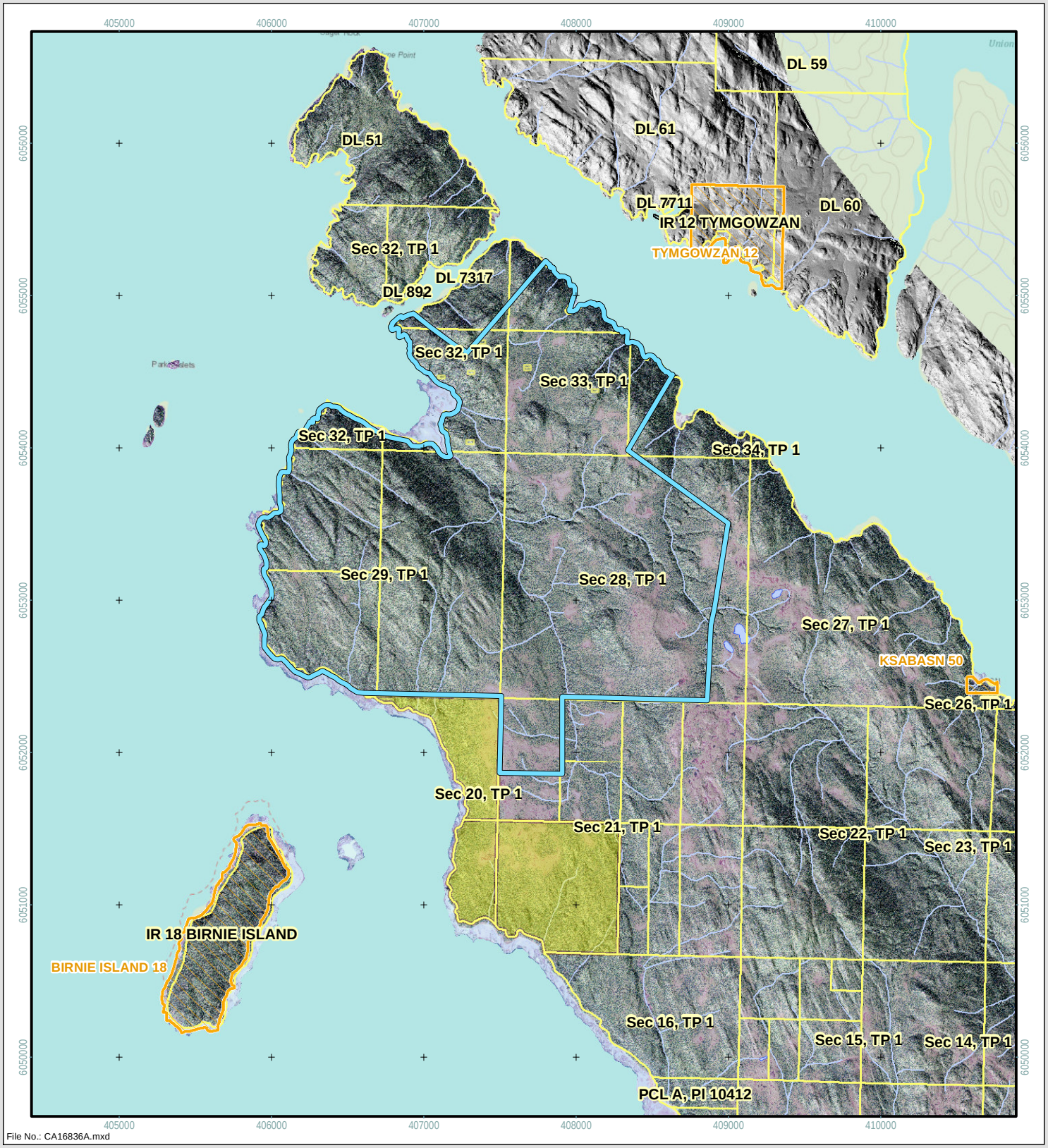
PROPOSED PROJECT LOCATION GRASSY POINT SITE

Date: June 12, 2014

FIGURE 2



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Legend

- Aurora LNG - Grassy Point
- District Lots (TANTALIS)
- First Nations
- Road & Cutline
- Private Land
- Lake
- River / Stream

0 0.15 0.3 0.6 0.9 1.2 1.5
kilometre

0 0.1 0.2 0.4 0.6 0.8
Miles

1:35,000

N

Projection: UTM Zone 9
Datum: NAD 83

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DISTRICT LOTS NEAR THE GRASSY POINT SITE

Date: May 23, 2014

FIGURE 3

7.3 Land Use

Identified tenured land uses overlapping the proposed Project footprint include a trapline (TR0614T037), and a Mineral Tenure Area (ID#: 1022211). The mining tenure overlaps the southern end of the proposed site (Figure 8-4). No other identified Crown tenures occur at the Grassy Point site. The coast line along Grassy Point is included within the provincial Recreation Features Inventory. An Environmental Protection/Conservation designation (ID # 6406454) occurs on a segment of land to the north and outside of the Project footprint.

7.4 Marine Use

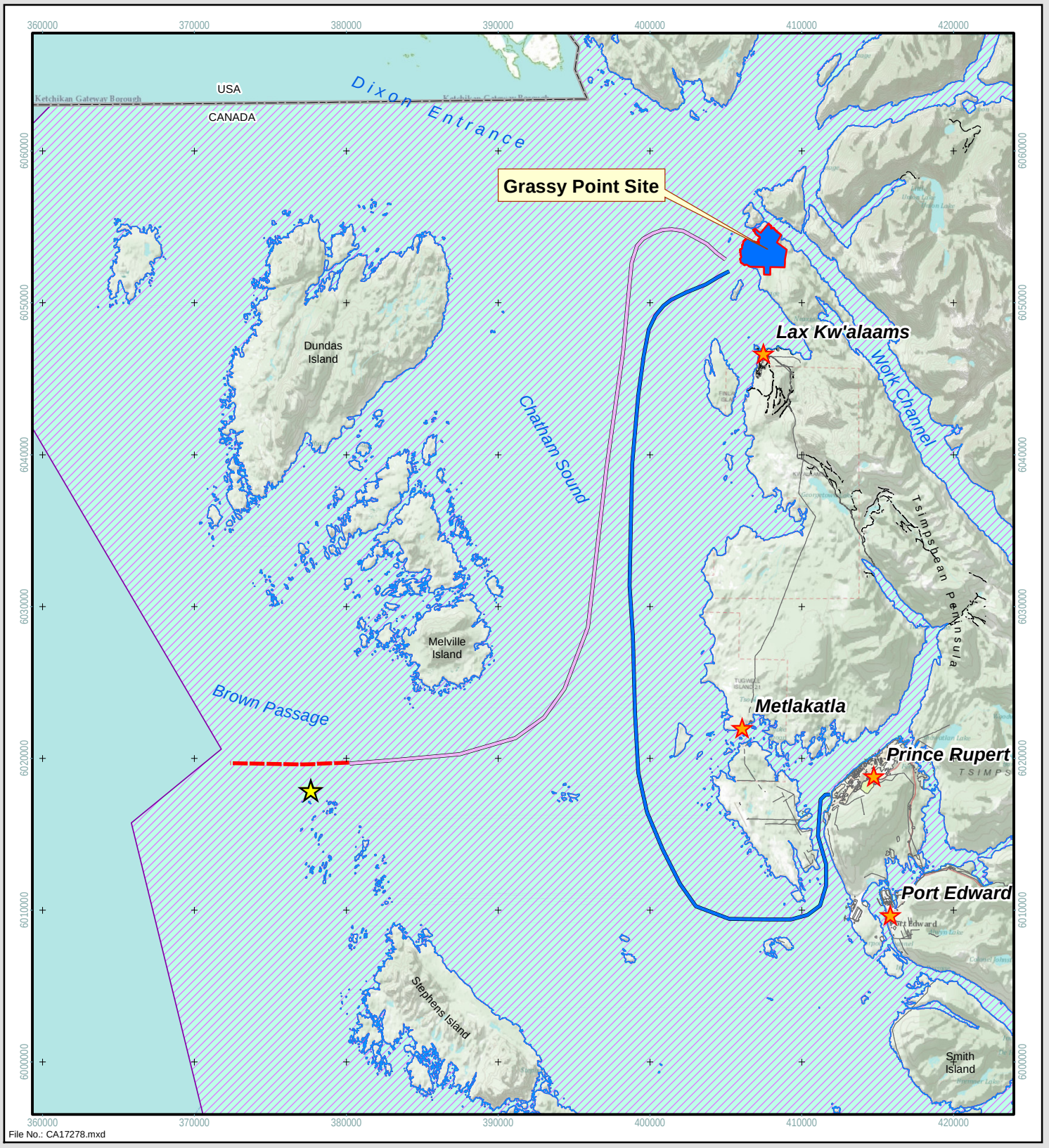
Aboriginal, recreational, and commercial fisheries and harvesting activities occur around the Tsimshian peninsula, along Work Channel, and to the west of the peninsula. Key target species include salmon, prawn, shrimp, halibut, and urchin. Commercial finfish fisheries occurring in marine areas adjacent to the Project site include salmon (gillnet) and salmon (seine). Commercial invertebrate fisheries in the area include prawn (trap) and prawn (trawl). The waters surrounding the Tsimshian peninsular are an identified First Nations Food Fishery, and recreational fishing occurs along Work Channel.

The Zumtela Bay conservancy is of particular importance to the coast Tsimshian communities. There are several other conservancies west of Work Channel, including Kts'mkta'ani Union Lake Conservancy, Khutzeymateen Conservancy, and Ksi X'anmass Conservancy.

7.5 Project Access

The Grassy Point site is remote. Currently, there is no road access to the site from the Lax Kw'alaams community or Prince Rupert; access is currently limited to boat or aircraft from these two communities. Access to Prince Rupert includes the Prince Rupert Airport, located on Digby Island approximately 9 km west southwest of the city, which is accessible by ferry. The airport is serviced by two air carriers, which provide direct connections between Prince Rupert area and Vancouver, Sandspit and Masset. BC Ferries operates ferry routes from Port Hardy and Ketchikan Alaska from May through October.

During the construction and operation phases, access to the Grassy Point site will be by air and marine vessels. The marine access route to the Project site will start near the Triple Island Pilotage station, where a BC marine pilot from the Pacific Pilotage Authority will board the vessel, and continue east along Hecate Strait and north up Chatham Sound (Figure 4).



File No.: CA17278.mxd

Legend

- Aurora LNG Area - Grassy Point
- Urban Centre
- Triple Islands Pilot Staion
- Compulsory Pilotage Areas
- Road & Cutline

Aproach Route (Conceptual)

- Pilot Boarding Zone
- Grassy Point Route
- Grassy Point Water Supply Route

0 1.5 3 6 9 12 15
kilometre

0 1 2 4 6 8
Miles

1:350,000

N

Projection: UTM Zone 9
Datum: NAD 83

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MARINE ACCESS ROUTE TO GRASSY POINT SITE

Date: March 3, 2014

FIGURE 4

7.6 Past and Current Environmental Studies in the Region

In 1981, Dome Petroleum conducted an environmental assessment for a proposed LNG facility within the Grassy Point area. The facility was never constructed.

There have not been any regional environmental studies carried out under the *CEAA* in the vicinity of the Project.

Numerous LNG and pipeline projects within the Prince Rupert region are currently entering the environmental assessment and review process and, as such, many environmental studies will likely occur in the near future to support these applications.

7.7 Project Components

The general characteristics of the Project components are consistent with existing LNG production facilities and include the LNG facility, marine terminal, supporting infrastructure, and temporary infrastructure. The core project components are identified in Table 7.

Table 7 Key Components of the Project

Infrastructure	Project Components
LNG Facility	• Feed gas receiving equipment • Natural gas treatment equipment to remove impurities (CO_2, H_2S, mercury and natural gas liquids(NGLs)) from feed gas • Storage tanks and infrastructure for staging and loading of NGLs • Liquefaction refrigerant storage • Four 5 mtpa to 6 mtpa liquefaction trains with gas turbine-driven compressors • Up to three 180,000 m^3 LNG storage tanks • Flare system • Continuously manned control room
Marine Terminal	• A conventional trestle • Loading and offloading arms and associated infrastructure • Up to three LNG carrier berths • Cryogenic rundown and vapour return pipelines between the LNG facility and marine terminal • Possible loading of NGL
Supporting Infrastructure	• Water supply pipeline from MOF to LNG facility • Wastewater treatment systems • Nitrogen and compressed air equipment • Fuel storage • Administration and maintenance buildings • Materials offloading facility (MOF) • Power infrastructure for the LNG facility and marine terminal • Fire water system • Demineralization water system

Infrastructure	Project Components
	• Process heat system • Solid waste collection and disposal • Wastewater collection and treatment • Facility stormwater management system • Facility and maritime security • Medical centre and fire station • Heliport for medevac • Camp for operational staff and maintenance turnaround personnel • Haul road
Construction-related Infrastructure and Facilities	• Construction camps • Additional temporary laydown areas • Construction offices

A conceptual layout of the Project components is illustrated in Figure 5.

LNG Facility

It is anticipated that the LNG facility will comprise a land-based modular units for receiving and processing natural gas into LNG. The facility will include the infrastructure required to receive natural gas from the supply pipeline, gas pre-treatment, gas liquefaction and LNG storage and loading.

The facility will be built in phases, with two LNG trains constructed during the first phase, each with a processing capacity of between 5 and 6 mtpa. An additional two LNG trains will be constructed as required by market conditions. The exact phasing and optimization of the trains' size will be established during early pre-front end engineering and design (Pre-FEED).

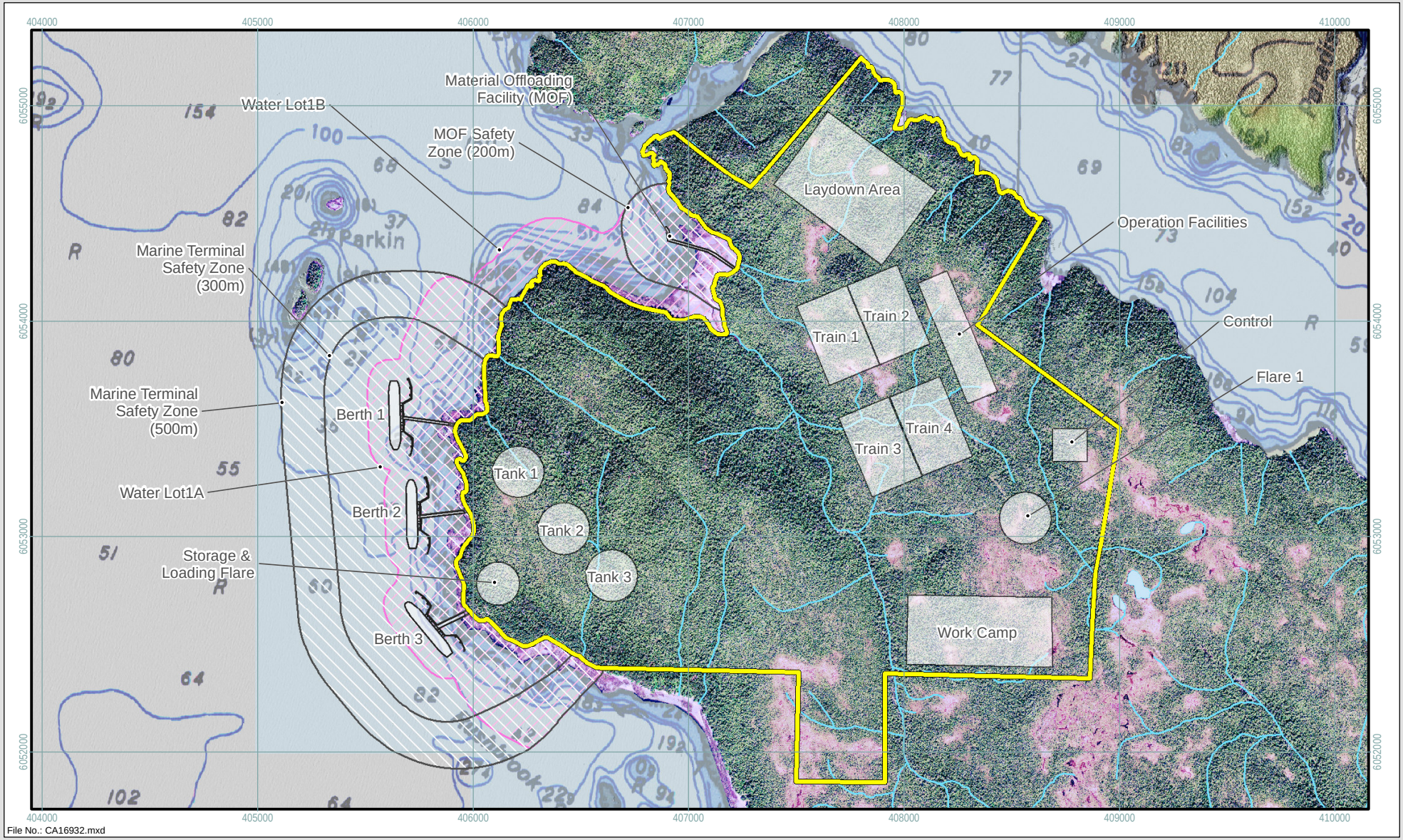
The pre-treatment, processing and LNG production facilities and processes are described below.

Natural Gas Supply

Supply of natural gas for the Project will be sourced primarily from the Horn River and the Liard and Cordova basins of northeast BC through a combination of proprietary natural gas holdings and third-party gas, which may include, but not limited to, purchases at market hubs, gas supply arrangements and upstream joint ventures. Natural gas will be delivered to the Project via a third party-owned pipeline(s), which is yet to be determined.

Natural Gas Reception System

The natural gas supply pipeline will enter the property boundary via a dedicated pipeline delivery station.



Legend

- Aurora LNG - Grassy Point Site
- Conceptual LNG Layout
- Water Lot
- Rivers & Streams (TRIM)
- Lake / Waterbody (TRIM)

0 0.125 0.25 0.5 0.75 1
Kilometres

0 0.1 0.2 0.4 0.6
Miles

1:25,000

N

Projection: UTM Zone 9
Datum: NAD 83

AURORA LNG

nexen INPEX

CONCEPTUAL LNG LAYOUT GRASSY POINT SITE

Date: June 5, 2014

FIGURE 5

Natural Gas Pre-treatment Process

The natural gas will be cleaned by separating off impurities and various non-methane hydrocarbons and fluids for safety of the process and to ensure that the composition of the final LNG product meets end-use specifications. Any mercury in the feed gas will be removed to prevent corrosion of the cryogenic equipment. Trace amounts of carbon dioxide (CO_2) and hydrogen sulphide (H_2S) will then be removed. The feed gas will undergo dehydration to remove water to prevent freezing during the liquefaction process. Components of the gas treatment infrastructure will include: mercury removal unit, acid gas removal unit, gas dehydration unit, and natural gas liquid (NGL) extraction unit.

Natural Gas Liquefaction Process

Gas leaving the NGL extraction unit will be routed to the liquefaction unit of the facility, where it will be condensed into a liquid by cooling it to a cryogenic temperature of approximately -162°C. In liquid form, the natural gas will be reduced in volume by approximately 600 times at near normal ambient pressure, allowing it to be efficiently and safely stored and shipped by sea. Once the LNG is produced, it will be stored at atmospheric pressure in one of three insulated LNG storage tanks located in the LNG tank area.

The natural gas liquids (NGL) will be directed to storage tanks located in the LNG tank area, and will be either used for onsite power generation or will be transported offsite to market.

Power Supply

Power supply during construction will be provided by diesel-powered generators.

During operation, the Project will require energy for the natural gas liquefaction process and to operate non-process related infrastructure. The LNG liquefaction trains will utilize natural gas-fired turbines for the refrigeration compressor drivers. The LNG facility and marine terminal will require electrical power to operate supporting facilities and infrastructure. At this point in facility design (Pre-FEED), it is estimated that approximately 120 MW to 300 MW of electrical power could be required for Phase 1 depending on the selected process and refrigerant compressor drivers. The total power consumption at full site build out will be between 200 MW and 550 MW. It is likely that electricity for plant operations will be generated by on-site power generators driven by natural gas from the plant inlet. However, final decisions regarding the type of power generation and capacity will be studied and developed during the feasibility study and engineering phases.

Diesel generators will be provided on site during startup, and in the event of emergencies.

Safety Systems

Safety management systems, operating procedures, and risk assessments will be used to identify potential hazards and the safety measures required to protect facility personnel, equipment and the environment. Key safety-related equipment for emergency purposes will include flare stacks, shutdown and depressurization systems, fire protection, and safety flare systems.

A safety-instrumented system will be used at each LNG process train and the ship-loading facilities to manage the safety, shutdown and gas depressurization processes at the Project. The system will include a combination of manual and automatic shutdown and gas depressurization processes.

Fire protection and safety measures (operating procedures and emergency response plans) will be implemented at the Project to ensure protection of personnel and equipment. Response equipment, such as fire and gas detection systems, alarms, fire extinguishers, foam systems, firewater pumps, fire response vehicles, and personal protective equipment, monitors and passive protection, will be provided on site.

The flare system will provide reliable and safe disposal of liquid and vapour hydrocarbons during upset and emergency conditions, and during operational controlled events such as startup, shutdown, venting and purging. Gas flaring is not expected to occur during normal operating procedures, and is expected to occur only on an occasional basis.

Water Supply

Aurora LNG is intending to secure water for the Project from existing water supply infrastructure at the Port of Prince Rupert. However, onsite sources such as groundwater and desalinated seawater are also being investigated.

During construction, municipal water would be barged from the Prince Rupert port to the MOF (see Figure 4) for dust control, domestic uses and civil works. It is anticipated that construction activities will require one barge per day. During operations, municipal water would be barged to site and conveyed from the MOF through a pipeline as feed to water treatment systems providing potable water, demineralized water, utility water and firewater. The total projected water supply requirements for the Project are estimated to be approximately 875 m^3/d during construction, and 50 m^3/d during operations.

Water Treatment

SITE PREPARATION AND CONSTRUCTION

The Project area will require clearing and grubbing, soil stabilization, backfill and grading activities prior to the installation of permanent plant infrastructure. During site preparation, a temporary drainage and stormwater system will be established to collect and control stormwater flows and runoff from the site to the marine environment. The system will include internal and perimeter ditches, and erosion and sediment control measures.

A sanitary sewage facility will be established as part of the camp system for use during the construction and operations phases. Treated sewage effluent will be discharged to marine waters once it meets current wastewater requirements. Sewage sludge will be transported off site and disposed of at an approved landfill. Prior to establishing the sewered site facilities, portable toilets will be available on site with offsite disposal to a licensed facility.

OPERATIONS

The design of the facility will include provision for effluent collection, segregation and treatment prior to discharge to the marine environment. Discharge of treated effluent will meet or exceed regulatory requirements.

Sanitary wastewater will be pumped to the treatment units where the wastewater will undergo biological oxidation, clarification and chlorination. The type of treatment will be determined during final design. The treated water will be monitored prior to discharge to ensure that it meets all applicable federal and provincial regulatory requirements.

Runoff from roads and buildings will drain into a drainage ditch system and discharged via the stormwater outfall into marine waters. All contact water (i.e., runoff from the processing areas, process equipment and firewater system testing) will be directed to an oil separator where any oily residue will be skimmed off to a collection sump. The effluent will be treated and directed to the stormwater outfall. The location of the outfall will be selected during the detailed design phase.

Pipe-rack Corridor

A corridor between the LNG plant area, the LNG tank area and the marine terminal will contain the pipe-rack for cryogenic rundown lines, cool-down lines, fuel gas line from the BOG compressors, and utilities.

Haul Road

To accommodate the potential for modular construction and allow receipt of large items of equipment and gas turbine/compressors, a haul road will be required. The road will extend from the MOF and the LNG plant area to the LNG tank area, and will enable the movement of modules or pre-assembled units from the MOF to the LNG tank area. The haul road will be used throughout the operational phase of the Project for the movement of bulk refrigerants required for the liquefaction process, and large gas turbine rotor canisters required for refurbishment or repair.

Marine Jetty and LNG Loading

The Project will include a marine jetty and LNG loading facility capable of accommodating Q-Flex LNG carriers), with a LNG cargo capacity up to 217,000 m^3. Initially, the facility will include two carrier berths, oriented to allow carrier approach, moorage and departure with the bow into the prevailing southeast wind and wave direction. Future expansion may include a third berth.

The LNG will be delivered from the LNG tank area to the berth through pipelines supported on an elevated pile-supported trestle. The loading of LNG carriers will be conducted from loading platforms located off the shoreline at the end of the jetty. The facility may allow concurrent loading of carriers at adjacent berths. There will be loading arms at each berth for transferring the LNG onto the carriers, and a vapour return arm for transferring boil-off gas (BOG) back to the liquefaction trains. It is anticipated that the LNG carriers will be loaded at a maximum loading rate of 12,000 m^3/h, and will typically be at berth for approximately 24 hours.

Materials Offloading Facility

The north end of Grassy Point is currently being considered as the location for the marine offloading facility (MOF); however, other locations are also being investigated. The facility will provide for the safe berthing and transportation of large loads, modules from heavy lift and roll-on roll-off (ro-ro) vessels to land transportation units. It will also provide space for inspection of pre-assembled units, as well as an area to stow modules or packaged equipment and park shipments so they can be received out of the required path of the construction sequence. The MOF area will also be used for the concrete batch plant, aggregate storage and water treatment plant for concrete production. The MOF area may continue to be used over the life of the Project to receive or dispatch shipments such as refrigerant, containers, rotating equipment and rotar transport canisters from ro-ro vessels.

Camp Facilities

A construction camp will be provided onsite to accommodate up to 4,000 – 5,000 Project workers. The number of occupants is anticipated to be less than 1,000 during the initial 10 months of construction, and will peak at 4,000 people by month 20.

The camp will likely be constructed using pre-manufactured modular units shipped to site, which will allow for timely assembly of the camp once site preparation is completed and utilities are installed. Temporary utilities and facilities to support the construction camp will include maintenance buildings, power generation, potable water systems, sanitary facilities, waste treatment plant, a marine outfall and fuel supply.

During facility operation, the camp will continue to be used for permanent operations and maintenance personnel (up to 400), as well as those personnel required during plant turnaround (possibly in excess of 700). The camp may also be used to provide skills training and other capacity-building programs for the community.

Heliport Area

A heliport is proposed to enable emergency evacuation of injured personnel to appropriate medical facilities. This will ensure that, in the rare event of an emergency, people with critical injuries can receive treatment at better equipped metropolitan hospitals, if required.

7.8 Project Activities

Construction

Site preparation and construction will commence once all required regulatory permits and approvals have been obtained. The construction phase will involve the following key activities:

- Pioneer activity of establishing facilities for site preparation
- Facility site preparation for Project components and staging areas, including:
    - vegetation clearing and grubbing
    - grading and levelling of the site using cut and fill of rock, overburden, and/or other materials. Depending on site specifics, this could include blasting activities
    - compaction
    - implementation of erosion control measures and
    - potentially some paving in required areas
- Erection of temporary facilities such as maintenance buildings, sanitary facilities and potentially temporary water collection structures
- Construction of the MOF and haul road to allow materials required for construction to be transported to site via boat / barge and offloaded appropriately. Larger components such as LNG facility modules, construction materials, supplies, and equipment will then be shipped to site via barge.
- Installation of utilities required for the LNG facility and the marine terminal. This will include electrical power, industrial and potable water systems, wastewater collection and treatment systems, storm water collection, fire protection system, vehicle fueling stations, and an oil-water separator.
- Construction of temporary facilities such as trailers, sanitary facilities, the construction camp, and maintenance buildings on site to accommodate initial work. Construction workers will stay at the construction camp for the duration of their rotation. Prior to completion of the construction camp, workers will commute to site by boat and/or helicopter from Prince Rupert.
- Construction of suitable foundations, and installation of pilings
- Construction of major terrestrial and marine components, including:
    - natural gas treatment, extraction, and storage facilities
    - natural gas liquefaction trains, compressors and associated infrastructure
    - storage tanks
    - flare systems
    - plant piping
    - administration buildings and storage areas and
    - access roads within the site

- Construction of the marine terminal and installation of:
  - piles, decking, and other support infrastructure
  - piping and electrical infrastructure
  - containment structures
  - cryogenic rundown and vapour return pipelines and
  - a storage and loading flare system

It is anticipated that dredging will not be required along the marine approach and turning basin as water depths are adequate to accommodate Q-flex carriers. However, dredging of marine sediment within the MOF area will likely be required. This will entail the mechanical excavation of marine sediment, and may require subsea blasting. The volumes of dredgeate will be determined through further geotechnical and engineering design work. The dredged material will be stored and/or disposed of at a regulatory-approved location. A suitable disposal area will be identified through consultation with regulatory authorities, First Nations, and stakeholders. Brown Passage, located approximately 30 km west of Prince Rupert, is the current designated marine disposal site within the Prince Rupert area. The suitability of this site will be evaluated.

Facility Operations and Maintenance

Operation of the LNG facility and marine terminal is expected to occur over 25 years. The following activities will occur during regular operations:

- Shipment of supplies and equipment to the material offloading area
- Transportation of supplies and equipment to the LNG facility
- Maintenance of all infrastructure (LNG facility, marine terminal, wastewater outfall)
- Monitoring of all operations, including emissions
- Provision of camp and food services to employees
- Shipment of solid waste generated by the Project to a licensed waste receiver
- Storage and loading of LNG onto carriers
- Storage and possible shipment of NGL to market
- Piloting of LNG carriers between the Triple Island Pilotage Station and the Project site
- Operation of tugs
- Shipping of LNG to overseas markets

Marine Shipping

Shipping activities will include regular transit of LNG carriers to the Project. At full build-out, approximately 160 to 320 LNG carriers (up to Q-Flex size) will call on the marine terminal each year, depending on the size of the carrier. The LNG carriers will be contracted by Aurora LNG to carry cargo on a free-on-board (FOB) and delivered at place (DAP) basis. The carriers will be powered by a combination of low sulphur fuel and boil-off gas. Escort and berthing tugs and pilot boat operations will support safe passage of the LNG, and the shipment of equipment and materials to the MOF.

LNG carriers will transit through Chatham Sound and Brown Passage within designated shipping zones. Operation of the vessels will be in accordance with shipping operations approved under the *Canada Shipping Act*. All LNG carriers will be double hulled, and have primary and secondary containment systems. The marine terminal and channel approach will have navigation aids that conform to the standards under the *Canada Shipping Act*.

Decommissioning and Reclamation

At the end of its operation life, Aurora LNG will either sell the LNG facility and marine terminal, or decommission it and reclaim the land according to applicable legislation at that time. Decommissioning will include removal of all land-based LNG and storage components, the gas reception facilities, and the marine terminal and associated infrastructure.

7.9 Emissions, Wastes, Noise and Light

The LNG facility will generate various wastes, emissions, and effluents during the life of the Project. Construction, operation and decommissioning activities will be guided by site- specific and activity-specific management plans to manage emissions and discharges, which will be in compliance with the applicable regulatory regime and associated government requirements and conditions.

Air Emissions

Air emissions that will be generated by the Project include nitrogen oxide (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter ($PM_{2.5}$, PM_{10}), volatile organic compounds, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fugitive hydrocarbons. Emission sources and quantities will vary during each of the Project phases (Table 8).

Table 8 Anticipated Sources of Air Emission

	Construction & Decommissioning	Operations
Emission Sources	Diesel engines in trucks and barges used to transport materials to site, and in construction and dismantling of equipment Power generation during construction, commissioning, and dismantling Particulate matter emissions from vehicle traffic on roads and the construction site	Gas turbine generators Gas turbine drivers Gas treating equipment for the removal of trace contaminants from the gas-fired reboilers, heaters and incinerators Flare system used in upset and emergency, startup and maintenance situations Back-up generators (diesel) used during start-up, shut-down and in the case of emergencies Inert gas from dry-dock LNG carriers LNG vessels and other marine support vessels Fugitive emissions from the facility Exhaust from vehicle traffic on roads

Air emissions during facility shutdown and decommissioning are expected to be similar to those generated by construction activities. The emissions will be predominantly from the use of diesel fuel in heavy equipment used to dismantle the plant and haul away materials for salvage.

Emissions management plans will be developed to minimize releases of GHGs, CACs, and hazardous air pollutants from Project activities and infrastructure, and ensure compliance with applicable guidelines and regulations during construction and operation of the Project.

Solid and Liquid Waste

Design of the facility will include provision for the collection, segregation, treatment, discharge and monitoring of all effluent streams. Non-hazardous liquid effluents will be controlled and discharges treated to meet all applicable federal and provincial regulatory requirements. This includes process water from construction and operation activities, storm water, and ballast water.

A waste management plan will be developed prior to site construction and operations to ensure that solid wastes are managed in accordance with relevant legislation. Non-hazardous solid wastes will either be recycled or reused or collected in a central secure area on site, where they will be disposed of in a local landfill or other licensed waste receiver facility. Options for waste disposal are currently being evaluated.

All hazardous liquid and solid waste will be collected in a secure enclosed building and shipped offsite to an existing licensed hazardous waste facility.

Potential sources of solid and liquid wastes generated by the Project are listed in Table 9.

Table 9 Anticipated Sources of Solid and Liquid Wastes

	Construction & Decommissioning	Operations
Solid Waste	Biomass (chipped vegetative material) Excavated overburden, organic material, large boulders Construction Waste (wood, scrap metal, concrete) Domestic waste Dredge materials Sand blast waste Empty containers	Domestic waste Paper/cardboard waste Wood Scrap Metal Municipal waste Waste absorbents and adsorbents Filter cartridges Spent demineralized water membranes and/or bed material
Liquid Waste	Sanitary waste water Storm water Hydrostatic test water Used oils or solvents	Sanitary wastewater Storm water Water discharged from blow-down Reject water from water demineralization unit
Hazardous Waste	Treated sewage and sludge Medical waste Contaminated soil	Mercury removed from the feed gas Medical waste Contaminated soil Waste water contaminated with hydrocarbons or solvents Waste absorbents Used oils or solvents Treated sewage and sludge Misc. wastes, including batteries, filters, etc. Used methyl diethanolamine **(**MDEA) from acid gas removal

Aurora LNG will require that LNG carriers comply with all relevant national and international shipping requirements regarding disposal of waste and ballast water discharge.

Noise and Light Emissions

Table 10 lists the potential sources of noise and light at the Project. Noise and light emissions will be managed through best management practices incorporated into project design, and project-specific management plans.

Table 10 Anticipated Sources of Noise and Light Emissions

	Construction & Decommissioning	Operations
Noise Sources	Blasting Pile driving Facility assembly/disassembly Equipment movement Vehicle traffic Module offloading Pressure testing	Flares Vessel traffic Air coolers Gas turbines Compressors and pipework Vehicle traffic LNG carrier loading LNG carriers and tugs
Light Sources	Vehicles Construction Camp Lighting	Vehicles Vessels Facility Lighting Tugs, carriers, flares

7.10 Aboriginal Groups

Five First Nations and one Aboriginal Group could be adversely affected by the Project and associated marine shipping activities. These are Gitxaala Nation, Kitselas First Nation, Kitsumkalum First Nation, Lax Kw'alaams First Nation, Metlakatla First Nation and the Métis Nation of BC. The first five groups are part of a larger cultural group known historically and ethnographically as the Tsimshian. However, they represent distinct groups with different historical and cultural backgrounds.

The Metlakatla, Kitselas, and Kitsumkalum are in the BC Treaty process and are represented in their negotiations by the Tsimshian First Nations Treaty Society. Lax Kw'alaams is negotiating a treaty independently. Gitxaala Nation is currently not involved in the BC treaty process.

Although there are no Métis settlements within the Project area, there are a number of Métis living in the Prince Rupert area.

Table 11 summarizes potential overlap between Project components and identified First Nations issues, with terrestrial interests identified as "Facility" and marine interests identified as "Shipping Route".

Table 11 Potential overlap between First Nations' interests and Aurora LNG project components and activities at Grassy Point

First Nation	Potential Overlap with Identified First Nations Interests	
	Facility	Shipping Route
Gitxaala Nation		X
Kitselas Nation		X
Kitsumkalum First Nation	X	X
Lax Kw'alaams First Nation	X	X
Metlakatla First Nation	X	X

7.11 Traditional and Current Land and Resource Use

The Tsimshian cultural areas stretch from the lands and waters surrounding the Nass and Skeena watersheds and the coastal areas from the Nass River to Queen Charlotte Sound. Traditionally, groups have used the areas along the lower Skeena River from the Kitselas Canyon and Kitsumkalum (near Terrace) and the adjacent coast south to Milbanke Sound, including Port Simpson (Lax Kw'alaams) Metlakatla (in the Prince Rupert area), and Gitxaala (Kitkatla). Findings through archaeological excavations and studies reveal villages dating back 5000 years. The Tsimshian have one of the oldest continuous cultural heritages in the western hemisphere. Tsimshian groups possess a rich cultural heritage, and ceremonial practices, such as the potlatch feast, continue to be undertaken.

Initial desktop research of publicly available sources and discussions with First Nations, to date, indicate that Tsimshian groups have used, and continue to use, the lands at the mouth of the Skeena River and the adjacent lands and marine areas for fishing, hunting, and marine and terrestrial food harvesting, as well as for ceremonial practices. Culturally modified trees are also common throughout the area. Examples of marine resources traditionally used by the local First Nations include: seaweed, halibut, salmon, eulachon, shellfish, fish roe, seal, sea lions, and sea otter. Terrestrial resources are also traditionally harvested and include: tree bark, planks, berries, bird eggs, deer, elk, bear, and other animals. As well, Aurora LNG understands that the Project may be located nearby areas of potential cultural and spiritual significance for these groups. First Nations community members also use the marine area for commercial fishing purposes.

Aurora LNG has initiated consultations and will continue work with each of the five First Nations to understand their current and historic uses of the Grassy Point area and surrounding marine environment for the purpose of assessing the potential effects of the Project on their respective interests.

7.12 Environmental Setting

Climate

The main climatic processes in the northwest coastal area are driven by a high frequency of frontal systems arriving from the Pacific Ocean. Constant streams of oceanic low pressure systems bring mild, moist air and create cloudy, wet weather conditions during winter. The climate of Grassy Point is

dominated by fog, cloud, and drizzle. Annual precipitation varies, but can exceed 2500 mm. In general, October through to December are the wettest months. The area receives very little precipitation in the form of snow. The Pacific Ocean moderates temperatures in the area, with average temperatures ranging from 2°C in winter to15°C in summer. Winds blow predominantly from the southeast, ranging from 10 km/h to 20 km/h.

Air Quality

Existing air quality in the Grassy Point area is generally good. Based on ambient air quality data collected at monitoring stations in Prince Rupert and Port Edward and the BC MoE Mobile Air Monitoring Laboratory (MAML) at Westview Terminal, substances generally considered when assessing air quality (SO_2, PM_{10}, NO_2, O_3, CO) were below BC ambient air quality objectives. Some exceedances of H_2S were found at the Port Edward site primarily due to the Skeena Cellulose pulp mill, which closed in 2006.

Acoustic Environment

The existing ambient acoustic environment in the vicinity of Grassy Point is characterized primarily by sounds from the natural environment such as birds, wind, rain and waves along the coast. The closest community is Lax Kw'alaams. Existing sound levels at Grassy Point are expected to be similar to that of a quiet rural environment.

Geology and Geomorphology

The Grassy Point area is characterized as coastal lowlands with elevations generally less than 175 m above sea level. Surficial geology of the site is generally characterized as a morainal or glaciomarine veneer deposit located in lower areas with colluvium or till veneer deposits located on the upland areas. Extensive and deep organic (coastal muskeg) deposits occur in areas of flat or gentle sloping bedrock surfaces throughout the site.

The Grassy Point site is influenced by the Queen Charlotte Fairweather fault system located west of Haida Gwaii. This fault separates the Pacific and North American tectonic plates. This region is located within seismic zone #3, which indicates a zone of potential major earthquake damage with peak ground accelerations in excess of 6% g that have an annual probability of 1%.

Hydrology

Grassy Point is located in the Central Coast Mountains hydrologic zone. In this hydrologic zone, stream flow is maintained throughout the year in all but the smallest and highest elevation creeks. There are 10 first and second order streams mapped at the Grassy Point site (one of these has a watershed code: 910-832300). These range from approximately 300 m to 1800 m in length. One larger watercourse (910-831400), which is approximately 4,400 m in length, flows north through the center of the Project site. Peak annual flows in these creeks likely occur in the winter in response to rain storms off the Pacific Ocean.

Vegetation Resources

The Grassy Point site lies within the Hecate Lowland Ecosection of the Coastal Gap Ecoregion, which is located within the larger Coast and Mountains Ecoprovince.

The Project site is located entirely within the Central Very Wet Hypermaritime Coastal Western Hemlock (CWHvh2) BEC unit. The CWHvh2 biogeoclimactic zone occupies the outer coastal areas, usually less than 25 km from salt water, and ranges in elevation from 0 m to 600 m.

The natural vegetation of the Grassy Point site is primarily a mosaic of poor forest and bog. Productive forests are restricted to well-drained soils on moderate and steep slopes near the edges of the Tsimshian peninsula and dominated by western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), and Sitka spruce (*Picea sitchensis*). Yellow-cedar (*Chamaecyparis nootkatensis*), lodgepole pine (*Pinus contorta*), and red alder (*Alnus rubra*) are abundant on the outer coast where scrubby forests grow on organic soils over bedrock. Because fires occur rarely, seral stands were uncommon before clearcut logging began.

The characteristic understory species are salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), deer fern (*Blechnum spicant*), false lily-of-the-valley (*Maianthemum dilatatum*), fern-leaved goldthread (*Coptis aspleniifolia*), skunk cabbage (*Lysichiton americanum*), and various bryophyte species (*Rhytidiadelphus loreus, Mnium* spp*., Sphagnum girgensohnii, Eurhynchium oreganum, Scapania bolanderi,* etc.).

According to information contained in the BC Conservation Data Centre (CDC), 32 plant species of conservation concern, including 25 blue-listed species and seven red-listed species, have potential to occur within 4 km of the Project area. This includes 15 vascular plant species (14 flowering plants and a fern), 15 bryophyte species (11 true mosses (Bryopsida) and four peat-mosses (Sphagnopsida)), and a lichen species (*Pseudocyphellaria rainierensis*). This lichen is listed as a species of special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Ac*t (*SARA*).

Thirteen blue-listed and four red-listed ecosystems potentially occur within approximately 4 km of the Project area. This includes 12 forest ecosystems and five wetland ecosystems (three fens, one marsh, one swamp). Four ecosystems are explicitly defined as red- or blue-listed ecological communities (i.e. legally designated) in the Central and North Coast Land Use Objectives Order for Ecosystem Based Management (EBM) Implementation.

Wildlife Resources

In the CWH zone, common large mammal species include black bear (*Ursus americanus*), grizzly bear (*Ursus arctos*), gray wolf (*Canis lupus*), and black-tailed deer (*Odocoileus hemionus*).

Four amphibian species and two reptile species are expected to occur in the region: western toad (*Anaxyrus boreas*), rough skinned newt (*Taricha granulosa*), long-toed salamander (*Ambystoma macrodactylum*), northwestern salamander (*Ambystoma macrodactylum*), common garter snake

(*Thamnophis sirtalis*), and western garter snake (*Thamnophis elegans*). Although not documented in any regional studies, coastal tailed frog (*Ascaphus truei*) may also be found in the region.

Common birds expected to occur at Grassy Point include bald eagle (*Haliaeetus leucocephalus*), common raven (*Corvus corax*), dark-eyed junco (*Junco hyemalis*), and glaucous-winged gull (*Larus glaucescens*). There are two Important Bird Areas (IBA) within the vicinity of Grassy Point: BC 124 and BC 125. BC124 extends from Big Bay south to Delusion Bay. Birds such as black turnstone (*Arenaria melanocephala*), brant (*Branta bernicla*), colonial water birds and seabirds, dunlin (*Calidris alpina*), surf scoter (*Melanitta perspicallata*), and waterfowl have been observed to congregate in large numbers in this area. BC125 includes Grey and Green islets. Birds such as black oystercatcher (*Haematopus bachmani*), glaucous winged gull, pigeon guillemot (*Cepphus columba*), and harlequin duck (*Histrionicus histrionicus*) are known to occur in large numbers.

Species of Conservation Concern

There are 24 species of conservation concern that are known or likely to occur in the Prince Rupert region (BC CDC 2014). These are listed in Table 12.

Aquatic Resources

Marine Aquatic Resources

Chatham Sound is recognized by Fisheries and Oceans Canada (DFO) as an ecologically and biologically significant area (EBSA). Intertidal and subtidal habitats in this area support a diverse assemblage of marine algae, invertebrates and fish, as well as numerous species of marine mammals.

Marine intertidal and subtidal habitats in the area are characterized by rocky cliffs; rock, sand and gravel beaches; and sand flats, and support a wealth of algal and invertebrate species (BC MFLNRO 2005). Algal species including rockweed (*Fucus gardneri*), sea lettuce (*Ulva* spp.), red algae and a variety of canopy-forming and understory kelp species (e.g., *Laminaria* spp.) are likely present in the area. Eelgrass beds may also be present in the area and invertebrates such as barnacles likely inhabit the foreshore environment. Eelgrass and kelp beds provide essential feeding and rearing habitat for an array of species including juvenile salmon, Pacific herring (*Clupea pallassi*) and Dungeness crabs (*Metacarcinus magister*).

Table 12 Species of Conservation Concern within the Prince Rupert Region

Species Name	Scientific Name	SARA Status	COSEWIC Status	BC Status
Mammals				
Grizzly Bear	*Ursus arctos*		SC	Blue
Wolverine	*Gulo gulo luscus*		SC	Blue
Fisher	*Pekania pennanti*			Blue
Keen's Myotis	*Myotis keenii*	SC (Schedule 3)	DD	Red
Little Brown Myotis	*Myotis lucifugus*		E	Yellow
Amphibians				
Western Toad	*Anaxyrus boreas*	SC (Schedule 1)	SC	Blue
Coastal Tailed Frog	*Ascaphus truei*	SC (Schedule 1)		Blue
Birds				
Surf Scoter (M)	*Melanitta perspicillata*			Blue
Ancient Murrelet (M)	*Synthliboramphus antiquus*	SC (Schedule 1)	SC	Blue
California Gull (M)	*Larus californicus*			Blue
Cassin's Auklet (M)	*Ptychoramphus aleuticus*			Blue
Common Murre (M)	*Uria aalge*			Red
Marbled Murrelet (M)	*Brachyramphus marmoratus*	T (Schedule 1)	T	Blue
Red-necked Phalarope (M)	*Phalaropus lobatus*			Blue
Tufted Puffin (M)	*Fratercula cirrhata*			Blue
Band-tailed Pigeon (M)	*Patagioenas fasciata*	SC (Schedule 1)	SC	Blue
Peregrine Falcon	*Falco peregrinus pealei*	T (Schedule 1)	SC	Blue
Northern Goshawk	*Accipiter gentilis laingi*	T (Schedule 1)	T	Red
Sooty Grouse	*Dendragapus fuliginosus*			Blue
Barn Swallow (M)	*Hirundo rustica*		T	Blue
Olive-sided Flycatcher (M)	*Contopus cooperi*	T (Schedule 1)	T	Blue
Great Blue Heron (M)	*Ardea herodias fannini*	SC (Schedule 1)	SC	Blue
Western Screech-Owl	*Megascops kennicottii kennicottii*	SC (Schedule 1)	T	Blue
Short-eared Owl	*Asio flammeus*	SC (Schedule 1)		Blue

NOTES:
DD = Data Deficient
E = Endangered
T = Threatened
SC = Special Concern
M = Migratory

Marine waters surrounding Grassy Point are within DFO Important Areas (IAs) for tanner crab (*Cancer baerdii*), green sea urchin (*Strongylocentrotus droebachiensis*), and Pacific herring (*Clupea pallasii*). A DFO IA for shrimp is also located near Grassy Point. All five species of Pacific salmon (*Onchorhynchus* spp.) are abundant in the waters surrounding Grassy Point, especially during the migration of juvenile and adult salmon to and from the Nass and Skeena rivers. These and other fish and invertebrate species support important commercial, recreational and Aboriginal fisheries in the area.

The productive waters of Chatham Sound are also home to numerous species of marine mammals, including harbour porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoided dalli*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), killer whale (*Orcinus orca*), grey whale (*Eschrichtius robustus*), minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), harbour seal (*Phoca vitulina*) and Steller sea lion (*Eumetopias jubatus*).

A number of marine species listed under the federal *Species at Risk Act (SARA)* have the potential to use habitats in Chatham Sound. These include northern abalone (*Haliotis kamtschatkana*), yelloweye rockfish (*Sebastes ruberrimus*), bluntnose sixgill shark (*Hexanchus griseus),* Steller sea lion (*Eumetopias jubatus)*, harbour porpoise (*Phocoena phocoena*), northern resident killer whale (*Orcinus orca*), Bigg's (Transient) Killer whale (*Orcinus orca*), gray whale (*Eschrichtius robustus*), sei whale (*Balaenoptera borealis*), fin whale (*Balaenoptera physalus*), and blue whale (*Balaenoptera musculus*).

Freshwater Aquatic Resources

Anadromous and resident fish species important for commercial, recreational, and/or aboriginal fisheries that could be present within the watercourses of Grassy Point include coho salmon (*Oncorhynchus kisutch*), pink salmon (*O. gorbuscha*), chum salmon (*O. keta*), cutthroat trout (*O. clarki*), rainbow trout/steelhead (*O. mykiss)*, and Dolly Varden (*Salvelinus malma)*. Historical fish capture information is not available for the majority of the watercourses. The exceptions are for Trail Bay Creek, where pink salmon, Dolly Varden, and rainbow trout have been captured, and watercourse 910-831400, where coho salmon, Dolly Varden, and sculpin (not identified to species) have been captured.

7.13 Potential Project Effects

Natural Environment

Air Quality

Key Project activities that could cause a change in air quality include those that involve emissions of criteria air contaminants (CAC). The primary substances of concern include gaseous compounds (SO_2, NO_x, CO), particulate matter (PM_{10}, $PM_{2.5}$), and GHGs. Anticipated sources of air emissions include:

- Construction: land clearing, blasting, grading, hauling, material handling, fuel combustion, power generation

- Operations: vehicle traffic, power generation, fuel combustion, LNG vessels and other marine support vessels, and fugitive emissions from the LNG facility
- Decommissioning: fuel combustion, removal of infrastructure, backfilling and contouring

Climate (GHG Management)

The Project will result in the emission of greenhouse gases, including CO_2 and methane, which will contribute to global climate change. GHG emissions of concern will be related primarily to the operational phase, although some emissions are also expected to occur during site preparation (i.e., clearing of vegetation to accommodate the facility footprint) and construction.

Acoustic Environment

The Project has the potential to affect the acoustic environment of the surrounding area as a result of noise emissions generated by equipment and vehicles during site preparation and onshore construction activities, and operation of the LNG facility and marine terminal. In-water activities such as construction of the trestle and marine terminal, dredging and operation of marine vessels could also generate underwater noise, which could adversely affect the marine acoustic environment. Increased noise levels could result in human health effects (annoyance, sleep disturbance) and/or wildlife effects (displacement and disturbance).

Vegetation and Wetland Resources

The Project has the potential to cause changes in vegetation and wetland resources due to a direct loss of these resources from vegetation clearing and surface disturbance, as well as air emissions and dust deposition. Site clearing and preparation will remove vegetation from the footprint and may affect surrounding vegetation indirectly through changes in environmental conditions.

The potential direct and indirect effects on vegetation and wetland resources could include:

- Change in abundance of plant species of interest, including at-risk species, species of cultural significance, and invasive species
- Change in abundance or condition of ecological communities, including those of conservation interest (e.g., old forest and provincially at-risk)
- Change in wetland function (this may be subject to the “no net loss of wetland functions” of the Federal Policy on Wetland Conservation (Government of Canada 1991).

Wildlife Resources

Construction and operation of the facility has the potential to affect terrestrial wildlife and marine birds, including migratory birds. The key potential effects on wildlife resources include:

- Change in habitat: loss or alteration of terrestrial habitat directly due to vegetation clearing during site preparation and indirectly due to sensory disturbance during construction and operation, and atmospheric noise and lighting

- Change in movement: alteration of movement patterns during construction and operation, including displacement of marine birds, due to noise, human activity and vessel activity
- Change in mortality risk: alteration of mortality risk during construction and operation of the facility, including risk of collisions for marine birds.

Marine Resources

The *Fisheries Act*, the *Species at Risk Act*, and supporting regulations and policies define the marine species that need to be considered during a federal environmental assessment. This includes all marine fish and marine plants, as defined by the *Fisheries Act*.

Certain Project-related activities such as construction of the marine terminal infrastructure, dredging and disposal at sea, wastewater discharges, and LNG vessel operations could adversely affect marine fish and fish habitat, including marine mammals, and marine plants. The key potential effects on marine resources include:

- Permanent alteration or destruction of marine fish habitat (i.e., marine riparian habitat, intertidal habitat, and/or subtidal habitat, including marine plants) during construction as a result of dredging, pile driving, and disposal of dredgeate
- Injury or mortality of marine fish, invertebrates and/or marine mammals due to underwater noise created by in-water construction activities
- Injury or mortality of marine mammals due to marine vessel strikes
- Change in marine sediment or water quality due to increased turbidity, re-suspension of existing contaminants during in-water construction, and operations (i.e., stormwater/wastewater discharge)
- Behavioural disturbance to marine fish and marine mammals due to underwater noise generated by construction and operation-related activities.

Freshwater Resources

The Project has the potential to cause changes in freshwater fish and fish habitat. Key potential effects include:

- Permanent alteration or loss of fish habitat from clearing of riparian forest, and construction of the LNG facility, haul road, marine terminal, material offloading ramp, and temporary construction infrastructure and facilities
- Reduced habitat quality due to changes in surface water quality and sediment quality from sediment releases and introduction of nutrients and metals from blasting (potential effect dependent upon site geology).

Social Environment

Infrastructure and Services

The in-migration of workers, their spouses and dependents as well as an increase in the number of transient workers during construction and operation of the Project has the potential to increase local and regional populations and alter demographics. Changes in population and demographics could, in turn, increase demand on community infrastructure and services (e.g., utilities, transportation, education, emergency services, and social and recreational services) and cause a change in housing availability in the City of Prince Rupert, the District of Port Edward, and nearby First Nations communities.

Land and Marine Use

Construction and operation of the LNG facility and marine terminal could affect other tenured and non-tenured land and resources uses, including forestry, trapping, guide outfitting, and recreation activities, currently occurring on or near the proposed Project footprint. Fishing and marine harvesting are important activities in the SQRD, and it is possible that the marine terminal, exclusion zones, and vessel traffic could affect marine navigation in waters used for commercial, recreational, and subsistence fishing and other marine uses.

Economic Environment

The Project will create approximately 4,000 to 5,000 short-term jobs during the five-year construction period, and an estimated 400 long-term jobs during Project operations. Substantial indirect investments into the community will also occur in the form of additional goods and services required by the Project itself and employees drawn to the area. Potential adverse effects to the local and regional economies are also expected to occur as a result of competition for limited labour supply and changes in the economic activity of other sectors (i.e., cost of living, availability of goods and services).

Human Health

The Project has the potential to interact with human health through various pathways. Emissions of contaminants from facility construction and operation, and from vessels berthed at the facility could degrade ambient air quality, resulting in inhalation health risks. The primary air contaminants of interest are SO_2, NO_2, CO, respirable particulate matter ($PM_{2.5}$ and PM_{10}), and H_2S. Human health could also be affected by emissions to both the terrestrial and marine environments, as well as noise emissions, which could lead to elevated stress and annoyance levels.

The potential presence of historic contaminants in marine sediments and soils may pose a risk to human health if contaminants are re-introduced to the environment during Project construction activities. These contaminants could be taken up by terrestrial or marine biota, and subsequently ingested by humans through consumption of traditional foods.

Heritage Environment

Potential effects on heritage and archaeological resources, if they are present, are likely to occur as a result of site preparation activities during Project construction. In particular, the clearing of vegetation and any excavation works that disturb native sediments have the potential to disturb archaeological and heritage resources. It is anticipated that any adverse effects on heritage resources will be mitigated through data recovery or other standard acceptable approaches to mitigation.

Operational activities could also cause damage to archaeological and heritage sites even if they have been mitigated by data recovery. For example, a large lithic site may be sample excavated and monitored during construction, but individual artifacts could be exposed by vehicle traffic, pipeline monitoring or accessing service sites.

Cumulative Effects and Transboundary Effects

The scope of the environmental assessment will consider the potential for direct and indirect effects of the Project on the biophysical and human environments, as well as potential cumulative effects, and trans-boundary effects. The cumulative effect assessment will include:

- Past projects (e.g., Canpotex, Fairview Terminals 2)
- Current and future marine terminal infrastructure and industrial facilities in Prince Rupert and Port Edward
- Development of other proposed LNG projects in the area (e.g., Pacific Northwest LNG, Prince Rupert LNG, Woodside, LNG Canada, Kitimat LNG)
- Development of gas pipelines associated with the Project and other proposed LNG projects
- Marine traffic associated with current and reasonably foreseeable projects and activities between Triple Island and the Port of Prince Rupert

Aboriginal Communities

The Project could potentially affect traditional land and marine-based activities of Aboriginal people such as hunting, fishing, gathering, and tree harvesting as a result of changes in land use, restricted access and increased marine traffic, Marine resources traditionally used by Aboriginal people include: seaweed, halibut, salmon, eulachon, shellfish, fish roe, seal, sea lions, and sea otter. Terrestrial resources include: tree bark, planks, berries, bird eggs, deer, elk, bear, and other animals.

Traditional activities of Aboriginal people could also be affected indirectly as a result of potential changes to the biophysical environment, including effects on freshwater and marine fish, fish habitat and aquatic species, vegetation resources and wildlife resources, including marine birds, which could affect harvesting patterns and/or harvesting success.

Aurora LNG anticipates that the Project has the potential to adversely affect Aboriginal people through human health effects, social and cultural effects and effects on heritage resources. The following is a list of potential adverse effects that may be included in the assessment. The list will be refined based on ongoing discussions with First Nations.

- Human health effects
  - Degradation of air quality as a result of air emissions generated by construction equipment and activities (e.g., blasting) and operation of the LNG facility and marine vessels
  - Sensory disturbance due to noise exposure during construction and operation activities
- Social effects
  - Sensory disturbances that affect traditional lifestyle values
- Heritage effects
  - Damage or destruction of archaeological or heritage sites from site preparation and ground disturbances
- Cultural effects
  - Changes in spiritually or culturally important areas
  - Changes in traditional use areas

Federal Land and Other Lands

Most land-based environmental effects are anticipated to be localized to the Project area within provincial Crown lands. Marine-based environmental effects are expected to occur in waters outside of PRPA jurisdiction. Environmental effects are not anticipated to occur on federal lands, or in a province other than BC. Due to the proximity of the Project site to the US border (15 km), there is potential that trans-boundary air quality effects could occur.

PART C – DIGBY ISLAND OPTION

8 DIGBY ISLAND SITE OPTION

8.1 Site Location

Digby Island is on the northwest coast of BC, approximately 700 km north of Vancouver. The potential Project site is located on the southeast corner of Digby Island, approximately 3 km southwest of Prince Rupert, and 50 km south southeast of the US border (Figure 6). Digby Island is situated within the Skeena-Queen Charlotte Regional District (SQCRD) and the North Coast Forest District.

The LNG facility will be located on approximately 200-400 hectares (ha) of provincial Crown land. Coordinates for the approximate centre of the site are:

- Latitude/Longitude - 54°16’5”N/130°22’58”W
- Universal Transverse Mercator – Zone 9 East 409945.6 North 6014228.5

The marine terminal will be located at the south end of Digby Island on a water lot within the jurisdiction and administration of the PRPA. It is expected that the lot would be leased from the PRPA under a site lease agreement with Aurora LNG.

The nearest federal land to the proposed Project site is a First Nation Reserve that belongs to the Metlakatla First Nation (S 1/2 TSIMPSEAN 2) and it is approximately 5 km away, on the northeastern part of Digby Island.

8.2 Land Ownership and Zoning

Digby Island is a small island with two small communities of Dodge Cove and Crippen Cove. These communities are located on small lots of private lands on the east side of the island approximately 2 km and 6 km from the Project site, respectively. The northeastern portion of the island is a First Nations Reserve belonging to the Metlakatla (S 1/2 Tsimpsean 2), which is located about 5 km from the Project site. Other nearby First Nations reserves include Wilnaskancaud 3, Shoowahtlans 4, Tugwell Island 21, which are located approximately 10 km from the proposed site. The nearest identified permanent, temporary or seasonal residence is located approximately 0.4 km north to the proposed project site.

The northwestern portion of Digby Island contains the Prince Rupert Airport, which is on lands owned by the City of Prince Rupert through the incorporation of the Prince Rupert Airport Authority. An Order-in-Council reserve extends east to west, connecting the airport to east edge of the island.

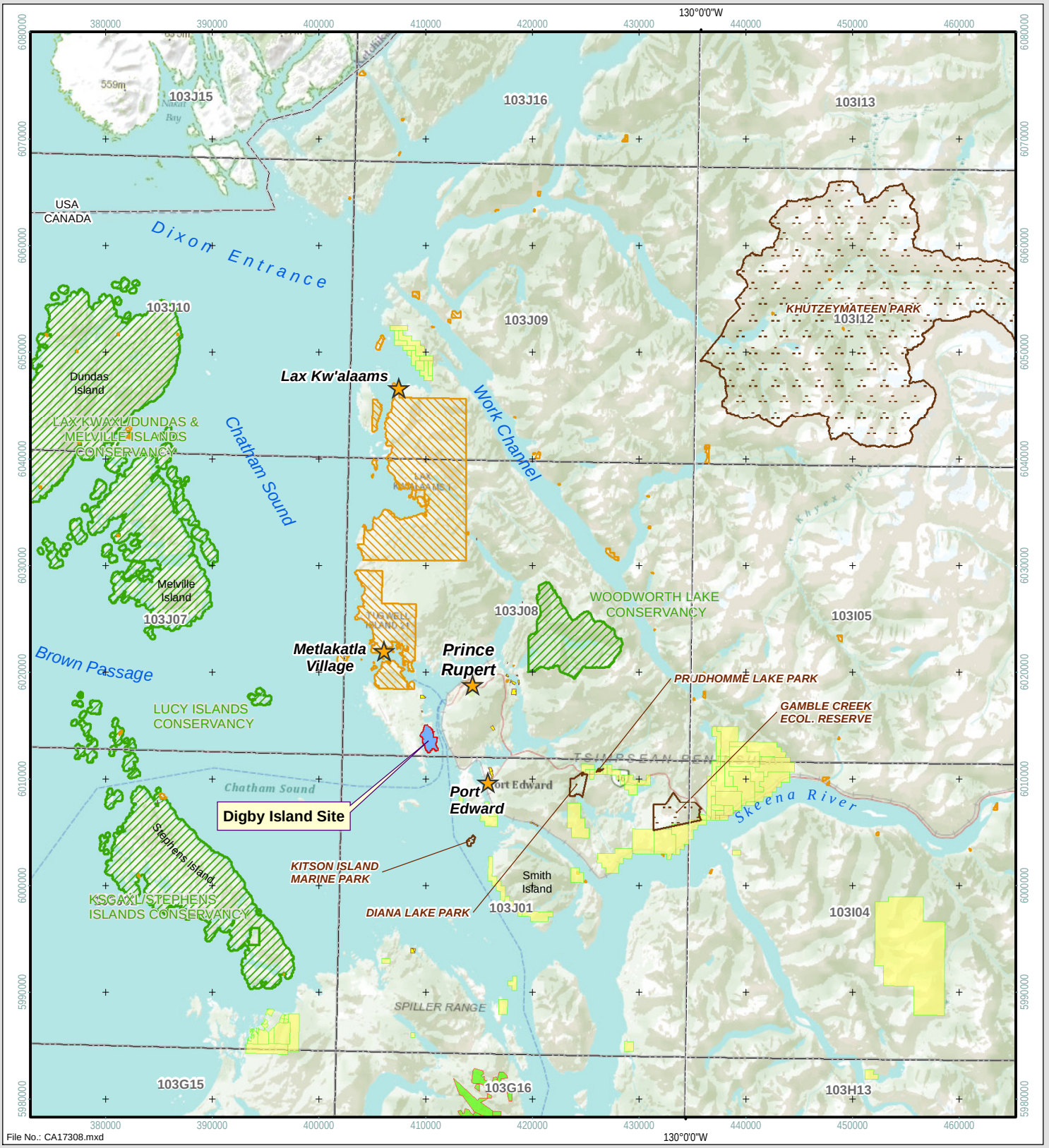
There is a CBC repeater station on CBC Hill near Dodge Cove, and several submerged BC hydrolines near Dodge Cove that connect Digby Island to Kaien Island. A notation of interest exists immediately west of Dodge Cove that extends linearly northwards. The remainder of the island is designated as a map reserve. The proposed Project site is situated within this map reserve. There are no Crown tenures or permits in the proximity to the Digby Island site. The only federal Crown lands within the proximity of the site are marine areas administered by the PRPA. Discussion with the PRPA indicates that there are no registered water lots within the project area. A description of the lands proposed for the LNG facility site and marine terminal is provided in Table 13 and Figure 6.

The Digby Island Project Site Legal Description is:

Crown Land – Range 5 Coast District within Units 1, 11, 21, 22, 31 Block D & Units 9, 10, 20, 30 Block C, 103-J-08.

Table 13 Lands Description for the Digby Island Project Site

LNG Facility	Marine Terminal	Material Offloading Area
PIN_SID: 2586370District Lot 1993 Range 5 Coast District	PIN_SID: 2586370 District Lot 1993 Range 5 Coast District	PIN_SID: 2586370 District Lot 1993 Range 5 Coast District
PIN_SID: 1685201 District Lot 1993 Range 5 Coast District except assigned LOT A, Plan 1620, Assigned LOT B, LOT C, Plan 954	PIN_SID: 1685201 District Lot 1993 Range 5 Coast District except assigned LOT A, Plan 1620, Assigned LOT B, LOT C, Plan 954	PIN_SID: 1685201 District Lot 1993 Range 5 Coast District except assigned LOT A, Plan 1620, Assigned LOT B, LOT C, Plan 954
PIN_SID: 1686821 Block E District Lot 1993 Range 5 Coast District		



File No.: CA17308.mxd

Legend

- Aurora LNG - Digby Island
- Protected Areas
- First Nations Reserve
- Mineral & Placer Tenure
- Woodlot Licence
- Conservation Areas
- Urban Centre

0 2 4 8 12 16 20
kilometre
0 1.25 2.5 5 7.5 10
Miles

1:500,000

N

Projection: UTM Zone 9
Datum: NAD 83

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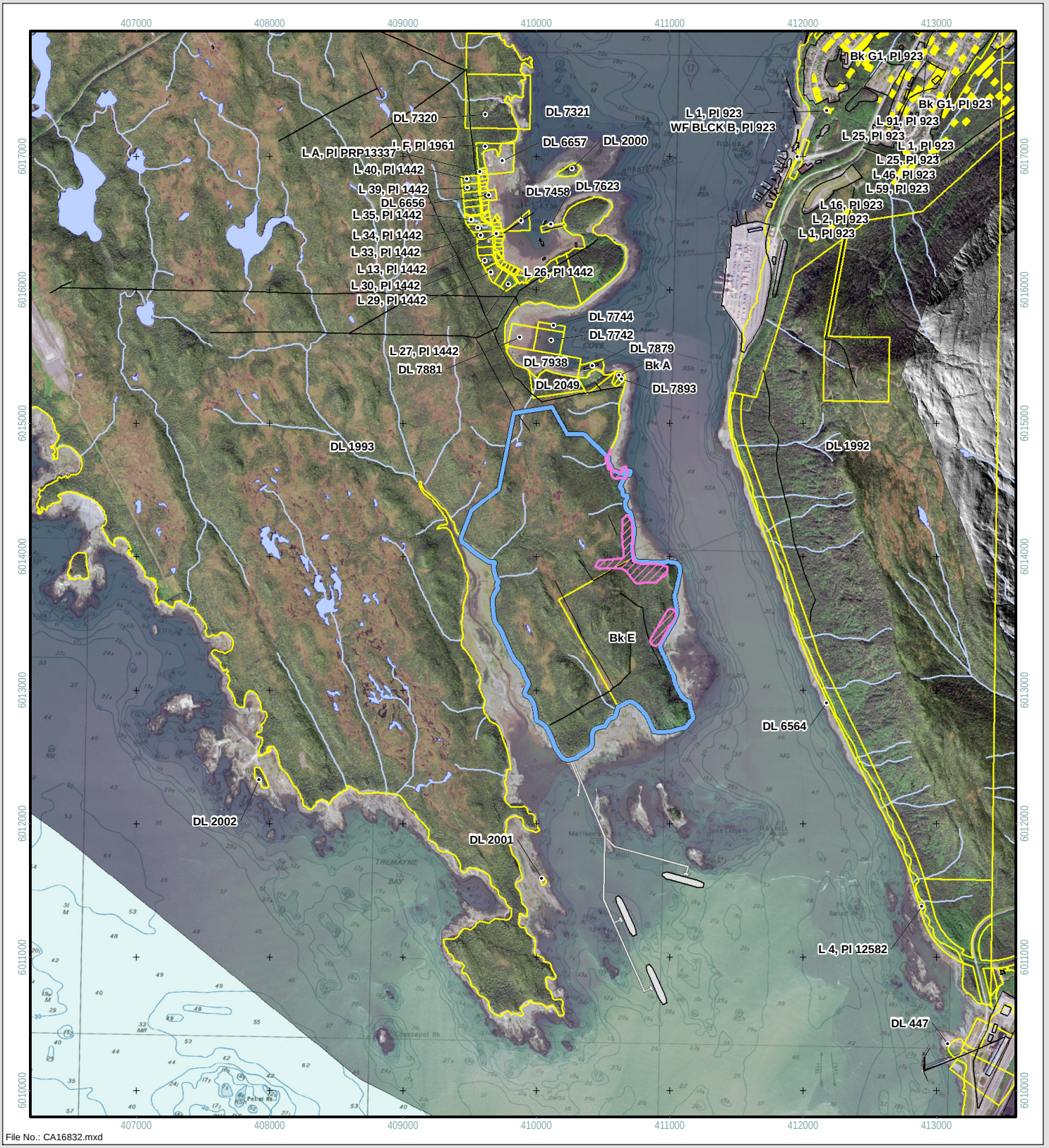
PROPOSED PROJECT LOCATION
DIGBY ISLAND SITE

Date: June 6, 2014

FIGURE 6



File No.: CA16832.mxd

Legend

- Digby Island IUP
- District Lots
- Archeological Area
- Marine Terminal
- Lake
- River / Stream
- Road & Cutline

0 0.15 0.3 0.6 0.9 1.2 1.5
kilometre

0 0.1 0.2 0.4 0.6 0.8
Miles

1:40,000

N

Projection: UTM Zone 9
Datum: NAD 83

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DISTRICT LOTS
DIGBY ISLAND SITE

Date: June 6, 2014

FIGURE 7

8.3 Land Use

The Digby Island site is within the Skeena Block of the North Coast Timber Supply Area. Trapline (TR0614T029) overlaps with the proposed Project site, but no other tenured land uses have been identified in the area. The coast line along the south end of Digby Island is included within the provincial Recreation Features Inventory.

8.4 Marine Use

The marine channel between Digby Island and Kaien Island is the main navigable entrance to the Prince Rupert Harbour. This channel experiences significant volumes of commercial marine traffic, as well as ferry traffic. The Prince Rupert Port Authority (PRPA) governs these waters, and Transport Canada has installed several navigational aids between the islands. In 2008, there were 281 vessels calling at the Port of Prince Rupert. With expansion of the Fairview Terminal and Ridley Island Inc. terminal, and the Canpotex facility, the number of vessels is expected to increase by 864 vessels per year by 2018.

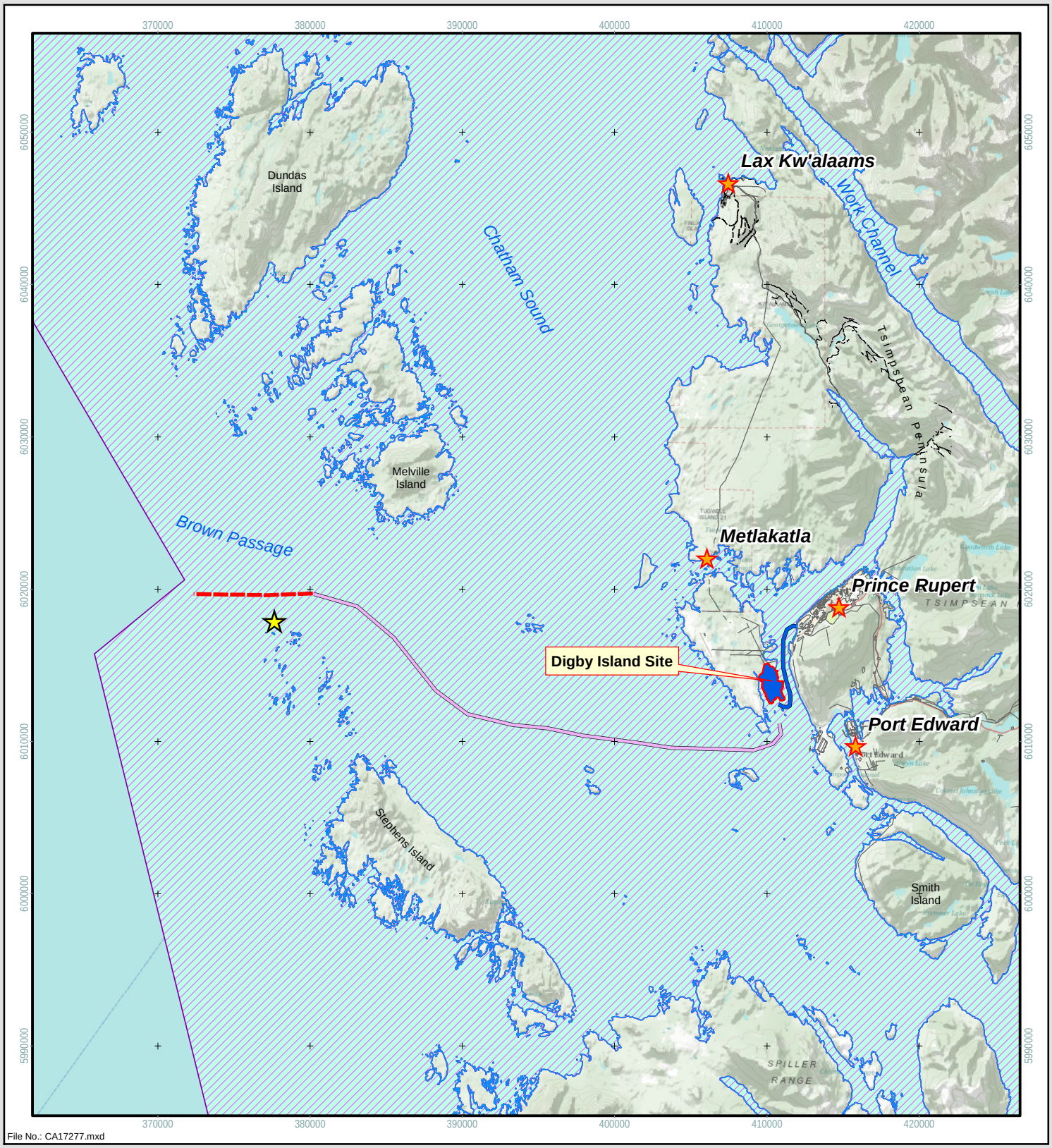
Commercial shrimp trawl and prawn trap fisheries occur in waters surrounding the Digby Island site, and a prawn (trawl) fishery occur in waters to the south and west. A commercial salmon gillnet and seine fishery also occurs off the south end of Digby Island. A First Nations Food fishery occurs in waters immediately offshore, to the east, west and south of the Project site.

8.5 Project Access

The southeast portion of Digby Island is relatively undeveloped and access to site is currently limited to helicopter and boat from Prince Rupert. The island is served by the Prince Rupert Airport and daily bus and ferry transportation. The airport is located approximately 3.5 km from the Project site and 9 km west of Prince Rupert, and currently handles general and commercial aviation aircraft. It is serviced by two air carriers, which provide direct connections between Prince Rupert area and Vancouver, Sandspit and Masset.

Improvements to transportation to Digby Island have been identified as a high priority by the PRPA. In its draft 2020 Land Use Management Plan, the PRPA has identified the need for road access to Digby Island as it would offer substantial benefits for long-term industrial use. However, this is not within the scope of the proposed Project.

During the construction and operation phases, access to the Digby Island site will be by air and marine vessels. The marine access route for LNG carriers will start near the Triple Island Pilotage station where a BC marine pilot from the Pacific Pilotage Authority will board the vessel, and continue east along Hecate Strait. The vessel will turn southeast and circle the south end of Digby Island to reach the Project site (Figure 8).



Legend

- Aurora LNG Area - Digby Island
- Urban Centre
- Triple Islands Pilot Staion
- Compulsory Pilotage Areas
- Road & Cutline

Aproach Route (Conceptual)

- Pilot Boarding Zone
- Digby Island Route
- Digby Island Water Supply Route

0 1.5 3 6 9 12 15
kilometre

0 1 2 4 6 8
Miles

1:350,000

N

Projection: UTM Zone 9
Datum: NAD 83

AURORA LNG

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MARINE ACCESS ROUTES
DIGBY ISLAND SITE

Date: June 3, 2014

FIGURE 8

8.6 Past and Current Environmental Studies in the Region

Two relevant environmental assessments have been conducted for projects in close proximity to Digby Island: the 2012 Canpotex Potash Terminal Project on Ridley Island, and the 2013 Fairview Terminal Phase II Expansion Project. In addition, there are two other LNG-related projects within the Prince Rupert region that are currently within the environmental assessment and review process:

- Prince Rupert LNG (BG Group and Spectra Energy Natural Gas)
- Pacific Northwest LNG (PETRONAS & Progress)

Existing publicly available information for these projects, in addition to available scientific literature and grey literature (technical reports, government reports) will be reviewed for this Project. Project-specific baseline studies will also be conducted to support the environmental, socio-economic and health assessments for the Project.

8.7 Project Components

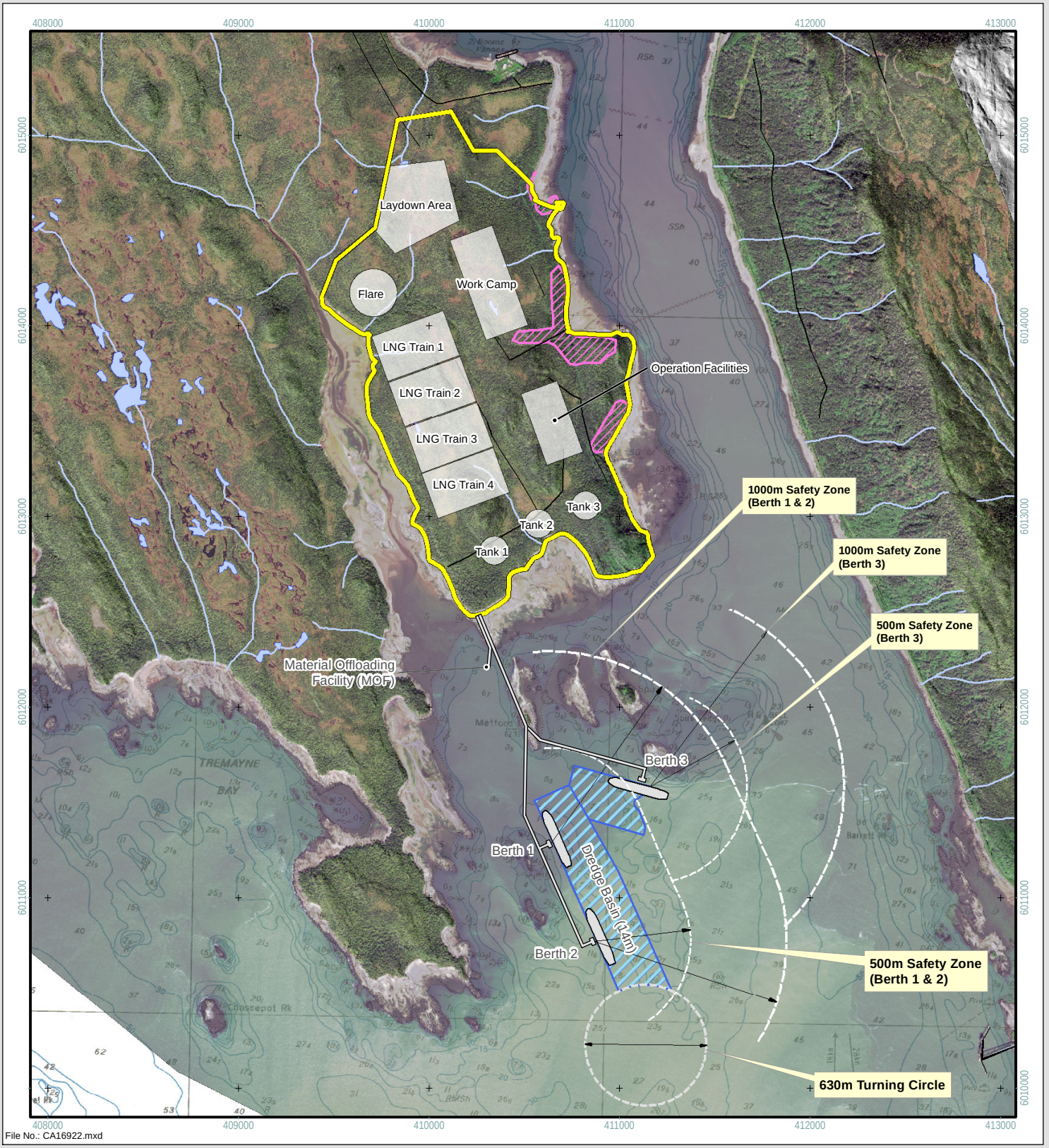
The general characteristics of the Project components are consistent with existing LNG production facilities and include the LNG facility, marine terminal, supporting infrastructure, and temporary infrastructure. The core project components are identified in Table 14.

Table 14 Key Components of the Project

Infrastructure	Project Components
LNG Facility	Feed gas receiving equipment Natural gas treatment equipment to remove impurities (CO_2, H_2S, mercury and natural gas liquids(NGLs)) from feed gas Storage tanks and infrastructure for staging and loading of NGLs Liquefaction refrigerant storage Four 5 mtpa to 6 mtpa liquefaction trains with gas turbine-driven compressors Up to three 180,000 m^3 LNG storage tanks Flare system Continuously manned control room
Marine Terminal	A conventional trestle Loading and offloading arms and associated infrastructure Up to three LNG carrier berths Cryogenic rundown and vapour return pipelines between the LNG facility and marine terminal Possible loading of NGL
Supporting Infrastructure	Water supply pipeline from MOF to LNG facility Wastewater treatment systems Nitrogen and compressed air equipment Fuel storage Administration and maintenance buildings Materials offloading facility (MOF)

Infrastructure	Project Components
	Power infrastructure for the LNG facility and marine terminal Fire water system Demineralization water system Process heat system Solid waste collection and disposal Wastewater collection and treatment Facility stormwater management system Facility and maritime security Medical centre and fire station Heliport for medevac Camp for operational staff and maintenance turnaround personnel Haul road
Construction-related Infrastructure and Facilities	Construction camps Additional temporary laydown areas Construction offices

A conceptual layout of the Project components is illustrated in Figure 9.



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Legend

- Digby Island Site
- Marine Terminal & LNG Vessel
- Archeological Area
- Conceptual LNG Layout
- Conceptual Dredge Basin
- Road & Cutline
- Lake
- River / Stream

0 0.1 0.2 0.4 0.6 0.8 1
kilometre

0 0.075 0.15 0.3 0.45 0.6
Miles

1:28,000

N

Projection: UTM Zone 9
Datum: NAD 83

AURORA LNG

CNOOC nexen INPEX

CONCEPTUAL LNG LAYOUT
DIGBY ISLAND SITE

Date: June 6, 2014

FIGURE 9

Aurora LNG is currently evaluating three alternate berthing locations (Figure 10). Final site selection will be made once further site evaluations and assessments are completed.

LNG Facility

It is anticipated that the LNG facility will comprise a land-based modular unit for receiving and processing natural gas into LNG. The facility will include the infrastructure required to receive natural gas from the supply pipeline, gas pre-treatment, gas liquefaction and LNG storage and loading.

The facility will be built in phases, with two LNG trains constructed during the first phase each with a processing capacity of between 5 and 6 mtpa. An additional two LNG trains will be constructed as required by market conditions. The exact phasing and optimization of the trains' size will be established during early pre-front end engineering and design (Pre-FEED).

The pre-treatment, processing and LNG production facilities and processes are described below.

Natural Gas Supply

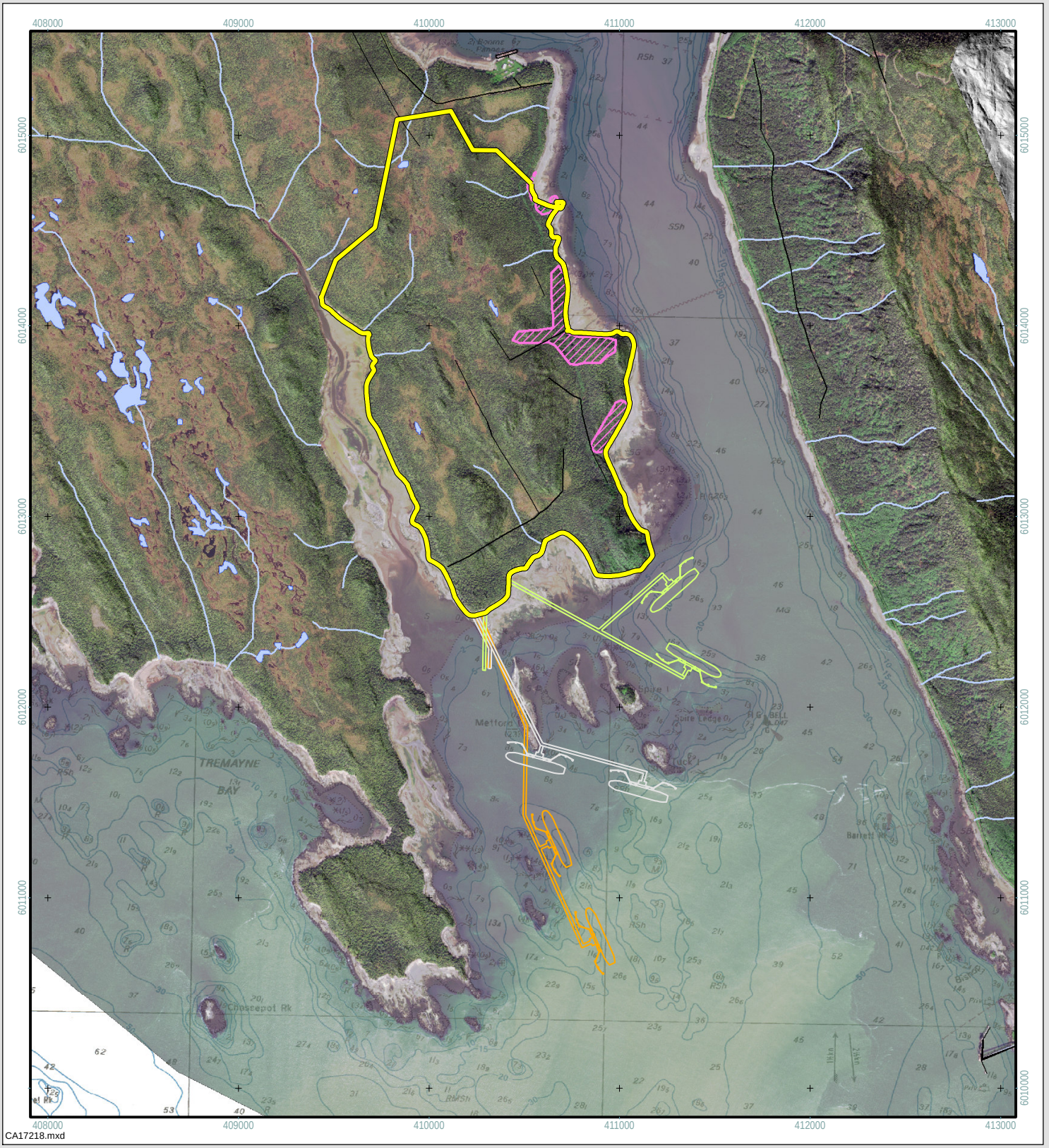
Supply of natural gas for the Project will be sourced primarily from the Horn River and the Liard and Cordova basins of northeast BC through a combination of proprietary natural gas holdings in northeast BC and third-party gas, which may include, but not limited to, purchases at market hubs, gas supply arrangements and upstream joint ventures. Natural gas will be delivered to the Project via a third party-owned pipeline(s), which is yet to be determined.

Natural Gas Reception System

The natural gas supply pipeline will enter the property boundary via a dedicated pipeline delivery station.

Natural Gas Pre-treatment Process

The natural gas will be cleaned by separating off impurities and various non-methane hydrocarbons and fluids for safety of the process and to ensure that the composition of the final LNG product meets end-use specifications. Any mercury in the feed gas will be removed to prevent corrosion of the cryogenic equipment. Trace amounts of carbon dioxide (CO_2) and hydrogen sulphide (H_2S) will then be removed. The feed gas will then undergo dehydration to remove water to prevent freezing during the liquefaction process. Components of the gas treatment infrastructure will include: mercury removal unit, acid gas removal unit, gas dehydration unit, and natural gas liquid (NGL) extraction unit.



CA17218.mxd

Legend

- Digby Island Site
- Archeological Area
- Road & Cutline
- Lake
- River / Stream

Marine Terminal Options (Conceptual)

- Marine Terminal Option A
- Marine Terminal Option B
- Marine Terminal Option C

0 0.1 0.2 0.4 0.6 0.8 1
kilometre

0 0.075 0.15 0.3 0.45 0.6
Miles

1:28,000

N

Projection: UTM Zone 9
Datum: NAD 83

AURORA LNG

nexen INPEX

SITING OPTIONS FOR THE LNG CARRIER BERTHS AT THE MARINE TERMINAL, DIGBY ISLAND SITE

Date: March 20, 2014

FIGURE 10

Natural Gas Liquefaction Process

Gas leaving the NGL extraction unit will be routed to the liquefaction unit of the facility, where it will be condensed into a liquid by cooling it to a cryogenic temperature of approximately -162°C. In liquid form, the natural gas will be reduced in volume by approximately 600 times at near normal ambient pressure, allowing it to be efficiently and safely stored and shipped by sea. Once the LNG is produced, it will be stored at atmospheric pressure in one of three insulated LNG storage tanks located in the LNG tank area.

The NGL will be directed to storage tanks located in the LNG tank area, and will be either used for onsite power generation or will be transported offsite to market.

Power Supply

Power supply during construction will be provided by diesel-powered generators.

During operation, the Project will require energy for the natural gas liquefaction process and to operate the plant units and non-process related infrastructure. The LNG liquefaction trains will utilize natural gas-fired turbines for the refrigeration compressor drivers. The LNG facility and marine terminal will require electrical power to operate supporting facilities and infrastructure. At this point in facility design (Pre-FEED), it is estimated that approximately 120 MW to 300 MW of electrical power could be required for Phase 1 depending on the selected process and refrigerant compressor drivers. The total power consumption at full site build out will be between 200 MW and 550 MW. It is likely that electricity for plant operations will be generated by on-site power generators driven by natural gas from the plant inlet. However, final decisions regarding the type of power generation and capacity will be studied and developed during the feasibility study and engineering phases.

Diesel generators will be provided on site during startup, and in the event of emergencies.

Safety Systems

Safety management systems, operating procedures, and risk assessments will be used to identify potential hazards and the safety measures required to protect facility personnel, equipment and the environment. Key safety-related equipment for emergency purposes will include flare stacks, shutdown and depressurization systems, fire protection, and safety flare systems.

A safety-instrumented system will be used at each LNG process train and the ship-loading facilities to manage the safety, shutdown and gas depressurization processes at the Project. The system will include a combination of manual and automatic shutdown and gas depressurization processes.

Fire protection and safety measures (operating procedures and emergency response plans) will be implemented at the Project to ensure protection of personnel and equipment. Response equipment, such as fire and gas detection systems, alarms, fire extinguishers, foam systems, firewater pumps, fire response vehicles, and personal protective equipment, monitors and passive protection, will be provided on site.

The flare system will provide reliable and safe disposal of liquid and vapour hydrocarbons during upset and emergency conditions, and during operational controlled events such as startup, shutdown, venting and purging. Gas flaring is not expected to occur during normal operating procedures, and is expected to occur only on an occasional basis.

Water Supply

Aurora LNG is intending to secure water for the Project from existing water supply infrastructure at the Port of Prince Rupert. However, onsite sources such as groundwater and desalinated seawater are also being investigated.

During construction, municipal water would be barged from the Prince Rupert port to the MOF (see Figure 4), for dust control, domestic uses and civil works. It is anticipated that construction activities will require one barge per day. During operations, municipal water will be fed to the water treatment systems providing potable water, demineralized water, utility water and firewater. The total projected water supply requirements for the Project are estimated to be approximately 875 m^3/d during construction, and 50 m^3/d during operations.

Water Treatment

SITE PREPARATION AND CONSTRUCTION

The Project area will require clearing and grubbing, soil stabilization, backfill and grading activities prior to the installation of permanent plant infrastructure. During site preparation, a temporary drainage and stormwater system will be established to collect and control stormwater flows and runoff from the site to the marine environment. The system will include internal and perimeter ditches, and erosion and sediment control measures.

A sanitary sewage facility will be established as part of the camp system for use during the construction and operations phases. Treated sewage effluent will be discharged to the marine environment once it meets current waste water requirements. Sewage sludge will be transported off site and disposed of at a local landfill. Prior to establishing the sewered site facilities, portable toilets will be available on site with offsite disposal to a licensed facility.

OPERATIONS

The design of the facility will include provision for effluent collection, segregation and treatment prior to discharge to the marine environment. Discharge of treated effluent will meet or exceed regulatory requirements.

Sanitary wastewater will be pumped to the treatment units where the wastewater will undergo biological oxidation, clarification and chlorination. The type of treatment will be determined during final design. The treated water will be monitored prior to discharge to ensure that it meets all applicable federal and provincial regulatory requirements.

Runoff from roads and buildings will drain into a drainage ditch system and discharged directly into the stormwater outfall. All contact water (i.e., runoff from the processing areas, process equipment and firewater system testing) will be directed to an oil separator where any oily residue will be skimmed off to a collection sump. The effluent will be treated and directed to the stormwater outfall.

Pipe-rack Corridor

A corridor between the LNG plant area, the LNG tank area and the marine terminal will contain the pipe-rack for cryogenic rundown lines, cool-down lines, fuel gas line from the BOG compressors, and utilities.

Haul Road

To accommodate the potential for modular construction and allow receipt of large items of equipment and gas turbine/compressors, a haul road will be required. The road will extend from the MOF and the LNG plant area to the LNG tank area, and will enable the movement of modules or pre-assembled units from the MOF to the LNG tank area. The haul road will be used throughout the operational phase of the Project for the movement of bulk refrigerants required for the liquefaction process, and large gas turbine rotor canisters required for refurbishment or repair.

Marine Jetty and LNG Loading

The Project will include a marine jetty and LNG loading facility capable of accommodating Q-Flex LNG carriers, with a LNG cargo capacity up to 217,000 m^3. Initially, the facility will include two carrier berths, oriented to allow carrier approach, moorage and departure with the bow into the prevailing southeast wind and wave direction. Future expansion may include a third berth.

The LNG will be delivered from the LNG tank area to the berth through pipelines supported on an elevated pile-supported trestle. The loading of LNG carriers will be conducted from loading platforms located off the shoreline at the end of the jetty. The facility may allow concurrent loading of carriers at adjacent berths. There will be loading arms at each berth for transferring the LNG onto the carriers, and a vapour return arm for transferring BOG back to the liquefaction trains. It is anticipated that the LNG carriers will be loaded at a maximum loading rate of 12,000 m^3/h, and will typically be at berth for approximately 24 hours.

Materials Offloading Facility

The south end of Digby Island is currently being considered for the location of the MOF. The facility will provide for the safe berthing and transportation of large loads, modules from heavy lift and roll-on roll-off (ro-ro) vessels to land transportation units. It will also provide space for inspection of pre-assembled units, as well as an area to stow modules or packaged equipment and park shipments so they can be received out of the required path of the construction sequence. The MOF area will also be used for the concrete batch plant, aggregate storage and water treatment plant for concrete production. The MOF area may

continue to be used over the life of the Project to receive or dispatch shipments such as refrigerant, containers, rotating equipment and rotar transport canisters from ro-ro vessels.

Camp Facilities

A construction camp will be provided onsite to accommodate up to 4,000 to 5,000 Project workers (assuming modular construction methods) in motel-style units. The number of occupants is anticipated to be less than 1,000 during the initial 10 months of construction, and will peak at 4,000 to 5,000 people by month 20.

The camp will likely be constructed using pre-manufactured modular units shipped to site, which will allow for timely assembly of the camp once site preparation is completed and utilities are installed. Temporary utilities and facilities to support the construction camp will include maintenance buildings, power generation, potable water systems, sanitary facilities, waste treatment plant, a marine outfall and fuel supply. At the end of the construction phase, temporary facilities will be removed and the land reclaimed.

During facility operation, the camp will continue to be used for permanent operations and maintenance personnel (up to 400), as well as those personnel required during plant turnaround (possibly in excess of 700). The camp may also be used to provide skills training and other capacity-building programs for the community.

Heliport Area

A heliport is proposed to enable emergency evacuation of injured personnel to appropriate medical facilities. This will ensure that, in the rare event of an emergency, people with critical injuries can receive treatment at better equipped metropolitan hospitals, if required.

8.8 Project Activities

Construction

Site preparation and construction will commence once all required regulatory permits and approvals have been obtained. The construction phase will involve the following key activities:

- Pioneer activity of establishing facilities for site preparation
- Facility site preparation for Project components and staging areas, including:
  - vegetation clearing and grubbing
  - grading and levelling of the site using cut and fill of rock, overburden, and/or other materials. Depending on site specifics, this could include blasting activities
  - compaction
  - implementation of erosion control measures and
  - potentially some paving in required areas

- Erection of temporary facilities such as maintenance buildings, sanitary facilities and potentially temporary water collection structures
- Construction of the MOF and haul road to allow materials required for construction to be transported to site via boat / barge and offloaded appropriately. Larger components such as LNG facility modules, construction materials, supplies, and equipment will then be shipped to site via barge.
- Installation of utilities required for the LNG facility and the marine terminal. This will include electrical power, industrial and potable water systems, wastewater collection and treatment systems, storm water collection, fire protection system, vehicle fueling stations, and an oil-water separator.
- Construction of temporary facilities such as trailers, sanitary facilities, the construction camp, and maintenance buildings on site to accommodate initial work. Construction workers will stay at the construction camp for the duration of their rotation. Prior to completion of the construction camp, workers will commute to site by boat and/or helicopter from Prince Rupert.
- Construction of suitable foundations, and installation of pilings
- Construction of major terrestrial and marine components, including:
    - natural gas treatment, extraction, and storage facilities
    - natural gas liquefaction trains, compressors and associated infrastructure
    - storage tanks
    - flare systems
    - plant piping
    - administration buildings and storage areas and
    - access roads within the site
- Construction of the marine terminal and installation of:
    - piles, decking, and other support infrastructure
    - piping and electrical infrastructure
    - containment structures
    - cryogenic rundown and vapour return pipelines and
    - a storage and loading flare system

There will be no requirement for dredging at the marine approach and turning basin as water depths are adequate to accommodate Q-flex carriers. However, dredging of marine sediment within the proposed berth areas and the MOF area will be required (see Figure 7). This will entail the mechanical excavation of marine sediment, and may require subsea blasting. The volumes of dredgeate will be determined through further geotechnical and engineering design work. The dredged material will be stored and/or disposed of at a regulatory-approved location. A suitable disposal area will be identified through consultation with regulatory authorities, First Nations, and stakeholders. Brown Passage is the current

designated marine disposal site within the Prince Rupert area, which is located approximately 30 km east of the city. The suitability of this site will be evaluated.

Facility Operations and Maintenance

Operation of the LNG facility and marine terminal is expected to occur over 25 years. The following activities will occur during regular operations:

- Shipment of supplies and equipment to the material offloading area
- Transportation of supplies and equipment to the LNG facility
- Maintenance of all infrastructure (LNG facility, marine terminal, wastewater outfall)
- Monitoring of all operations, including emissions
- Provision of camp and food services to employees
- Shipment of solid waste generated by the Project to a licensed waste receiver
- Storage and loading of LNG onto carriers
- Storage and possible loading of NGL for shipment to market
- Piloting of LNG carriers between Triple Island Point and the Project site
- Operation of tugs
- Shipping of LNG to global markets

Marine Shipping

Shipping activities will include regular transit of LNG carriers to the Project. At full build-out, approximately 160 to 320 LNG carriers (up to Q-Flex size) will call on the marine terminal each year, depending on the size of the carrier. The LNG carriers will be contracted by Aurora LNG to carry cargo on a free-on-board (FOB) and delivered at place (DAP) basis. The carriers will be powered by a combination of low sulphur fuel and boil-off gas. Escort and berthing tugs and pilot boat operations will support safe passage of the LNG, and the shipment of equipment and materials to the MOF.

LNG carriers will transit through Chatham Sound and Brown Passage within designated shipping zones. Operation of the vessels will be in accordance with shipping operations approved under the *Canada Shipping Act* and by-laws established by the PRPA. All LNG carriers will be double hulled, and have primary and secondary containment systems. The marine terminal and channel approach will have navigation aids that conform to the standards under the *Canada Shipping Act*.

The marine terminal and marine access to the terminal falls within the jurisdiction of the PRPA. The PRPA operates under the *Canada Marine Act* and the *Port Authority Operations Regulations*, and manages all waters of Prince Rupert Harbour. All ships operating within this area are subject to the authority of the PRPA. The Canadian Coast Guard's Marine Communication Traffic Services (MCTS) provides marine safety communications, and manages the movement of vessel traffic in the Prince Rupert area. Prince

Rupert Harbour is designated as a compulsory pilotage area under the *Pilotage Act*. All vessels over 350 gross tonnes are subject to compulsory pilotage.

Shipping outside of the bounds of the PRPA and within Canadian Territorial waters will occur within established shipping channels.

Decommissioning and Reclamation

At the end of its operational life, Aurora LNG will either sell the LNG facility and marine terminal, or decommission it and reclaim the land according to applicable legislation at that time. Decommissioning will include removal of all land-based LNG and storage components, the gas reception facilities, and the marine terminal and associated infrastructure.

8.9 Emissions, Wastes, Noise and Light

The LNG facility will generate various wastes, emissions, and effluents during the life of the Project. Construction, operation and decommissioning activities will be guided by site- specific and activity-specific management plans to manage emissions and discharges, which will be in compliance with the applicable regulatory regime and associated government requirements and conditions.

Air Emissions

Air emissions that will be generated by the Project include nitrogen oxide (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter ($PM_{2.5}$, PM_{10}), volatile organic compounds, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fugitive hydrocarbons. Emission sources and quantities will vary during each of the Project phases (Table 15).

Table 15 Anticipated Sources of Air Emission

	Construction & Decommissioning	Operations
Emission Sources	Diesel engines in trucks and barges used to transport materials to site, and in construction and dismantling of equipment Power generation during construction, commissioning, and dismantling Particulate matter emissions from vehicle traffic on roads and the construction site	Gas turbine generators Gas turbine drivers Gas treating equipment for the removal of trace contaminants from the gas-fired reboilers, heaters and incinerators Flare system used in upset and emergency, startup and maintenance situations Back-up generators (diesel) used during start-up, shut-down and in the case of emergencies Inert gas from dry-dock LNG carriers LNG vessels and other marine support vessels Fugitive emissions from the facility Exhaust from vehicle traffic on roads

Solid and Liquid Waste

Design of the facility will include provision for the collection, segregation, treatment, discharge and monitoring of all effluent streams. Non-hazardous liquid effluents will be controlled and discharges treated to meet all applicable federal and provincial regulatory requirements. This includes process water from construction and operation activities, storm water, and ballast water.

A waste management plan will be developed prior to site construction and operations to ensure that solid wastes are managed in accordance with relevant legislation. Non-hazardous solid wastes will be recycled, reused or collected in a central secure area on site, where they will be disposed of in a local landfill or other licensed waste receiver facility. Options for waste disposal are currently being evaluated.

All hazardous liquid and solid waste will be collected in a secure enclosed building and shipped offsite to an existing licensed hazardous waste facility.

Potential sources of solid and liquid wastes generated by the Project are listed in Table 16.

Table 16 Anticipated Sources of Solid and Liquid Wastes

	Construction & Decommissioning	Operations
Solid Waste	Biomass (chipped vegetative material) Excavated overburden, organic material, large boulders Construction Waste (wood, scrap metal, concrete) Domestic waste Dredge materials Sand blast waste Empty containers	Domestic waste Paper/cardboard waste Wood Scrap Metal Municipal waste Waste absorbents and adsorbents Filter cartridges Spent demineralized water membranes and/or bed material
Liquid Waste	Sanitary waste water Storm water Hydrostatic test water Used oils or solvents	Sanitary wastewater Storm water Water discharged from blow-down Reject water from water demineralization unit
Hazardous Waste	Treated sewage and sludge Medical waste Contaminated soil	Mercury removed from the feed gas Medical waste Contaminated soil Waste water contaminated with hydrocarbons or solvents Waste absorbents Used oils or solvents Treated sewage and sludge Misc. wastes, including batteries, filters etc Used methyl diethanolamine **(**MDEA) from acid gas removal

Aurora LNG will require that LNG carriers comply with all relevant national and international shipping requirements regarding disposal of waste and ballast water discharge.

Noise and Light Emissions

Table 17 lists the potential sources of noise and light at the Project. Noise and light emissions will be managed through best management practices incorporated into project design, and project-specific management plans.

Table 17 Anticipated Sources of Noise and Light Emissions

	Construction & Decommissioning	Operations
Noise Sources	Blasting Pile driving Facility assembly/disassembly Equipment movement Vehicle traffic Module offloading Pressure testing Aircraft	Flares Vessel traffic Air coolers Gas turbines Compressors and pipework Vehicle traffic LNG carrier loading LNG carriers and tugs Aircraft
Light Sources	Vehicles Construction Camp Lighting	Vehicles Vessels Facility Lighting Tugs, carriers, flares

8.10 Aboriginal Groups

There are five First Nations and one Aboriginal Group that could be adversely affected by the Project and associated marine shipping activities. These are Gitxaala Nation, Kitselas Nation, Kitsumkalum First Nation, Lax Kw'alaams First Nation, Metlakatla First Nation and the Métis Nation of BC. The first five groups are part of a larger cultural group known historically and ethnographically as the Tsimshian. However, they represent distinct groups with different historical and cultural backgrounds.

The Metlakatla, Kitselas, and Kitsumkalum are in the BC Treaty process and are represented in their negotiations by the Tsimshian First Nations Treaty Society. Lax Kw'alaams is negotiating a treaty independently. Gitxaala Nation is currently not involved in the BC treaty process.

Although there are no Métis settlements within the Project area, there are a number of Métis living in the Prince Rupert area.

Table 18 summarizes potential overlap between Project components and identified First Nations issues, with terrestrial interests identified as "Facility" and marine interests identified as "Shipping Route".

Table 18 Potential overlap between First Nations' interests and Aurora LNG project components and activities at Digby Island Site

First Nation	Potential Overlap with Identified First Nations Interests	
	Facility	Shipping Route
Gitxaala Nation	X	X
Kitselas Nation		X
Kitsumkalum First Nation	X	X
Lax Kw'alaams First Nation	X	X
Metlakatla First Nation	X	X

8.11 Traditional and Current Land and Resource Use

The Tsimshian cultural areas stretch from the lands and waters surrounding the Nass and Skeena watersheds and the coastal areas from the Nass to Queen Charlotte Sound. Traditionally, groups have used the areas along the lower Skeena River from the Kitselas Canyon and Kitsumkalum (near Terrace) and the adjacent coast south to Milbanke Sound, including Port Simpson (Lax Kw'alaams) Metlakatla (in the Prince Rupert area), and Gitxaala (Kitkatla). Findings through archaeological excavations and studies reveal villages dating back 5000 years. The Tsimshian appear to be one of the oldest continuous cultural heritages in the western hemisphere, and have a rich cultural heritage and ceremonial practices, such as the potlatch feast, that continue to be observed.

Initial desktop research of publicly available sources and discussions with First Nations, to date, indicate that Tsimshian groups have used, and continue to use, the lands at the mouth of the Skeena River and the adjacent lands and marine areas for fishing, hunting, and marine and terrestrial food harvesting, as well as for ceremonial practices. Culturally modified trees are also common throughout the area. Sources also confirm that First Nations use the marine area for commercial fishing purposes. Examples of marine resources traditionally used by the local First Nations include: seaweed, halibut, salmon, eulachon, shellfish, fish roe, seal, sea lions, and sea otter. Terrestrial resources are also traditionally harvested and include: tree bark, planks, berries, bird eggs, deer, elk, bear, and other animals. As well, Aurora LNG understands that the Project may be located nearby areas of potential cultural and spiritual significance for these groups.

Aurora LNG has initiated consultations and will continue work with each of the five First Nations to understand their current and historic uses of the Digby Island area and surrounding marine environment for the purpose of assessing the potential effects of the Project on their respective interests.

8.12 Environmental Setting

Climate

The main climatic processes in the northwest coastal area are driven by a high frequency of frontal systems arriving from the Pacific Ocean. Constant streams of oceanic low pressure systems bring mild, moist air and create cloudy, wet weather conditions during the winter. The climate of Digby Island is dominated by fog, cloud, and drizzle. Annual precipitation varies but can exceed 2500 mm. In general, October through to December are the wettest months. The island receives very little precipitation in the form of snow. The Pacific Ocean moderates temperatures in the area, with average temperatures ranging from 2°C in winter to15°C in summer. Winds blow predominantly from the southeast, ranging from 10 km/h to 20 km/h.

Air Quality

Existing air quality in the Grassy Point area is generally good. Based on ambient air quality data collected at monitoring stations in Prince Rupert and Port Edward and the BC MoE Mobile Air Monitoring Laboratory (MAML) at Westview Terminal, substances generally considered when assessing air quality (SO_2, PM_{10}, NO_2, O_3, CO) were below BC ambient air quality objectives. Some exceedances of H_2S were found at the Port Edward site primarily due to the Skeena Cellulose pulp mill, which closed in 2006.

Acoustic Environment

The existing ambient acoustic environment near the Digby Island site is characterized primarily by sounds from the natural environment such as birds, wind, rain and waves along the coast. Given its distance from Prince Rupert and the local communities of Dodge Cove and Crippen Cove, the acoustic environment is not influenced by human activities.

Geology and Geomorphology

Digby Island is characterized as coastal lowlands with elevations generally less than 75 m above sea level. Surficial geology of the island is generally comprised of an organic veneer (i.e., 0.5 m to 1.0 m thick) of peat on gentle slopes (i.e., <15 degrees) with occurrences of glaciomarine (e.g., silt and clay) veneer deposits and bedrock outcrops.

The Prince Rupert region is influenced by the Queen Charlotte Fairweather fault system. It is within seismic zone #3, which means that the peak ground acceleration in excess of 6%g has an annual probability of 1%. Earthquakes have occurred in this region; the most recent occurred in October 2012.

Hydrology

Digby Island is located in the Central Coast Mountains hydrologic zone. Stream flow is maintained throughout the year in all but the smallest and highest elevation creeks. The proximity of the Pacific Ocean regulates temperatures, leading to cool summers and mild winters. There are eight first order

streams mapped within the Digby Island site, which range from approximately 300 m to 900 m in total mapped length. The Project site is located near Delusion Creek and its tributaries. Peak annual flows in these creeks likely occur in the winter in response to rain storms off the Pacific Ocean. There is one small lake situated within the proposed Project footprint.

Vegetation and Wetland Resources

The Digby Island site lies within the Hecate Lowland Ecosection of the Coastal Gap Ecoregion, which is located within the larger Coast and Mountains Ecoprovince.

The Project site is located entirely within the Central Very Wet Hypermaritime Coastal Western Hemlock (CWHvh2) BEC unit. The CWHvh2 biogeoclimactic zone occupies the outer coastal areas, usually less than 25 km from salt water, and ranges in elevation from 0 m to 600 m.

The natural vegetation of the Digby Island site is primarily forest interspersed with low-lying wetlands. Productive forests are restricted to well-drained soils on moderate and steep slopes. It is dominated by western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), and Sitka spruce (*Picea sitchensis*). Yellow-cedar (*Chamaecyparis nootkatensis*), lodgepole pine (*Pinus contorta*), and red alder (*Alnus rubra*) are abundant on the outer coast where scrubby forests grow on organic soils over bedrock. Because fires occur rarely, seral stands were uncommon before clearcut logging began.

The characteristic understory species are salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), deer fern (*Blechnum spicant*), false lily-of-the-valley (*Maianthemum dilatatum*), fern-leaved goldthread (*Coptis aspleniifolia*), skunk cabbage (*Lysichiton americanum*), and various bryophyte species (*Rhytidiadelphus loreus, Mnium* spp., *Sphagnum girgensohnii, Eurhynchium oreganum, Scapania bolander*i, etc.).

According to information contained in the BC Conservation Data Centre (CDC), 32 plant species of conservation concern, including 25 blue-listed species and seven red-listed species, potentially occur within 4 km of the Project area. This includes 15 vascular plant species (14 flowering plants and a fern), 15 bryophyte species (11 true mosses (Bryopsida) and four peat-mosses (Sphagnopsida), and a lichen species (*Pseudocyphellaria rainierensis*). This lichen is listed as a species of special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Ac*t (*SARA*).

Thirteen blue-listed and four red-listed ecosystems potentially occur within approximately 4 km of the Project area. This includes 12 forest ecosystems and five wetland ecosystems (three fens, one marsh, and one swamp). Four ecosystems are defined as red- or blue-listed ecological communities (i.e., legally designated) in the Central and North Coast Land Use Objectives Order for Ecosystem Based Management (EBM) Implementation.

Wildlife Resources

In the CWH zone, common large mammal species include black bear (*Ursus americanus*), grizzly bear (*Ursus arctos*), gray wolf (*Canis lupus*), and black-tailed deer (*Odocoileus hemionus*) (Meidinger and Pojar 1991).

Four amphibian species and two reptile species are expected to occur in the region: western toad (*Anaxyrus boreas*), rough skinned newt (*Taricha granulosa*), long-toed salamander (*Ambystoma macrodactylum*), northwestern salamander (*Ambystoma macrodactylum*), common garter snake (*Thamnophis sirtalis*), and western garter snake (*Thamnophis elegans*). Coastal tailed frog could occur in the Project area, but current information suggests the species is absent.

Common birds expected to occur on Digby Island include bald eagle (*Haliaeetus leucocephalus*), common raven (*Corvus corax*), dark-eyed junco (*Junco hyemalis*), and glaucous-winged gull (*Larus glaucescens*). There are two Important Bird Areas (IBA) within the vicinity of Digby Island: BC 124 and BC 122. BC124 extends from Big Bay south to Delusion Bay, and has been designated as nationally significant. Birds such as black turnstone (*Arenaria melanocephala*), brant (*Branta bernicla*), colonial water birds and seabirds, dunlin (*Calidris alpina*), surf scoter (*Melanitta perspicallata*), and other waterfowl are known to congregate in large numbers in this area. BC122 includes Lucy Islands and has been designated globally and nationally significant. Birds such as bald eagle, black oystercatcher (*Haematopus bachmani*), glaucous-winged gull, pigeon guillemot (*Cepphus columba*), and rhinoceros auklet (*Cerorhinca monocerata*) are known to occur in large numbers (Birdlife International; Bird Studies Canada, and Nature Canada 2012).

Species of Conservation Concern

There are 24 wildlife species of conservation concern that are known or likely to occur in the Prince Rupert region (BC CDC 2014) (Table 19).

Aquatic Resources

Marine Aquatic Resources

Chatham Sound is recognized by Fisheries and Oceans Canada (DFO) as an ecologically and biologically significant area (EBSA). Intertidal and subtidal habitats in this area support a diverse assemblage of marine algae, invertebrates and fish, as well as numerous species of marine mammals.

Marine intertidal and subtidal habitats in the area are characterized by rock, sand and gravel beaches; and sand flats, and support a wealth of algal and invertebrate species (BC MFLNRO 2005). Algal species including rockweed (*Fucus gardneri*), sea lettuce (*Ulva* spp.) and a variety of canopy-forming and understory kelp species (e.g., *Laminaria* spp.) are likely present in the area. Eelgrass beds may also be present in the area and invertebrates such as barnacles likely inhabit the foreshore environment. Eelgrass and kelp beds provide essential feeding and rearing habitat for an array of species including juvenile salmon, Pacific herring (*Clupea pallassi*) and Dungeness crabs (*Metacarcinus magister*).

Table 19 Species of Conservation Concern within the Prince Rupert Region

Common Name	Scientific Name	SARA Status	COSEWIC Status	BC Status
Mammals				
Grizzly Bear	*Ursus arctos*		SC	Blue
Wolverine	*Gulo gulo luscus*		SC	Blue
Fisher	*Pekania pennanti*			Blue
Keen's Myotis	*Myotis keenii*	SC (Schedule 3)	DD	Red
Little Brown Myotis	*Myotis lucifugus*		E	Yellow
Amphibians				
Western Toad	*Anaxyrus boreas*	SC (Schedule 1)	SC	Blue
Coastal Tailed Frog	*Ascaphus truei*	SC (Schedule 1)		Blue
Birds				
Surf Scoter (M)	*Melanitta perspicillata*			Blue
Ancient Murrelet (M)	*Synthliboramphus antiquus*	SC (Schedule 1)	SC	Blue
California Gull (M)	*Larus californicus*			Blue
Cassin's Auklet (M)	*Ptychoramphus aleuticus*			Blue
Common Murre (M)	*Uria aalge*			Red
Marbled Murrelet (M)	*Brachyramphus marmoratus*	T (Schedule 1)	T	Blue
Red-necked Phalarope (M)	*Phalaropus lobatus*			Blue
Tufted Puffin (M)	*Fratercula cirrhata*			Blue
Band-tailed Pigeon (M)	*Patagioenas fasciata*	SC (Schedule 1)	SC	Blue
Peregrine Falcon	*Falco peregrinus pealei*	T (Schedule 1)	SC	Blue
Northern Goshawk	*Accipiter gentilis laingi*	T (Schedule 1)	T	Red
Sooty Grouse	*Dendragapus fuliginosus*			Blue
Barn Swallow (M)	*Hirundo rustica*		T	Blue
Olive-sided Flycatcher (M)	*Contopus cooperi*	T (Schedule 1)	T	Blue
Great Blue Heron (M)	*Ardea herodias fannini*	SC (Schedule 1)	SC	Blue
Western Screech-Owl	*Megascops kennicottii kennicottii*	SC (Schedule 1)	T	Blue
Short-eared Owl	*Asio flammeus*	SC (Schedule 1)		Blue

NOTES:
DD = Data Deficient
E = Endangered
T = Threatened
SC = Special Concern
M = Migratory

Digby Island falls within DFO Important Areas (IAs) for Dungeness crab (*Metacarcinus magister*), tanner crab (*Cancer baerdii*), green sea urchin (*Strongylocentrotus droebachiensis*), and Pacific herring (*Clupea pallasii*). All five species of Pacific salmon (*Onchorhynchus* spp.) are abundant in the waters surrounding Digby Island, especially during the migration of juvenile and adult salmon to and from the Skeena River. These and other fish and invertebrate species support important commercial, recreational and Aboriginal fisheries in the area.

The productive waters of Chatham Sound are also home to numerous species of marine mammals, including harbour porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoided dalli*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), killer whale (*Orcinus orca*), grey whale (*Eschrichtius robustus*), minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), harbour seal (*Phoca vitulina*) and Steller sea lion (*Eumetopias jubatus*). A DFO IA for humpback whale is located just west of Digby Island.

A number of marine species listed under the federal *Species at Risk Act (SARA)* have the potential to use habitats in Chatham Sound. These include northern abalone (*Haliotis kamtschatkana*), yelloweye rockfish (*Sebastes ruberrimus*), bluntnose sixgill shark (*Hexanchus griseus),* Steller sea lion (*Eumetopias jubatus)*, harbour porpoise (*Phocoena phocoena*), northern resident killer whale (*Orcinus orca*), Bigg's (Transient) Killer whale (*Orcinus orca*), gray whale (*Eschrichtius robustus*), sei whale (*Balaenoptera borealis*), fin whale (*Balaenoptera physalus*), and blue whale (*Balaenoptera musculus*).

Freshwater Aquatic Resources

Anadromous and resident fish species important for commercial, recreational, and/or aboriginal fisheries that could be present within the watercourses of Digby Island include coho salmon (*Oncorhynchus kisutch*), pink salmon (*O. gorbuscha*), chum salmon (*O. keta*), cutthroat trout (*O. clarki*), rainbow trout/steelhead (*O. mykiss)*, and Dolly Varden (*Salvelinus malma)*. Historical fish capture information is not available for the majority of these watercourses.

8.13 Potential Project Effects

Natural Environment

Air Quality

Key Project activities that could cause a change in air quality include those that involve emissions of criteria air contaminants (CAC). The primary substances of concern include gaseous compounds (SO_2, NO_x, CO), particulate matter (PM_{10}, $PM_{2.5}$), and GHGs. Anticipated sources of air emissions include:

- Construction: land clearing, blasting, grading, hauling, material handling, fuel combustion, power generation
- Operations: vehicle traffic, power generation, fuel combustion, LNG vessels and other marine support vessels, and fugitive emissions from the LNG facility
- Decommissioning: fuel combustion, removal of infrastructure, backfilling and contouring

Climate (GHG Management)

The Project will result in the emission of greenhouse gases, including CO_2 and methane, which will contribute to global climate change. GHG emissions of concern will be related primarily to the operational phase, although some emissions are also expected to occur during site preparation (i.e., clearing of vegetation to accommodate the facility footprint) and construction.

Acoustic Environment

The Project has the potential to affect the acoustic environment of the surrounding area as a result of noise emissions generated by equipment and vehicles during site preparation and onshore construction activities, and operation of the LNG facility and marine terminal. In-water activities such as construction of the trestle and marine terminal and operation of marine vessels could also generate underwater noise, which could adversely affect the marine acoustic environment. Increased noise levels could result in human health effects (annoyance, sleep disturbance) and/or wildlife effects (displacement and disturbance).

Vegetation and Wetland Resources

The Project has the potential to cause changes in vegetation and wetland resources due to a direct loss of these resources from vegetation clearing and surface disturbance, as well as air emissions and dust deposition. Site clearing and preparation will remove vegetation from the footprint and may affect surrounding vegetation indirectly through changes in abiotic conditions.

The potential direct and indirect effects on vegetation and wetland resources could include:

- Change in abundance of plant species of interest, including at-risk species, species of cultural significance, and invasive species
- Change in abundance or condition of ecological communities, including those of conservation interest (e.g., old forest and provincially at-risk)
- Change in wetland function (this may be subject to the “no net loss of wetland functions” of the Federal Policy on Wetland Conservation (Government of Canada 1991).

Wildlife Resources

Construction and operation of the facility has the potential to affect terrestrial wildlife and marine birds, including migratory birds. The key potential effects on wildlife resources include:

- Change in habitat: loss or alteration of terrestrial habitat directly due to vegetation clearing during site preparation and indirectly due to sensory disturbance during construction and operation, and atmospheric noise and lighting
- Change in movement: alteration of movement patterns during construction and operation, including displacement of marine birds, due to noise, human activity and vessel activity

- Change in mortality risk: alteration of mortality risk during construction and operation of the facility, including risk of collisions for marine birds.

Marine Resources

The *Fisheries Act*, the *Species at Risk Act*, and supporting regulations and policies define the marine species that need to be considered during a federal environmental assessment. This includes all marine fish and marine plants as defined in the *Fisheries Act*.

Certain Project-related activities such as construction of the marine terminal infrastructure, dredging and disposal at sea, wastewater discharges, and LNG vessel operations could adversely affect marine fish and fish habitat, including marine mammals, and marine plants. The key potential effects on marine resources include:

- Permanent alteration or destruction of marine fish habitat (i.e., marine riparian habitat, intertidal habitat, and/or subtidal habitat, including marine plants) during construction as a result of dredging, pile driving, and disposal of dredgeate
- Injury or mortality of marine fish, invertebrates and/or marine mammals due to underwater noise created by in-water construction activities
- Injury or mortality of marine mammals due to marine vessel strikes
- Change in marine sediment or water quality due to increased turbidity, resuspension of existing contaminants during in-water construction, and operations (i.e., stormwater/wastewater discharge)
- Behavioural disturbance to marine fish and marine mammals due to underwater noise generated by construction and operation-related activities.

Freshwater Resources

The Project has the potential to cause changes in freshwater fish and fish habitat. Key potential effects include:

- Permanent alteration or loss of fish habitat from clearing of riparian forest, and construction of the LNG facility, haul road, marine terminal, material offloading ramp, and temporary construction infrastructure and facilities
- Reduced habitat quality due to changes in surface water quality and sediment quality from sediment releases and introduction of nutrients and metals from blasting (potential effect dependent upon site geology)

Social Environment

Infrastructure and Services

The in-migration of workers, their spouses and dependents as well as an increase in the number of transient workers during construction and operation of the Project has the potential to increase local and

regional populations and alter demographics. Changes in population and demographics could, in turn, increase demand on community infrastructure and services (e.g., utilities, transportation, education, emergency services, and social and recreational services) and cause a change in housing availability in the City of Prince Rupert, the District of Port Edward, and nearby First Nations communities.

Land and Marine Use

The proposed Project site on Digby Island falls within provincial Crown Land. Waters to the south, east and west of Digby Island fall under the jurisdiction of the PRPA.

Construction and operation of the LNG facility and marine terminal could affect other tenured and non-tenured land and resources uses, including forestry, trapping, guide outfitting, and recreation activities, currently occurring on or near the proposed Project footprint. Fishing and marine harvesting are important activities in the SQRD, and it is possible that the marine terminal, exclusion zones, and vessel traffic could affect marine navigation in waters used for commercial, recreational, and subsistence fishing and other marine uses.

Economic Environment

The Project will create approximately 4,000 to 5,000 short-term jobs during the five-year construction period, and an estimated 400 long-term jobs during Project operations. Substantial indirect investments into the community will also occur in the form of additional goods and services required by the Project itself and employees drawn to the area. Potential adverse effects to the local and regional economies are also expected to occur as a result of competition for limited labour supply and changes in the economic activity of other sectors (i.e., cost of living, availability of goods and services).

Human Health

The Project has the potential to interact with human health through various pathways. Emissions of contaminants from facility construction and operation, and from vessels berthed at the facility could degrade ambient air quality, resulting in inhalation health risks. Chemical emissions to the air are anticipated to be the key issue with respect Project effects on human health. The primary air contaminants of interest are SO_2, NO_2, CO, respirable particulate matter ($PM_{2.5}$ and PM_{10}), and H_2S. Human health could also be affected by emissions to both the terrestrial and marine environments, as well as noise emissions, which could lead to elevated stress and annoyance levels.

The potential presence of historic contaminants in marine sediments and soils may pose a risk to human health if contaminants are re-introduced to the environment during Project construction activities. These contaminants could be taken up by terrestrial or marine biota, and subsequently ingested by humans through consumption of country foods.

Heritage Environment

Potential effects on heritage and archaeological resources, if they are present, are likely to occur as a result of site preparation activities during Project construction. In particular, the clearing of vegetation and any excavation works that disturb native sediments have the potential to disturb archaeological and heritage resources. It is anticipated that any adverse effects on heritage resources will be mitigated through data recovery or other standard acceptable approaches to mitigation.

Operational activities could also cause damage to archaeological and heritage sites even if they have been mitigated by data recovery. For example, a large lithic site may be sample excavated and monitored during construction, but individual artifacts could be exposed by vehicle traffic, pipeline monitoring or accessing service sites.

Cumulative Effects and Transboundary Effects

The scope of the environmental assessment will consider the potential for direct and indirect effects of the Project on the biophysical and human environments, as well as potential cumulative effects, and trans-boundary effects. The cumulative effect assessment will include:

- Past projects (e.g., Canpotex, Fairview Terminals 2)
- Current and future marine terminal infrastructure and industrial facilities in Prince Rupert and Port Edward
- Development of other proposed LNG projects in the area (e.g., Pacific Northwest LNG, Prince Rupert LNG, Woodside, LNG Canada, Kitimat LNG)
- Development of gas pipelines associated with the Project and other proposed LNG projects
- Marine traffic associated with current and reasonably foreseeable projects and activities between Triple Island and the Port of Prince Rupert

Aboriginal Communities

The Project could potentially affect traditional land and marine-based activities of Aboriginal people such as hunting, fishing, gathering, and tree harvesting as a result of changes in land use, restricted access and increased marine traffic, Marine resources traditionally used by Aboriginal people include: seaweed, halibut, salmon, eulachon, shellfish, fish roe, seal, sea lions, and sea otter. Terrestrial resources include: tree bark, planks, berries, bird eggs, deer, elk, bear, and other animals.

Traditional activities of Aboriginal people could also be affected indirectly as a result of potential changes to the biophysical environment, including effects on freshwater and marine fish, fish habitat and aquatic species, vegetation resources and wildlife resources, including marine birds, which could affect harvesting patterns and/or harvesting success.

Aurora LNG anticipates that the Project could also adversely affect Aboriginal people through human health effects, social and cultural effects and effects on heritage resources. The following is a list of

potential adverse effects that may be included in the assessment. The list will be refined based on ongoing discussions with First Nations.

- Human health effects
  - Degradation of air quality as a result of air emissions generated by construction equipment and activities (e.g., blasting) and operation of the LNG facility and marine vessels
  - Sensory disturbance due to noise exposure during construction and operation activities
- Social effects
  - Sensory disturbances that affect traditional lifestyle values
- Heritage effects
  - Damage or destruction of archaeological or heritage sites from site preparation and ground disturbances
- Cultural effects
  - Changes in spiritually or culturally important areas
  - Changes in traditional use areas

Federal Land and Other Lands

Land-based environmental effects are anticipated to be localized to the Project area, which will be located within provincial Crown lands. Marine-based environmental effects are expected to occur within waters controlled by the PRPA. Due to the proximity of the Project site to the US border (50 km), there is potential that trans-boundary air quality effects could occur. However, based on previous experience, air emissions are not expected to affect air quality more than 25 km from the Project site.

The following provides an overview of the key potential environmental effects of the Project that could occur as a result of carrying out the Project in federal lands. As defined in the *CEAA 2012*, federal lands include all waters on and airspace above lands belonging to or controlled by the federal government.

Air Quality

Construction and operation of the marine terminal and operation of LNG carriers and support vessels will generate air emissions that have the potential to affect air quality. The primary substances of concern include gaseous compounds (SO_2, NO_x, CO), particulate matter (PM_{10}, $PM_{2.5}$), and GHGs. Anticipated sources of air emissions include:

- Construction: land clearing, blasting, grading, hauling, material handling, fuel combustion, power generation
- Operations: fuel combustion, LNG vessels and other marine support vessels
- Decommissioning: fuel combustion, removal of in-water infrastructure

Acoustic Environment

The underwater acoustic environment could be affected by construction of the marine terminal, installation of piles, blasting, dredging of the berth pockets and MOF, disposal of dredgeate, and marine vessels delivering equipment and materials to site. During operation, LNG carriers and support vessels will be the primary source of underwater noise from the Project.

Navigable Waters

Construction of the trestle and marine terminal and operation of marine vessels could affect interfere with navigation in nearshore waters. Lighting at the terminal may also affect nighttime navigational aids.

Marine Resources

Construction and operation of the marine terminal, and operation of marine vessels could affect fish and fish habitat, as well as marine birds. The primary pathways of potential effects include:

- Permanent alteration or destruction of marine fish habitat (i.e., marine riparian habitat, intertidal habitat, and/or subtidal habitat) as a result of dredging, blasting, piling, and disposal of dredgeate
- Injury or mortality of marine fish, invertebrates and/or marine mammals due to underwater noise generated by in-water construction activities
- Injury or mortality of marine mammals during in-water construction and operation of vessels (i.e., vessel strikes)
- Change in marine sediment or water quality (e.g., increased turbidity, re-suspension of existing contaminants) during in-water construction, and operations (i.e., stormwater/wastewater discharge)
- Behavioural disturbance to marine fish and marine mammals due to underwater noise generated by construction and operation-related activities
- Change in mortality risk of marine birds due to collisions with infrastructure
- Displacement of marine birds due to vessel activity

PART D – ABORIGINAL STAKEHOLDER AND AGENCY ENGAGEMENT

9 ABORIGINAL, STAKEHOLDER AND AGENCY ENGAGEMENT

9.1 Aboriginal Engagement

Principles of Aboriginal Engagement

Aurora LNG believes that meaningful consultation with First Nations begins with building solid relationships based on mutual trust and respect of customs and culture, a shared understanding of issues, transparency, inclusiveness, open communication, and collaborative problem-solving approach to achieve mutually satisfactory outcomes. Engaging and building relationships with First Nation communities is an important component of earning Aurora LNG's social license to operate. First Nation communities have a right to know about proposed activities of the Project that have the potential to adversely affect their interests. Aurora LNG will endeavor to provide opportunities for engagement that will meet all reasonable expectations of First Nations as well as those of the Project.

Approach to Aboriginal Engagement and Consultation

Early and ongoing engagement and consultation is key factor in building respectful relationships as well as limiting or avoiding challenges and delays in advancing the Project development. Cultivating meaningful relationships with First Nations people takes time. Through early and ongoing engagement with potentially affected First Nations, Aurora LNG is seeking to build its knowledge of the values and goals, as well as the social, cultural, economic, and political structures of each community.

Aurora LNG began engagement early with First Nation communities to build a solid foundation on which to establish long-term, respectful and mutually beneficial relationships. Aurora LNG's commitment to First Nation engagement is guided not only by its commitment to responsible development but also its Indigenous Peoples Policy, Aboriginal Guidelines and Guiding Principles. Through these exchanges, Aurora LNG seeks to:

- Ensure engagement respects the rights and cultural traditions of First Nations
- Build and sustain long-term mutually beneficial relationships with First Nations communities
- Facilitate the open exchange of information and ideas
- Foster shared understanding and management of expectations
- Develop an understanding of how the proposed Project might affect Aboriginal interests and discuss concerns regarding these potential effects

- Manage expectations, especially regarding the potential for Project timelines to shift, which can affect benefit-sharing opportunities
- Provide capacity funding to ensure meaningful participation in Aurora LNG's engagement and consultation process
- Initiate negotiations of early stage protocols to deliver early benefits to potentially affected First Nations
- Identify opportunities for First Nations people to participate in the industry
- Ensure the Project meets all provincial and regulatory requirements.

Aurora LNG's engagement approach reflects its belief that it takes time and consistent effort to develop relationships with First Nation community leaders and members, and to identify issues and opportunities over the lifecycle of the Project.

First Nations Communities

Aurora LNG determined which First Nations to engage using the BC Consultative Areas Database (CAD). According to the CAD, both the proposed Digby Island and Grassy Point sites are on the asserted traditional territory of several First Nations.

The Project footprint at the Grassy Point site overlaps with the asserted traditional territory of three First Nations (Lax Kw'alaams, Metlakatla, and Kitsumkalum). The proposed shipping route overlaps with marine interests of these three Nations, as well as the Gitxaala Nation and Kitselas Nation. The Project footprint at the Digby Island site overlaps with the asserted traditional territory of the Lax Kw'alaams, Metlakatla, Kitsumkalum and Gitxaala. The proposed shipping route overlaps with marine interests of these four Nations, as well as the Kitselas Nation.

Contact information of First Nations communities identified for engagement is provided in Table 20.

Meetings to Date

Aurora LNG began engagement with the five Tsimshian First Nations in January 2013. The purpose of these meetings was to initiate information sharing and relationship building. Engagement activities have focused mainly on one-on-one meetings with leadership and technicians. As well, advanced notifications have been provided to First Nation representatives when Aurora LNG intended to conduct initial non-invasive investigative activities. During the early engagement phase, the Aurora LNG participants included senior leadership, environmental technicians, an engagement advisor and a negotiator.

Table 20 Contact Information for First Nations with Potential Interests in the Project

First Nation	Contact information	
Gitxaala Nation	Location:	Kitkatla, BC
	Website:	www.gitxaalanation.com
	Mailing Address:	PO Box 149 Kitkatla, BC V0V 1C0
	Phone:	250-848-2215
	Fax:	250-848-2238
Kitselas Nation	Name:	Kitselas Administration
	Location:	Terrace, BC
	Website:	www.kitselas.com
	Address:	2225 Gitaus Rd Terrace, BC V8G 0A9
	Phone:	250-635-5084
	Fax:	250-635-5335
Kitsumkalum First Nation	Name:	Kitsumkalum Treaty
	Location:	Terrace
	Website:	www.kitsumkalum.com
	Address:	PO BOX 544 Terrace BC V8G 4B5
	Phone:	250-635-1718
	Fax:	250-635-6196
Lax Kw'alaams First Nation	Address:	206 Shashaak Street, Lax Kw'alaams, BC V0V 1H0
	Phone:	250-625-3293
	Fax:	250-625-3246
Metlakatla First Nation	Location:	Prince Rupert
	Website:	www.metlakatla.ca
	Address:	PO Box 224, Prince Rupert, V8J 3P6
	Phone:	250-628-3315
	Fax:	250-628-9259
Coastal First Nations – Great Bear Initiative	Location:	Central and North Coast District, and Haida Gwaii
	Website:	www.coastalfirstnations.ca

Table 21 summarizes the number of one-on-one meetings that have been held between Aurora LNG and each of the five First Nations. In addition to meetings, Aurora LNG representatives have also had telephone and email exchanges with representatives of the First Nations' regarding various aspects of the proposed Project, including discussions regarding the preparation of initial permit applications.

The Aurora LNG site evaluation team has also engaged with the First Nations as it began developing the work plan for investigative activities. Such meetings are not reflected in Table 21.

Prior to directly engaging with the broader community, Aurora LNG will take direction and seek the support of each First Nation's respective leadership. Given the very early stages of the proposed Project

and initial phases of determining site viability, Aurora LNG has not yet formally held community meetings with any of the First Nations.

Table 21 Summary of Aboriginal Engagement January 1, 2013 to May 15, 2014

First Nation	No. of Meetings
Lax Kw'alaams	6
Metlaklatla	12
Gitxaala	4
Kitselas	6
Kitsumkalum	6
Coastal First Nations	4

Key Issues Identified by First Nations to Date

Table 22 provides a high-level overview of comments and concerns expressed by First Nations through engagement efforts to date.

Table 22 Concerns and Interests Identified by First Nations

Area of Interest and/or Concern	Concern and/or Interest Identified
Emissions	Potential effects on air quality Increased greenhouse gases Potential effects of dust, noise and light emissions
Freshwater Resources	Potential effects on freshwater quality, fisheries habitat and aquatic species Concern over demands for freshwater during construction and operations
Marine Resources	Potential effects on marine habitat and species fisheries values Potential effects on marine fisheries Protection of marine harvesting areas for traditional use Potential effects on aquaculture
Shipping	Increased measures to prevent accidents, manage shipping traffic, emergency response, spill response and establish higher ship standards Potential effects on commercial aquaculture and fisheries Potential effects on anchorage sites Marine pollution due to waste water and bilge water disposal Restricted access zones
Land	Potential effects on vegetation and wildlife Potential effects on viewscapes
Archaeological Resources	Potential effects on archaeological resources and historic sites
Governance/Rights and Title	Historic lack of recognition by government and proponents of First Nation aboriginal rights and title Potential effect on exercise of traditional and current uses, food supply and aboriginal rights and title

Area of Interest and/or Concern	Concern and/or Interest Identified
	Increased role for First Nations in stewardship of lands and resources, management of spill response etc.
Benefits	Historic lack of acceptable benefits Fair share of long-term benefits and profits Preferred access to business opportunities along the value chain Full access to training, education and employment opportunities Need for green energy to offset greenhouse gas emissions
Cumulative Impacts	Effective mitigation and compensation strategies required to offset the potential cumulative effects of a high number of proposed industrial development projects in Prince Rupert area
Historic Remediation Issues	Past industrial sites have not been properly cleaned up (e.g., Watson Island) Past problems in clean up after marine accidents (e.g., Queen of the North)
EA Process /Project Reviews	Concern about rigor of historical environmental process generally and specifically in assessing effects of projects on Aboriginal rights and interests Historical inadequacy of assessments of regional and cumulative effects Historical inadequacy in funding for project reviews Concern for adequate traditional use studies and baseline studies Concern for adequate assessment of socio-cultural effects
Health	Potential effects on First Nation communities health and well-being
Access	Need for improved access for coastal communities – road access where feasible, improved infrastructure

Ongoing Aboriginal Engagement and Consultation

Through ongoing engagement and consultation with each First Nation, Aurora LNG's goals are to enhance the leadership's and community's understandings of the proposed Project, and to identify and advance our understanding of the interests and views of the leadership and community members regarding potential effects of the development on their communities and culture. These exchanges will continue to inform proposed Project planning, and provide the basis for developing mitigation strategies to minimize potential effects on Aboriginal interests.

Specifically, the objectives of Aurora LNG's engagement and consultation program include the following.

- Develop an agreed upon engagement schedule to share information with the First Nation leadership and communities regarding the proposed Project
- Conduct a range of engagement activities to facilitate the inclusion of all interested and affected Aboriginal peoples
- Ensure adequate capacity funding for participation in consultation activities
- Engage in negotiations to develop agreements to deliver community benefits
- Fund and /or support Traditional Use Studies to support the Project environmental assessment and to identify measures to mitigate adverse effects on Aboriginal interests, including areas or resources of

cultural or ecological importance, Project design and reduce the likelihood of disturbing culturally and ecologically significant areas

- Collaborate to identify opportunities for Nations' participation in environmental studies
- Collaborate to determine areas of particular interest, and organize technical meetings and/or workshops to advance the mutual understanding of these issues (e.g., marine safety, marine and land use, air quality)
- Identify opportunities to assist in building the knowledge, capacity and skills necessary to engage more fully in the direct and indirect benefits of Project development.

Ongoing Engagement and Consultation Methods – June 2014 onwards

Aurora LNG will continue to work with the First Nation leadership and community representatives to identify the most appropriate methods of engagement (e.g., meetings, open houses, world cafés) and communication materials (e.g., displays, handouts) to support engagement activities, and ensure that First Nation communities have an opportunity to offer their input and feedback on the proposed Project. Aurora LNG will use various communication tools to foster understanding across a range of ages and literacies, such as poster boards, maps, flow charts, presentations, hand-outs and open discussions. Notices for community meetings will be distributed through various media well in advance to maximize community participation.

Ongoing exchanges at the Project conceptual stage are intended to help establish and build trust with the leadership and community members by being open and transparent. Aurora LNG will continue to track and document engagement activities and build a list of the First Nations' concerns and specific issues. Aurora LNG will promptly respond to requests by First Nation community members regarding Project activities, prepare briefings as necessary, and will ensure that information is presented in a manner that is understandable to the community members. Through this process, Aurora LNG will also work with the Nations to ensure issues requiring follow-up are identified, actioned, and tracked to ensure a timely response. To facilitate effective communication during field work and ongoing consultation, Aurora LNG will work with First Nation representatives to develop protocols to ensure the timely exchange of information.

Engagement and consultation methods may include the following:

- One-on-one meetings with Chief and Council, Band Economic Development Officers, Land and Resource Officers, and other Band-based office representatives
- Formal meetings with community groups such as Elder and youth committees
- Workshops
- World cafés
- Community Advisory Committee
- Open Houses in communities
- Issue-specific information sessions

- Technical meetings
- Tours and site visits
- School presentations
- Career fairs and trade shows
- Advertisements in community newsletters and local radio stations

In addition to scheduled engagement activities, Aurora LNG project members will participate, whenever possible, in community events and identify opportunities to support First Nations community celebrations and cultural events.

Government Engagement

Over the last two years, Aurora LNG has met with various municipal, provincial, and federal agencies. These include the following:

Municipal and Regional Government

- City of Prince Rupert
- Skeena Queen Charlotte Regional District

Provincial Government

- BC Ministry of Forests, Lands and Natural Resource Operations (FLNRO)
- BC Ministry of Aboriginal Relations and Reconciliation (MARR)
- BC Ministry of Transportation and Infrastructure (MOTI)
- BC Ministry of Environment (MOE)
- BC Ministry of Jobs, Tourism and Innovation (MJTI)
- BC Environmental Assessment Office (EAO)
- BC Oil and Gas Commission (OGC)

Federal Government

- Canadian Environmental Assessment Agency (CEAA)
- Environment Canada (EC)
- Fisheries and Oceans Canada (DFO)
- Natural Resources Canada (NRCan)
- Transport Canada
- Prince Rupert Port Authority

During these meetings, Aurora LNG introduced the joint venture and the Aurora LNG Project to the agencies, and began preliminary discussions regarding their concerns and potential social, economic, environmental and regulatory issues regarding the Project.

Ongoing consultation with government is planned to continue throughout the planning, construction and operations of the Project.

Stakeholder and Public Engagement

Early engagement with key stakeholders and the public is integral to the success of the Project and earning the Aurora LNG's social license to operate. As with First Nations communities, solid relationships develop through building mutual trust and a shared understanding of issues.

Aurora LNG will ensure engagement and consultation processes are inclusive, and provide stakeholders and the public with opportunities to identify their concerns and provide their input to inform Project planning and the regulatory process. The goals of the stakeholder engagement and consultation program are to:

- Introduce Aurora LNG and the proposed Project at the conceptual stage
- Facilitate stakeholders' and communities' understanding of the potential effects of the Project
- Establish dialogue to understand the views and perceptions of stakeholders and communities, and provide opportunities for them to influence Project planning
- Identify how Aurora LNG can work with stakeholders and communities to address issues (e.g., social and environmental effects, business development, training) and develop possible mitigation strategies.

Aurora LNG has yet to initiate consultation and engagement with stakeholders and the public. When the formal consultation phase commences, activities will involve a broad range of stakeholders in the Prince Rupert, Port Edward and surrounding areas who could be affected or has an interest in the Project. The main stakeholder groups include:

- Residents, individuals, and landowners
- Municipal, provincial and national governments representatives, and regulatory bodies
- Elected officials
- Non-governmental organizations (NGOs), environmental NGOs (ENGOs), and civil society organizations (e.g., Chamber of Commerce)
- Educational institutions (e.g., public, secondary, post-secondary, vocational)
- Emergency and medical services
- Media (e.g., local and regional radio stations, newspapers)
- Industry partners and peers
- Other business and industry sectors (e.g., recreational and commercial fishing, forestry, tourism, outfitting, guiding, hospitality)

- Contractors and suppliers.

9.1.1 Stakeholder and Public Engagement and Consultation Methods

Aurora LNG will use various media to notify stakeholders and community members of engagement activities planned for the Project. Public consultation will focus on timely sharing of information about the Project and providing opportunities for the public to identify their interests and concerns. Information gained through the stakeholder and public engagement and consultation program will assist in informing key issues related to the Project, integration of local knowledge into Project planning, and development of mitigation strategies.

The following activities are integral to the successful delivery of Aurora LNG's stakeholder and public engagement and consultation program.

- Confirming individuals and organizations to be engaged and consulted
- Developing communication plans to ensure timely sharing of Project information with the public, stakeholders and local communities
- Ensuring information sessions and communication plans are tailored to meet the needs of the event participants
- Organizing activities that engage diverse populations and ensuring all participants' voices and concerns are heard
- Employing a variety of communication tools and media (e.g., handouts, display panels, fact sheets, advertisements, web-based discussion forums, and PowerPoint presentations) to address diverse audiences and in accessible language
- Gathering information and identifying concerns and issues of the public and stakeholders to help inform Project design and the regulatory process
- Implementing and maintaining a stakeholder tracking database for documenting engagement activities and communications with the public, stakeholders and communities; logging issues and concerns, tracking commitments and monitoring follow-up.

Engagement and consultation activities may include the following.

- One-on-one meetings
- Community and public information sessions
- Feedback cards
- Open houses
- Focus groups
- Workshops and issue-specific information sessions and technical meetings
- Tours and site visits

- School presentations
- Career fairs, trade shows and conferences.

In addition to scheduled engagement activities, the Aurora LNG engagement team will also participate, whenever possible, in community events.