



## PROJECT DESCRIPTION

### **LNG CANADA PROJECT**

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**LNG CANADA**



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## ACRONYMS AND ABBREVIATIONS

AANDC 2011 .....	Aboriginal Affairs and Northern Development Canada 2011
AGRU .....	acid gas removal unit
AIR.....	Assessment Information Requirements
Alcan.....	Aluminum Company of Canada
BC.....	British Columbia
BCEAA .....	<i>British Columbia Environmental Assessment Act</i>
Bcf/d .....	billion standard cubic feet per day
CDC.....	Conservation Data Centre
CEA Agency .....	Canadian Environmental Assessment Agency
CEAA 2012.....	<i>Canadian Environmental Assessment Act 2012</i>
CGL .....	Coastal GasLink Pipeline Limited
CO2 .....	carbon dioxide
COSEWIC .....	Committee on the Status of Endangered Wildlife in Canada
CRA .....	commercial, recreational and aboriginal
CWH.....	Coastal Western Hemlock
CSU .....	commissioning and start up
DFO .....	Fisheries and Oceans Canada
DMR .....	Dual Mixed Refrigeration
DWT .....	Dead Weight Tonnage
EA.....	environmental assessment
EAO .....	Environmental Assessment Office
GDU.....	gas dehydration unit
H2S.....	hydrogen sulphide
ha.....	hectares
HTF.....	heat transfer fluid
LNG .....	liquefied natural gas
LNG Canada.....	LNG Canada Development Inc.

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km.....	kilometres
mm.....	millimetres
MNBC .....	Métis Nation BC
mtpa.....	million tonnes per annum
NEB .....	National Energy Board
NGLs .....	natural gas liquids
NOx .....	mono-nitrogen oxides
O <sub>3</sub> .....	ozone
PAD .....	Permanent Alteration and Destruction
PD.....	Project Description
PJ/day.....	Peta Joules per day
PM10, PM2.5.....	particulate matter 10 / particulate matter 2.5
PMR.....	precool mixed refrigerant
PNCIMA.....	Pacific North Coast Integrated Management Area
ppm.....	parts per million
Project .....	LNG Canada Export Terminal Project
RTA .....	Rio Tinto Alcan
SARA.....	<i>Species at Risk Act</i>
SOx.....	sulphur oxides
tcf .....	trillion cubic feet
TCPL .....	TransCanada Pipelines Limited
TERMPOL ....	Technical Review Process of marine terminal Systems in Transshipment Sites
TSAs.....	Transportation Service Agreements
vm1 .....	very wet maritime subzone
WCSB.....	Western Canadian Sedimentary Basin

## **PROJECT DESCRIPTION**

Acronyms and Abbreviations

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Table of Concordance of Project Description with Prescribed Information for the Description of a Designated Project

Regulation Clause	Requirement	PD Section(s)	Notes
REGULATION SOR/2012-148			
<b>1.0 General Information</b>			
1	The name of the project	1	
1	The nature of the project	1	
1	The proposed location of the project	4	
2	The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project	3	
3	A description of and the results of any consultations undertaken with any jurisdictions and other parties including Aboriginal peoples and the public	10	
4(a)	Other relevant information, including the environmental assessment and regulatory requirements of other jurisdictions	1, 12	
4(b)	Information concerning any environmental study that is being or has been conducted of the region where the project is to be carried out.	9	
<b>2.0 Project Information</b>			
5	A description of the project's context and objectives	1, 4	
6	The provisions in the schedule to the <i>Regulations Designating Physical Activities</i> describing the project in whole or in part.	5	
7	A description of the physical works that are related to the project including their purpose, size and capacity	6	
8	The anticipated production capacity of the project and a description of the production processes to be used, the associated infrastructure and any permanent or temporary structures.	1, 5, 6	
9	A description of all activities to be performed in relation to the project.	6	
10	A description of any solid, liquid, gaseous or hazardous waste that is likely to be generated during any phase of the project and of plans to manage those wastes.	6	
11	A description of the anticipated phases of and the schedule for the project's construction, operation, decommissioning, and abandonment.	6, 11	

## PROJECT DESCRIPTION

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Regulation Clause	Requirement	PD Section(s)	Notes
<b>3.0 Project Location Information</b>			
12	A description of the project's location, including:	4	
12(a)	<ul style="list-style-type: none"> <li>Geographic coordinates</li> </ul>	4	
12(b)	<ul style="list-style-type: none"> <li>Site maps produced at an appropriate scale in order to determine the project's overall location and the spatial relationship of the project components</li> </ul>	4; Figures 4-1 and 4-2	
12(c)	<ul style="list-style-type: none"> <li>The legal description of land to be used for the project, including the title, deed or document and any authorization relating to a water lot</li> </ul>	7, Figure 7-2	
12(d)	<ul style="list-style-type: none"> <li>The project's proximity to any permanent, seasonal or temporary residences</li> </ul>	7, Figure 7-1	
12(e)	<ul style="list-style-type: none"> <li>The project's proximity to reserves, traditional territories as well as lands and resources currently used for traditional purposes by Aboriginal peoples</li> </ul>	7, 12, Figure 7-1	
12(f)	<ul style="list-style-type: none"> <li>The project's proximity to any federal lands</li> </ul>	7, 12, Figure 7-1	
<b>4.0 Federal Involvement</b>			
13	A description of any financial support that federal authorities are, or may be, providing to the project	12	No federal funding for the project
14	A description of any federal land that may be used for the purpose of carrying out the project	12	No federal land involved in the Project
15	Any federal legislative or regulatory requirements that may be applicable including a list of permits, licenses or other authorizations that may be required in order to carry out the project.	12, Table 8	
<b>5.0 Environmental Effects</b>			
16	A description of the physical and biological setting	9	
17 (a)	A description of any changes that may be caused, as a result of carrying out the project, to fish as defined in section 2 of the <i>Fisheries Act</i> and fish habitat as defined in subsection 34(1) of that Act	13	
17(b)	A description of any changes that may be caused, as a result of carrying out the project to aquatic species, as defined in subsection 2(1) of the <i>Species at Risk Act</i>	13	

Regulation Clause	Requirement	PD Section(s)	Notes
17(c)	A description of any changes that may be caused, as a result of carrying out the project to migratory birds, as defined in subsection 2(1) of the <i>Migratory Birds Convention Act, 1994</i>	13	
18	A description of any changes to the environment that may occur, as a result of carrying out the project, on federal lands, in a province other than the province in which the project is proposed to be carried out or outside of Canada	13	
19	Information on the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	13	
20	Summary of the information required under section 1 to 19	Executive Summary	See separate document
<b>Guide to Preparing a Description of a Designated Project, CEAA (July 2012)</b>			
<b>1.0 General Information and Contact(s)</b>			
1	Describe the nature of the designated project, and proposed location (2–3 paragraphs; note that additional location details are to be provided in section 3).	1, 4	
2	Provide proponent contact information: <ul style="list-style-type: none"> <li>Name of the designated project.</li> <li>Name of the proponent.</li> <li>Address of the proponent.</li> <li>Chief Executive Officer or equivalent (include name, official title, email address and telephone number).</li> <li>Principal contact person for purposes of the project description (include name, official title, email address and telephone number).</li> </ul>	1, 3	
3	Provide a list of any jurisdictions and other parties including Aboriginal groups and the public that were consulted during the preparation of the project description. (A description of the result of any consultations undertaken is to be provided in sections 6 and 7).	10	
4	Provide other relevant information: <ul style="list-style-type: none"> <li>Provide information on whether the designated project is subject to the environmental assessment and/or regulatory requirements of another jurisdiction(s).</li> <li>Provide information on whether the designated project will be taking place in a</li> </ul>	9	

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Regulation Clause	Requirement	PD Section(s)	Notes
	region that has been the subject of a regional environmental study. Proponents are advised to contact the Agency during the preparation of the project description for information regarding any regional environmental studies that may be relevant.		
<b>2.0 Project Information</b>			
1	Provide a general description of the project, including the context and objectives of the project.	1, 4	
2	Indicate the provisions in the Regulations Designating Physical Activities setting out the designated activities that describe the project in whole or in part.	5	
2.1	Provide a description of the components associated with the proposed project, including: <ul style="list-style-type: none"> <li>Physical works associated with the designated project (e.g., large buildings, other structures, such as bridges, culverts, dams, marine transport facilities, mines, pipelines, power plants, railways, roads, and transmission lines) including their purpose, approximate dimensions, and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the designated project.</li> <li>Anticipated size or production capacity of the designated project, with reference to thresholds set out in the Regulations Designating Physical Activities, including a description of the production processes to be used, the associated infrastructure, and any permanent or temporary structures.</li> <li>If the designated project or one component of the designated project is an expansion, the percent of increase in size or capacity from the existing project (relative to the thresholds set out in the Regulations Designating Physical Activities).</li> <li>A description of all activities to be performed in relation to the designated project</li> </ul>	6  1, 5, 6  6	No expansion
2.2	Provide a description of any solid, liquid, gaseous or hazardous wastes likely to be generated during any phase of the designated project and of plans to manage those wastes, including the following: <ul style="list-style-type: none"> <li>Sources of atmospheric contaminant emissions during the designated project</li> </ul>	6	

Regulation Clause	Requirement	PD Section(s)	Notes
	<p>phases (focusing on criteria air contaminants and greenhouse gases, or other non-criteria contaminants that are of potential concern) and location of emissions.</p> <ul style="list-style-type: none"> <li>Sources and location of liquid discharges.</li> <li>Types of wastes and plans for their disposal (e.g., landfill, licensed waste management facility, marine waters, or tailings containment facility).</li> </ul>		
2.3	<p>Provide a description of the timeframe in which the development is to occur and the key project phases, including the following:</p> <ul style="list-style-type: none"> <li>Anticipated scheduling, duration and staging of key project phases, including preparation of the site, construction, operation, and decommissioning and abandonment.</li> <li>Main activities in each phase of the designated project that are expected to be required to carry out the proposed development (e.g., activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sediments, infilling, and installing structures).</li> </ul>	6	
<b>3.0 Project Location</b>			
1	Coordinates (i.e. longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the facility or, for a linear project, provide the beginning and end points	4	
2	Site map/plan(s) depicting location of the designated project components and activities. The map/plan(s) should be at an appropriate scale to help determine the relative size of the proposed components and activities	4, Figures 4-1 and 4-2	
3	Map(s) at an appropriate scale showing the location of the designated project components and activities relative to existing features, including but not limited to:		
3(a)	<ul style="list-style-type: none"> <li>Watercourses and waterbodies with names where they are known</li> </ul>	Figure 4-1	
3(b)	<ul style="list-style-type: none"> <li>Linear and other transportation components (e.g., airports, ports, railways, roads, electrical power transmission lines and pipelines)</li> </ul>	Figure 4-1, Figure 9-1	
3(c)	<ul style="list-style-type: none"> <li>Other features of existing or past land use (e.g., archaeological sites, commercial development, houses, industrial facilities, residential areas and any waterborne structures)</li> </ul>	7, Figure 4-1, Figure 7-1	
3(d), 6(b)	<ul style="list-style-type: none"> <li>Location of Aboriginal groups, settlement land (under a land claim agreement) and, if available, traditional territory</li> </ul>	7, 12, Figure 8-1	



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Regulation Clause	Requirement	PD Section(s)	Notes
3(e), 6(c)	<ul style="list-style-type: none"> <li>Federal lands including, but not limited to National parks, National historic sites, and reserve lands</li> </ul>	7, 8, 12, Figure 4-1, Figure 7-1, Figure 9-1	
3(f)	<ul style="list-style-type: none"> <li>Nearby communities</li> </ul>	7, Figure 7-1, Figure 9-1	
3(g) 6(a)	<ul style="list-style-type: none"> <li>Permanent, seasonal or temporary residences</li> </ul>	7, Figure 9-1	
3(h)	<ul style="list-style-type: none"> <li>Fisheries and fishing areas (i.e., Aboriginal, commercial and recreational)</li> </ul>		Information is being developed in consultation with First Nations and stakeholders
3(i)	<ul style="list-style-type: none"> <li>Environmentally sensitive areas (e.g., wetlands, and protected areas, including migratory bird sanctuary reserves, marine protected areas, and National Wildlife areas)</li> </ul>	Figure 4-1, Figure 9-1	
3(j)	Provincial and international boundaries	Figure 1-1	
4	Photographs of work locations to the extent possible	4, Photo 1, Photo 2	
5	Legal description of land to be used for the designated project, including the title, deed or document and any authorization relating to a water lot.	7, Figure 7-2	
3.1	To the extent that is known at this time, describe the ownership and zoning of land and water that may be affected by the project, including the following:	7	
3.1(a)	<ul style="list-style-type: none"> <li>Zoning designations</li> </ul>	7	
3.1(b)	<ul style="list-style-type: none"> <li>Current land ownership, including sub-surface rights</li> </ul>	7	
3.1(c)	<ul style="list-style-type: none"> <li>Any applicable land use, water use (including ground water), resource management or conservation plans within and near the project site.</li> </ul>	7	
3.1(d)	For the proposed construction, operation, decommissioning and abandonment of a marine terminal, state whether or not the lands are routinely, and have been historically, used as a marine terminal, or are designated for such use in a land use plan that has been the subject of public consultation	7	

Regulation Clause	Requirement	PD Section(s)	Notes
3.1(e)	If the project is to take place within the waters or lands administered by a Canada Port Authority under the Canada <i>Marine Act</i> and its regulations, describe applicable land status and zoning under the Port Land Use Plan.	7	
3.1(f)	Describe whether the designated project is going to require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Aboriginal peoples	7, 8	
<b>4.0 Federal Involvement—Financial Support, Lands and Legislative Requirements</b>			
1	Describe if there is any proposed or anticipated federal financial support that federal authorities are, or may be, providing to the designated project	12	No federal funding for the project
2	Describe any federal lands that may be used for the purpose of carrying out the designated project. This is to include any information on any granting of interest in federal land (i.e., easement, right of way, or transfer of ownership)	12	No federal land involved in the Project
3	Detail any federal legislative or regulatory requirements that may be applicable, including a list of permits, licenses or other authorizations that may be required to carry out the designated project.	12, Table 8	
<b>5.0 Environmental Effects</b>			
1	A description of the physical and biological setting, including the physical and biological components in the area that may be adversely affected by the project (e.g., air, fish, terrain, vegetation, water, wildlife, including migratory birds, and known habitat use).	9	
2	A description of any changes that may be caused as a result of carrying out the designated project to:		
2(a)	▪ Fish and fish habitat, as defined in the <i>Fisheries Act</i>	13	
2(b)	▪ Aquatic species, as defined in the <i>Species at Risk Act</i>	13	
2(c)	▪ Migratory birds, as defined in the <i>Migratory Birds Convention Act, 1994</i>	13	
3	A description of any changes to the environment that may occur, as a result of carrying out the designated project, on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada	13	
4	A description of the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the designated project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance	13	

## PROJECT DESCRIPTION

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Regulation Clause	Requirement	PD Section(s)	Notes
<b>6.0 Proponent Engagement and Consultation with Aboriginal Groups</b>			
1	A list of Aboriginal groups that may be interested in, or potentially affected by, the designated project, including contact information (location, name, mailing address, email address, and fax and telephone numbers).	8	
2	A description of the engagement or consultation activities carried out to date with Aboriginal groups, including:	10	
2(a)	▪ Names of Aboriginal groups engaged or consulted to date with regard to the project	10	
2(b)	▪ Date(s) each Aboriginal group was engaged or consulted	10	
2(c)	▪ Means of engagement or consultation (e.g., community meetings, mail or telephone).	10	
3	An overview of key comments and concerns expressed by Aboriginal groups identified or engaged to date, including any responses provided to these groups.	10	
4	An overview of information on current use of lands and resources for traditional purposes by Aboriginal groups or peoples (e.g., information provided verbally or in writing, and past or present studies).	8	
5	A consultation and information-gathering plan that outlines the ongoing and proposed Aboriginal engagement or consultation activities, the general schedule for these activities and the type of information to be collected (or, alternatively, an indication of why such engagement or consultation is not required).	10	Consultation Plan to be developed

Regulation Clause	Requirement	PD Section(s)	Notes
<b>7.0 Consultation with the Public and Other Parties (other than Aboriginal consultation included above)</b>			
1	A list of stakeholders that may be interested and potentially affected by the carrying out of the designated project. In addition, please describe consultation activities carried out to date with stakeholders, including:	10	
1(a)	▪ Names of stakeholders previously consulted	10	
1(b)	▪ Date(s) each stakeholder was consulted	10	
1(c)	▪ Means of consultation (e.g., community meetings, mail or telephone)	10	
2	An overview of key comments and concerns expressed to date by stakeholders and any responses that have been provided.	10	
3	An overview of any ongoing or proposed stakeholder consultation activities.	10	Consultation Plan to be developed
4	A description of any consultations that have occurred with other jurisdictions that have environmental assessment or regulatory decisions to make with respect to the project.	10	
<b>8.0 Executive Summary</b>			
	Proponents are to include as part of the project description an executive summary that summarizes the information identified in Sections 1 to 7 of this Guide. Under CEAA 2012, the Agency is required to consult the public on a summary of the project description that has to be posted on the Agency's Internet site in both of Canada's official languages as required under the <i>Official Languages Act</i> . As a result, in order to be in a position to initiate the screening phase in a timely manner, the executive summary is to be prepared and submitted to the Agency in both English and French.	Summary of the Project Description	See separate document

## PROJECT DESCRIPTION

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# 1 INTRODUCTION

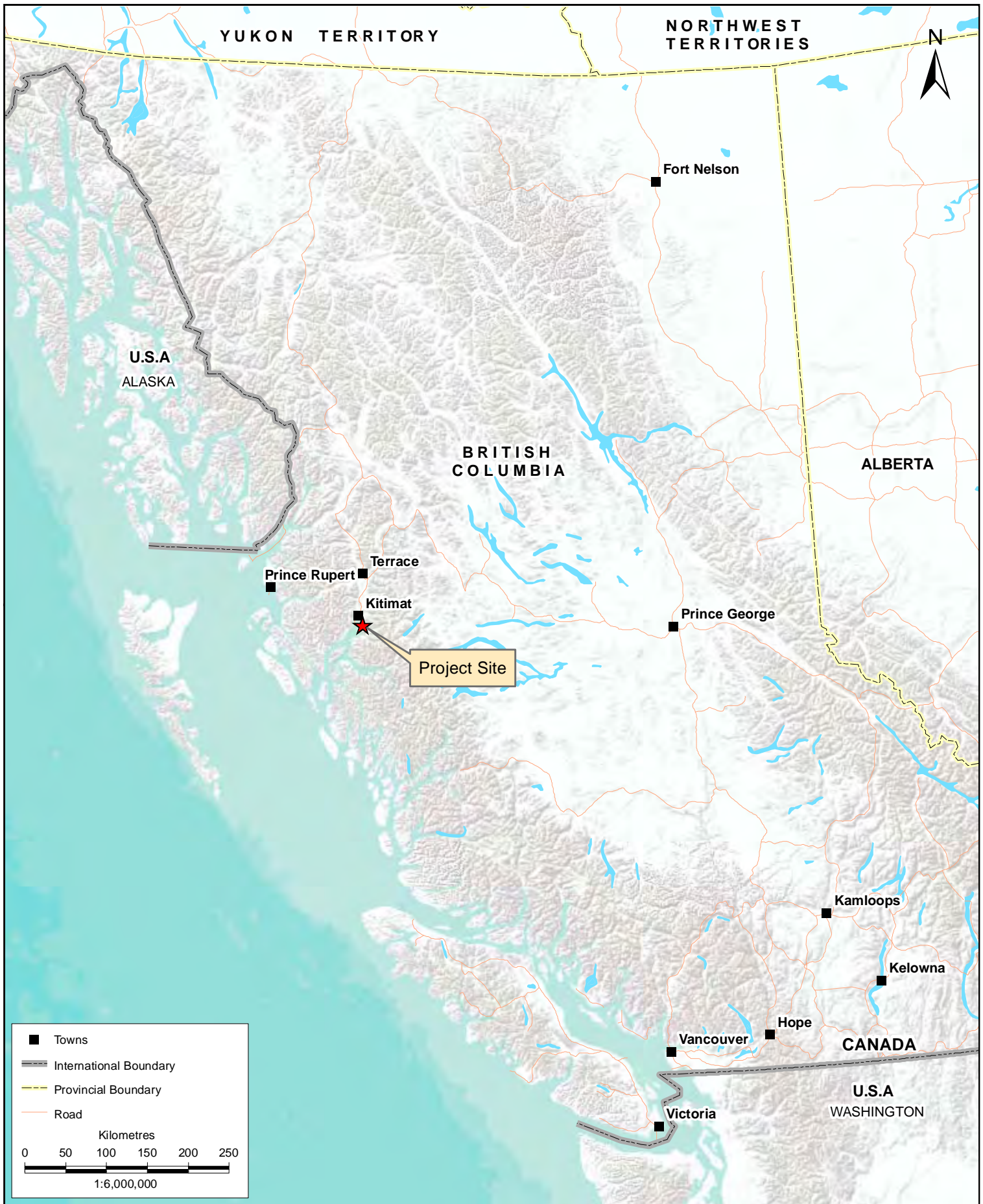
LNG Canada Development Inc. (“**LNG Canada**”) on behalf of Shell Canada Energy (“**Shell**”), Diamond LNG Canada Ltd. (an affiliate of Mitsubishi Corporation [“**Mitsubishi**”]), Kogas Canada LNG Ltd. (an affiliate of Korea Gas Corporation [“**KOGAS**”]), and Phoenix Energy Holdings Limited (an affiliate of Petro-China Investment (Hong Kong) Limited [“**PetroChina**”]) (collectively “**the Project Owners**”) is proposing to construct and operate a natural gas liquefaction facility and marine terminal for the export of liquefied natural gas (“**LNG**”). This project is called the LNG Canada Export Terminal Project (“**the Project**”). The Project will be located in the District of Kitimat, British Columbia (**BC**) as shown in Figure 1-1.

At full build-out, the LNG facility will require approximately 104 million m<sup>3</sup>/day (3.7 billion standard cubic feet per day [**Bcf/day**] or 3.9 Peta Joules per day [**PJ/day**]) of natural gas of which approximately 96 million m<sup>3</sup>/day (3.4 Bcf/day or 3.57 PJ/day) will be processed into 24 million tonnes per annum (**mtpa**) of LNG and approximately 8 million m<sup>3</sup>/day (0.3 Bcf/day or 0.32 PJ/day) will be used for fuel. The natural gas will be delivered by a new third-party-owned and operated pipeline. It is anticipated that the Project will be constructed in two or three phases with the first phase having a design capacity of 12 mtpa of LNG and a further 12 mtpa of design capacity to be added in one or two subsequent phases. Construction of the first phase is expected to be completed in 2019/2020 and subsequent phase(s) will be developed as market demand requires.

It is expected that the Project will require an environmental assessment (“**EA**”) under both the British Columbia *Environmental Assessment Act* (**BCEAA**) and the *Canadian Environmental Assessment Act 2012* (**CEAA 2012**). This project description (“**PD**”) is provided to the BC Environmental Assessment Office (**EAO**) and the Canadian Environmental Assessment Agency (“**CEA Agency**”) to provide an overview of the Project and initiate the respective EA processes. Details of the threshold requirements for the EA and the permits expected to be required are provided in Section 12. This project description is also intended to provide sufficient information on the nature and extent of the Project to enable government agencies, local governments, First Nations, and other stakeholders to determine whether they have an interest in the Project and to initiate discussion on the scope of the EA.

## **2 PROPONENT INFORMATION**

The Project Owners are leaders in the global LNG industry. Shell has been a global leader in natural gas liquefaction since 1964, with nine LNG projects in operation and three under construction. Mitsubishi is Japan's largest trading company and operates in 90 countries. It has been investing in LNG since 1969 and handles approximately one half of Japan's LNG imports. KOGAS has been South Korea's principal LNG provider since 1983. It currently operates three LNG import terminals in Korea and other terminals in Asia and Mexico. KOGAS is also a leader in storage and re-gasification technology. PetroChina is China's largest oil and gas producer and supplier. It initiated development of three LNG import projects in June 2004, with two starting operations in 2011. Shell is also working bilaterally with each of these parties on various other LNG projects globally. If approved, the EA certificate and operational permits for the Project will be held by LNG Canada, a corporation incorporated under the laws of British Columbia, on behalf of the Project Owners. It is the intention of the Project Owners that LNG Canada will be subject to a shareholder agreement setting out the rights and obligations among the Project Owners.



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**LNG CANADA**

**LNG CANADA REGIONAL MAP**

LNG CANADA  
KITIMAT, BRITISH COLUMBIA

Source: BC TRIM Topographic Database

PROJECTION BC Albers	DRAWN BY NP
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## 4 BACKGROUND INFORMATION

### 4.1 Project Overview

The Project will consist of the following major components, all located in the Province of British Columbia:

- a natural gas receiving and LNG production facility (“**LNG facility**”) that, at full build-out, will require approximately 104 million m<sup>3</sup>/day (3.7 Bcf/day or 3.9 PJ/day) of natural gas of which approximately 96 million m<sup>3</sup>/day (3.4 Bcf/day or 3.57 PJ/day) will be processed into approximately 24 mtpa of LNG and approximately 8 million m<sup>3</sup>/day (0.3 Bcf/day or 0.32 PJ/day) will be used for fuel;
- a marine terminal (“**marine terminal**”) able to accommodate two LNG carriers each with a capacity between 130,000 m<sup>3</sup> (approximately 64,000 DWT) and 265,000 m<sup>3</sup> (approximately 122,000 DWT) and a materials offloading area;
- supporting infrastructure and facilities including power supply and handling, water supply and handling, and waste collection and treatment; and
- temporary infrastructure and facilities (located outside of the facility site).

More detailed information on the Project is provided in Section 5.

### 4.2 Project Location

The LNG facility will be located on approximately 300 – 350 hectares (ha) of fee simple property within the District of Kitimat. Approximately 10% of the LNG facility site was previously developed for methanol production, storage, and transshipment (former Methanex Corporation facility), and for condensate transshipment (Cenovus Energy Inc.). The former Methanex site is now owned by Shell (“**Shell site**”) on behalf of the Project Owners. Coordinates for the approximate centre of the Shell site are:

- Latitude/Longitude—54.029229/-128.68809
- Universal Transverse Mercator—Zone 9U East 520431.7386 North 5986818.7386
- BC Oil and Gas Grid—D-36-B and C-35-B/103-I-2

More detail on the proposed Project lands is provided in Section 7.

The marine terminal will be located within the private Port of Kitimat. The proposed marine terminal involves the modification of the existing RTA “B” Wharf to accommodate two LNG carriers and a materials offloading area. LNG Canada continues to evaluate an alternative marine terminal that



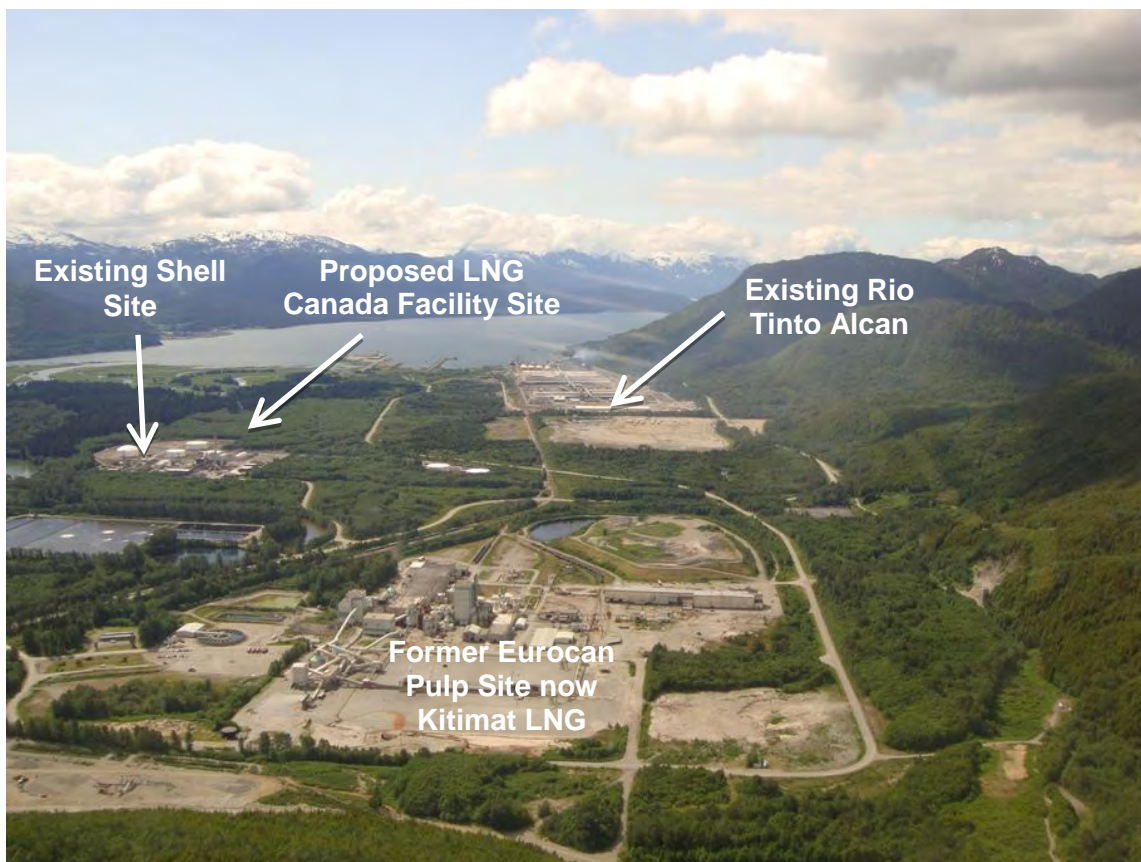
## PROJECT DESCRIPTION

### Section 4: Background Information

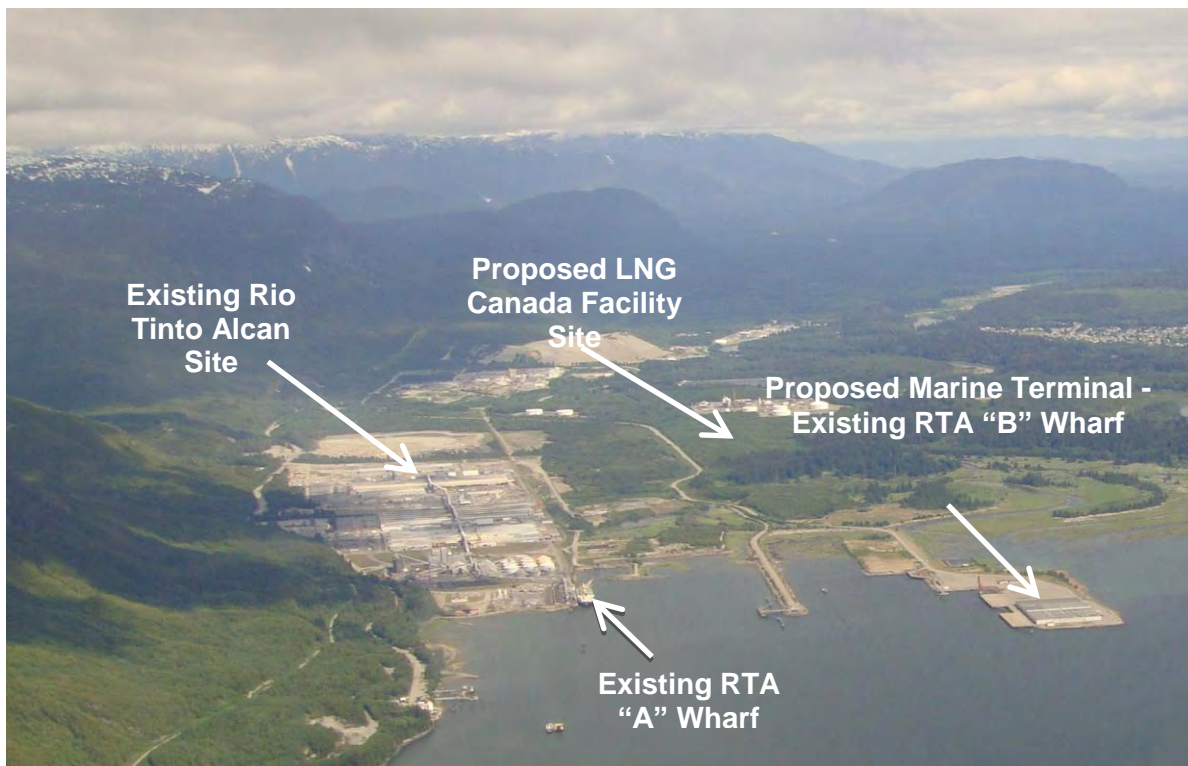
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would involve the installation of two new wharves adjacent to District Lots 88 and 89 and modification of the existing Methanex jetty to accommodate materials offloading. More detail on the marine terminal is provided in Section 5. A schematic view of the Project is shown in Figure 4-1 and the marine terminal alternative is shown in Figure 4-1A. Cryogenic rundown and vapour return pipelines would interconnect the LNG facility site with the selected marine terminal.

Photos 1 and 2 show overviews of the LNG facility site and the marine terminal.



**Photo 1: Proposed LNG Canada facility site and adjacent facilities**



**Photo 2: Proposed LNG Canada marine terminal**

### 4.3 Project Access

Kitimat is approximately 650 kilometres (**km**) northwest of Vancouver by air; approximately 640 km west of Prince George, 210 km east of Prince Rupert, and 60 km south of Terrace by provincial highways. The closest airport is the Terrace-Kitimat Regional Airport (approximately 60 km north of Kitimat). Highway access to the Project is from Prince George by Highway 16 to Terrace, and then following Highway 37 south to Kitimat. In the town of Kitimat, Highway 37 is also called Haisla Boulevard. Rail transportation to and from Kitimat is provided by CN Rail.

The marine access route to the Port of Kitimat will start near the Triple Island Pilotage Station where a BC Pilot will board the LNG carrier or other marine vessel, and continue south through Principe Sound, angle east and northeast into Douglas Channel to the Kitimat Arm. The marine access route is shown on Figure 4-2. At full build-out, the Project would expect between 170 and 350 carrier visits per year depending on the size of the LNG Carriers.

#### 4.4 Project Purpose and Rationale

LNG exported from the Project will connect the abundant natural gas resources in the Western Canadian Sedimentary Basin ("WCSB") and the growing worldwide demand for LNG, including in the Asia-Pacific region. The North American gas market has experienced a dramatic shift in recent years, where North American gas supply now exceeds forecasted near and long-term demand. Increased gas production from new gas fields in the United States, such as the Barnett, Haynesville, and Marcellus plays, have significantly reduced the share of the continental gas market served by the WCSB. In addition, unconventional gas plays in Western Canada have significantly enhanced the resources potential of the WCSB.

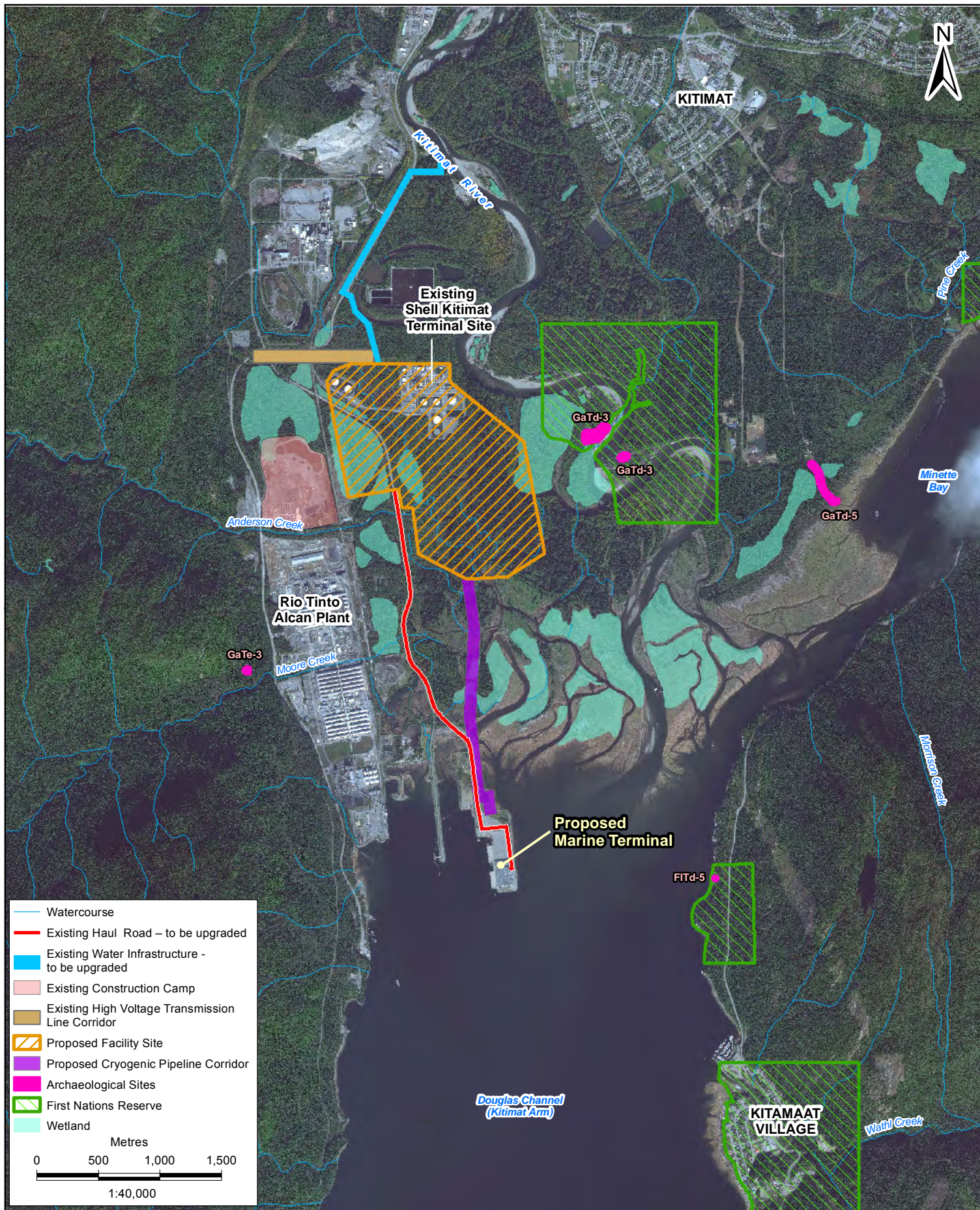
Concurrent with the dramatic increase in gas supply in North America and productive potential in the WCSB, demand for natural gas is expected to continue to increase around the world. Canada can provide a politically stable, major new supply source of LNG with ready access to investors throughout the value chain. The Project will allow access to global markets for LNG, including the Asia-Pacific region for which the WCSB represents one of the closest and most attractive long-term supply sources.

#### 4.5 Project Capital Cost and Employment Estimates

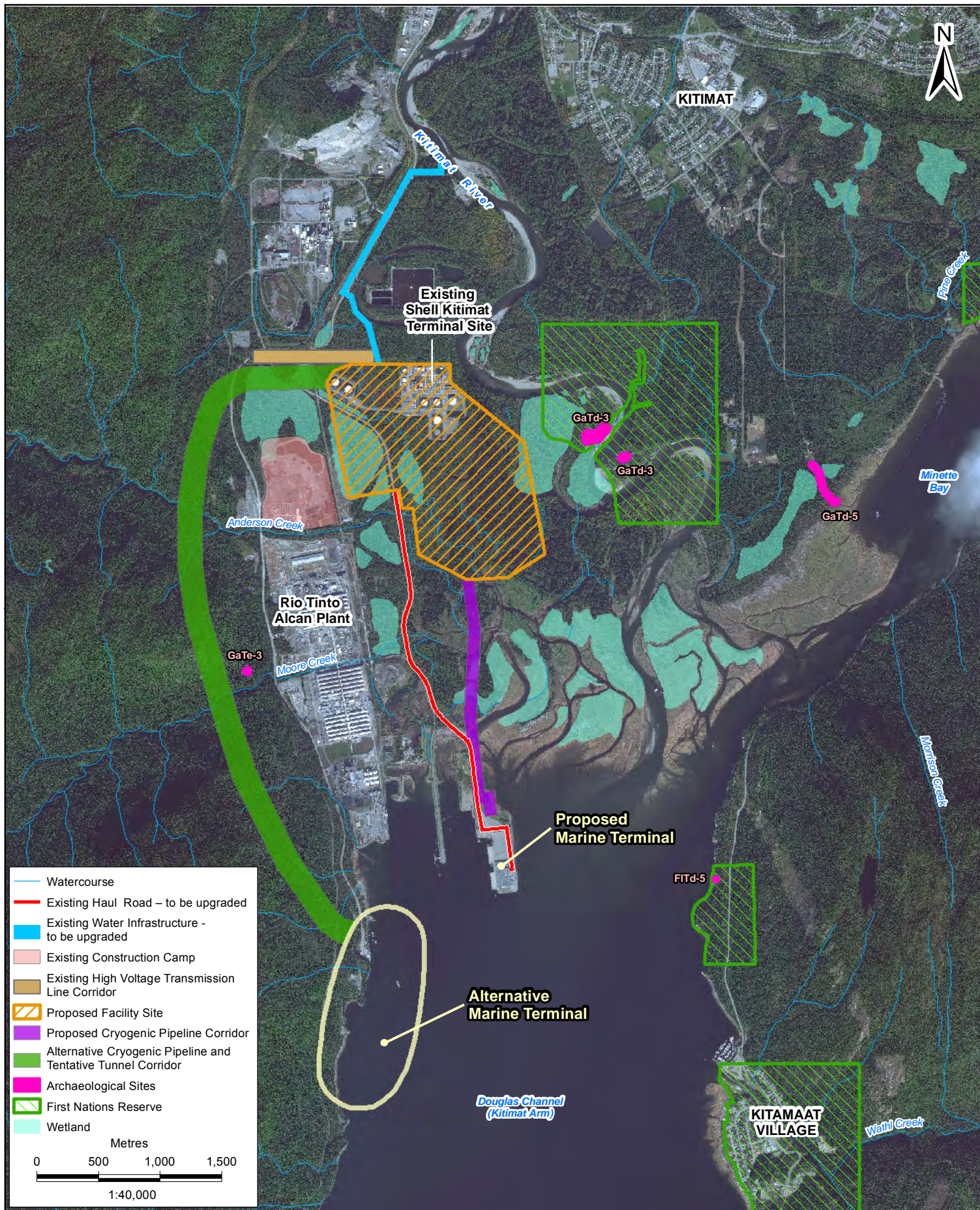
The estimated capital cost for the first phase of the Project is \$10 to \$15 billion (2012 Canadian dollars). The first phase capital cost estimate includes the construction and commissioning of two natural gas liquefaction trains, one LNG storage tank, and a marine terminal for two LNG carriers and a materials offloading area. The first phase of the Project will require an estimated workforce in the Kitimat area of approximately 5500 people at the peak of construction. The full build-out construction is expected to generate up to 20,000 person-years of employment.

During operation, the Project will employ an estimated 200 to 400 people after full build-out. It will also create additional indirect jobs in the local community and elsewhere through suppliers of goods and services.

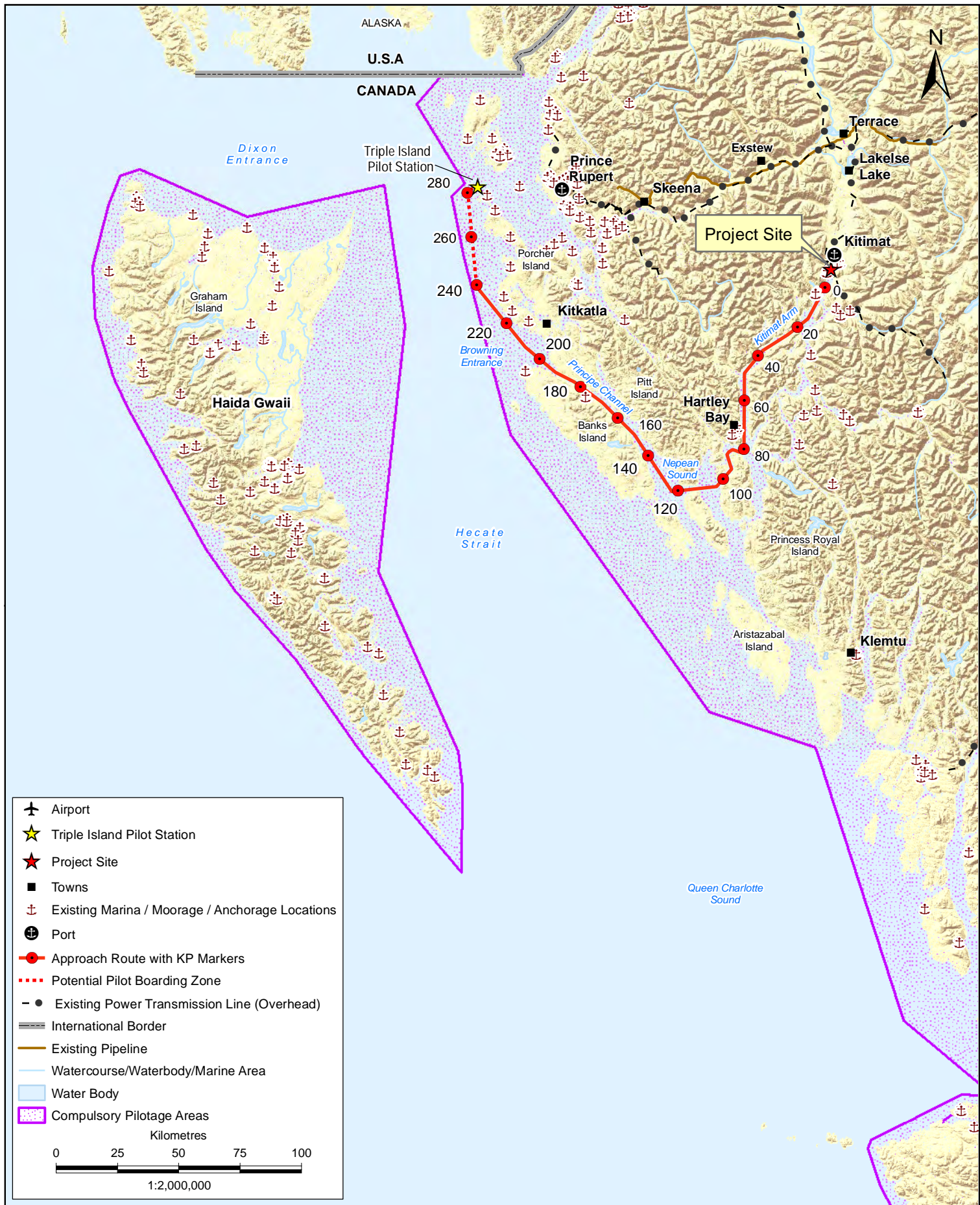












## 5 PROJECT COMPONENTS

The Project will consist of the following major components:

- an LNG facility that includes natural gas receiving and treatment facilities, natural gas liquefaction facilities, LNG storage tanks, natural gas liquids (“**NGLs**”) storage tanks, connecting piping, office and maintenance facilities, an NGL rail car staging area and loading facility, and interconnecting cryogenic rundown and vapour return pipelines between the LNG facility and the marine terminal;
- a marine terminal consisting of a wharf, able to accommodate two LNG carriers (each with a capacity between 130,000 m<sup>3</sup> and 265,000 m<sup>3</sup>), and a materials offloading area;
- supporting infrastructure and facilities including power supply and handling, water supply and handling (including water intake on the Kitimat River and interconnecting pipeline to facility site) and waste collection and treatment (including waste water collection and treatment plus an interconnecting disposal pipeline to Kitimat Arm), supporting maintenance and laydown area and roads;
- temporary infrastructure and facilities (located outside of the facility site) including temporary laydown and assembly areas, and a construction camp; and
- operation of LNG carriers and other supporting marine traffic along the marine access route.

At full build-out, the Project will consist of four natural gas liquefaction trains with each train designed to process approximately 24 million m<sup>3</sup>/day of natural gas (0.85 Bcf/day or 0.89 PJ/day) and produce approximately 6 mtpa of LNG. Two trains will be constructed in the first phase, and up to two additional liquefaction trains could be constructed as market demand requires. At full build-out (with four trains), the LNG facility will require approximately 104 million m<sup>3</sup>/day (3.7 Bcf/day or 3.9 PJ/day) of natural gas of which approximately 96 million m<sup>3</sup>/day (3.4 Bcf/day or 3.57 PJ/day) will be processed into approximately 24 mtpa of LNG and approximately 8 million m<sup>3</sup>/day (0.3 Bcf/day or 0.32 PJ/day) will be used for fuel. The Project is expected to operate for a minimum of 25 years.

Key components of the Project are listed in Table 5-1 and a more detailed discussion of the liquefaction process follows.

Table 5-1: Physical Components of the Project

Project	Components
LNG facility	<ul style="list-style-type: none"> <li>▪ Natural gas inlet station</li> <li>▪ Natural gas treatment equipment to remove impurities from the feed gas (including CO<sub>2</sub>, H<sub>2</sub>S, H<sub>2</sub>O, mercury, and NGLs)</li> <li>▪ Storage tanks for NGLs and infrastructure for staging and loading NGLs into rail cars</li> <li>▪ LNG production capacity of approximately 24 mtpa</li> <li>▪ Liquefaction refrigerant storage</li> <li>▪ Minimum of two and up to four natural gas liquefaction trains with natural gas-fired refrigeration compressors</li> <li>▪ Two 225,000 m<sup>3</sup> LNG storage tanks, for a total storage capacity of 450,000 m<sup>3</sup> (note: tank locations will vary depending on the marine terminal selected)</li> <li>▪ Cryogenic rundown and vapour return pipelines between the LNG facility and the marine terminal</li> <li>▪ Fresh water cooling towers (utilizing fresh water piped from the Kitimat River)</li> <li>▪ Flare systems</li> <li>▪ Fire water system</li> <li>▪ Administration and control buildings</li> <li>▪ Waste solids collection and disposal</li> <li>▪ Wastewater (effluent) collection and treatment</li> <li>▪ Facility site stormwater management system</li> </ul>
marine terminal	<ul style="list-style-type: none"> <li>▪ marine terminal to accommodate two LNG carriers each with a capacity between 130,000 m<sup>3</sup> and 265,000 m<sup>3</sup> and supporting materials offloading area</li> <li>▪ The proposed marine terminal would involve modifications to the existing RTA "B" wharf (former Eurocan wharf) facilities,</li> <li>▪ The wharf(s) would include cryogenic rundown and vapour return piping, LNG loading arms and associated infrastructure. The planned maximum LNG loading rate will be 12,000 m<sup>3</sup>/hour</li> <li>▪ Dredged berth areas to provide sufficient water depth for safe berthing of LNG carriers</li> </ul>
Supporting Infrastructure and Facilities	<ul style="list-style-type: none"> <li>▪ Existing access road upgrades to accommodate larger loads</li> <li>▪ Replacement of the existing water intake infrastructure on the Kitimat River and installation of a larger water pipeline to the LNG facility site</li> <li>▪ Replacement of the existing wastewater pipeline to the Kitimat Arm</li> <li>▪ power infrastructure for the LNG facility site and marine terminal</li> </ul>
Temporary Infrastructure and Facilities	<ul style="list-style-type: none"> <li>▪ Construction camps</li> <li>▪ Additional temporary laydown areas</li> <li>▪ Construction offices</li> </ul>



## PROJECT DESCRIPTION

### Section 5: Project Components

A block diagram of the first phase of the LNG facility with two LNG trains is shown in Figure 5-1. The scheme shows two parallel natural gas liquefaction trains, common infrastructure, buildings, and other facilities that are within the LNG facility site. Subsequent phase(s) would be similar with the addition of one or two additional trains in a format similar to the first phase.

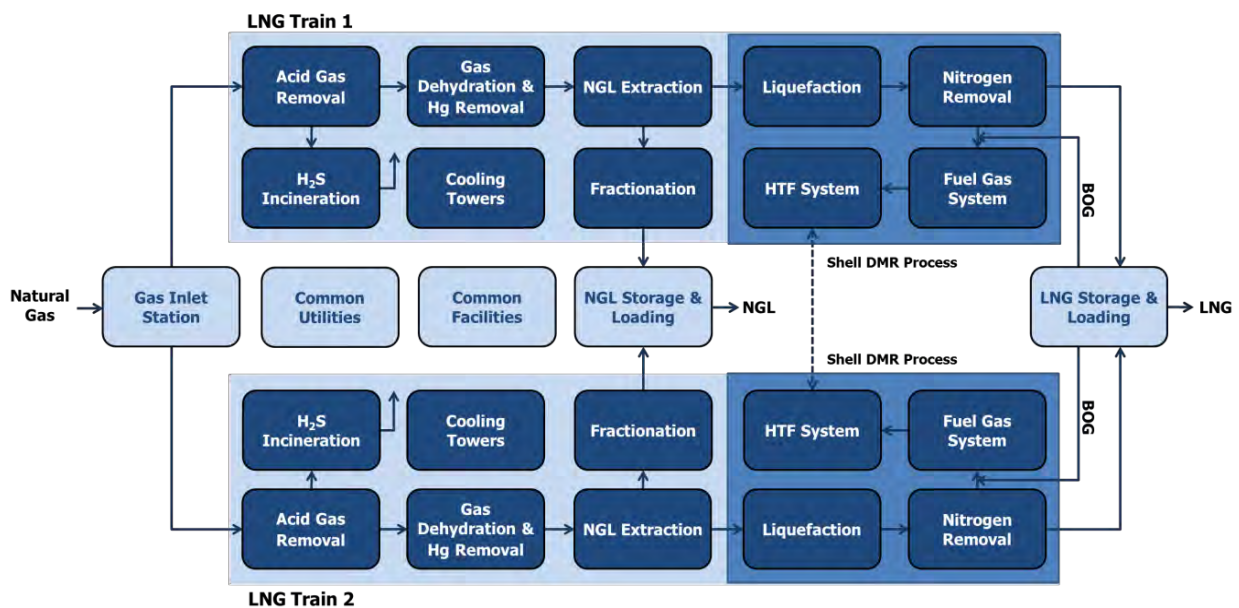


Figure 5-1: Block Scheme for Phase 1 of the LNG facility

## 5.1 Liquefaction Process

Natural gas for the Project is expected to be drawn from a number of sources within the WCSB. The sales gas specification feed gas will contain known levels of carbon dioxide ( $\text{CO}_2$ ), as well as trace amounts of hydrogen sulphide ( $\text{H}_2\text{S}$ ), water, NGLs, and other components that may not meet LNG process specifications. To meet the LNG process specifications, the following units within each train will remove, or reduce to allowable levels, the undesired components from the feed gas before liquefaction:

- **Acid Gas Removal Unit (AGRU)**—Removes  $\text{CO}_2$  and  $\text{H}_2\text{S}$ . The  $\text{CO}_2$  and  $\text{H}_2\text{S}$  stream is then sent to an acid gas incineration unit that incinerates the  $\text{H}_2\text{S}$  (converting it to sulphur dioxide) and traces of hydrocarbons that could be present in the  $\text{CO}_2$  and  $\text{H}_2\text{S}$ ;

- **Gas Dehydration Unit (GDU)**—Removes water from the gas stream to levels below 1 parts per million (**ppm**) to prevent freezing in the downstream units. This unit uses a molecular sieve to absorb the water. The sieves are periodically regenerated by heating the unit to drive out the absorbed water and have a lifecycle of approximately four years (at which time they will be regenerated). Condensed wastewater from the sieve will be treated and discharged to the marine waters of Kitimat Arm;
- **Mercury Guard Bed**—Removes trace amounts of mercury, if present; and
- **NGLs Extraction Unit**—Cools the inlet gas stream allowing the NGLs to condense and separate from the methane that makes up more than 99% of the LNG. The NGLs are stabilized in a debutaniser (a fractionating column for removing butane and other liquid components) and then sent to onsite NGL storage tanks until loaded onto rail cars for transfer to markets.

The gas leaving the NGLs Extraction Unit will meet the specification for LNG. It will then be routed to the cryogenic section and cooled using the Shell Dual Mixed Refrigeration (**DMR**) Process. The DMR Process cools the gas stream in heat exchangers where it is converted into LNG at high pressure.

As the LNG leaving the Main Cryogenic Heat Exchanger will be under pressure, it will have higher levels of nitrogen entrained than normally occurs under atmospheric pressure. The LNG pressure is then reduced allowing the excess nitrogen to escape which is then combined with the natural gas vapours (from the LNG storage tanks and vapour return pipeline from the LNG carrier) and fed into the low-pressure fuel gas system which is used for various heating processes in the LNG facility. The resulting LNG is sent to the LNG storage tanks.

The liquefaction process facilities will be supported by utility units providing the various water grades, instrument air, and nitrogen. Each LNG liquefaction train will have a heat transfer fluid (**HTF**) system and cooling water utility system. Facilities that will be common to all of the liquefaction trains include the fire water system, the pressure relief and liquid disposal unit, and the drainage and effluent treatment facility.

Freshwater cooling towers will be used to absorb the process heat and waste heat from cooling the gas (i.e., the energy that is removed from the natural gas as it is cooled from the ambient inlet gas temperature to -162°C). The cooling towers will utilize cold water (from the Kitimat River) that will be used to absorb heat and the resultant warm water will be cooled again by being re-circulated back through the towers. The estimated water demand is up to 70,000 m<sup>3</sup>/day (approximately 2,900 to 3,000 m<sup>3</sup>/hour) at full build-out, which includes an estimated 15,000 m<sup>3</sup>/day for each LNG train plus water for use in other facility processes. Approximately 80% of this water is expected to evaporate and the

remaining water (which will contain the natural minerals from the original volume) is proposed to be treated and cooled as necessary and discharged to the marine waters of Kitimat Arm.

## 5.2 Storage Tanks

There will be storage tanks for both LNG and NGL's. At full build out, the Project will have up to two 225,000 m<sup>3</sup> LNG storage tanks for a total storage capacity of 450,000 m<sup>3</sup> of LNG. The first phase (with two LNG trains) will have one tank with 225,000 m<sup>3</sup> of LNG storage capacity. The location of the LNG storage tanks will vary depending on the marine terminal selected. The two storage tanks will be located on the LNG facility site with the proposed marine terminal. The two storage tanks will be located in District Lot 89 with the alternative marine terminal. The LNG storage tank's contents will be kept at an average temperature of -162°C. The insulated tanks will rest on insulated platforms to prevent heat ingress through the tank floor. All piping will enter and exit the tank through the roof.

The tank capacity for each NGL component generated by the liquefaction process (ethane, propane and butane) will be sized based on the agreed upon feed gas specifications and estimated volumes to be generated. The NGL storage tanks will be located on the LNG facility site. The NGLs will be removed by rail. Suitably sized rail car staging area and NGL loading facilities will be constructed in coordination with CN Rail.

## 5.3 Marine Terminal and Shipping

LNG Canada has investigated several marine terminal options and undertaken vessel movement simulations to ensure the existing Kitimat harbour area can accommodate the LNG carrier and supporting traffic without disrupting the existing and forecasted RTA traffic. This computer-based movement simulation has confirmed that a redeveloped harbour area could accommodate the additional LNG carrier traffic. At full build-out, between 170 and 350 LNG carriers will visit the marine terminal annually. Additional supporting traffic would be expected to include tug boats plus barge traffic both during construction and operation.

There are three existing wharf facilities in the Kitimat harbour currently in use by RTA and others. The proposed marine terminal involves the modification and enhancement of the existing RTA "B" Wharf (former Eurocan wharf) to accommodate two LNG carriers and a materials offloading area. LNG Canada continues to evaluate an alternative marine terminal that involves the construction of two new wharves adjacent to District lots 88 and 89 along with modifications to the existing Methanex jetty to accommodate materials offloading. Both marine terminals would involve harbor berth dredging to accommodate the LNG carriers. The EA will consider potential effects for the selected marine terminal.

LNG Canada will work with Transport Canada to coordinate the Technical Review Process of Marine Terminal Systems in Transshipment Sites (**TERMPOL**) for the marine shipping and marine terminal operations associated with the Project. The TERMPOL review process is expected to identify any new measures (over and above existing requirements) to improve marine navigation safety. Operation of LNG carriers and other marine traffic along the marine access route (see Figure 4-2) will be assessed as part of the EA.

#### **5.4 Cryogenic Rundown and Vapour Return Pipelines**

The proposed cryogenic rundown and vapour return pipeline routing travels south from the LNG facility site to with the proposed marine terminal. LNG Canada continues to evaluate an alternative cryogenic rundown and vapour return pipeline route to connect the LNG facility site with the alternative marine terminal. This alternative route would travel west from the north edge of the LNG facility site, around the north end of the RTA smelter site, and then enter a proposed tunnel paralleling the west side of the RTA smelter to emerge in District Lot 89 near the alternative marine terminal. The EA will consider potential effects for the selected pipeline routing.

#### **5.5 Permanent Support Facilities**

The Project will require the installation of permanent administrative offices and other supporting structures (e.g., maintenance facilities). All of these facilities will be located within the LNG facility site.

#### **5.6 Construction Support Facilities, Laydown Areas**

The Project is expected to require temporary laydown areas and storage facilities during construction. A portion of the LNG facility site encompasses a laydown area. However, the Project may require additional areas to stage or store materials (e.g., adjacent to barge loading/unloading ramps). The plan will be to use existing cleared lands close to the LNG facility site wherever feasible. If temporary sites are required outside of available cleared lands, these additional lands will be assessed as part of the EA process.

#### **5.7 Construction Camp(s)**

Temporary accommodation will be needed to house construction staff (“the **Camp(s)**”). The area required for the Camp(s) is estimated to be approximately 50-100 ha and may be split into multiple smaller sites depending on the final configuration, availability of existing facilities, and discussions with the District of Kitimat and local landowners. The Camp(s) will have bedrooms, eating areas, recreational facilities, offices, and sewage treatment to support an expected peak construction staff

of approximately 5500 people. The current plan is for the Camp(s) to obtain drinking water from the District of Kitimat or from a water treatment facility located at or near the relevant Camp site (with water sourced from the Kitimat River), and to utilize the regional landfill for solid waste disposal.

To minimize the potential for negative Project effects on the existing infrastructure, services, and residents in the District of Kitimat, the Camp(s) will be located based on discussions with the District of Kitimat and may involve locations outside of the main town site. The operation of the Camp(s) will incorporate a “full-cycle transportation model” where staff will be transported between the Terrace-Kitimat Regional airport (during crew changes), the Camp(s), and the LNG facility site by buses or other suitable transportation method (e.g., railway). The use of personal vehicles will be controlled to minimize additional traffic on local roads and regional highways and minimize the need for additional parking.

A number of sites are being considered for the Camp(s) and each will be studied as part of the EA process. There is currently one preferred (existing) Camp location which is on RTA lands immediately adjacent to the LNG facility site.

## 5.8 Water Supply

The Project is currently proposing water cooling for the LNG processes. This determination was based on a number of factors including water cooling efficiency and technical challenges with air cooling systems (i.e., fans) in heavy snow load areas such as Kitimat. At full build-out, the Project proposes to withdraw up to 70,000 m<sup>3</sup>/day of water from the Kitimat River. The existing (former Methanex) water intake infrastructure purchased by Shell on behalf of the Project Owners would be replaced as would the existing 12 inch diameter interconnect pipeline to handle the increased water volume with greater reliability. The potential effects from the installation of the upgraded water intake infrastructure will be considered during the EA.

## 5.9 Power Supply

Each LNG liquefaction train will utilize natural gas-fired direct drive for the main refrigeration compressors to produce the LNG. The LNG facility and marine terminal will require electrical power to operate all other supporting facilities and infrastructure. Approximately 90 Megawatts (MW) of electrical power will be required for phase 1 and approximately 150 MW will be required at full build-out. There are currently two supply options being considered for the electrical power requirements including:

- **power supply option 1**—electrical power sourced from the BC Hydro electrical grid; and
- **power supply option 2**—new electrical generation installed in the LNG facility site.



The selected option will be considered in the EA which will include GHG emissions.

## 5.10 Natural Gas Supply

The Project will be supplied with gas from throughout the WCSB including northeast BC. Shell, on behalf of the Project Owners, has entered into a commercial arrangement with Coastal GasLink Pipeline Limited (**CGL**), a subsidiary of TransCanada PipeLines Limited. CGL will permit, build, own, and operate a pipeline that will deliver gas from the WCSB to the Kitimat area. Any regulatory review or approvals required by CGL in support of the proposed pipeline project will be undertaken by CGL. The Project Owners anticipate individually entering into firm, long-term Transportation Service Agreements (**TSAs**) with CGL prior to operation of the Project. The Project Owners will be individually obligated to contract with CGL for service sufficient to transport their respective participating interest share of natural gas to the LNG facility. At full build-out, the LNG facility will require approximately 104 million m<sup>3</sup>/day (3.7 Bcf/day or 3.9 PJ/day) of natural gas of which approximately 96 million m<sup>3</sup>/day (3.4 Bcf/day or 3.57 PJ/day) will be processed into approximately 24 mtpa of LNG and approximately 8 million m<sup>3</sup>/day (0.3 Bcf/day or 0.32 PJ/day) will be used for fuel.

## **6 PROJECT ACTIVITIES**

### **6.1 Construction**

Upon receipt of the necessary regulatory approvals and permits, construction will commence. This phase will include the following main steps:

- LNG facility site preparation involving vegetation clearing and grubbing, rock or material removal or fill, grading and levelling, compaction, potential installation of retention or erosion control structures, and potentially some paving in designated areas;
- site preparation for staging areas and (where necessary) the Camp(s), including vegetation clearing and grubbing, rock or material removal or fill, grading and levelling, compaction;
- the set-up of temporary facilities such as trailers, maintenance buildings, approved sanitary facilities and potentially temporary water collection structures;
- modifications and upgrades to the existing RTA (former Eurocan) haul road to accommodate the transfer of large LNG modules and equipment from the material offloading area to staging areas or the LNG facility site;
- shipping of LNG facility modules, supplies, and equipment by barge or other vessel to the material offloading area at the marine terminal;
- transportation of construction materials, supplies and equipment by transport truck or rail to the LNG facility site;
- installation of necessary utilities for both the LNG facility site and selected marine terminal (including electrical power, industrial and potable water systems, industrial and municipal wastewater collection, industrial and municipal wastewater treatment, fire protection system, storm water collection, vehicle fuelling station, and oil-water separator);
- construction of suitable foundations including installation of piles where required;
- construction of the natural gas treatment facilities, and NGL extraction and storage facilities (including construction of a rail car staging area and loading facilities in coordination with CN Rail);
- construction of the natural gas liquefaction facilities (including trains, refrigeration compressors, and relevant infrastructure);
- construction of up to two 225,000 m<sup>3</sup> LNG storage tanks;
- construction of plant piping, process cooling towers and facility site flare system;

- construction of a larger water intake structure on the Kitimat River and larger connecting water pipeline to the facility site;
- construction of a larger wastewater pipeline from the facility to an outlet in the Kitimat Arm;
- construction of ancillary support facilities such as facility administrative offices, storage, and maintenance facilities;
- installation of additional temporary or permanent access roads into the facility site and the marine terminal;
- construction of the proposed marine terminal would involve modifications to the existing RTA “B” Wharf and would include:
  - modifying the wharf to accommodate two LNG carriers and a material offloading area including:
  - removal of portions of the existing wharf to accommodate two berths;
  - installation of sheet piling, additional pilings and relevant support structures (e.g., mooring and berthing dolphins);
  - installation of material offloading and laydown areas;
  - installation of transfer piping and electrical infrastructure;
  - construction and installation of the cryogenic rundown and vapour return pipelines connecting the LNG facility site with the marine terminal; and
  - dredging of the harbour berth areas and transportation of dredge materials to approved containment/disposal areas.
- construction of the alternative marine terminal would include the construction of two new wharves adjacent to District Lots 88 and 89 to accommodate two LNG carriers and would include:
  - installation of piles, decking and relevant support structures (e.g., mooring and berthing dolphins);
  - installation of transfer piping and electrical infrastructure;
  - construction of a cut and cover tunnel from the LNG facility site west across the north side of the RTA site and underneath the existing road and railway infrastructure;
  - boring of a tunnel between a suitable entry area northwest of the RTA site and a suitable exit point in District Lot 89 near the marine terminal site;
  - blasting / excavation of areas in Lot 89 near the tunnel exit;
  - transportation and containment/disposal of blast rock/excavated materials;

- installation of support piles as necessary;
  - installation of containment structures where required;
  - installation of the cryogenic rundown and vapour return pipelines; and
  - installation of a secondary flare system.
  - modification and upgrades to the Methanex Jetty to accommodate material offloading; and
  - dredging of the proposed berth areas and transportation of dredge materials to approved containment/disposal areas.
- Transportation of construction workers between the Terrace-Kitimat Regional airport (during crew changes), the Camp(s), and the LNG facility site/marine terminal by buses or other suitable group transportation method (e.g., rail transportation on the existing CN Rail corridor from Terrace).

## 6.2 Commissioning and Start-up

During the commissioning and start-up (**CSU**) phase, Project components will be tested (including hydrotesting of piping and vessels) and optimized (including repeated starting and stopping of various components, testing of emergency shutdown procedures and repeated facility flaring).

## 6.3 Operation

During regular operation of the Project, the following key activities will occur:

- gas treatment to remove trace amounts of CO<sub>2</sub>, H<sub>2</sub>S, mercury, water, and other impurities;
- NGLs extraction, storage, and transfer onto rail cars;
- LNG production;
- LNG transfer to storage tanks;
- LNG loading onto LNG carriers;
- piloting of LNG carriers along the marine access route;
- shipping of LNG to global markets;
- maintenance of the LNG facility and marine terminal;
- maintenance of water intake infrastructure on the Kitimat River;
- maintenance of the wastewater outfall in the Kitimat Arm;
- shipping of supplies and equipment by barge or other vessel to the material offloading area at the marine terminal;

- transportation of supplies and equipment by transport truck or rail to the LNG facility site;
- solid and liquid industrial and municipal waste management including collecting and testing of storm water and wastewaters, and the collecting and transfer of solid wastes to approved disposal facilities; and
- monitoring of facility emissions.

The marine access route is from near the Triple Island Pilotage Station through Principe Sound, Douglas Channel to the Kitimat Arm as shown on Figure 4-2. At full build-out, the Project would expect between 170 and 350 carrier visits per year depending on carrier size.

## 6.4 Decommissioning and Reclamation

At the end of the Project's operational life, the LNG facility and marine terminal will either be sold or decommissioned in accordance with the applicable regulations at the time. Currently there are no regulations for decommissioning of LNG facilities in BC, but LNG Canada expects requirements will be established through discussions with the BC Oil and Gas Commission as part of permitting.

## 6.5 Emissions, Discharges, and Wastes

Construction, CSU, and operation emissions, discharges and wastes will be managed to ensure compliance with applicable policies and regulations. The emissions, discharges, and wastes are expected to include:

- expected atmospheric emissions include:
  - particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>);
  - GHG's;
  - CO, SO<sub>x</sub> (sulphur oxides), and NO<sub>x</sub> (mono-nitrogen oxides); and
  - fugitive hydrocarbons.
- expected liquid wastes include:
  - sewage from the Camp(s), construction offices, facility;
  - wastewater from the cooling towers and industrial wastewater from gas dehydration process;
  - site gathered storm water,
  - wastewater discharge locations are expected to include the Kitimat River (for clean storm water discharge) and the Kitimat Arm marine waters; and
  - allowable ballast water discharges (in accordance with legislation and best management practices).

- expected solid wastes include:
  - contaminated soil/materials excavated from Project footprint;
  - dredged material from the harbour berth pocket(s);
  - solid wastes from shipment of project components, including packing materials;
  - solid wastes from construction of project components, including materials from tunnel and marine terminal;
  - solid municipal or industrial wastes from the Camp(s);
  - solid municipal and industrial wastes from LNG facility operation and maintenance; and
  - solid wastes from LNG carriers including plastic ash and packaging materials.

The disposal of solid project wastes is being evaluated. Options include municipal waste disposal at the local District of Kitimat landfill (contracted removal by truck), industrial or contaminated waste disposal at a licensed waste management facility located elsewhere (contracted removal by rail car or truck), dredge material disposal within approved containment areas at or near the LNG facility site or marine terminal site (that meet regulations) or possibly through disposal at sea (potential sites to be determined in discussion with regulators and local First Nations).

## 7 SOCIO-COMMUNITY AND LAND USE SETTING

The Project will be within the municipal boundaries of the District of Kitimat, and the asserted traditional territory of the Haisla Nation. It is located approximately 1 km from the Kitimat townsite and approximately 4 km from Kitimaat Village (across the Kitimat Arm), the primary community of the Haisla Nation (see Figure 7-1).

Kitimat has existed as a municipality since the 1950s when the Aluminum Company of Canada (**Alcan**) developed its aluminum smelter and port facilities with support from the BC government. As part of the arrangement, Alcan planned and supported initial construction of the Kitimat townsite to support its workers. In 2007, Alcan was acquired by Rio Tinto to become Rio Tinto Alcan (**RTA**). In addition to the RTA smelter facility, other industrial operations have been key employers in Kitimat. The industrial development in Kitimat has included or currently includes:

- **The RTA Aluminum smelter.** This facility currently produces 282,000 tonnes of aluminum per year. The smelter is being expanded to increase production to 420,000 tonnes per year. RTA has an existing wharf (called the RTA “A” Wharf) with one carrier berth.
- **Methanex methanol facility.** This facility produced methanol from 1982 to 2005 and ammonia from 1986 to 2005. Both the methanol and ammonia plants have been dismantled and, in 2011, the site was purchased by Shell on behalf of the Project Owners and is now a component of the LNG facility site. As part of the purchase of the site, LNG Canada acquired an easement for a jetty/wharf located on RTA lands in the harbour plus a water intake infrastructure on the Kitimat River. The jetty/wharf has one berth and continues to accommodate occasional import shipments. LNG Canada has taken over this jetty easement as part of its purchase of the Methanex site. However, the existing jetty structure cannot accommodate the proposed LNG carriers.
- **Eurocan pulp and paper mill.** This mill was operational from 1969 to 2010. It has been permanently closed and partially dismantled. The pulp mill site is now owned by KM LNG Operating General Partnership, which intends to use the land for a construction camp, laydown and storage area for its LNG export facility at Bish Cove. A wharf previously associated with the Eurocan pulp mill is now owned by RTA (called the RTA “B” Wharf) and is being actively used to berth additional metal carriers. The Eurocan water intake infrastructure on the Kitimat River was also acquired and is being used by RTA.

Since 1961, the population of Kitimat grew from 8,217 to a peak of 12,814 in 1981. Through the 1980s and mid-1990s, the population was stable at around 11,200 but has since steadily declined to 8,335 in 2011 (Statistics Canada 2012). The population level has been closely tied to industrial

employment and the decline since the mid-1990s is primarily attributed to the closure of the Methanex facility and the Eurocan pulp mill as discussed above.

Kitimat's labour force (consisting of males and females of working age) was 4,740 in 2006<sup>1</sup> (down 13% from 2001). The primary employment sectors (from largest to smallest) were: manufacturing; retail trade; health care and social assistance; educational services; and accommodation and food services.

## 7.1 Land Use

The District of Kitimat encompasses approximately 243 km<sup>2</sup> of land. Land use within the district is governed by its current zoning, with future land use goals, objectives and policies reflected in its Official Community Plan ("**OCP**", District of Kitimat 2008). The District of Kitimat has four types of zoning: residential, commercial, industrial, and greenbelt.

The OCP was prepared during 2007 – 2008 and outlines the community's objectives, goals, and policies to guide planning and land use management decisions in Kitimat until 2027. It contains guidelines and regulations governing industrial, residential, commercial, and recreational land use within the district as specified by Section 877 of the *Local Government Act* (District of Kitimat 2008). The OCP was adopted as a bylaw and must be amended by bylaw if changes are required.

The OCP sets out eleven land use designations:

- Neighbourhood
- Residential Small Holdings
- Commercial
- City Centre
- Service Centre
- Parks And Recreation
- Major Institutional
- Indian Reserve
- Resource Extraction
- Industrial
- Forest Licence

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<sup>1</sup> The most recent labour force data available from the Government of Canada is from 2006.



As shown in Figure 7-1, the majority of the lands and water lots supporting and adjacent to the Project are designated “Industrial, M1 - Manufacturing”. Portions of the cryogenic rundown and vapour return pipeline routes and road easements fall within lands designated as Industrial or Forest Licence. For the lands designated Industrial, approved uses include industrial and marine activities, as well as temporary construction camps. The LNG facility site does abut and in small areas overlap lands zoned as “Greenbelt, G6-A Special Area, Environmentally Sensitive”. The areas zoned Greenbelt are generally a 100 m buffer on the western edge of the Kitimat River, following Fisheries and Oceans Canada (**DFO**) development restrictions in the District (District of Kitimat 1992).

The LNG facility site will be located on private, fee-simple lands adjacent to the RTA site. These lands are expected to have had traditional use in the past. However, given the past privatization of this land and long-standing industrial use, any current or recent use of these lands for traditional purposes is not expected.

The LNG Canada marine terminal will be located within or adjacent to the existing Kitimat harbour.

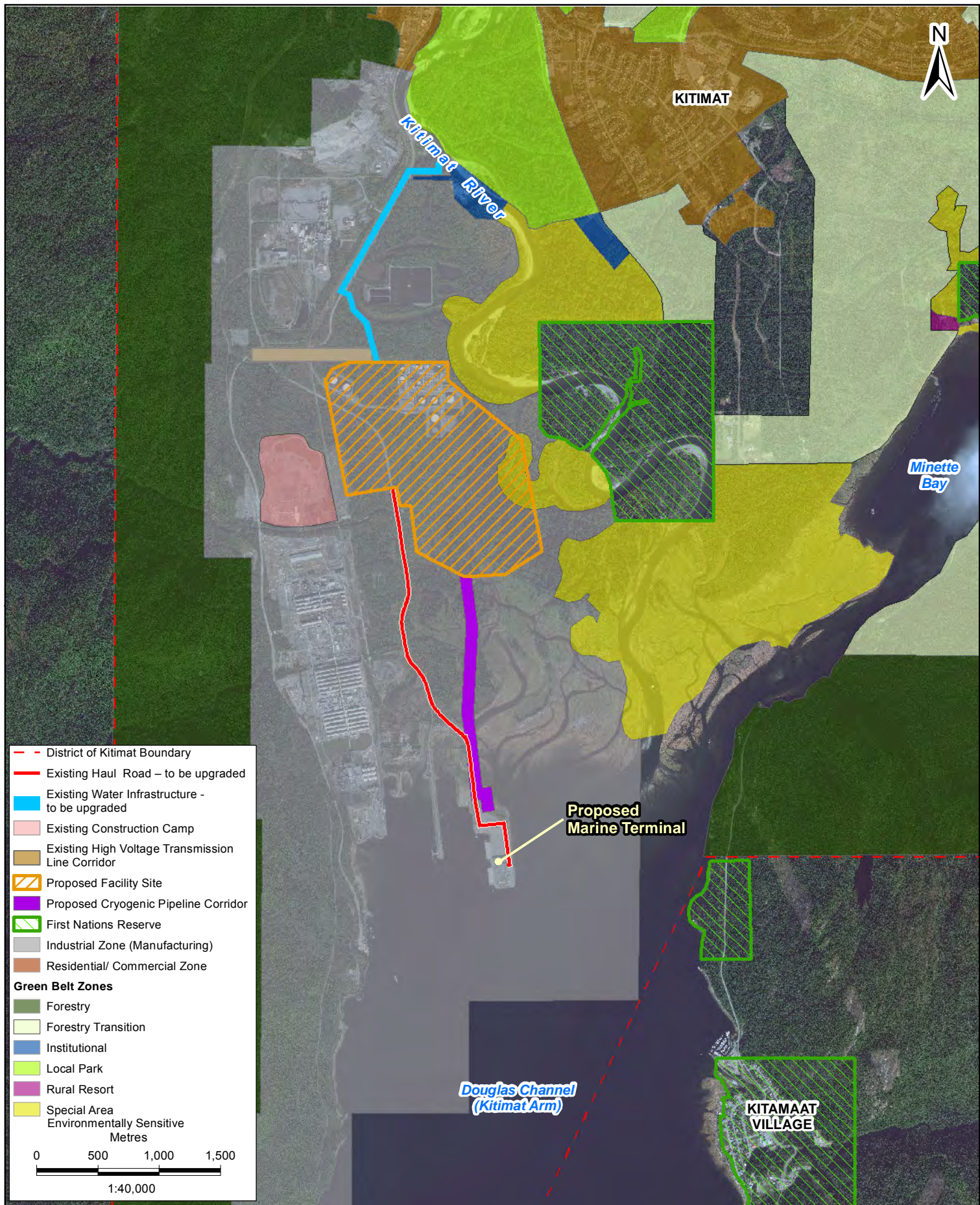
The descriptions of the proposed lands for the LNG facility site and marine terminal are provided in Table 7-1 and shown on Figure 7-2.

## 7.2 Other Planning Initiatives

Two other planning initiatives that are potentially relevant to the project include the 2001 Kalum Land and Resource Management Plan (**LRMP**) and the Pacific North Coast Integrated Management Area (**PNCIMA**). The Kalum LRMP guides land use beyond the boundaries of the District of Kitimat and covers 2.2 million ha encompassing the Kalum Forest District, City of Terrace, District of Kitimat, Kitimaat Village and several other First Nation and rural communities. It does not apply to land uses within the District of Kitimat or to marine shipping activities.

The PNCIMA initiative is a planning process that involves the Government of Canada, the Government of British Columbia and Coastal First Nations. The aim of the plan is to develop an integrated management plan for coastal waters from Campbell River to the Alaska border. The planning process is underway and the draft plan was scheduled to be submitted to government in December 2012 and to be shared with the public in 2013.







## PROJECT DESCRIPTION

### Section 7: Socio-Community and Land Use Setting

**Table 7-1: Lands Description for LNG facility site, pipelines, marine terminals, and camp**

Row	LNG Facility Site	Proposed Marine Terminal and Corridor for Cryogenic Rundown Pipeline	Alternative Marine Terminal and Corridor for Cryogenic Rundown Pipeline	Current Camp Option
		(NOTE: final pipeline alignment still to be determined)	(NOTE: final pipeline alignment still to be determined)	(NOTE: Existing Cleared Area on RTA Lands)
1	<b>PID: 010-308-857</b> Lot A District Lot 6050 Range 5 Coast District Plan 12032	<b>PID 009-834-290</b> District Lot 981, Except Block A Range 5 Coast District, (Crown Lease) (to the extent necessary)	<b>PID 013-085-638</b> Part Lot 187, Range 5 Coast District, except plan 11524, (to the extent necessary)	<b>PID 013-085-5469</b> District Lot 102A Range 5, Coast District (north of Anderson Creek) (to the extent necessary)
2	PID: 004-334-078 District Lot 6004 Range 5 Coast District	(there is no PID number for this) District Lot 7940, Except Block A of District Lots 7940 & 981, all Range 5 Coast District (Crown Lease) (to the extent necessary)	<b>PID 012-877-298</b> District Lot 6058 Range 5, Coast District (to the extent necessary)	<b>PID 013-085-590</b> District Lot 186 Range 5 Coast District (to the extent necessary)
3	<b>PID: 011-068-001</b> Lot 1 District Lot 187 Range 5 Coast District Plan 11524	<b>PID 013-085-484</b> District Lot 94, Range 5 Coast District (to the extent necessary)	<b>PID 004-337-069</b> District Lot 7595 Range 5, Coast District (to the extent necessary)	PID 012-877-298 District Lot 6058 Range 5 Coast District (to the extent necessary)
4	<b>PID: 011-067-993</b> Lot 2 District Lot 187 Range 5 Coast District Plan 11524	<b>PID 013-085-522</b> District Lot 96 Range 5 Coast District (to the extent necessary)	<b>PID 004-337-191</b> District Lot 7596 Range 5, Coast District (to the extent necessary)	PID 013-085-638 District Lot 187 Range 5 Coast District (to the extent necessary)
5	<b>PID: 004-331-079</b> Block 1513 District Lot 6267 Range 5 Coast District Plan 10424 (this is the water intake)	<b>PID 013-085-441</b> District Lot 93 Range 5 Coast District (to the extent necessary)	Unsurveyed Crown Land between District Lot 7596 and District Lot 97 (to the extent necessary)	

## PROJECT DESCRIPTION

### Section 7: Socio-Community and Land Use Setting

Row	LNG Facility Site	Proposed Marine Terminal and Corridor for Cryogenic Rundown Pipeline	Alternative Marine Terminal and Corridor for Cryogenic Rundown Pipeline	Current Camp Option
6	<b>PID: 013-119-621</b> Parcel A (See L361) of Lot 6003 Range 5 Coast District	<b>PID 004-332-041</b> District Lot 5469, (between District Lots 93/94 and Lot 1 Plan 12731) Range 5 Coast District, (to the extent necessary)	<b>PID 013-085-395</b> District Lot 92 Range 5 Coast District (to the extent necessary)	
7	<b>PID 004-333-021</b> Lot 6001, Range 5 Coast District (to the extent necessary)	<b>PID 016-334-558</b> Lot 1 District Lots 981, 5469, 7940 Range 5 Coast District Plan 12731 (to the extent necessary)	<b>PID 013-085-352</b> District Lot 91 Range 5 Coast District (to the extent necessary)	
8	<b>PID 004-333-276</b> Lot 6002, Range 5 Coast District (to the extent necessary)	<b>PID 004-329-627</b> District Lot 73, Range 5 Coast District (to the extent necessary)	<b>PID 013-061-208</b> District Lot 90 Range 5 Coast District (to the extent necessary)	
9	<b>PID 004-329-627</b> Lot 1506, District Lot 73, Range 5 Coast District (to the extent necessary)	<b>PID 004-333-276</b> Lot 6002, Range 5 Coast District (to the extent necessary)	<b>PID 013-061-186</b> District Lot 89 Range 5 Coast District (to the extent necessary)	
10	<b>PID 013-085-590</b> Part Lot 186, Range 5 Coast District, (portion of lot east of the rail line and north of Anderson Creek)		<b>PID 013-061-186</b> District Lot 88 Range 5 Coast District (to the extent necessary)	
11	<b>PID 013-085-638</b> Part Lot 187, Range 5 Coast District, except plan 11524, (portion of lot east of the rail line)		<b>PID 004-332-041</b> Part District Lot 5469, Range 5 Coast District, (adjacent to DL' 88 and 89) (to the extent necessary)	







## 8 ABORIGINAL GROUPS

There are eight First Nations and one Aboriginal Group that may be affected by the Project and associated marine shipping or land transportation activities:

- Haisla
- Lax Kw'alaams
- Haida
- Gitxaala
- Metlakatla
- Kitsumkalum
- Gitga'at
- Kitselas
- Métis Nation of BC

Many of the First Nations are members of the Coastal First Nations organization/Great Bear Initiative (**CFN organization**). The Project lies within the asserted traditional territory of the Haisla Nation. LNG Canada also recognizes that the Gitga'at First Nation and Gitxaala Nation, as well as others, may have an interest in the Project, particularly from a marine transportation or construction-related logistics perspective. LNG Canada has been engaging directly with First Nations or through the CFN organization to provide preliminary information on the project and identify potential interests of First Nations in the region. The following provides a brief overview of these First Nations. LNG Canada's consultation activities with First Nations are set out in Section 10 below. See Figure 8-1 showing the asserted traditional territories of the Haisla, Gitga'at, and Gitxaala First Nations. While there are no specific Métis communities within the project area, there are a number of Métis individuals living in the area.

### 8.1 Haisla Nation

The Haisla Nation is made up of 1,708 members of whom 645 live in Kitimaat Village, located 10 km southwest of Kitimat and 4 km (across the Kitimat Arm) from the RTA "B" Wharf (proposed marine terminal). Aboriginal Affairs and Northern Development Canada's 2011 (AANDC 2011) breakdown of the residency locations of the population is provided in Table 8-1. The Haisla asserted traditional territory covers just over 1,295 km<sup>2</sup> encompassing the Kitimat River, portions of Douglas Channel north of Princess Royal Channel, the Kemano River, and surrounding lands. The Canadian federal government set aside 18 reserves totaling 807.9 ha of land. Of these reserves, Kitimaat 1 (located on the east side of the Kitimat River across from the LNG facility site) and Kitimaat 2 (Kitimaat Village) are the largest.

**Table 8-1: Residency Locations of Haisla Nation Members**

Residency	Registered Population, AANDC 2011
On Reserves and Crown Land	676
Off Reserve	1,032

## 8.2 Gitga'at First Nation

The Gitga'at First Nation is made up of 715 members, of which 133 live in Hartley Bay. The village is 145 km southeast of Prince Rupert and 80 km southwest of Kitimat on the west shore of Douglas Channel near the confluence with Grenville Channel. AANDC's breakdown of the residency locations of the population is provided in Table 8-2.

The Gitga'at asserted traditional territory covers approximately 7,500 km<sup>2</sup> encompassing mainland and coastal islands of the lower Douglas Channel, Whale Channel, Wright Sound and Lewis Pass to Caamano Sound. The Canadian federal government set aside 15 reserves totaling 641.7 ha. A larger portion of this land base, 176 ha, is within Kulkayu Reserves No. 4 and 4A where the village of Hartley Bay is located. The community is only accessible by boat, floatplane or ferry from Prince Rupert with commercial barge service available from Kitimat.

**Table 8-2: Residency Locations of Gitga'at First Nation Members**

Residency	Registered Population, AANDC 2011
On Reserves and Crown Land	148
Off Reserve	567

## 8.3 Gitxaala Nation

The Gitxaala Nation has a registered population of 1,844. Its village of Kitkatla is located on the southeast side of Dolphin Island, approximately 50 km south of Prince Rupert and 160 km northwest of Kitimat. Access to the village is via float plane or boat from Prince Rupert; there is no road access.

AANDC's breakdown of the residency locations of the population is provided in Table 8-3. The Gitxaala asserted traditional territory covers just over 30,000 km<sup>2</sup> encompassing Prince Rupert harbour, the lower Skeena River, portions of Douglas Channel south of the confluence with Devastation Channel, and south to Laredo Sound, and surrounding lands. The Canadian federal government set aside 21 reserves 1,885.2 ha. Most of this land base, 1,557 ha, is within Dolphin Island Reserve No. 1.

**Table 8-3: Residency Locations of Gitxaala Nation Members**

Residency	Registered Population, AANDC 2011
On Reserves and Crown Land	455
Off Reserve	1,389



#### 8.4 Coastal First Nations

The CFN organization is an alliance of First Nations providing strategic regional planning, negotiation, and administrative support to member First Nations on environmental and socio-economic issues. The CFN organization is governed by a Board of Directors comprised of Chief and Councilors of the following First Nations:

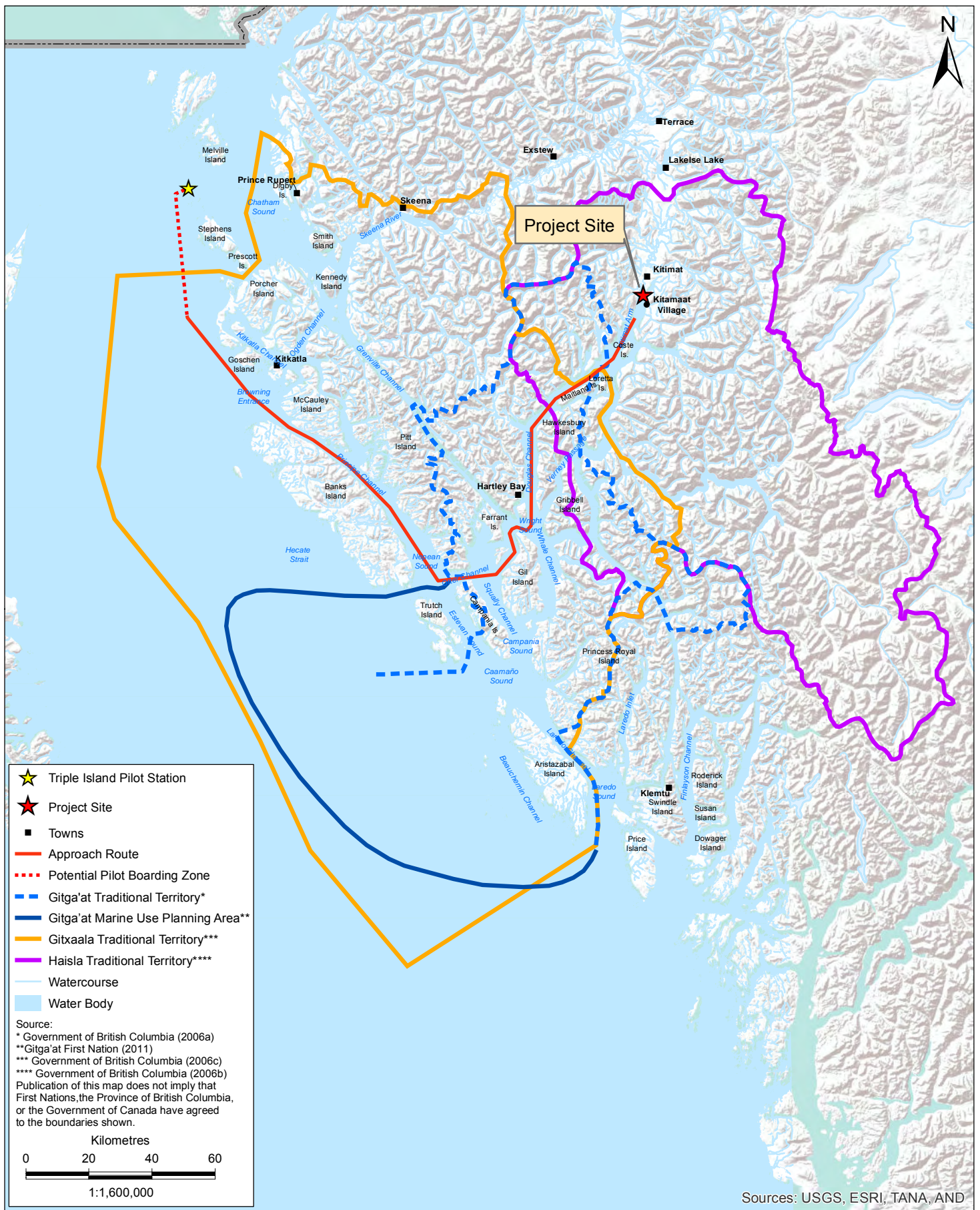
- Wuikinuxv Nation
- Heiltsuk Nation
- Nuxalk Nation
- Kitasoo/Xaixais First Nation
- Metlakatka First Nation
- Gitga'at First Nation
- Haida Nation (Council of the Haida Nation, Skidegate, and Old Masset)

#### 8.5 Other First Nations

Preliminary introductory meetings were held with the two First Nations located in the Terrace area: Kitselas and Kitsumkalum. An informal meeting was held with Chief Don Roberts of Kitsumkalum in Vancouver, followed by a meeting with Terry Bennett, Kitsumkalum Economic Development Coordinator, in Terrace. On April 24, 2012 a formal presentation was made to Kitselas Chief and Council to provide a general overview of LNG and preliminary project information.

#### 8.6 Métis Nation

Métis Nation of BC (MNBC) is a governing member of Métis National Council, one of the three National Aboriginal Organizations in Canada (along with Assembly of First Nations and Inuit Tapiriit Kanatami). MNBC represents Métis Citizens from 35 communities throughout BC including Fort St. John, Dawson Creek, Arras, Chetwynd, Prince George, Fort St. James, Vanderhoof, Smithers, Terrace, Kitimat, Prince Rupert, Port Hardy, and Haida Gwaii. Engagement with the MNBC is expected to occur through the broader consultation program. Additional consultation is anticipated through discussions related to capacity and skill building initiatives aimed at increasing opportunities for Indigenous People to meaningfully participate in Project-related economic activities.



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 <p>Stantec 4370 Dominion Street Burnaby, British Columbia V5G 4L7 Tel. (604) 436 3014 Fax. (604) 436 3752</p>		<p>PROJECT DESCRIPTION</p> <p><b>ASSERTED TRADITIONAL TERRITORY OVERVIEW MAP</b></p> <p>LNG CANADA KITIMAT, BRITISH COLUMBIA</p> <p><small>Source: BC TRIM Topographic Database</small></p>	<table><tr><td>PROJECTION</td><td>UTM9</td></tr><tr><td>DATUM</td><td>NAD 83</td></tr><tr><td>DATE</td><td>13-MAR-13</td></tr></table>	PROJECTION	UTM9	DATUM	NAD 83	DATE	13-MAR-13	<table><tr><td>DRAWN BY</td><td>SHS</td></tr><tr><td>CHECKED BY</td><td>SW</td></tr><tr><td>FIGURE NO.</td><td>8-1</td></tr></table>	DRAWN BY	SHS	CHECKED BY	SW	FIGURE NO.	8-1
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## **9 ENVIRONMENTAL SETTING**

The “Kitimat area” (including the District of Kitimat and Kitamaat Village) is located at the head of Kitimat Arm at the mouth of the Kitimat River. The Kitimat area is located between two parallel mountain belts, the St. Elias-Insular Mountains and the Coast-Cascade Mountains. Douglas Channel, which lies immediately south of Kitimat Arm, and Kitimat Arm together form one of BC’s largest fjords and provides a deep water, sheltered harbor approximately 140 km from the open ocean. The Kitimat River valley is more than 5 km wide and extends north toward Terrace. The following sections provide an overview of the environmental setting of the Kitimat area. Figure 9-1 provides an overview of parks, protected areas and other environmental features in the vicinity of the Project.

### **9.1 Climate and Air Quality**

The Kitimat area is influenced by Pacific air streams that result in mild winters and summers, with small seasonal temperature differences. Temperatures hover around freezing in winter and seldom exceed 30°C in summer. Mean annual precipitation in the Kitimat area ranges from 2,200 to 2,400 millimetres (mm). Daily precipitation maximums generally occur in October and December and are in the range of 129 to 145 mm. The average annual wind speed reported at the Kitimat townsite climate station is 18 km/h. The windiest month is March with average wind speeds of 20 km/h. The prevailing winds are from the south or southwest in summer and from the northwest in winter (Environment Canada 2011).

Air quality in the Kitimat area has been influenced by the existing or former industrial facilities for many years but with the prevailing winds, air quality is generally very good. Due to the industrial history of Kitimat, local air quality and meteorological data have been (for more than 20 years) and continue to be extensively monitored. There are currently four active monitoring stations in or near the towns of Kitimat and Kitamaat Village. At one location near the RTA site, SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and ozone (O<sub>3</sub>) are monitored on a continuous basis.

### **9.2 Aquatic Resources**

The Kitimat River and its tributaries support regionally important populations of salmon, trout, and char. All five species of Pacific salmon are found in the river and its tributaries (Chinook, chum, coho, pink, and sockeye). Dolly Varden char, bull trout, cutthroat trout, and rainbow/steelhead trout are also found in the river and its tributaries. Anderson Creek and Moore Creek are two of the larger creeks flowing into the lower Kitimat River in the vicinity of the LNG facility site. Anderson Creek supports chum salmon, pink salmon, cutthroat trout, and Dolly Varden char. Moore Creek supports



coho salmon and pink salmon. Dolly Varden and cutthroat trout are of special conservation concern and are provincially blue-listed.

Eulachon also use the Kitimat River, but in the early 1990s there was a significant decline in the local population and it has yet to recover. The population decline has been attributed to effluent outfalls installed in the Kitimat River during the 1970s and 1980s (Derksen, 1981, Moody, 2008). Eulachon are currently listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (**COSEWIC**) and are provincially blue-listed (BC Conservation Data Centre (**BC CDC**), 2012a).

Douglas Channel, Kitimat Arm, and the Kitimat River estuary support a broad diversity of marine aquatic resources. Notable fish species with recreational and commercial value in Kitimat Arm include Pacific herring; coho, chum, pink, sockeye and Chinook salmon; sea-run Dolly Varden char; English sole; halibut; and Dungeness crab. Marine mammals that occur in Douglas Channel include killer whales (resident and Bigg's), humpback whales, Steller sea lion, Dall's porpoise, harbour porpoise, and harbour seal. Under the *Species at Risk Act* (**SARA**), northern resident killer whales and humpback whales are listed as *threatened* and Steller sea lions and harbour porpoises are listed as *special concern*.

### 9.3 Vegetation Resources

The area surrounding the lower Kitimat River is in the Sub-montane variant of the Coastal Western Hemlock (CWH) Very Wet Maritime Subzone (vm1). Forests in this area are typically comprised of Western hemlock, Amabilis fir, western red cedar, Sitka spruce and yellow cedar. Western hemlock and Amabilis fir dominate the canopy of late seral stands. Sitka spruce is common, but seldom dominant, and occurs mainly on alluvial soils. Deciduous trees are uncommon in mature forest communities but are found on floodplains, fluvial terraces and landslide scars where disturbances expose mineral soil, leading to red alder and black cottonwood being common.

Within the wetter microhabitats of the lower portions of the Kitimat Valley, vegetation cover ranges from herbaceous to pole/sapling and young forests. There is a predominance of shrubby habitat in the lowlands where common understory species include devil's club, salmonberry, lady fern, oak fern, skunk cabbage, and sphagnum mosses. Non-forested fens, marshes and bogs are the most common wetland type and occur in scattered small depressions and occasionally on slopes. Some of these sites support unique plant communities that contain fern-leaved goldthread, tufted clubrush, beaked sedge and sphagnum mosses.

The BC CDC (2012b) identifies three plants of special conservation status documented in the lower Kitimat River valley:

1. Bog adder's-mouth orchid (Blue-listed);
2. White adder's-mouth orchid (Blue-listed); and
3. Cryptic paw lichen (Blue-listed and Special Concern on Schedule 1 of SARA).

In addition, the BC CDC (2012a) reports 11 provincially-listed plant communities that potentially to occur in the Kitimat Valley lowlands. Three red-listed communities occur in the CWHvm1 and Kalum Forest District:

1. Dune wildrye—beach pea community, Ecological Unit CWHvm1/00;
2. Sitka spruce/Salmonberry, Ecological Unit CWHvm1/09; and
3. Sitka sedge/peat moss wetland fen, Wetland community Wf51.

Eight blue-listed communities occur in the CWHvm1 and Kalum Forest District:

1. Western hemlock—western redcedar/Salal very wet maritime, Ecological unit CWHvm1/03;
2. Western redcedar—western hemlock/sword fern, Ecological unit CWHvm1/04;
3. Western hemlock—amabilis fir/Deer fern, Ecological Unit CWHvm1/06;
4. Amabilis fir—Sitka spruce/Devil's club, Ecological Unit CWHvm1/08;
5. Black cottonwood—red alder/Salmonberry, Ecological Unit CWHvm1/10;
6. Western redcedar—Sitka spruce/skunk cabbage, Ecological unit CWHvm1/14;
7. Labrador tea/western bog-laurel bog/ peat mosses, Wetland community Wb50; and
8. Sitka willow/Sitka sedge swamp, Wetland community Ws06.

## 9.4 Wildlife Resources

The Kitimat River estuary supports a number of large and small mammal species, including black-tailed deer, moose, grizzly bear, black bear, American marten, and snowshoe hare. Amphibian species occurring in the estuary include northwestern salamander and western toad. The estuary also supports migrating and resident species of songbirds, raptors, waterfowl, and sea birds. It is an important staging and over-wintering site for birds during migration, and supports large seasonal concentrations of shorebirds and waterfowl. There are sixteen potentially occurring species of conservation concern in the Kalum Forest District (BC CDC 2012a), including fourteen species with red or blue list designations in BC, and eleven species listed on Schedule 1 of the *Species at Risk Act*. It is expected that only a fraction of these species occur in the vicinity of the Project due to the availability of specific habitat requirements within the estuary. Recent studies indicate that species of conservation concern occurring in the Kitimat River estuary include western toad (BC blue list; SARA

Special Concern), marbled murrelet (BC blue list; SARA Threatened), tundra swan (BC blue list), western grebe (BC red list; SARA Threatened), pelagic cormorant (BC red list), double-crested cormorant (BC blue list), great blue heron fannini subspecies (BC blue list; SARA Special Concern), short-billed dowitcher (BC blue list), red-necked phalarope (BC blue list), California gull (BC blue list), and grizzly bear (BC blue list).

The north coast of BC supports large and diverse populations of seabirds. Many species breed at established nesting sites on islets and shores from Haida Gwaii to the mainland coast. Within the confined channels of the shipping route including Douglas Channel, Principe Sound and associated sounds, bays and crossing areas, there are potentially 11 seasonally occurring provincially red-listed and 23 blue-listed marine bird species.

## **9.5 Past and Current Environmental Studies**

Several assessments have been conducted in close proximity to the Kitimat area including those in support of the following projects or initiatives:

- Kitimat LNG Terminal Project (2004 to 2006);
- BC LNG Export Cooperative Project (2010 to 2012);
- Pacific Trail Pipelines (formerly Kitimat to Summit Lake Pipeline Loop) Project (2005 to 2008);
- Enbridge Northern Gateway Project (2004 to 2012);
- Crab/Europa Hydroelectric Development (2007 to 2008);
- Chu Molybdenum Mine Project (2009 to 2010); and
- RTA smelter facility and other activities or facilities within the RTA site adjacent to the Project.

The existing publicly available information from these projects, in addition to available scientific literature, and grey literature (technical reports, government reports, previous assessments in the area) will be reviewed. In addition, project-specific baseline studies will be completed to support the environmental, socio-economic, and health assessments for the Project.







## 10 CONSULTATION ACTIVITIES

### 10.1 First Nations Engagement

The objectives of engagement with First Nations have been, and will continue to be:

- to provide information about the Project and create a forum for open dialogue;
- to understand the Aboriginal Group governance and community interests;
- to develop a positive long-term relationship with the Aboriginal Group;
- to discuss project concerns raised by the Aboriginal Group related to environmental, cultural, and traditional land and resource use issues; and
- to identify mutually beneficial commercial opportunities and benefits associated with the Project.

The LNG facility site and marine terminal are located in the asserted traditional territory of the Haisla Nation. As a result, a key focus of First Nation engagement efforts has been, and will continue to be, with the Haisla Nation. Early engagement with the Haisla Nation was initiated in 2010 and has continued through 2011 and 2012. The initial focus of the discussions was the acquisition of the site in Kitimat and introductory engagements including:

- introductory meetings with First Nation Chief and Council to introduce the Project, and discuss issues followed by a formal presentation regarding the nature of the Project in February 2012 and a follow-up presentation to the Governance Working Committee in September 2012;
- mutual understanding of engagement and capacity funding to participate in the regulatory review process;
- liaising with the Haisla Nation and receiving their preliminary feedback related to the Project;
- a presentation on LNG shipping; and
- preliminary discussions on the LNG facility site, wharf design and potential effects on the Kitimat River estuary, as well as possible mitigation measures.

LNG Canada and representatives of the Haisla Nation continue to meet on a regular basis and members of the Haisla Nation have been involved in a number of the baseline studies. A key focus of engagement with the Haisla Nation over the next two years will relate to Project design, regulatory review, and finalization of project-related agreements.

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From a marine transportation perspective, the Gitga'at and Gitxaala First Nations have been identified as having an interest in the Project. The communities of Hartley Bay (Gitga'at First Nation) and Kitkatla (Gitxaala Nation) are both located along the LNG Canada marine access route, and the proposed shipping activities may have potential impacts to the asserted aboriginal rights of the Gitga'at and Gitxaala First Nations. LNG Canada has been meeting with both Gitga'at and Gitxaala representatives since Spring 2012. The primary focus of these engagements was to share preliminary project information and development of protocol agreements related to their involvement in the LNG Canada regulatory process including provision of capacity funding. Introductory letters were sent to Gitga'at Chief and Council and Gitxaala Chief and Council in December 2011, followed by invitations to attend an introduction to LNG workshop held in Vancouver.

As Gitga'at is a member of the CFN organization, engagement with Gitga'at has occurred both through the CFN organization (e.g. the March LNG workshop) and directly. Direct engagement with Gitga'at began in late March 2012. In addition to discussions related to the development of a protocol agreement, preliminary information about the project and LNG shipping was provided. Gitga'at members also participated in the initial marine mammal survey held in February 2013.

In April 2012, LNG Canada met with the Gitxaala Nation to introduce the Project and begin negotiation of a protocol agreement.

As of November 2012, LNG Canada had signed protocol engagement agreements with Haisla, Gitga'at and Gitxaala First Nations, providing a framework for engagement and capacity funding to participate in the regulatory process and negotiate project benefits.

Key planned or ongoing activities for each of Haisla, Gitga'at and Gitxaala First Nations include:

- continuing to explore opportunities related to commercial opportunities and economic benefits associated with the Project;
- review of the Project Description and discussion of the preliminary Assessment Information Requirements (AIR) for the EA;
- participation on the BC EAO Working Group established for the EA review process;
- sharing of information related to regulatory applications, baseline studies, and other information collected for the EA (as requested), including sharing by each First Nation of traditional knowledge studies and reports,
- ongoing opportunities to participate in relevant field programs including marine mammal surveys and traditional land use surveys;

- regular updates on the Project through direct meetings, written materials and other communication vehicles, as appropriate; and
- ensure Project representatives are available to respond to information requests or issues raised in a timely fashion.

Depending on other transportation activities during construction or operation (e.g., barge traffic to the facility site, vehicle traffic along highway 37 from Terrace), there are other Aboriginal Groups who may have an interest in the Project:

- Lax Kw'alaams First Nation;
- Metlakatla First Nation;
- Haida Nation;
- Kitsumkalum First Nation;
- Kitselas First Nation; and
- Métis Nation of BC.

Many of the First Nations in this region are members of the CFN organization and have signed the Coastal First Nations Reconciliation Agreement 2009 with the Province of British Columbia (amended in 2010 and 2011 to include additional First Nations).

LNG Canada held a meeting with the CFN organization on November 15, 2011 and an introductory letter was sent to the Chief and Council of each First Nation in the CFN organization in December 2011. A follow up meeting with the CFN organization was held in January 2012. Ongoing meetings with the CFN organization occurred throughout 2012, with discussions focused on building understanding of LNG and LNG shipping and Project power options. Of note, on March 26, 2012, LNG Canada participated in and provided funding for an LNG Workshop hosted by the CFN organization. Participants included representatives from Council of the Haida, Skidegate and Old Masset, Gitga'at First Nation, Haisla Nation, Kitsoo First Nation, Heiltsuk Nation, Metlaktla First Nation, Wuikinuxv Nation, and staff of the CFN organization. In addition, LNG Canada, along with other LNG proponents, has provided funding support to the CFN organization for a marine study to look at the risks and opportunities associated with LNG shipping. In March 2012, LNG Canada met with the Gitga'at First Nation to provide an introduction of the Project and begin discussions about development of a protocol agreement.

LNG Canada has also provided a number of opportunities for First Nations to learn more about the LNG industry including hosting an LNG information session in Vancouver for interested First Nations (coinciding with the National Aboriginal Achievement Awards in February 2012). CFN organization

members as well as First Nations representatives from northeast BC were invited to attend this presentation.

LNG Canada is committed to providing local benefits associated with its Project and working proactively with interested First Nations and the local community to identify and provide training, employment and contracting opportunities during the phases of the Project. LNG Canada will continue to engage with these First Nations through provincial and federal regulatory processes.

## 10.2 Stakeholder and Community Engagement

Engagement with regulatory agencies and government began in 2011. Introductory meetings were held with the BC EAO, CEA Agency, DFO, Transport Canada, BC Oil and Gas Commission and BC Ministry of Energy and Mines. In June 2011, LNG Canada met with the Mayors of Kitimat and Terrace to introduce the Project prior to acquisition of the LNG facility site. Follow-up meetings were held in September 2011, just prior to the announcement of LNG Canada's purchase of the Shell Site.

In December 2011, LNG Canada conducted an LNG information session in Victoria for representatives from a variety of government ministries including Energy and Mines, Aboriginal Relations and Reconciliation, and Forests, Lands and Natural Resource Operations. Follow-up meetings were also held with key regulators such as the BC EAO and the BC Oil and Gas Commission. LNG Canada has held ongoing discussions and updates with both provincial and federal regulatory agencies including LNG and LNG shipping sessions for provincial and federal ministries in late summer 2012. Additional LNG information sessions or regulatory workshops were held in December 2012 and again in January and March 2013.

In the spring and summer of 2012, LNG Canada conducted a number of informal updates and discussions with various local and regional stakeholders in or near Kitimat including the Mayors and City Administrators of Kitimat and Terrace, the Regional District of Kitimat-Stikine, the Kitimat Chamber of Commerce, the Kitimat Terrace Industrial Development Society, the Terrace Economic Development Association, and RTA.

In addition to local area engagement, LNG Canada has had preliminary discussions with some key environmental groups such as Pembina Institute and Tides Canada to share information about the Project and get preliminary feedback.

## 10.3 Preliminary Feedback

Preliminary discussions with First Nations focused on providing basic information about the LNG industry and the Project as well as the negotiation of protocol agreements with Haisla, Gitga'at, and

Gitxaala Nations. Based on these preliminary discussions, the following areas of interest and/or concern have been identified:

Facility and Marine Terminal:

- air quality and GHG's;
- project interactions with fisheries (in Douglas Channel, Kitimat Arm and Kitimat River), including effects of shipping and dredging in the harbour area;
- site safety setback requirements;
- port design and layout;
- cultural heritage; and
- economic opportunities.

Shipping:

First Nations located along the marine access route have raised concerns related to proposed increase in shipping activity. Areas of interest and/or concern include:

- potential impacts on:
  - traditional use and culture;
  - traditional governance;
  - food supply and subsistence lifestyle;
  - marine mammals, abalone, etc.; and
  - overall ecosystem.
- current economic use (forestry, fishing, aquaculture & tourism);
- potential for shoreline wake impacts (e.g. seaweed harvesting areas, historic cultural sites, etc.;
- air quality;
- ship emissions and waste disposal;
- introduction of foreign species;
- potential for marine accidents and/or fuel spills;
- marine emergency response;



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- noise; and
- opportunities for local benefits - financial, renewable power, community infrastructure, jobs, new businesses (particularly in the area of marine services such as tugs, towing, repairs, etc).

From a stakeholder and community perspective, discussions with the local government and the community to date have been focused primarily on building understanding of LNG and introducing the Project and the majority of inquiries and questions have focused on jobs and economic opportunities. While the focus has been primarily economic, safety and environmental performance have also been areas of interest

LNG Canada will continue to work with First Nations, local communities and other stakeholders throughout the regulatory process to undertake baseline data collection, complete assessments, better understand community interests and concerns, develop mitigation strategies, and identify opportunities to ensure local benefits associated with project.

## 11 SUMMARY OF PROPOSED SCHEDULE

A summary of the proposed schedule for the Project is presented in Table 11-1.

**Table 11-1: Proposed Schedule**

Project Component	Date
Engineering and Technical Studies/Investigations	2011 to 2015
Environmental Assessment Process	2013 to 2015
Final Investment Decision	2015
Construction of Phase 1	2015 to 2019 / 2020
Commissioning of first LNG train	Begins after construction completion
Commissioning of second LNG train	6 months after first LNG train is commissioned
Construction and commissioning of the third and fourth LNG trains	As market conditions allow
Decommissioning	2045 or later

The life of the Project is expected to be a minimum of 25 years. At the end of its life, the Project will be decommissioned pursuant to an approved decommissioning plan conducted in accordance with the applicable regulations at the time.

## 12 REQUIRED PERMITS AND APPROVALS

### 12.1 Environmental Assessment Requirements

It is expected the Project will require an EA under BCEAA and CEAA 2012. The Project is a “reviewable project” under the Reviewable Projects Regulation pursuant to BCEAA, and is a “designated project” under the Regulations Designating Physical Activities pursuant to CEAA 2012.

### 12.2 BCEAA and Provincial Permitting

Three triggers for an EA under BCEAA have been identified. Each is discussed below:

1. If the Project is constructed and operated based on an LNG Canada electric power generation scenario with facilities that will generate at least 50 MW of electrical power, this will meet the definition of a “thermal electric power plant” under the Reviewable Projects Regulation. Part 4, Table 12-1 (Electricity Projects), line 1 of the Reviewable Projects Regulation establishes new thermal electrical generation facilities “*with a rated nameplate capacity of  $\geq 50$  MW of electricity*” to be a reviewable project under the BCEAA;
2. LNG facilities meet the definition of an “energy storage facility” under the Reviewable Projects Regulation and, depending on the size of the storage tanks, may be considered reviewable. Part 4, Table 12-2 (Petroleum and Natural Gas Projects), line 1 of the Reviewable Projects Regulation defines “*a new energy storage facility with the capability to store an energy resource in a quantity that can yield by combustion  $\geq 3$  PJ of energy*” to be a reviewable project under the BCEAA. The Project will incorporate storage capacity of 225,000 m<sup>3</sup> for phase one, increasing to 450,000 m<sup>3</sup> (approximately 10.5 PJ) at full build-out. These volumes of LNG are  $\geq 3$  PJ of potential energy;
3. Natural gas processing plant facilities are reviewable under the Reviewable Projects Regulation if they have the design capacity to process natural gas at a rate greater than 5.634 million m<sup>3</sup>/day. At full build-out, the LNG facility will require approximately 104 million m<sup>3</sup>/day (3.7 Bcf/day or 3.9 PJ/day) of natural gas of which approximately 96 million m<sup>3</sup>/day (3.4 Bcf/day or 3.57 PJ/day) will be processed into approximately 24 mtpa of LNG and approximately 8 million m<sup>3</sup>/day (0.3 Bcf/day or 0.32 PJ/day) will be used for fuel; and
4. The planned dredging for LNG carrier berths at the marine terminal is expected to disturb more than 2 ha of seabed and this triggers Part 8, Table 14 (Transportation Projects), line 4 of the Reviewable Projects Regulation, which defines “*a new marine port facility, other than a ferry terminal, if construction of the facility entails dredging, filling or other direct physical disturbance of  $\geq 2$  hectares of foreshore or submerged land, or a combination of foreshore*

and submerged land, below the natural boundary of a marine coastline or marine estuary” to be a reviewable project under the BCEAA.

The additional permits, approvals, and authorizations anticipated to be required from the Province of British Columbia, following the issuance of an EA Certificate for construction and operation of the Project, are summarized in Table 12-1.

**Table 12-1: Additional Provincial Permitting Requirements**

Permit Required	Governing Agency	Project Component
<b>Construction Permits</b>		
LNG facility Permit under the <i>Oil and Gas Activities Act</i>	BC Oil and Gas Commission	Construction of the LNG facility
Water system construction permit under Section 7 of the <i>Drinking Water Protection Act</i>	BC Ministry of Health Services	Drinking water supply if municipal water not used
Water Licence under Section 8 of the <i>Water Act</i>	BC Oil and Gas Commission	Short-term water withdrawal from Kitimat River for hydrostatic testing of LNG tanks
<b>Operations Permits</b>		
LNG facility Permit under the <i>Oil and Gas Activities Act</i>	BC Oil and Gas Commission	Operation of the LNG facility
Waste Discharge Permit under the <i>Environmental Management Act</i>	BC Oil and Gas Commission/ BC Ministry of Environment	Air and water emissions
Water Licence under <i>Water Act</i>	BC Ministry of Forests, Lands and Natural Resource Operations (Resource Stewardship Division/Water Management Branch)	Water supply from Kitimat River for facility
Water system operation permit under Section 8 of the <i>Drinking Water Protection Act</i>	BC Ministry of Health Services	Drinking water supply if municipal water not used

## 12.3 CEAA 2012 and Federal Permitting

Based on the Projects processing capacity (up to 69,000 t/d at full build out) and storage capacity (450,000 m<sup>3</sup> of LNG at full build-out; equivalent to approximately 10.5 PJ of potential energy), the Project is a “designated project” under the Canadian Environmental Assessment Act 2012 (CEAA 2012). The following sections of the Regulations Designating Physical Activities likely apply to the Project.

- **Section 2(a):** Depending on final power option selected, the Project may involve construction and operation of a fossil fuel-fired electrical generating station with a production capacity of 200 MW or more,

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### Section 12: Required Permits and Approvals

- **Section 13(d):** *The construction, decommissioning and abandonment of a facility for the liquefaction, storage or regasification of liquefied natural gas, with a liquefied natural gas processing capacity of more than 3,000 t/d or a liquefied natural gas storage capacity of more than 50,000 t.*
- **Section 13(f):** *The construction, decommissioning and abandonment of a liquefied petroleum gas storage facility with a capacity of more than 100,000 m<sup>3</sup>.*
- **Section 27(c):** *The construction, operation, 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.*

No federal financial support for the Project is proposed or anticipated, and no federal lands will be used for carrying out the Project. The closest federal land is Indian Reserve No. 1, a Haisla reserve located approximately 200 m east of the Project across the Kitimat River, as shown in Figure 4-1.

The permits, approvals and authorizations anticipated to be required from the Government of Canada for construction and operation of the Project, in addition to a federal EA Certificate, are summarized in Table 12-2.

**Table 12-2: Additional Federal Permitting Requirements**

Permit Required	Governing Agency	Project Component
<i>Fisheries Act Authorization</i>	Fisheries and Oceans Canada	Impacts to freshwater and marine habitat that supports species that are harvested by commercial, recreational and aboriginal (CRA) fisheries. The impacts will result from the LNG facility site development, construction of the cryogenic rundown and vapour return pipelines, modifications of the marine terminal, dredging of the harbour areas, construction of the wastewater outfall
<i>Navigable Waters Protection Act or Navigation Protection Act Approval</i>	Transport Canada	Expansion of/modifications to the existing wharf to allow LNG carriers to berth,
<i>Disposal at Sea Permit under section 127 of the Canadian Environmental Protection Act</i>	Environment Canada	Potentially required for disposal of marine sediments dredged from the harbour berth area



## 13 ANTICIPATED SCOPE OF THE PROJECT AND ENVIRONMENTAL ASSESSMENT

The “scope of the Project” refers to the physical works and the activities that comprise the Project and are subject to consideration in the EA. The proposed scope includes the anticipated physical works and activities involved in construction, CSU, operation, and decommissioning of the Project. An overview of the scope for each of the major Project components is provided below:

- LNG facility:
  - natural gas inlet station;
  - natural gas treatment equipment to remove impurities from the feed gas (CO<sub>2</sub>, H<sub>2</sub>S, H<sub>2</sub>O, mercury, and NGLs);
  - LNG production facilities (four liquefaction trains including natural gas-fired direct drive main refrigeration compressors);
  - storage facilities, including two 225,000 m<sup>3</sup> LNG storage tanks and NGL storage tanks; and
  - interconnecting cryogenic rundown and vapour return pipelines between the LNG facility site and the marine terminal.
- Marine terminal:
  - modifications to existing wharves in the Kitimat harbour including materials offloading infrastructure;
  - wharf topside infrastructure including cryogenic rundown piping, vapour return piping, LNG loading arms and associated infrastructure; and
  - associated LNG carrier and other barge or vessel traffic along the marine access route (see Figure 4-2).
- Supporting Infrastructure and Facilities:
  - water intake and pipeline infrastructure;
  - site access roads and vehicle traffic between sites;
  - temporary facilities including the construction camp(s);
  - permanent facilities including administrative and control buildings;
  - wastewater (effluent) collection, treatment and disposal to Kitimat Arm infrastructure;
  - facility site stormwater management system;
  - flare systems;
  - fire water system;

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### Section 13: Anticipated Scope of the Project and Environmental Assessment

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- waste management (including solid wastes collection and disposal);
- power infrastructure;
- supporting rail staging and loading facilities; and
- temporary storage and laydown area.

Expected concurrent activities that are not within the scope of the Project, but may be considered in cumulative effects assessments (where interactions have been identified) include:

- construction and operation of the third party CGL pipeline that is delivering gas to the Project gas inlet station;
- provision of any third party electrical power; and
- third party marine traffic along the marine access route between the marine terminal and Triple Island Pilotage Station.

For the cumulative effects assessment, a comprehensive project and activity inclusion list will be developed that will include past, present, and reasonably foreseeable future projects and activities including:

- Kitimat LNG Terminal Project (2004 to 2006);
- BC LNG Export Cooperative Project (2010 to 2012);
- Pacific Trails Pipeline (formerly Kitimat to Summit Lake Pipeline Loop) Project (2005 to 2008);
- Enbridge Northern Gateway Project (2004 to 2012);
- Crab/Europa Hydroelectric Development (2007 to 2008);
- Chu Molybdenum Mine Project (2009 to 2010);
- Operation of the RTA smelter facility and other activities or facilities within the RTA site adjacent to the Project; and
- Operation of the town site of Kitimat.

The environmental and socio-economic effects expected from LNG facilities are generally well understood and have been established through several previous provincial and federal EAs in Canada. Based on the existing biophysical and socio-economic conditions in the Kitimat area and the combined requirements of BCEAA and CEAA 2012, it is anticipated that the EA will focus on the following aspects of the biophysical and human environment:

- environmental effects (air quality, noise emissions, vegetation resources, wildlife resources including breeding birds, marine resources, and freshwater resources);

- heritage effects (archaeological resources in the vicinity of the LNG facility site and marine terminal);
- social effects (increasing demands on public infrastructure and services, and informed by local government engagement and stakeholders);
- health effects (air, noise, and water emissions, and stresses caused by the operation of the LNG facility);
- economic effects (job creation, tax revenue generation, development opportunities);
- shipping/marine traffic within the Compulsory BC Pilotage Area;
- First Nations or other Aboriginal Group interests;
- environmental effects of malfunctions or accidents;
- effects of the environment on the Project; and
- cumulative effects.

Under CEAA 2012, the Project Description must address the potential for changes to fish and fish habitat, aquatic species, and migratory birds, as well as potential for environmental changes on federal lands, and effects of environmental changes on Aboriginal peoples. These are summarized as follows:

- **Fish and Fish Habitat.** Changes to fish and fish habitat, as defined in the *Fisheries Act*, may include Permanent Alteration and Destruction (“**PAD**”) of habitat through interactions between the Project footprint and aquatic or riparian areas of the Kitimat River estuary side channels and tributaries;
- **Aquatic Species.** Changes to aquatic species, as defined in the *SARA*, may include changes to the behaviour of aquatic species due to vessel activity and potential injury or mortality from ship strikes;
- **Migratory Birds.** Changes to migratory birds, as defined in the *Migratory Birds Convention Act, 1994*, could occur through clearing of vegetation during construction, leading to loss of habitat or mortality;
- **Federal and Other Lands.** As a result of carrying out the Project, no environmental effects are anticipated on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada; and
- **Effects of Environmental Changes on Aboriginal Peoples.** Potential effects of environmental changes on Aboriginal peoples could result in human health effects, socioeconomic effects,

effects on traditional and cultural activities, and effects on heritage resources. Examples of potential effects to Aboriginal peoples are:

- human health effects such as:
  - degradation of local air quality through combustion of fossil fuels, acid gas incineration, and potential flaring, with the potential to contribute to inhalation-based health effects; and
  - sensory disturbance and or degradation due to exposure to noise.
- socio-economic effects such as:
  - economic benefits for Aboriginal peoples, including employment and contracting opportunities;
  - sensory disturbances such as noise affecting traditional lifestyle values; and
  - potential effects from increased traffic along local roads and Highway 37 and shipping activity.
- effects to heritage resources through:
  - damage to or destruction of terrestrial archaeological or heritage sites as a result of ground disturbing activities associated with site preparation.
- change to traditional harvesting activities through loss of vegetation resources from:
  - loss of community diversity (e.g. old forest, listed ecosystems, wetlands) through site clearing; and
  - loss of species diversity (e.g. listed species, traditional use plants) through site clearing.
- change to traditional harvesting activities through effects to wildlife resources including:
  - change in habitat availability from site clearing that may result in either direct habitat loss, habitat isolation or habitat fragmentation;
  - reduced habitat use caused by sensory disturbance during construction and operations;
  - increased direct wildlife mortality as a result of interactions with Project activities, including site clearing and increased traffic; and
  - loss of wildlife movement corridors.
- change to traditional harvesting of aquatic resources through:
  - change in marine mammal and fish behaviour due to underwater noise;
  - change in risk of mortality to marine mammals due to risk of vessel strikes; and



- change in habitat availability through PAD of habitat through interactions between the Project footprint and aquatic or riparian areas of the Kitimat River estuary side channels and tributaries.
- effects to historical, archaeological, paleontological or architectural resources through:
  - loss or modification of culturally modified trees (CMT), shell middens, lithic scatter, and petroforms (e.g. canoe skids, fish traps, and clam gardens); and
  - loss of access to or changes to asserted traditional use areas.

Potential for environmental effects to Aboriginal people will be assessed through ongoing engagement and traditional use studies. In the event that there are potential environmental effects that cannot be avoided, mitigation options will be developed through ongoing engagement with First Nations, and the potential environmental effects will be minimized to the greatest extent possible.

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