



# Project Description

## Cedar LNG Project Liquefaction and Export Terminal

**Prepared by:**  
Stantec Consulting Ltd.  
Project: 1232210301  
Revision 1.1  
August 22, 2019

**Prepared for:**  
Cedar LNG





## Glossary

Cedar LNG Project Area	The area to be utilized by the Project and includes District Lot 99, the northern half of District Lot 309, and marine waters extending approximately 500 m offshore
Front end engineering design (FEED)	The basic engineering design phase which comes after the Pre-FEED and before the start of engineering, procurement and construction (EPC) work. The scope focuses on technical issues/requirements and identifying main costs for construction of a project.
Floating liquefied natural gas facility	A water-based liquefied natural gas production facility that is purpose-built to liquefy and store liquefied natural gas and transfer it to LNG carriers for global export.
Liquefied natural gas (LNG)	Natural gas that has been cooled to approximately -162°C where the methane and other components condense from gas to liquid form. In its liquid state, natural gas takes up 1/600 of the space that the gaseous phase occupies.
LNG Carrier	A marine cargo ship with specialized cryogenic tanks that designed for transporting liquefied natural gas.
LNG facility	Cedar's proposed floating liquefied natural gas facility and marine export terminal
Natural gas	A naturally occurring hydrocarbon gas mixture consisting primarily of methane (typically >98%) plus varying amounts of ethane, propane, butanes, pentanes, higher molecular weight hydrocarbons, hydrogen sulfide, carbon dioxide, water vapor, and sometimes helium and nitrogen.
Nearshore LNG production unit	A permanent jetty-moored floating LNG facility located near shore that operates independently for the purposes of natural gas pre-treatment, liquefaction and storage
Petajoule	A metric unit of energy equal to 10 <sup>15</sup> joules
Preliminary front end engineering design (Pre-FEED)	An engineering study that establishes the design basis, initial project concept, specifications and other technical and operational requirements for a project before starting the FEED.
Tonne	A metric unit of mass equal to 1,000 kilograms

## List of Abbreviations

°C	degrees Celsius
BC MEMPR	BC Ministry of Energy, Mines and Petroleum Resources
BCEAA	<i>British Columbia Environmental Assessment Act</i>
Cedar	Cedar LNG Export Development Ltd.
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
CRA	commercial, recreational or Aboriginal
CWHvm1	coastal western hemlock very wet maritime subzone
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office
FEED	front end engineering design
FSR	Forest Service Road
GHG	greenhouse gas
ha	hectare
HCA	<i>Heritage Conservation Act</i>
IAA	<i>Impact Assessment Act</i>
IAAC	Impact Assessment Agency of Canada
INAC	Indigenous and Northern Affairs Canada
km	kilometre
kV	kilovolt
LNG	liquefied natural gas
m	metre
m <sup>3</sup>	cubic metre
mm	millimetre

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MOF	marine offloading facility
MSRM	BC Ministry of Sustainable Resource Management
MTPA	million tonnes per annum
MW	megawatt
NAICS	North American Industry Classification System
NO <sub>x</sub>	nitrogen oxides
PJ	petajoule
PM <sub>10</sub>	inhalable particulate matter
PM <sub>2.5</sub>	respirable particulate matter
Pre-FEED	preliminary front end engineering design
RDKS	Regional District of Kitimat Stikine
SO <sub>2</sub>	sulphur dioxide
SRMP	Sustainable Resource Management Plan

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# 1.0 Introduction

Haisla Nation, through its wholly owned Cedar LNG Export Development Ltd. (Cedar)<sup>1</sup>, is proposing to design, construct and operate the Cedar LNG Project (the Project), a floating liquefied natural gas (LNG) facility and marine export terminal (the LNG facility), including related infrastructure, in Kitimat, British Columbia, Canada (Figure 1).

The Project is a key element of the Haisla Nation economic and social development strategy and will further advance reconciliation by allowing Haisla Nation to—for the first time ever—directly own and participate in a major industrial development in its territory. It is also in keeping with Article 32 of the United Nations Declaration on the Rights of Indigenous Peoples, which states:

1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.
2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

The proposed LNG facility will process and liquefy approximately 400 to 500 million standard cubic feet per day (11.3 to 14.15 million cubic metres [m<sup>3</sup>]) of natural gas into approximately 3 to 4 million tonnes per annum (MTPA) of LNG (averaging between 8,000 and 10,000 tonnes per day), with up to 250,000 m<sup>3</sup> (approximately 108,000 tonnes) of LNG storage capacity (equivalent to approximately 5.97 petajoules [PJ] of energy capacity). The Project will be powered by either connection to the provincial electricity transmission grid via a new 7 to 8 kilometre (km) long transmission line, through self-generation of power onsite using natural gas, or a combination of the two. It is currently anticipated that the feed gas pipeline will be owned and operated by a third party and subject to permitting requirements under the *Oil and Gas Activities Act*. Subject to the negotiation of certain agreements, Cedar intends to receive natural gas from Coastal GasLink at a meter station within the vicinity of Kitimat.

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<sup>1</sup> It is possible that Cedar will pursue the Project through a limited partnership in which Cedar or its affiliate serves as the general partner and Haisla Nation maintains a majority ownership interest.



Notes  
1. Coordinate System: NAD 1983 BC Environment Albers  
2. Data Sources: DataBC, Government of British Columbia;  
Natural Resources Canada

- Highway
- Road
- Railway
- Watercourse
- Waterbody
- First Nations Reserve
- Park, Ecological Reserve,
- Protected Area or
- Conservancy Area
- Treaty Lands

★ Project Location

0 50 100 150  
km  
1:4,000,000 (at original document size of 8.5x11)



Project Location  
Kitimat,  
British Columbia  
Project Number 12321301  
Prepared by TCARDINAL on 20190716  
Discipline Review by JMUNDY on 20190717

Client/Project/Report  
Cedar LNG Export Development Ltd  
Cedar LNG Project  
Project Description

Figure No.

1

Title

Project Location

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Cedar anticipates the Project will be subject to a review under both the federal *Impact Assessment Act* (IAA) and the *British Columbia Environmental Assessment Act* (BCEAA) (see Section 1.5).

Accordingly, the purpose of this Project Description is to:

- Provide an overview of Project information to enable the Impact Assessment Agency of Canada (IAAC) and the BC Environmental Assessment Office (EAO) to determine whether an environmental assessment is required under their respective legislation.
- Provide information to assist the IAAC and the federal Minister of the Environment and Climate Change in determining whether the Project can be reviewed through a substituted process led by the EAO.
- Provide other parties (e.g., Indigenous groups, local and regional governments, the public) with information so that they can determine whether they have an interest that would be affected by the Project.

This Project Description has been prepared in accordance with the Information and Management of Time Limits Regulations under the IAA and Preparing a Project Description (EAO 2016). Concordance tables are provided in Appendix A.

## 1.1 Haisla Nation

Haisla Nation are Indigenous peoples of Canada who reside on the northwest coast of British Columbia within the country of Canada. The term “Haisla” means “People at the mouth of the river” and Haisla people have occupied their lands for over 9,000 years. Haisla Nation is the result of the amalgamation of two bands: the Kitamaat of the Douglas and Devastation Channels and the Kitlope of the Upper Princess Royal Channel and Gardner Canal.

The traditional territory of Haisla Nation is approximately four million acres, located in and around Kitimat, British Columbia. The home community of the Haisla people is Kitamaat Village, located at the head of the Douglas Channel on British Columbia’s West Coast. Kitamaat Village is home to around 500 of the approximately 1,850 Haisla members and is located 10 km from Kitimat and 65 km from Terrace. Approximately half of the Haisla people are centered around Kitamaat Village (i.e., live in Kitamaat Village or the Kitimat area); the balance of the population resides elsewhere in the traditional territory and in Metro Vancouver. Kitamaat is a Tsimshian word (Gee-tah-maat) meaning “People of the Snow” along with the Kitlope (Geet-lope) people of the rock.

Haisla Nation is governed by Haisla Nation Council, an elected council consisting of ten Councillors and one Chief Councillor. Haisla Nation Council is committed to furthering economic development for the Haisla people. The Haisla Nation Council is recognized as a competent and progressive organization by all agencies with whom they do business.

The Haisla people have lived off the land and water resources of the Douglas Channel and the traditional territory for thousands of years, and protection of those resources for future generations is an important objective for Haisla Nation. Haisla Nation seeks opportunities that are consistent with this objective but that will also provide material economic development for Haisla people. LNG development has been identified as one such opportunity. For many years, Haisla Nation has actively encouraged the development of LNG export facilities in the Douglas Channel. Haisla Nation has worked with the Province of British Columbia, regulatory agencies, proponents such as LNG Canada and Kitimat LNG (Chevron), and associated pipeline transmission companies to facilitate the development of LNG export in Kitimat.

The business philosophy of Haisla Nation is to advance commercially successful initiatives and to promote environmentally responsible and sustainable development, while minimizing impacts on land and water resources, partnering with First Nations and non-First Nations persons, working with joint venture business partners, and promoting and facilitating long-term development opportunities.

This philosophy fits with Haisla Nation's Comprehensive Community Plan entitled *duu'duks'wa ci'mo'ca*, which means "our vision" in the Haisla language. The Comprehensive Community Plan identifies nine inter-connected community goals required to achieve Haisla Nation's vision of a strong, independent and proud nation that is healthy in mind, body and spirit. These nine community goals are:

- **Housing**—Increase access to healthy, affordable, suitable housing for all members
- **Language and Culture**—Revitalize Haisla language and cultural practices
- **Youth**—Support the growth and development of Haisla children and youth to be strong, successful, and independent
- **Education**—Provide high quality education, capacity building, and employment training for all members
- **Economic Development**—Promote economic development that respects community values and creates employment, and skills development opportunities for members.
- **Elders**—Support Haisla Elders and facilitate intergenerational learning opportunities.
- **Environment**—Protect and steward Haisla Nation's traditional territory, including fisheries and watersheds
- **Health and Wellbeing**—Support physical, spiritual, and emotional health and wellbeing through holistic programs that reflect Haisla culture
- **Community Safety**—Support Haisla Nation members to feel safe and secure in their communities

Throughout the development of the Project, Cedar and the Haisla Nation will work to leverage Project opportunities to advance these goals.

## 1.2 Project Overview

The proposed Project is an LNG processing and export facility. LNG will be exported pursuant to Licence GL-327 issued by the National Energy Board on May 27, 2016 in favour of Cedar 1 LNG Export Ltd. (a wholly owned subsidiary of Cedar), which permits annual exports of up to 8.55 billion m<sup>3</sup> for 25 years (Cedar may apply to extend to 40 years). The Project will be constructed in one phase and is expected to be operational by the second quarter of 2025.

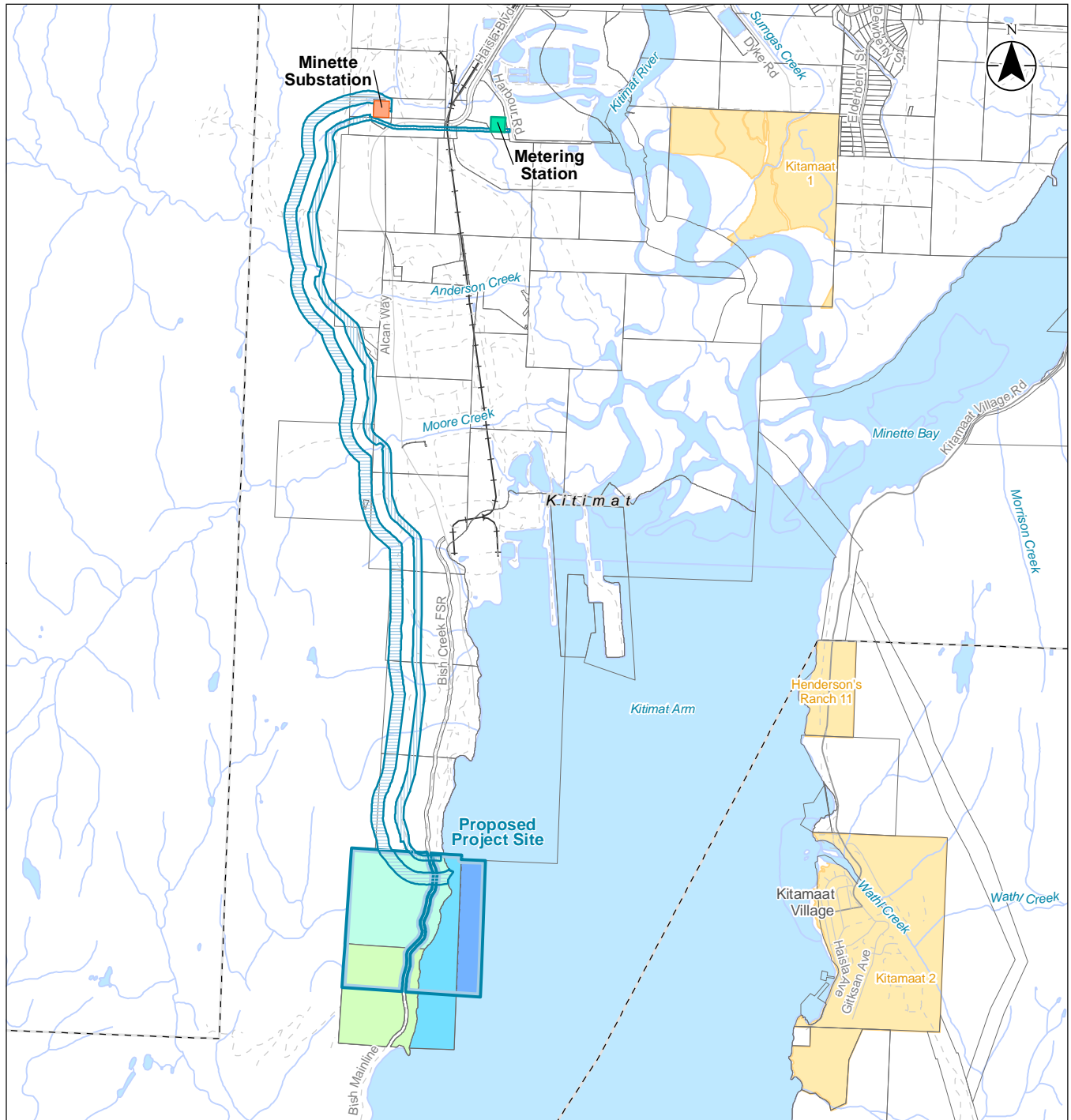
The proposed Project will contribute to the advancement of the LNG sector in British Columbia, promote the use of the cleanest-burning fossil fuel, generate economic opportunities for Haisla Nation and British Columbia-based businesses, and provide long-term revenue generation for local, provincial and national economies to reinvest in health care, education, infrastructure, and other programs. Additional benefits include employment and business opportunities for other Indigenous groups and surrounding community members.

The Cedar LNG Project Area (Figure 2) is the area where Project components and activities (aside from the interconnecting natural gas pipeline and potential electric transmission line) are anticipated to be located. It includes an approximate 500 metre (m) buffer (safety awareness zone) around the anticipated marine facility components. The size of the Cedar LNG Project Area is approximately be 130 hectares (ha), which roughly consists of:

- 84 ha of land that encompasses all of District Lot 99 (PID 013-061-267) and the northern portion of District Lot 309 (PID 013-061-089), both owned by Haisla Enterprise Ltd.
- 23 ha of Water Lot A (PID 029-462-142) owned by Haisla Enterprise Ltd.
- 23 ha of submerged Crown land, to encompass the safety awareness zone

There are no current industrial, commercial, project or residential uses on the Cedar LNG Project Area. A portion of District Lot 99 was previously used as a log sort facility. Additional information regarding land ownership and tenures is presented in Section 4.2.

Of the 130 ha area, the facility footprint is approximately 2.7 ha with in-water components comprising 1.8 ha, and land components comprising 0.9 ha. The area of subtidal and intertidal seabed that will be occupied by the footprint of the jetty, small craft vessel berth and potential tug berth is approximately 0.15 ha. The ultimate arrangement of Project components within the Cedar LNG Project Area will be determined through the engineering design process. The first phase of engineering design, the preliminary front end engineering design (Pre-FEED), is scheduled to start in the second half of 2019. Design information from Pre-FEED will be incorporated into the environmental assessment certificate (EAC) application.



Notes  
1. Coordinate System: NAD 1983 BC Environment Albers  
2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

- Road
- Local Street
- - - Resource Road
- + + + Railway
- Watercourse
- Waterbody
- First Nations Reserve
- - - Municipal Boundary
- Parcel Boundary
- Minette Substation

- Cedar LNG Project Area (Approximate Location)
- Pipeline Corridor
- Transmission Line Corridor
- Metering Station

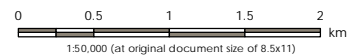
Cedar LNG Project Area

Parcel Owned by Haisla Enterprise Ltd.

- District Lot 309, PID 013-061-089
- District Lot 99, Plan 14740, PID 013-061-267
- Water Lot A, Plan EPP 14217, PID 029-462-142

Proposed Crown Lease

- Conceptual Water Lot (Approximate Location)



Project Location  
Kitimat,  
British Columbia

Project Number 123221301  
Prepared by LTRUDELL on 20190708  
Discipline Review by JMUNDY on 20190708

Client/Project/Report  
Cedar LNG Export Development Ltd  
Cedar LNG Project  
Project Description

Figure No.

2

Title

Cedar LNG Project Area

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Subject to the negotiation of certain agreements, Cedar intends to receive feed gas from the Coastal GasLink pipeline at a meter station within the vicinity of Kitimat. Natural gas will be delivered to the Cedar LNG Project Area by a 20-inch diameter, approximately 8 km long pipeline. The pipeline will follow the shared multi-use corridor established by the Ministry of Transportation and Infrastructure for this purpose. The Douglas Channel, Kitimat LNG and Northern Gateway projects collected baseline data in the vicinity of the shared corridor, and the respective provincial and federal regulatory authorities concluded, based on the findings of the environmental assessment processes for the latter two projects, that the pipelines in the shared corridor would not result in significant adverse environmental effects. It is anticipated that the pipeline will be owned and operated by a third party and constructed separately from the remainder of the Project in order to reduce the number of times construction occurs in the corridor.

The Cedar LNG Project Area will include supporting onshore components, marine infrastructure, and a jetty-moored floating nearshore LNG production unit. A summary of the Project components is provided below, and additional information is available in Section 2.1.

Onshore infrastructure may consist of pipeline receiving and metering facilities, a possible power generation facility (see alternative option discussed in Section 2.1.3), support buildings such as the administration building, maintenance workshop/warehouse and laboratory facilities, site roads, and utility services. The onshore infrastructure complex may also include a facility for unloading and storing mixed refrigerant gases in a liquid state. Unloading and storage of mixed refrigerant gases may also be located on the floating nearshore LNG production unit as a preferred scenario; this decision will be made as engineering design advances and outlined in the EAC application as appropriate. Temporary construction infrastructure (e.g., storage and laydown areas) may also be based onshore within the Cedar LNG Project Area.

A permanent jetty-moored floating nearshore LNG production unit will operate independently for the purposes of natural gas pre-treatment, liquefaction and integrated storage. Pre-treatment is required to remove components that would freeze in the liquefaction process and to meet the required LNG processing specification (e.g., carbon dioxide [CO<sub>2</sub>], mercury, heavier hydrocarbons, sulphur compounds, water). The train(s) will chill the natural gas to approximately -162 degrees Celsius (°C) when it liquefies, producing LNG for storage and export to global markets. The Project will hold the LNG in storage tanks that will be within the hull of the floating nearshore LNG production unit.

Liquefaction requires notable amounts of heat extraction. This is primarily due to the cooling required to liquefy the natural gas and the heat produced during compression of the refrigerant. The selection of the appropriate cooling medium is an important step in the design of the facility, its liquefaction efficiency and corresponding LNG production. Based on technical and environmental considerations, Cedar has decided to utilize an air-cooling system as part of the main cooling medium in the refrigeration system for the liquefaction process.

The nearshore LNG production unit will be permanently moored to a marine jetty that will either be constructed on traditional marine piles or as a floating structure permanently anchored to the foreshore. The final design of the jetty structure will be determined as engineering design evolves and will be described in the EAC application. LNG carriers will arrive at the facility and are expected to moor directly alongside the nearshore LNG production unit (preferred option). Alternatively, a separate LNG loading jetty may be constructed for mooring the LNG carrier (see Section 2.1.7). It is anticipated that the LNG carriers will be berthed at the facility for up to 24 hours during loading.





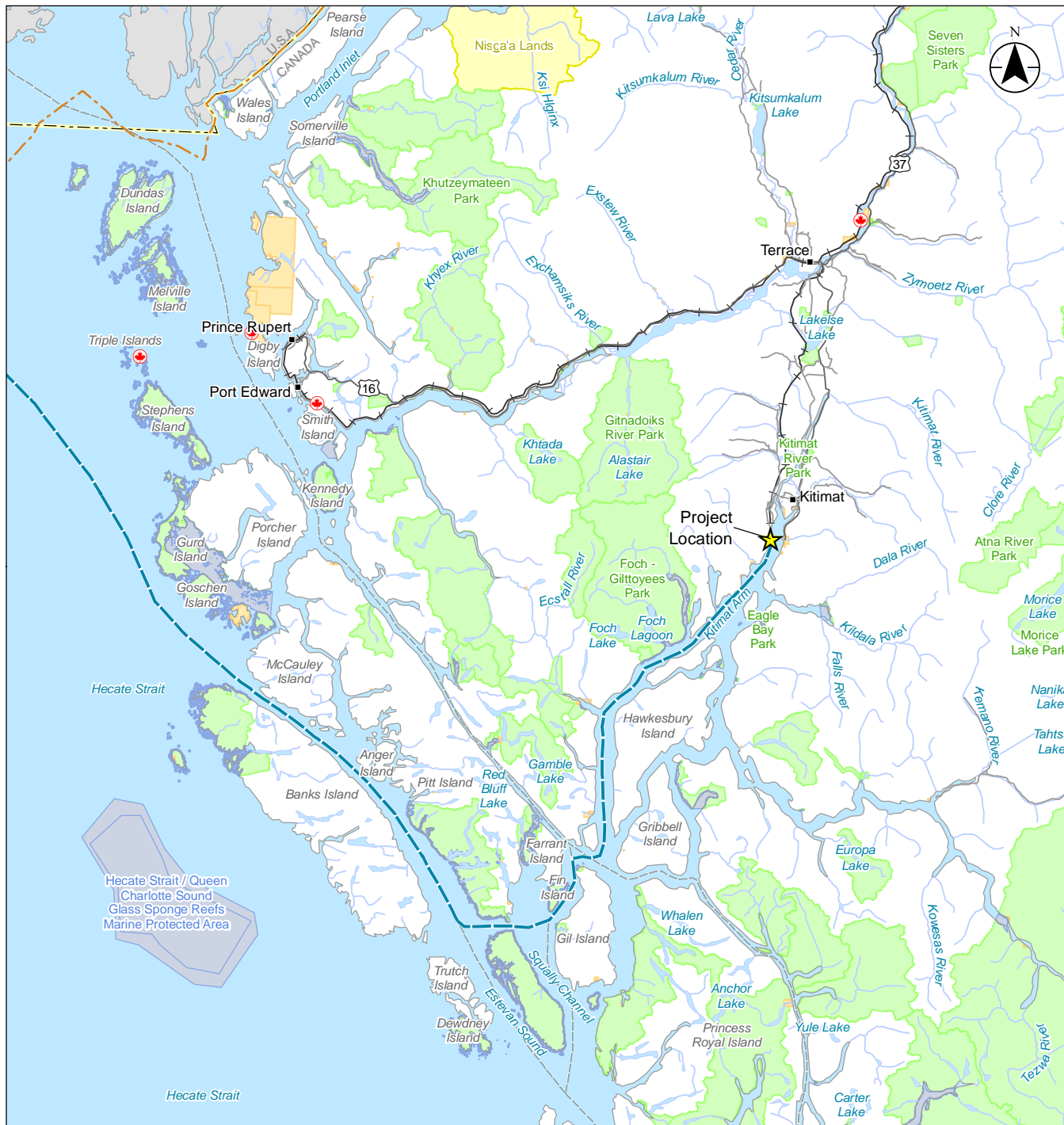
The Project is anticipated to be built to the full 3 to 4 MTPA LNG production capacity in a single project development phase. The nearshore LNG production unit and other facilities are expected to require up to approximately 215 megawatts (MW) of power at peak power demand, which may be supplied from either the provincial (BC Hydro) transmission grid (preferred option), self-generation (alternative option), or a combination thereof.

One hundred percent electrification of the LNG facility requires the removal and separation of heavy hydrocarbons (condensates) from the natural gas. The heavy hydrocarbons are then stabilized and stored either onshore or onboard the nearshore LNG production unit for further handling (offload and transport or combusted onboard for heat and power where applicable). Cedar is committed to developing the Project in a manner that utilizes the maximum amount of electrification possible whilst not introducing further environmental and/or operational risks.

Cedar is currently working with BC Hydro to explore options to power the Project with electricity provided from the provincial transmission grid. In the preferred option, electricity would be supplied to the site via a new electric transmission line constructed from the Minette substation in Kitimat. If that is not feasible, the Project will pursue an alternative option involving onsite power generation (self-generation either onshore or onboard the nearshore LNG production unit). If self-generation of electricity is pursued, approximately 5% to 7% of incoming fuel gas will be diverted to the power plant or direct mechanical drive unit (gas turbine) to produce the power needed for the liquefaction process. For the purposes of the environmental assessment, Cedar will be seeking approval of both options (electrified and self-generation). If, during the environmental assessment, it is determined that BC Hydro can and will provide power on mutually acceptable terms and within the required timeframe, then Cedar will withdraw its alternative self-generation proposal to the extent applicable.

LNG carriers are anticipated to call at the LNG facility approximately 40 to 50 times annually (an average of approximately one LNG shipment every 7 to 10 days). The average size of LNG carriers anticipated to arrive at the LNG facility will be approximately 180,000 m<sup>3</sup> with the terminal design allowing carriers of up to 216,000 m<sup>3</sup> to moor and load. When transiting to and from the facility, LNG carriers will most likely follow the North Route, a pre-established deep-sea shipping route open year-round (Figure 3).

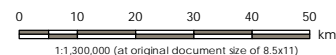
LNG carriers would enter Canadian waters through Dixon Entrance north of Haida Gwaii, proceed eastward and then southward through Hecate Strait where a Pilot will board at a designated location, into Browning Entrance at the northern extent of Principe Channel. Vessels will follow a route south through Principe Channel before navigating through Nipean Sound, Otter Channel, Lewis Passage, Wright Sound, and Douglas Channel.



Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 \* Approximate Location

- Highway
- Road
- Railway
- Watercourse
- Waterbody
- First Nations Reserve
- Treaty Lands
- Terrestrial Park, Ecological Reserve, Protected Area or Conservancy Area
- Marine Park, Ecological Reserve, Protected Area or Conservancy Area

- ★ Project Location
- Marine Shipping Route\*
- Shipping Route
- 12 Mile Nautical Limit
- National Historic Site of Canada



Project Location: Kitimat, British Columbia  
 Project Number: 123221301  
 Prepared by: LTRUDEL on 20190717  
 Discipline Review by: USERNAME on 201907XX

Client/Project/Report: Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.

3

Title

Project-related Marine Shipping Route

## 1.3 Project Purpose and Rationale

The Project will contribute to economic reconciliation in British Columbia by recognizing and implementing Haisla Nation's authority over economic development on Haisla Nation-owned lands. Income generated by the Project will be invested in the Haisla community, including helping to advance the goals of the Comprehensive Community Plan (see Section 1.1). In addition, the Project will provide jobs and contracting opportunities for Haisla Nation members, member of other local First Nations, and local community members.

Over the last decade, global demand for LNG has steadily increased in Asia and Europe. According to British Columbia's Natural Gas Strategy, this growth is expected to continue as countries pursue alternatives to diesel and coal to support cleaner electricity generation, heating, and transportation requirements (BC MEMPR n.d.). The Project will help meet the increasing demand, connecting plentiful natural gas resources in the Western Canadian Sedimentary Basin with markets worldwide to reduce global air pollution and greenhouse gases (GHGs) while helping to ensure the development of and fair pricing for those provinces' natural gas resources.

The Project will contribute to the advancement of the LNG sector in British Columbia, promote the use of the cleanest-burning fossil fuel, generate economic opportunities for British Columbia-based businesses by creating fair market values for this provincial resource, and provide long-term revenue generation for local and Provincial economies to reinvest in health care, education, infrastructure, and other programs.

The Project is uniquely positioned to facilitate economic reconciliation objectives for Haisla Nation and the goals of British Columbia's Natural Gas Strategy. Alternatives to the Project, such as an LNG facility in a different location with a different proponent, or a different Haisla Nation-led economic opportunity on Haisla Nation-owned lands, could contribute towards one of these two objectives, but Cedar is not aware of any viable alternatives to the Project that would contribute towards both of these objectives.

## 1.4 Proponent Information

Contact information for Cedar and the primary contact person for the environmental assessment process is provided in Table 1.

**TABLE 1 PROPONENT INFORMATION**

<b>Name of the Designated/Reviewable Project</b>	Cedar LNG Project
<b>Name of the Proponent</b>	Cedar LNG Export Development Ltd.
<b>Proponent Corporate Address</b>	500 Gitksan Ave. Haisla PO Box 1101 Kitamaat Village, British Columbia V0T 2B0
<b>Proponent Contact Information</b>	250.639.9361
<b>Company Website</b>	<a href="http://www.cedarlng.com">www.cedarlng.com</a>
<b>Company President</b>	Tony Brady, President
<b>Primary Contact for the Project Description</b>	Tony Brady, President 250.639.9361 <a href="mailto:tbrady@haisla.ca">tbrady@haisla.ca</a>

The information in this Project Description was prepared by the professionals identified in Appendix B.

## 1.5 Environmental Assessment Regulatory Requirements

Cedar anticipates that the Project will require reviews under both the IAA and BCEAA. Under the IAA, the Project meets the criteria for a designated project in the Physical Activities Regulations (Table 2). Under BCEAA, the Project meets the criteria for a reviewable project under the Reviewable Projects Regulation (Table 3).

**TABLE 2 PHYSICAL ACTIVITIES REGULATIONS CRITERIA**

Section	Physical Activity	Relevant Project Component
30	The construction, operation, decommissioning and abandonment of a new fossil fuel-fired power generating facility with a production capacity of 200 MW or more	The Project may include a power generation facility with a peak power demand of up to approximately 215 MW, pending outcome of discussions with BC Hydro
37(d)	A new facility for the liquefaction, storage or regasification of liquefied natural gas, with a liquefied natural gas processing capacity of 3,000 tonnes/day or more or a liquefied natural gas storage capacity of 136,000 m <sup>3</sup> or more	The Project will liquefy between 8,000 and 10,000 tonnes/day of natural gas and include storage of up to 250,000 m <sup>3</sup>
52	The construction, operation, decommissioning and abandonment of a new marine terminal designed to handle ships larger than 25,000 deadweight tonnage	LNG carriers greater than 25,000 deadweight tonnage will either moor directly alongside the nearshore LNG production unit or at a separate independent LNG loading jetty

**TABLE 3 REVIEWABLE PROJECTS REGULATION CRITERIA**

Section	Criteria/ Threshold	Relevant Project Component
<b>Part 4—Energy Projects</b>		
Power Plants (Table 7)	A new facility with a rated nameplate capacity of $\geq 50$ MW of electricity that is a thermal electric power plant	The Project may include a power generation facility with a peak power demand of up to approximately 215 MW, pending outcome of discussions with BC Hydro
Energy Storage Facilities (Table 8)	A new energy storage facility with the capability to store an energy resource in a quantity that can yield by combustion $>3$ PJ of energy	The Project will include storage of up to 250,000 m <sup>3</sup> , which is equivalent to approximately 5.97 PJ

Cedar intends to seek a substituted environmental assessment for the Project and has commenced early dialogue with both the EAO and federal officials on the topic.

No regional assessments or strategic assessments as defined by the IAA have occurred within the Cedar LNG Project Area.

## 2.0 Project Description

### 2.1 Project Overview and Components

The key Project components are as follows:

- Feed gas distribution system, including metering, pressure let-down and regulation facilities if required
- Electric transmission line (preferred option; under investigation with BC Hydro)
- Power generation (alternative option if electrification is not feasible)
- Power supply and distribution
- Nearshore LNG production unit, including feed gas processing, pre-treatment and integrated LNG storage
- Marine terminal and jetty (preferred option) or jetties (alternative option)
- Supporting infrastructure

Further details on each of the key components are provided in Table 4 and discussed in the following sub-sections. Design information included herein is conceptual and will be refined as Project design advances.

The preferred and alternative options for power supply and marine terminal and jetty/jetties layout represent alternative means of undertaking the Project that Cedar will carry forward and evaluate through Project design. Other alternative means that Cedar has considered include the decision to proceed with a floating LNG facility rather than an on-land LNG facility.

**TABLE 4 PROJECT COMPONENTS**

Component	Capacity and Details
Feed gas distribution system	<ul style="list-style-type: none"> <li>Up to approximately 400–500 million standard cubic feet of natural gas per day</li> <li>On-site natural gas piping to the nearshore LNG production units and power generation facility (if required)</li> <li>Pipeline isolation valves, metering, pressure let-down and regulation facilities as required</li> </ul>
Electric transmission line (preferred option; under investigation with BC Hydro)	<ul style="list-style-type: none"> <li>Approximately 7 to 8 km transmission line up to 287 kilovolt (kV), from the existing Minette substation in Kitimat to the Cedar LNG Project Area</li> <li>If only partial electrification is feasible, may be a lower capacity (e.g., 138 kV, 230 kV) transmission line</li> <li>Switching station</li> <li>Transformers</li> <li>Variable frequency drives</li> <li>Auxiliary equipment</li> </ul>
Power generation (alternative option; if electrification is not feasible)	<ul style="list-style-type: none"> <li>Up to approximately 215 MW of peak power demand for self-generation</li> <li>Power generation facility, including <ul style="list-style-type: none"> <li>Gas turbines</li> <li>Steam turbines</li> <li>Heat recovery steam generator</li> <li>Electrical generators</li> <li>Transformers</li> <li>Auxiliary equipment</li> </ul> </li> <li>May be located onshore or on the floating LNG unit</li> </ul>
Power supply and distribution	<ul style="list-style-type: none"> <li>Power Aggregation, including <ul style="list-style-type: none"> <li>Switching station</li> <li>Transformers</li> <li>Auxiliary equipment</li> <li>Onsite distribution including electric transmission lines</li> </ul> </li> <li>Auxiliary equipment</li> </ul>

Component	Capacity and Details
Feed gas processing and pre- treatment facilities	<ul style="list-style-type: none"> <li>• Located on the nearshore LNG production unit</li> <li>• Removes the following elements from the feed gas to prepare for liquefaction: <ul style="list-style-type: none"> <li>○ CO<sub>2</sub></li> <li>○ Mercury</li> <li>○ Heavier hydrocarbons</li> <li>○ Water</li> <li>○ Sulphur compounds</li> </ul> </li> </ul>
Nearshore LNG production unit including integrated storage	<ul style="list-style-type: none"> <li>• Approximately 3 to 4 MTPA of LNG production capacity</li> <li>• Permanently moored to a fixed marine jetty</li> <li>• Natural gas, LNG, high-voltage electrical and utilities interface connection</li> <li>• Liquefaction process system</li> <li>• Integral LNG storage</li> <li>• Air coolers</li> <li>• Boil-off gas compression system</li> <li>• Supporting utilities, including potential desalination for domestic and safety purposes</li> <li>• Marine systems</li> <li>• Process controls and safety systems</li> <li>• Safety flares and vent systems</li> <li>• Individual natural gas liquids storage capacity up to approximately 30,000 m<sup>3</sup> (could also be located onshore, pending final design)</li> <li>• LNG storage capacity of up to 250,000 m<sup>3</sup></li> </ul>
Marine terminals and jetties	<ul style="list-style-type: none"> <li>• Jetty for mooring the nearshore LNG production unit (extending out approximately 50 m to 100 m from the foreshore)</li> <li>• Potential second independent jetty for LNG carrier berthing if the preferred side by side loading directly from the nearshore LNG production unit is not pursued</li> <li>• Gas service marine loading arms or hoses for gas supply to the nearshore LNG production unit</li> <li>• Conventional marine loading arms or flexible pipe for transfer of LNG to the LNG carriers and vapour return</li> <li>• Small craft jetty and potential tug basin (if required)</li> <li>• Dedicated material offloading facility (MOF) for heavy equipment and materials, if required</li> </ul>

Component	Capacity and Details
Supporting infrastructure (may be located onshore or on the floating LNG production unit)	<ul style="list-style-type: none"> <li>• Onshore flare if required</li> <li>• Administration building, maintenance workshop/warehouse, laboratory, and customs/port authority offices as appropriate</li> <li>• Utilities infrastructure, including water withdrawal and treatment and wastewater treatment</li> <li>• Groundwater well(s) (if required)</li> <li>• Stormwater management system</li> <li>• Temporary concrete batch plant if required</li> <li>• Storage and laydown areas</li> <li>• Access roads</li> <li>• Firewater system, including potential freshwater storage</li> <li>• Refrigerant storage</li> <li>• Natural gas liquids storage with up to 30,000 m<sup>3</sup> capacity</li> <li>• Medical services</li> <li>• Perimeter fencing and security as required</li> </ul>

### 2.1.1 Feed Gas Distribution System

The Project will be supplied by a natural gas pipeline terminating within the Cedar LNG Project Area. It is expected that the pipeline will include a land approach as it enters the receiving area, although the exact route is yet to be determined. The natural gas receiving facility will consist of pipeline isolation valves for emergency isolation, a metering station, and pig receiver to ensure a smooth flow of natural gas.

The area downstream of metering, as part of the Project, may consist of a feed gas distribution system to the nearshore LNG production facilities, pressure let-down and regulation facilities, power generation (alternative option only), gas processing, and ancillary systems.

Approximately 400 to 500 million cubic feet of natural gas per day will be received at the pipeline receiving facility. If onsite power generation is required (the alternative option), approximately 380 to 475 million cubic feet of natural gas per day will be processed and liquefied, and the remainder (approximately 5 to 7%) will be used to produce self-generated power. Pending the outcome of the power study and discussions with BC Hydro, this volume of gas may be lower or eliminated if power from the provincial grid is integrated into Project design. The preferred option involves full electrification (to the maximum extent possible) such that all of the natural gas received at the LNG facility is processed and liquefied.



### **2.1.2 Electric Transmission Line**

Cedar is currently working with BC Hydro to explore options to power the Project with electricity provided from the provincial grid. Electricity would be supplied to the LNG facility via an electric transmission line with up to 287 kV capacity constructed from the existing BC Hydro Minette Substation located in Kitimat. The anticipated length of the transmission line is approximately 7 km to 8 km. Where possible, the transmission line will be routed to align with existing utility corridors and roads to the Cedar LNG Project Area.

### **2.1.3 Power Generation**

It is anticipated that the Project will require up to approximately 215 MW of power at peak demand, while construction phase work may need up to 20 MW of power. Power may be supplied from the provincial transmission grid (preferred option), self-generation (alternative option), or a combination thereof. As previously noted, if it is determined that BC Hydro can provide power on mutually acceptable terms during the environmental assessment process, Cedar will withdraw its proposal for self-generation to the extent applicable. The anticipated transmission line corridor for connection to the provincial transmission grid is shown in Figure 4.

Should the self-generation option be required, the power generation facility may either be onshore, a temporary self-contained floating power barge, or integrated into the nearshore floating LNG production unit. Should Cedar pursue 100% electrification, emergency backup generators will be required for safety and emergency systems only. These options are currently being evaluated in conjunction with Cedar's initial discussions with BC Hydro.

### **2.1.4 Feed Gas Processing and Pre-treatment Facilities**

The natural gas processing and pre-treatment facilities will be located on the nearshore LNG production unit and will include all the infrastructure associated with the front-end conditioning of natural gas arriving via pipeline to the Cedar LNG Project Area prior to entering the liquefaction process. It is anticipated that the design will consist of a single train of feed gas pre-treatment, capable of processing the volume of feed gas required for the full nearshore LNG production unit.

Prior to the liquefaction process, the following elements will be removed from the feed gas:

- CO<sub>2</sub>
- Mercury
- Heavier hydrocarbons
- Water
- Sulphur compounds

### **2.1.5 Power Supply and Distribution**

As described in Section 2.1.3, power will either be received via a transmission line or self generated or a combination thereof. The electricity will then be distributed to Project components requiring electricity through onsite transmission and distribution lines located within the Cedar LNG Project Area.

To supply Project components with electricity at the correct voltages, the power supply and distribution will also include switching stations, transformers and other auxiliary equipment.

## 2.1.6 Nearshore LNG Production Units

Feed gas will be transferred from the marine jetty to the nearshore LNG production unit via a flexible pipe transfer system or rigid marine loading arms with articulated joints. The dimensions of the nearshore LNG production unit will be determined during FEED but are expected to be approximately 300 m long by 60 m wide. Approximately 12 m to 15 m of the hull will be below the waterline (vessel draft); the height above water level to the main hull deck of the nearshore LNG production unit will be approximately 25 m.

The natural gas liquefaction process will involve the use of a mixed refrigerant gas to chill the feed gas to approximately  $-162^{\circ}\text{C}$  and store it at near atmospheric pressure. The mixed refrigerant will be a blend of hydrocarbons and inert gases and will operate in a closed-loop system with minimal make-up requirements. Make-up refrigerants are expected to be sourced from a commercial operator, and storage will be on the nearshore LNG production unit or onshore.

At this early stage of design, an air-cooling system is proposed as part of the refrigeration system of the liquefaction process. All boil-off and end flash gas will be recovered and either used as fuel gas for self-generation or re-liquefied.

The nearshore LNG production unit will have integrated LNG holding tanks. Total LNG storage is expected to be up to approximately  $250,000\text{ m}^3$ . Integrated storage is expected to consist of four or five individual tanks within the hull of the nearshore LNG production unit. LNG will be transferred directly to an LNG carrier from either a separate dedicated loading jetty or side by side loading directly from the nearshore LNG production unit.

The nearshore LNG production units will include the following ancillary systems to support the process requirements:

- Hydraulic oil valve system
- Bilge system—primarily used to drain bilge water from the bilge wells, but will also be used for emergency situations such as flooding to ensure stability of the nearshore LNG production units
- Ballast water system—used to add/remove ballast water to control hull bending, shear forces, trim, and heel while maintaining the stability of the nearshore LNG production unit
- Cofferdam heating system—maintains the structural steel of the nearshore LNG production unit at specified operational temperatures and prevents icing on the inner hull structure
- Freshwater generation (i.e., desalination) and distribution system
- Firewater distribution system
- Nitrogen system—self-generated nitrogen membrane package system fed by air
- Service and instrument air systems
- Inert gas system—used to produce and supply inert gas to replace the tank hydrocarbon gas environment as part of the sequence to achieving an atmospheric condition in the tank for maintenance

- Drain systems
- Emergency backup power generation system
- Grey and wastewater treatment systems
- High voltage electrical and utilities interface connection between onshore infrastructure and the nearshore LNG production unit

The nearshore LNG production unit will have its own automation system, which incorporates an emergency shutdown system for safe and reliable operation. This control systems will be part of an integrated control and safety system for the facility.

The nearshore LNG production unit will have its own dedicated flare system, which will enable the safe depressurization and disposal of hydrocarbon vapour from process, utility, LNG storage, and offloading systems. The flare system is not used during normal operations but may be used during start-up, preparation of equipment for maintenance, plant upset, and emergency and shutdown conditions. The flare is expected to be approximately 145 m above the main deck of the nearshore LNG production unit. An additional flare may be located onshore based on requirements to be determined through Pre-FEED and FEED.

### **2.1.7 Marine Terminal and Jetties**

At its largest, the marine terminal may consist of two LNG jetties and a MOF. One jetty is required for permanent mooring of the nearshore LNG production unit, and one jetty may be required for LNG carrier berthing and loading if the preferred option of direct side by side loading from the nearshore LNG production unit is not pursued. Conceptual jetty layouts are shown in Figure 5. Components of the marine terminals and jetties are expected to include:

- Marine jetty for mooring the nearshore LNG production unit, equipped with pedestrian and vehicle access onto the nearshore LNG production unit
- Marine jetty for LNG carrier berthing and loading (if required)
- Berthing dolphins, mooring dolphins, mooring hooks, mooring bollards, and fenders
- Loading arms or flexible pipe transport system to transport natural gas from land to the nearshore LNG production unit
- LNG and vapour return loading arms or hoses for transfer of LNG to LNG carriers
- Dedicated MOF for heavy equipment and material transfers (if required)
- Small craft jetty and tug basin (if required)

The nearshore LNG production unit jetty will accommodate the loading arms or flexible pipe transfer system, as well as the interconnecting piping, personnel gangway, and crane or ramp for material transfer to the nearshore LNG production unit.

Other marine infrastructure may include a small craft jetty and possibly a tug basin if tugboat(s) are required to be present on stand-by. Infrequent support may also occasionally be required from supply vessels and small work barges (giving access for maintenance).

If required, a MOF will be built as a stand-alone bulkhead or jetty to facilitate roll-on, roll-off transfer of major construction, fabrication, and maintenance equipment as well as any operational equipment required for the Project.

## **2.1.8 Supporting Infrastructure**

Proposed supporting infrastructure will include support buildings, access roads and utilities.

### **2.1.8.1 ADMINISTRATION, MAINTENANCE, AND SUPPORT BUILDINGS**

Buildings for centralized administration and oversight including a main centralised control room for monitoring and controlling the entire project will be constructed either onshore or onboard the nearshore LNG production unit. Maintenance workshops, separate storage warehouses for equipment spares, and a laboratory will also be located onshore as required. Storage facilities will include both enclosed storage facilities and outdoor laydown areas.

Medical facilities will include first-aid stations, medical room(s) with beds and certified first-aid staff, dedicated communications devices for requesting outside emergency aid, first-aid kits, and space for equipment storage.

### **2.1.8.2 WORKFORCE ACCOMMODATIONS**

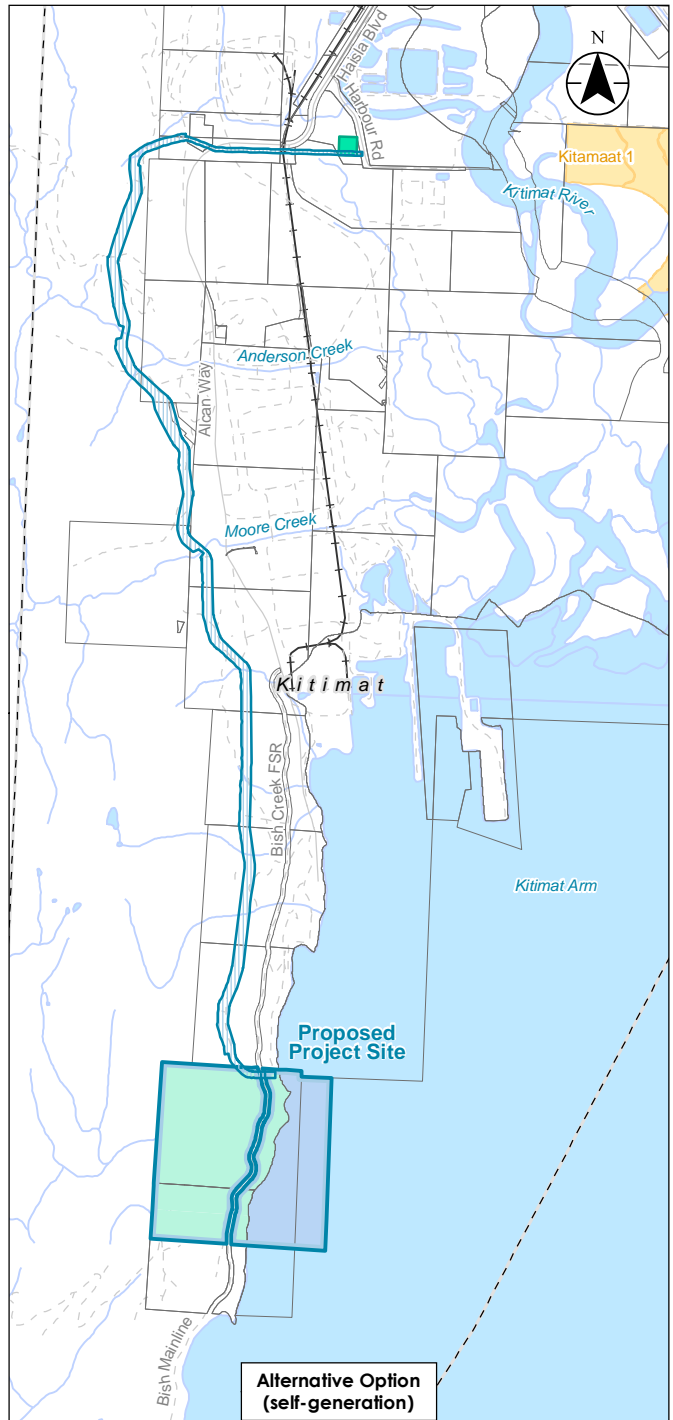
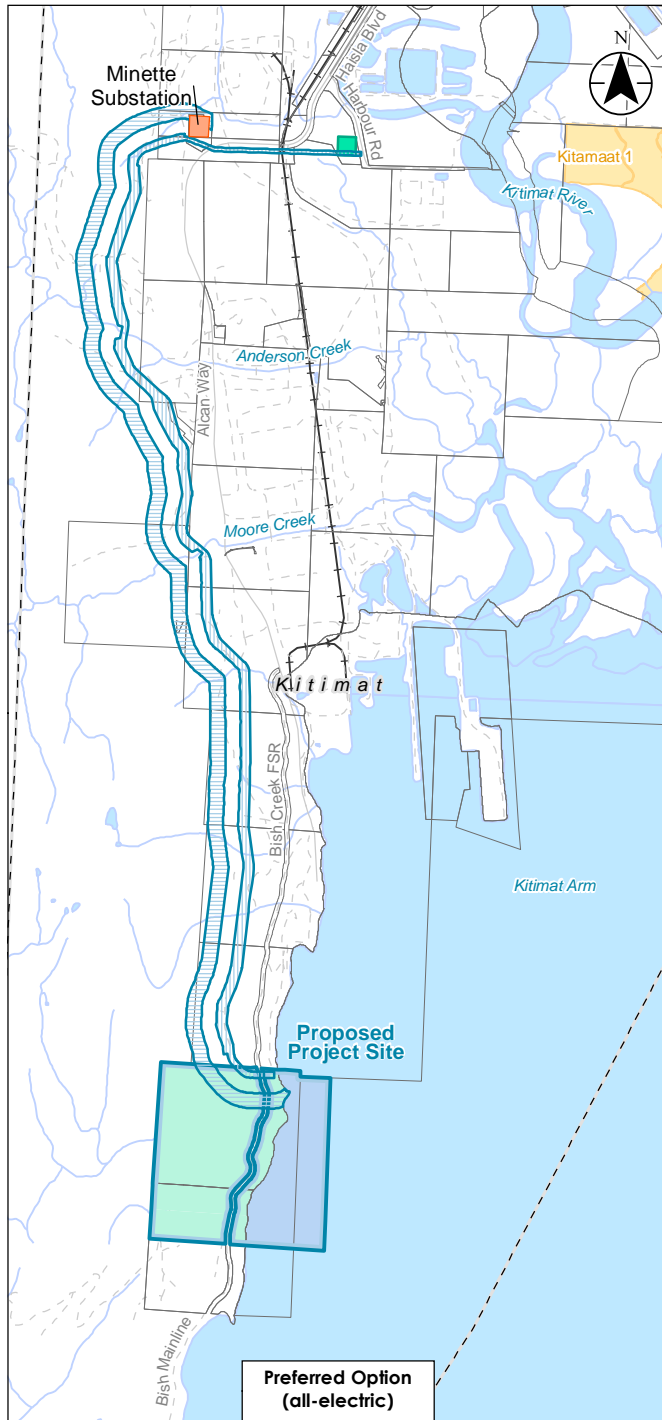
The construction and operations workforce will be recruited locally to the extent possible. Project construction and operations will require some specialized trades and personnel with relevant qualifications and experience, including positions with LNG experience (particularly in the start-up phase) who will likely be sourced from elsewhere in BC, Canada, or internationally.

During Project construction and operations, it is expected that the workforce will utilize existing accommodations or existing third-party camps available within Kitimat. Workers will travel between these accommodations and the Cedar LNG Project Area by bus or other vehicles where appropriate. During construction it is expected the Project will have a peak workforce of 350 to 500 workers, and during operations it will have 70 to 100 staff.

### **2.1.8.3 ACCESS ROADS**

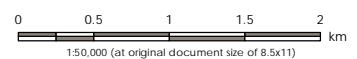
The Cedar LNG Project Area is adjacent to the Bish Creek Forest Service Road (FSR), which runs between Kitimat and Bish Cove. Bish Creek FSR recently went through an extensive upgrade as part of the Kitimat LNG Project, and further modification of the Bish Creek FSR is not expected as part of the Project.

Roads will be constructed within the Cedar LNG Project Area to provide access from the Bish Creek FSR to the LNG facility and associated infrastructure. A parking area will be provided within the Cedar LNG Project Area.



**Notes**  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 \* Approximate Location

- Railway
- Watercourse
- Waterbody
- First Nations Reserve
- Municipal Boundary
- Parcel Boundary
- Minette Substation
- Cedar LNG Project Area\*
- Land Area
- Water Area
- Pipeline Corridor
- Transmission Line Corridor\*
- Proposed Metering Station



Project Location  
 Kitimat,  
 British Columbia

Project Number 12321301  
 Prepared by LTRUDELL on 20190708  
 Discipline Review by JMUNDY on 20190708

Client/Project/Report  
 Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.

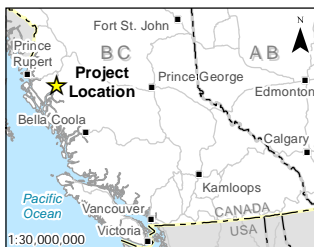
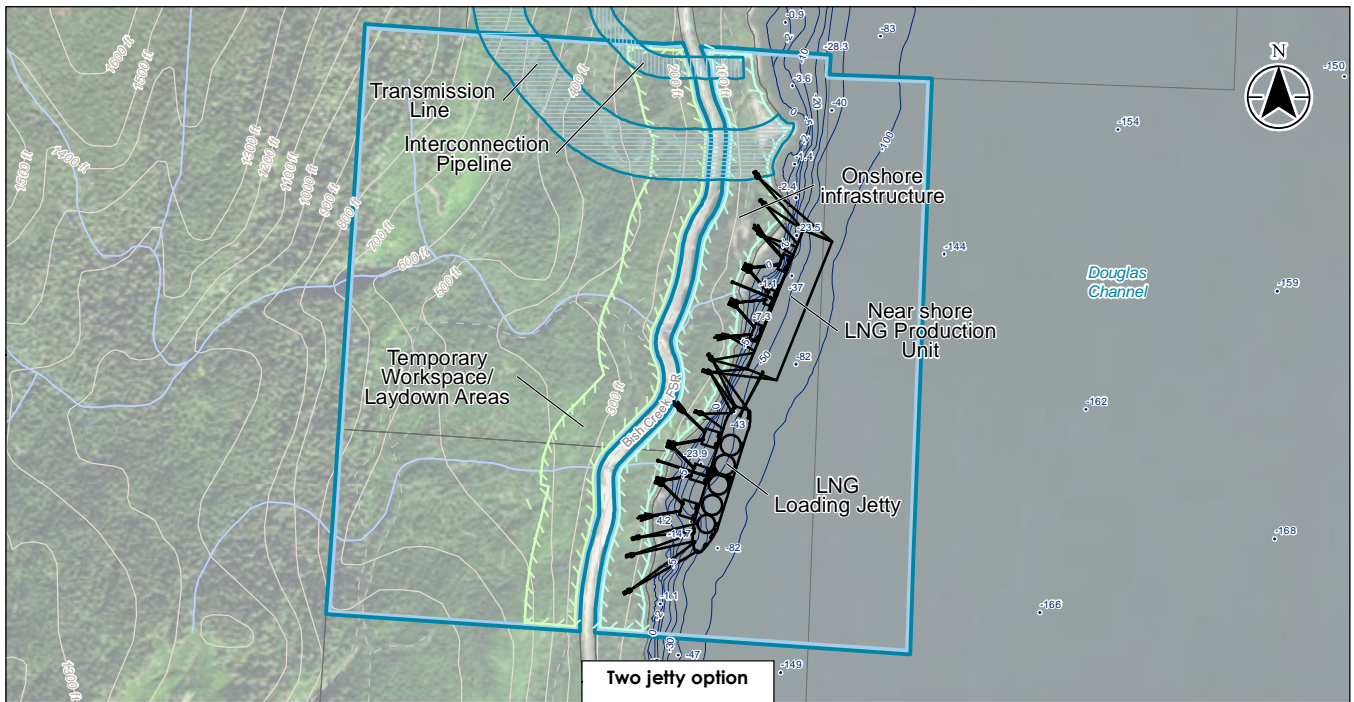
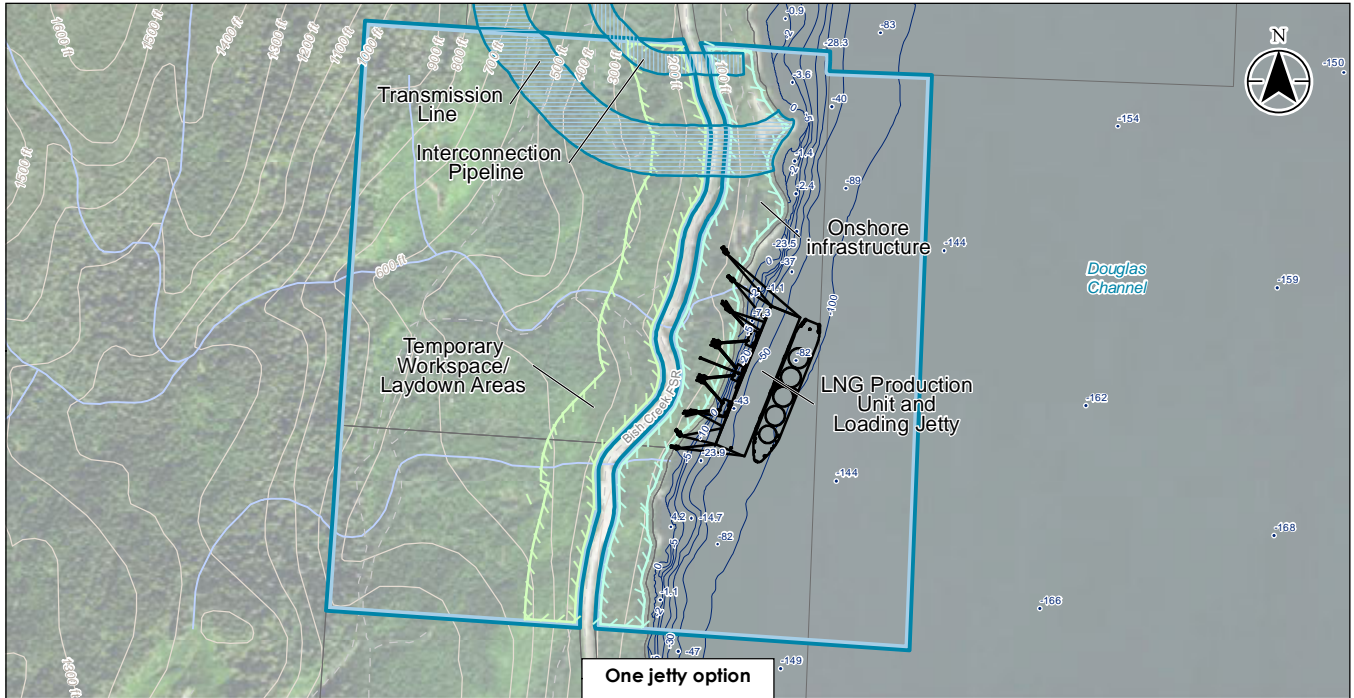
**4**

Title

**Project Layout – Power Generation Options**

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**Notes**  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada; Canadian Hydrographic Service  
 3. Imagery: ESRI World Imagery  
 \* Approximate Location

- Resource Road
- Topographic Contour
- Bathymetric Sounding
- Bathymetric Contour (metres at chart datum; CHS 3908 Kitimat Harbour)
- Watercourse
- Parcel Boundary

- Marine Terminal Layout
- Cedar LNG Project Area\*
- Pipeline Corridor
- Transmission Line Corridor\*
- Onshore Infrastructure\*
- Temporary Workspace/Laydown Areas\*

0 0.1 0.2 0.3 0.4 0.5  
 1:15,000 (at original document size of 8.5x11)



Project Location  
 Kitimat,  
 British Columbia

Project Number 123221301  
 Prepared by LTRUDELL on 20190708  
 Discipline Review by JMUNDY on 20190708

Client/Project/Report  
 Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.

**5**

Title

**Project Site Layout – Jetty Options**

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#### 2.1.8.4 UTILITIES

Water and wastewater facilities will be required to support workers at the LNG facility. Water may be supplied either through desalination or from a freshwater source (either stream or groundwater). Cedar may investigate the possibility of withdrawing water from the unnamed creek that runs through the Cedar LNG Project Area or from groundwater wells located within the Cedar LNG Project Area.

It is currently expected that potable water will be transported to the LNG facility by truck; however, Cedar may investigate the feasibility of treating water. Should potable water be treated as part of the Project, this activity will be assessed as part of the EAC application.

Wastewater is expected to be stored, pumped and disposed of at a licensed facility; however, Cedar may investigate treating and discharging the wastewater under an *Environmental Management Act* permit. Should potable water be treated as part of the Project, this activity will be assessed as part of the EAC application.

## 2.2 Project Activities

### 2.2.1 Construction

Construction activities will include site preparation as well as the construction and installation of Project components described in Section 3.1. Construction activities will be refined as design progresses, but are currently anticipated to consist of the following:

- Unloading of materials and equipment from trucks and barges
- Clearing and grubbing of areas not already cleared for previous industrial activity
- Blasting and grading, where required, to accommodate Project infrastructure (if required)
- Construction of the water supply system (either desalination, freshwater or a combination), including intake, treatment, and distribution
- Installation of storm water management, erosion prevention, and sediment control measures
- Mobilization and construction of onshore components, including administration buildings, supporting infrastructure, electrical transmission, external power reception, laydown areas, customs areas, and warehouses
- Mixing of concrete at an onsite batch plant (if required)
- Construction of marine jetties
- Construction of access roads within the Cedar LNG Project Area
- Installation of perimeter fencing and onshore access/security gates
- Permanent mooring of the nearshore LNG production unit
- Construction of electric transmission line (preferred option; under investigation)
- Connection of utilities (e.g., electrical, controls, gas, water) to the nearshore LNG production unit

- Potential rehabilitation or stabilization of areas not required for the operations phase
- Generation of electricity for construction activities (e.g., using portable generators)
- Waste disposal and recycling in accordance with applicable legislation
- Decommissioning of any temporary facilities

Construction activities may occur up to 24 hours per day, seven days per week.

Dredging for the safe arrival, berthing, and departure of LNG carriers is not expected to be required at this time, therefore disposal at sea is not being proposed. Similarly, removal of marine sediments to accommodate the jetty/jetties or nearshore LNG production unit is not expected. If at any point during Project development dredging and/or disposal at sea become necessary, Cedar will advise the appropriate authorities and any associated effects will be considered in the EAC application.

The nearshore LNG production unit will be built in a qualified offshore shipyard and towed or propelled under its own power to the Cedar LNG Project Area for installation and commissioning.

Construction materials will be transported to the Cedar LNG Project Area using existing land access roads and marine transportation routes. The method of transporting materials to and from the Cedar LNG Project Area will be dictated by practicality and is anticipated to employ a combination of marine, rail and vehicle transportation modes.

During construction, road access will be the primary transport means for ad-hoc deliveries of small tools and consumables, earthmoving equipment via low-bed trucks, and movement of the construction workforce between the Cedar LNG Project Area and Kitimat. It is anticipated that the number of movements by road could be on average up to approximately 10 to 15 movements per day (60 to 90 per week); a more specific breakdown will be developed as design progresses and presented in the EAC application.

It is anticipated that marine access will be the primary transport means for most major materials and heavy equipment used to construct the supporting marine and land-based infrastructure for the Project. These materials and equipment will be transported to site by deep sea marine vessels and/or marine barges via pre-existing marine shipping routes and offloading at the Project site. It is anticipated that during peak construction the number of marine vessel movements for this purpose could be on average in the range of approximately one to three movements per day (6 to 18 per week). Further details and breakdown will be provided in the EAC application

## 2.2.2 Operations

The operations phase will include operation of Project components described above to produce, store, and ship LNG to international markets. Project-related activities during the operations phase are expected to include the following:

- Start-up and commissioning support
- Delivery of natural gas via the feed gas distribution system
- Power generation (if required)



- Power aggregation and distribution to Project components, including the nearshore LNG production unit
- Gas reception and treatment in gas processing units on the nearshore LNG production unit
- Liquefaction of natural gas at the nearshore LNG production unit
- Storage and offloading of LNG at the nearshore LNG production unit
- Mooring, loading and transit of LNG carriers, including the assistance of tugs
- Water collection, treatment and use
- Wastewater, storm water, and process water treatment and disposal
- Waste disposal and recycling in accordance with applicable legislation
- Import of liquid refrigerant gases (by land or sea)
- Planned and unplanned maintenance
- Marine shipping along the marine access route from the Triple Island Pilotage Station, south through Principe Sound, east and northeast into Douglas Channel to Kitimat Arm

### 2.2.3 Decommissioning

The decommissioning phase will include removal of the nearshore LNG production unit for either re-use elsewhere or for full decommissioning and scrapping or recycling at a dedicated facility. Onshore infrastructure and facilities will be removed, vacated, and the Cedar LNG Project Area restored as appropriate in accordance with Haisla's development plans and applicable regulatory requirements. The Project has an expected operational lifespan of at least 25 years, and Cedar may apply to extend the export licence for the Project to 40 years.

### 2.2.4 Physical Activities Incidental to the Project

Potential physical activities incidental to the Project are anticipated to include:

- Laydown areas and temporary workspace
- Borrow pits
- Shipping

Laydown areas and temporary workspace may be required to support Project construction and borrow pits may be required to provide fill for the site. The configuration of these areas will be established as FEED progresses.

LNG produced by the Project will be offloaded from the nearshore LNG production unit to LNG carriers via either direct side by side loading from the nearshore LNG production unit itself (preferred option) or a dedicated loading jetty, which is designed to accommodate LNG carriers with capabilities ranging from 125,000 m<sup>3</sup> to 216,000 m<sup>3</sup>. Cedar anticipates that the average LNG carrier calling at the facility will have a capacity of approximately 180,000 m<sup>3</sup>, which will result in approximately 40 to 50 shipments of LNG per year (an average of one LNG shipment every 7 to 10 days).

The LNG carriers will be escorted and berthed with the assistance of tugs. The number, size, and arrangement of tugs to potentially escort and berth the LNG carriers will be determined during FEED.

LNG carriers bound for the Project are expected to be boarded by BC Coast Pilots at or near the Triple Island Pilotage Station. Loaded LNG carriers would follow the same route back out to the Pacific Ocean.

The LNG carriers will be operated by a third party with custody of the LNG transferred at the nearshore LNG production unit; however, Cedar will have the ability to require specific mitigation measures by the LNG carriers through contractual requirement.

### 2.2.5 Gas Transportation Services

Subject to the negotiation of certain agreements, Cedar intends to receive feed gas from the Coastal GasLink pipeline at a meter station within the vicinity of Kitimat. Natural gas will be delivered to the Cedar LNG Project Area by a 20-inch diameter, approximately 8 km long pipeline.

## 2.3 Project Schedule

The proposed Project schedule is outlined in Table 5. This schedule is contingent on regulatory approvals, First Nations consultation, and a positive final investment decision by Cedar's Board of Directors. Construction of the Project is currently planned to occur in one phase, scheduled to start in 2022 and continue until 2025. Construction may include activities occurring 24 hours a day, seven days a week. Operation of the LNG facility is expected to begin in 2025 and continue for the Project's lifespan of 25 years or more (with extension of the export licence).

**TABLE 5 PROPOSED PROJECT SCHEDULE**

Project Phase	Project Activity	Timing
Project Studies	Geotechnical Field Program	Q2/Q3 2020
	Engineering and technical desktop studies	Q3 2019-Q4 2020
	Commencement of Pre-FEED	Q3 2019
	Commencement of FEED	Q4 2020/Q1 2021
Environmental Assessment	Submit Project Description	August 2019
	Existing conditions field studies	Q3 2019 to Q3 2020
	Application preparation	Q3 to Q4 2020
	Application submission	Q1 2021
	Screening and review	Q1 2021 to Q3 2021

Project Phase	Project Activity	Timing
Financing	Final investment decision range	Q1 to Q3 2022
Construction	Construction start date	Q3 2022
	Start-up and commissioning	Q2 2025
Operations	First shipment of LNG from the facility	Q3-Q4 2025
	Operations and maintenance commencement	Q3 2025
Decommissioning and Abandonment	Decommissioning and reclamation	2050 to 2065
	Abandonment	2050 to 2065

The environmental assessment schedule outlined in Table 5 approximates the milestones identified as part of the provincial and federal environmental assessment processes. The actual duration of each stage of the process will depend on several factors, including the scope of the assessment, direction from the EAO and IAAC, and the resolution of issues raised during the environmental assessment process.

## 2.4 Project Capital Costs and Employment Estimates

The estimated capital cost for the Project is \$1.8 billion to \$2.5 billion (all cost estimates in 2019 Canadian dollars). The capital cost estimate includes the construction and commissioning of the natural gas liquefaction trains, a floating LNG storage, marine terminal, and all supporting infrastructure required. The estimated approximate average annual operating cost is anticipated to be \$55 million to \$75 million, excluding the annual purchase of natural gas supply. The estimated decommissioning costs for the Project are anticipated to be in the range of \$112 million to \$150 million.

The Project will require an estimated peak workforce in the Kitimat area of approximately 350 to 500 people at the peak of construction. Project construction is expected to generate up to 2,000 person-years of employment.

During operations, the Project will directly employ an estimated 70 to 100 people in ongoing full-time roles. The Project will create additional indirect jobs in the local community and elsewhere through suppliers of goods and services. Cedar's intent is to have a large number of Haisla members trained and working in full time employment roles to further benefit the Nation.

## 3.0 Emissions, Discharges and Waste

Construction and operation emissions, discharges and wastes will be managed to meet requirement of applicable guidelines, policies, and regulations. The emissions, discharges, and wastes from the Project are expected to include:

- Atmospheric emissions, including air, noise and light emissions
- Solid, liquid and hazardous wastes

### 3.1 Atmospheric Emissions

During construction, the primary sources of air emissions will be power generation with portable generators, construction equipment, and vehicle traffic. Construction equipment is anticipated to include fuel-driven machinery such as excavators, backhoe loaders, bulldozers, and trenchers. Vehicle traffic is expected to include pickup trucks, dump trucks, and barges used to transport construction materials to site. Air emissions are also expected from vegetation clearing and site preparation (e.g., GHG emissions from removal of vegetation, dust, burning of slash piles). Dust effects are expected to be local and temporary in nature, with measures such as road watering during dry conditions to limit the spread of dust beyond the Project boundaries. Construction is also anticipated to result in noise and light emissions. The primary sources of construction noise include blasting (if required), pile installation (if required), site clearing, and operation of heavy-duty construction equipment. Construction noise is expected to be local, with construction activities occurring up to 24 hours per day, seven days per week.

During operation, the primary sources of air emissions will include the acid gas removal unit, the flare system, self-generation power supply (depending on selected power supply option), and shipping. The acid gas removal unit removes and incinerates (via a thermal oxidizer) acid generating components of the gas stream (hydrogen sulphide and CO<sub>2</sub>) before the natural gas is liquified. The flare system disposes of gas in upset, maintenance, and emergency situations. In the alternative option, natural gas fired turbines will combust natural gas to supply power to the Project. LNG carriers and other marine support equipment will operate at the marine terminal. Fugitive emissions are also anticipated. During operation, the primary noise sources will be process facility equipment, such as the gas turbines and compressors, air coolers, and vehicle and vessel traffic.

Atmospheric emissions during decommissioning are expected to be similar to construction emissions, as similar equipment will be used.

The GHG emissions produced by the Project will be dependent upon the availability of power from the provincial grid. If the full amount of power required by the Project is available, the Project is expected to produce approximately 168,000 tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) per year. If Cedar is required self generate 100% of its power, the Project is expected to produce approximately 840,000 tonnes of CO<sub>2</sub>e per year. Cedar will report emissions in accordance with the *Greenhouse Gas Industrial Reporting and Control Act* and associated regulations.

Project emissions sources will be managed through adherence to best management practices, regulatory requirements, and guidelines. An environmental management system will be developed to oversee emission compliance requirements during Project operations, including any accidents or malfunctions.

Monitoring for atmospheric emissions is expected to be required under Project permitting through the *Environmental Management Act*.

Typical atmospheric emissions and sources, and the phase(s) of the Project in which they are expected to occur are presented in Table 6.

**TABLE 6 ANTICIPATED ATMOSPHERIC EMISSION AND THEIR SOURCES**

Atmospheric Emissions	Source locations	Project Phase
GHGs (CO <sub>2</sub> , methane, nitrous oxide)	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Marine Terminal</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation</li> <li>• Decommissioning</li> <li>• Accidents and Malfunctions</li> </ul>
Nitrogen oxides (NO <sub>x</sub> )	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Marine Terminal</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation</li> <li>• Decommissioning</li> <li>• Accidents and Malfunctions</li> </ul>
Sulphur dioxide (SO <sub>2</sub> )	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Marine Terminal</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation</li> <li>• Decommissioning</li> <li>• Accidents and Malfunctions</li> </ul>
Carbon monoxide	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Marine Terminal</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation</li> <li>• Decommissioning</li> <li>• Accidents and Malfunctions</li> </ul>
Inhalable particulate matter (PM <sub>10</sub> ; diameter less than 10 µm)	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Marine Terminal</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation</li> <li>• Decommissioning</li> <li>• Accidents and Malfunctions</li> </ul>
Respirable particulate matter (PM <sub>2.5</sub> ; diameter less than 2.5 µm)	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Marine Terminal</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation</li> <li>• Decommissioning</li> <li>• Accidents and Malfunctions</li> </ul>

Atmospheric Emissions	Source locations	Project Phase
Hydrogen sulphide	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Marine Terminal</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Accidents and Malfunctions</li> </ul>
Volatile organic compounds	<ul style="list-style-type: none"> <li>• LNG Facility</li> <li>• Supporting Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Operation</li> <li>• Decommissioning</li> <li>• Accidents and Malfunctions</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Mobile construction equipment</li> <li>• Pile installation</li> <li>• Blasting</li> <li>• Vehicle and vessel traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Decommissioning</li> </ul>
	<ul style="list-style-type: none"> <li>• Flare (maintenance or emergency)</li> <li>• Vehicle and vessel traffic</li> <li>• Gas turbines</li> <li>• Gas compressors</li> <li>• LNG carriers and LNG carrier loading</li> <li>• Air Coolers</li> </ul>	<ul style="list-style-type: none"> <li>• Operation</li> </ul>
Light	<ul style="list-style-type: none"> <li>• Building and work area lighting</li> <li>• Vehicles, vessels and construction equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Decommissioning</li> <li>• Operation</li> </ul>
	<ul style="list-style-type: none"> <li>• Facility lighting</li> <li>• Marine vessels</li> <li>• LNG carriers and tugs</li> <li>• Flares</li> </ul>	<ul style="list-style-type: none"> <li>• Operation</li> </ul>

### 3.2 Solid, Liquid and Hazardous Waste

Solid, liquid and hazardous waste emissions during the life of the Project are summarized in Table 7. Accidental releases will be managed through development and implementation of a spill response and emergency response procedures.

**TABLE 7 ANTICIPATED SOLID, LIQUID AND HAZARDOUS WASTES FOR THE PROJECT**

Waste Type	Waste Examples	Project Phase
Solid Waste	<ul style="list-style-type: none"> <li>• Soil and material excavated from Project footprint</li> <li>• Organic waste (vegetation, biomass materials)</li> <li>• Wastes from shipment of project components, including packing materials</li> <li>• Wastes from construction of Project components, including wood, metal, and concrete</li> <li>• Domestic waste</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Decommissioning</li> </ul>
	<ul style="list-style-type: none"> <li>• Domestic waste</li> <li>• Municipal waste</li> <li>• Waste absorbents</li> <li>• Paper / metal waste</li> </ul>	<ul style="list-style-type: none"> <li>• Operation</li> </ul>
Liquid Waste	<ul style="list-style-type: none"> <li>• Storm water</li> <li>• Hydrostatic test waste</li> <li>• Sanitary wastewater</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Decommissioning</li> </ul>
	<ul style="list-style-type: none"> <li>• Storm water runoff</li> <li>• Treated sanitary wastewater</li> <li>• Effluent run off</li> <li>• Industrial wastewater from gas dehydration process</li> <li>• Ballast water discharges</li> <li>• Brine from desalination system</li> </ul>	<ul style="list-style-type: none"> <li>• Operation</li> </ul>
Hazardous Waste	<ul style="list-style-type: none"> <li>• Treated sewage</li> <li>• Medical waste</li> <li>• Contaminated soil</li> </ul>	<ul style="list-style-type: none"> <li>• Construction</li> <li>• Decommissioning</li> </ul>
	<ul style="list-style-type: none"> <li>• Chemical waste</li> <li>• Sewage</li> <li>• Mercury absorbent</li> <li>• Contaminated soils</li> <li>• Waste absorbents</li> <li>• Miscellaneous waste such as batteries, filters, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Accidents and Malfunctions</li> </ul>

A waste management plan will be developed as part of the Construction Environmental Management Plan. Non-hazardous solid wastes will be recycled, reused, or collected in a central secure area on site and then disposed of in a licensed waste receiver facility. Hazardous liquid and solid waste will be collected in a secure, enclosed location and transported offsite to a licensed hazardous waste facility. Options for hazardous waste disposal are currently being evaluated.

Precautionary measures will be implemented to avoid uncontrolled runoff of non-hazardous waste liquids into adjacent waterbodies. Waste will be managed and treated in compliance with applicable federal and provincial regulatory requirements, and permits will be obtained in accordance with the *Environmental Management Act*. This includes process water from construction and operation activities, stormwater, and ballast water.

## 4.0 Project Location, Land and Water Use

The Cedar LNG Project Area is located within District Lot 99, DL 309 and the portion of the Water Lot A fronting those properties (Figure 2). The land and water lot are within the asserted traditional territory of Haisla Nation, and are owned in fee simple by an affiliate of Haisla Nation. A portion of the Cedar LNG Project Area is submerged Crown land for which Cedar anticipates obtaining a lease. These lands are within the municipal boundaries of the District of Kitimat and zoned for industrial and port development by the District of Kitimat's Official Community Plan.

The site is approximately 10 km southwest of Kitimat's town centre. The nearest residential area to the Project is Kitimaat Village, located approximately 3 km directly east across Kitimat Arm. Coordinates for the approximate centre of the Cedar LNG Project Area are:

- LAT/LONG 53.974972 -128.698639
- Degrees, minutes, and seconds (DMS) 53°58'29.9"N 128°41'55.1"W
- UTM (NAD83) Zone 9 Easting 519765.90 Northing 5980779.08

Industrial development in Kitimat has included or currently has proposed to include:

- Rio Tinto Aluminum smelter (existing)
- Methanex methanol facility (closed/decommissioned)
- Eurocan pulp and paper mill (closed/decommissioned)
- Kitimat LNG export terminal (proposed)
- LNG Canada export terminal (under construction)
- Pacific Traverse Energy liquefied petroleum gas export terminal (proposed)



## 4.1 Project Access

Kitimat is approximately 650 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. Highway access from Prince George to the project is by Highway 16 to Terrace, and then Highway 37 south to Kitimat. Once Highway 37 enters the Kitimat townsite, it turns into Haisla Boulevard. Haisla Boulevard then turns into Alcan Road. From Alcan Road, Bish Creek FSR connects directly to the Cedar LNG Project Area. As noted above, the Bish Creek FSR has been recently upgraded as part of the Kitimat LNG Project.

## 4.2 Land Ownership and Tenures

The Cedar LNG Project Area is located on privately owned lands and adjacent water lots as well as submerged Crown land. A review of land ownership has been completed for the upland and nearshore components of the LNG facility and associated marine infrastructure, as well as for transmission line and pipeline corridors (Table 8). No federal land is proposed for use in carrying out the Project.

**TABLE 8 LAND OWNERSHIP**

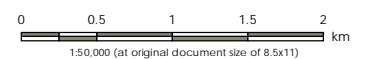
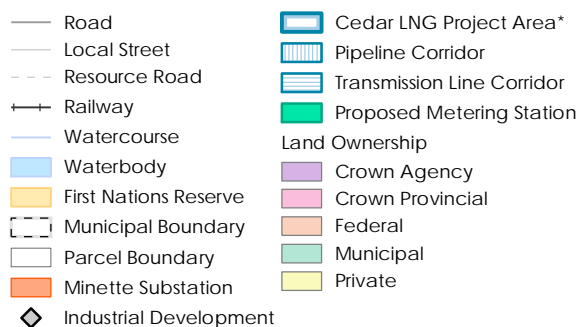
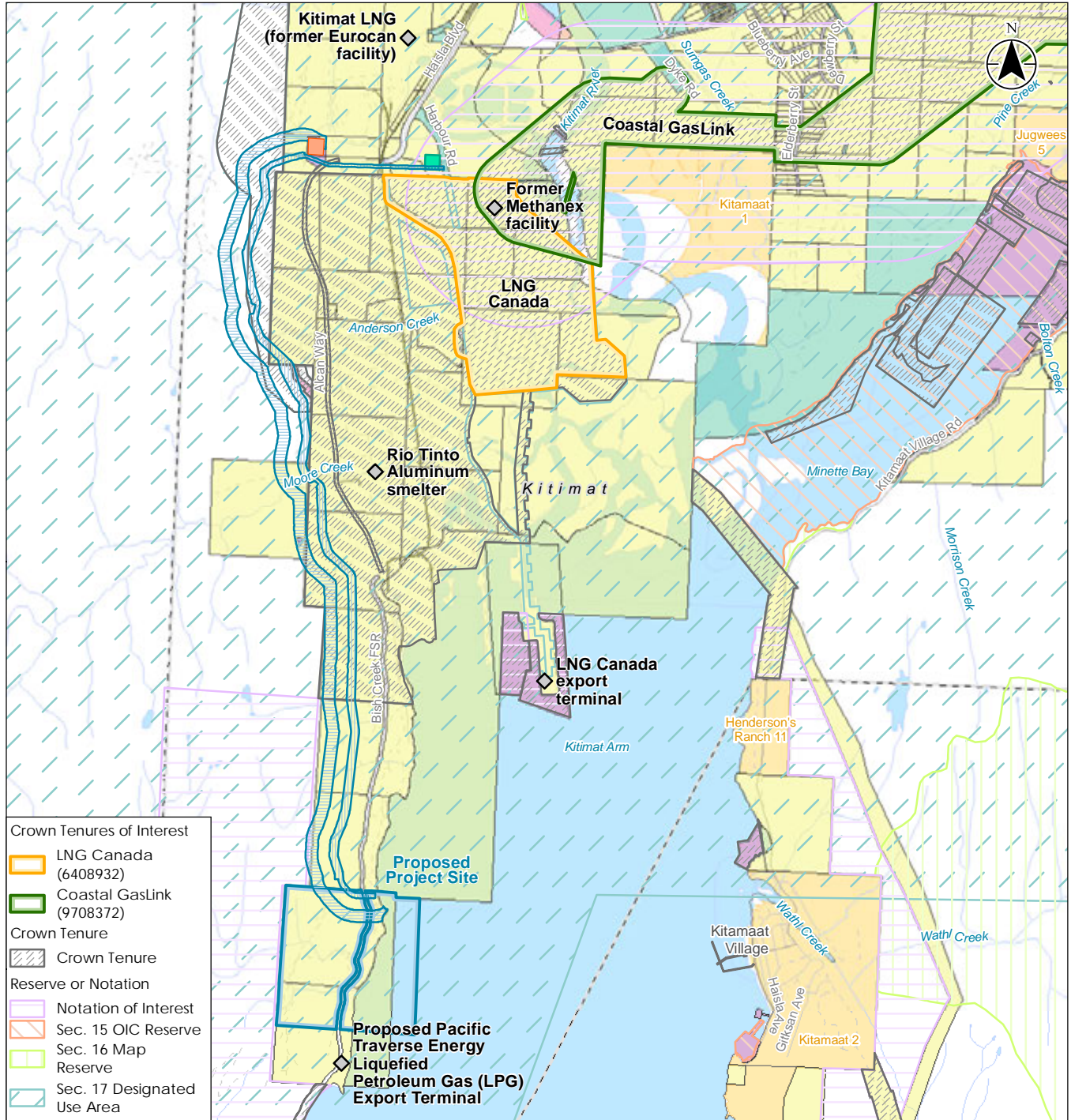
Project Component	Type	PIN	PID	Parcel Class	Legal Description / District Lot
LNG facility	Private	-	013-061-267	Subdivision	DL 99, Plan 14740
	Private		013-061-089		DL 309, Land District 13
Marine infrastructure	Private	-	029-462-142	-	Water Lot A, Plan EPP 14217, DL 5469
	Crown Waters	-	-	-	-
Transmission line and pipeline corridors	Private	-	004-336-887	Subdivision	DL 6050
	Private	-	004-336-976	Subdivision	DL 6051
	Private	2572810	004-337-191	Subdivision	DL 7596
	Private	-	007-736-649	Subdivision	DL 6050, DL 6053, DL 6054, DL 6057
	Private	-	007-745-249	Subdivision	DL 6051
	Crown Agency	-	010-128-174	Subdivision	DL 6051
	Private	-	013-061-127	Subdivision	DL 88
	Private	-	013-061-186	Subdivision	DL 89
	Private	-	013-061-208	Subdivision	DL 90, DL 91
	Private	2382130	013-061-232	Subdivision	DL 97
	Private	-	013-085-352	Subdivision	DL 91
	Private	2381640	013-085-395	Subdivision	DL 92

Project Component	Type	PIN	PID	Parcel Class	Legal Description / District Lot
Transmission line and pipeline corridors cont'd	Private	2382680	013-085-549	Subdivision	DL 102A
	Private	-	013-085-638	Subdivision	DL 187
	Crown Provincial	90023378	015-704-807	Interest	
	Private	-	030-237-939	Subdivision	DL 187, DL 6050
	Crown Agency	-	030-641-438	Subdivision	DL 6051

Tenures, licenses, reserves in the Cedar LNG Project Area and transmission line corridor and their uses are presented in Table 9 and on Figure 6. No Agricultural Land Reserve, range, guide outfitting, or mineral tenures are within proximity of the Project.

**TABLE 9 LAND TENURES, RESERVES, AND NOTATIONS**

Category	Crown Lands File	Tenure Type and Description
Utility (electric power line)	0260382	Statutory right of way (or easement)
Utility (electric power line)	6408847	Temporary licence
Transportation (roadway)	9635729	Temporary permit
Utility (gas and oil pipeline)	9708372	Temporary licence
Reserve (industrial)	6408539	Section 16 Map Reserve
Notation of interest (First Nations)	6408408	Notation of interest
Reserve (industrial)	6406661	Section 17 Designated Use Area
Utility	7409630	Notation of interest



Project Location  
Kitimat,  
British Columbia

Project Number 123221301  
Prepared by LTRUDELL on 20190708  
Discipline Review by JMUNDY on 20190708

Client/Project/Report  
Cedar LNG Export Development Ltd  
Cedar LNG Project  
Project Description

Figure No.  
6

Title  
Cedar LNG Project Area and Surrounding  
Land Ownership and Tenures

## 4.3 Planning Context and Zoning

Cedar reviewed various requirements, policies, objectives, and management directions apply to the use of lands, marine areas, and natural resources in the vicinity of the Cedar LNG Project Area and transmission line corridor. Because Project design is still conceptual, a 100 m buffer was applied to the area of interest. The applicability of these requirements and recommendations has been reviewed in consideration of the location of Project components and physical activities.

### 4.3.1 Proximity to Parks and Federal Lands

Table 10 shows the proximity of the Project to parks and surrounding federal lands (within 55 km; also see Figure 3). Figure 7 identifies key environmental features in the vicinity of the Project, including environmentally sensitive areas such as critical habitat for species at risk, known occurrences of listed species, and Wildlife Habitat Areas. The Project footprint does not overlap with any lands outside of British Columbia or Canada.

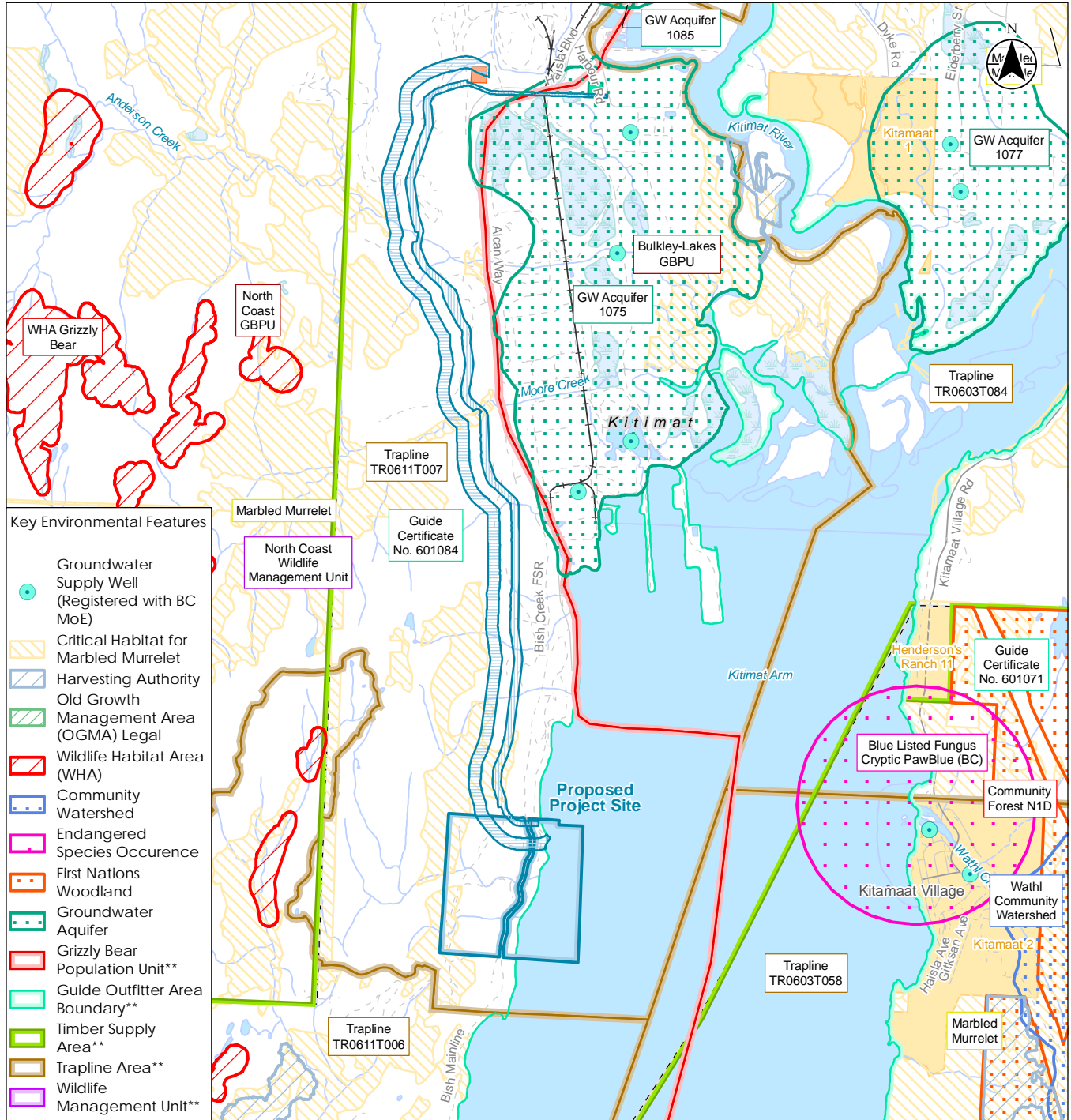
**TABLE 10 PARKS AND FEDERAL LANDS IN PROXIMITY TO THE PROJECT**

Parks and Federal Lands	Distance to Cedar LNG Project Area (km)
<b>Provincial Parks—Class A</b>	
Kitimat River Park, Nalbeelah Creek Wetlands Park, Gitnadoiks River Park, Dala-Kildala Rivers Estuaries Park, Dala-Kildala Rivers Estuaries Park, Eagle Bay Park, Eagle Bay Park, Foch-Gilttoeyes Park, Coste Rocks Park, Coste Rocks Park, Foch-Gilttoeyes Park, Sue Channel Park, Sue Channel Park, Weewanie Hot Springs Park, Weewanie Hot Springs Park	10 to 30
Lakelse Lake Wetlands Park, Lakelse Lake Park, Atna River Park, Hai Lake - Mount Herman Park, Lower Skeena River Park, Owyacumish River Park, Exchamsiks River Park, Morice Lake Park	32 to 53
<b>Regional Parks</b>	
Radley Park, Riverlodge Recreation Ball Park, Chilko Park, Radley Park, Radley Park, Coghlin Park View Point, Heron St Park, B2 Park (x2), Angle St Park, Raley St Park, Clague Mountain Park, Hirsch Creek Park	1 to 6
Ferry Island Recreation Area, Tetrault Park, Elk's Park, Duncan Kerr Memorial Park, Riverside Park, Geo Little Park, Upper Geo Little Park, Thornhill Community Grounds	53 to 55
<b>Protected Areas</b>	
Conservancies - Stair Creek Conservancy, Ecstall Headwaters Conservancy, Stair Creek Conservancy, Crab Lake Conservancy, Khtada Lake Conservancy, Bishop Bay-Monkey Beach Conservancy, Bishop Bay-Monkey Beach Conservancy, K'waal Conservancy, K'waal Conservancy, Alty Conservancy	34 to 54
Ecological Reserves—Williams Creek Ecological Reserve, Skeena River Ecological Reserve	45, 49
Protected Areas—Jesse Falls Protected Area, Jesse Falls Protected Area, Foch-Gilttoeyes Protected Area, Foch-Gilttoeyes Protected Area, Gitnadoiks River Protected Area, Exchamsiks River Protected Area, Brim River Hot Springs Protected Area, Brim River Hot Springs Protected Area	17 to 55

**TABLE 10 PARKS AND FEDERAL LANDS IN PROXIMITY TO THE PROJECT**

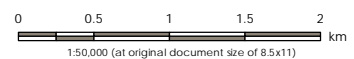
Parks and Federal Lands	Distance to Cedar LNG Project Area (km)
<b>First Nation Reserve Lands*</b>	
Kitimaat 1, Kitimaat 2, Henderson's Ranch 11, Walth 3, Jugwee 5 Bees 6	1 to 5
Kitasa 7, Kuaste 8, Tosehka 12, Tahla 4, Giltoyees 13, Ja we yah's 99, Kildala river 10, Misgatlee 14	10 to 29
Alastair 82, Alastair 80, Tsemknawalqan 79, Lakelse 25, Iakwulgyiyaps 78, Lakgeas 87, Psacelay 77, Ksames 85, Klakelse 86, Crab River 18, Gitandoiks 76, Gitandoiks 75, Dzagayap 74, Dzagayap 73, Kstus 83, Zimagord 3, Alder creek 70, Kitkahta 1, Kulspai 6, Kitsumkaylum 1, Iakvas 68, Gill island 2, Salvus 26, Kstus 84, Quaal 3a, Kasika 71, Kasika 72, Quaal 3	31 to 55
<b>Fisheries and Oceans Canada</b>	
Kitimat Hatchery, Kitimat	1
Kildala River Field Camp, Kitimat	2
Kitimat Boathouse Moorage and Storage, Kitimat	3
Small Craft Harbour—Kitimaat Village, Kitimaat 2	3
11 Coast Guard marine navigation aids and communication sites, Kitimat, Kitimat-Stikine C (Part 2), Skeena-Queen Charlotte C	7 to 51
<b>Royal Canadian Mounted Police</b>	
Kitimat Detachment, North District, Kitimat	3
Community Office, Terrace	54
Terrace Detachment, North District, Terrace	54
<b>Other Federal Lands</b>	
Transport Canada Kitimat NDB/SUPU (air transportation), Kitimat	2
Transport Canada Terrace Radio Range Site (NDB), Kitimat-Stikine C (Part 1)	38
Canada Post—Kitimat	3
Canada Post—Terrace	54
Business Development Bank of Canada—Nash Building, Terrace	54
Public Services and procurement Canada—Office, Terrace	54
Public Services and procurement Canada—Warehouse, storage and workshop	54
Public Services and procurement Canada—Office, Terrace	54
*Haisla Nation, Metlakatla First Nation, and Kitselas First Nation control and administer First Nation land as defined in subsection 2(1) of the First Nations Land Management Act	





Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 \*Approximate Location  
 \*\*Boundary will not be visible if it is beyond the extent of the data frame.

- Road
- Local Street
- Resource Road
- Railway
- Watercourse
- Waterbody
- Wetland
- First Nations Reserve
- Municipal Boundary
- Minette Substation
- Cedar LNG Project Area\*
- Pipeline Corridor
- Transmission Line Corridor
- Proposed Metering Station



Project Location  
 Kitimat,  
 British Columbia

Project Number 123221301  
 Prepared by LTRUDEL on 20190708  
 Discipline Review by JMUNDY on 20190708

Client/Project/Report  
 Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.

7

Title

Key Environmental Features

### 4.3.2 District of Kitimat

Development activities within the municipal boundaries of the District of Kitimat are subject to restrictions set out in Kitimat Municipal Code Bylaw Part 9 (Planning). The Project overlaps land use Zones M1 and G5 (limited to portions of the pipeline and transmission line). Zoning requirements for M1 and G5 are provided under Part 9, Division 6—Industrial Zoning and 7—Greenbelt Zoning of the Kitimat Municipal Code. Lands zoned M1 are intended for manufacturing purposes<sup>2</sup> while lands zoned G5 are intended for forestry uses<sup>3</sup>. Detailed zoning information is available from the District of Kitimat.

### 4.3.3 Kalum Land and Resource Management Plan

Approved in 2001, the Kalum Land and Resource Management Plan (Kalum LRMP) provides land and resource management direction for the Kalum Timber Supply Area, Tree Farm License 41—Skeena Cellulose, and Tree Farm License 41—Skeena Sawmills, including the communities of Terrace, Kitimat, Kitimaat Village and other surrounding rural communities (PBC 2019a). The Kalum LRMP encompasses an area of 2.2 million ha. Since its approval the plan has been updated to account for changes resulting from the Nisaga'a Treaty (2006), a Government Action Regulation Order establishing mountain goat ungulate winter range (2012), and a Government Action Regulation Order establishing moose ungulate winter range (PBC 2019a).

The Kalum LRMP establishes three categories of management direction: General Resource Management, Resource Management Zone, and Protected Areas (BC Ministry of Sustainable Resource Management [MSRM] 2002). On its own, the Kalum LRMP is not a legal planning document; however, various recommendations have been legalized through the issuance of the Kalum Sustainable Resource Management Plan (SRMP), established under a Land Use Objectives Regulation Order.

Implemented in 2006, the Kalum SRMP legally establishes wildlife areas for coastal tailed frogs and ungulate winter range for mountain goats and moose within the Kalum Timber Supply Area and Tree Farm License 1 and 41 (PBC 2019b). The Kalum SRMP encompasses an area of 1.6 million hectares in northwestern British Columbia. Since 2006 the Kalum SRMP has been updated to fulfill the Gitanyow Recognition and Reconciliation Agreement (2012), amend Objective 10 to better protect the Skeena Islands, and to improve consistency with old growth management areas established under the *Oil and Gas Activities Act* and the *Forest and Range Practices Act* (PBC 2019b).

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<sup>2</sup> Permitted uses listed in Section 9.6.2.1 of the Kitimat Municipal Code include: abattoir, agriculture, brewery, cidery, construction camp, distillery, log booming, manufacturing, marine activities, meadery, processing of animal products, restaurants, storage, transportation, temporary uses in accordance with Part 9 Division 8, winery.

<sup>3</sup> Permitted uses listed in Section 9.7.10.1 of the Kitimat Municipal Code include: agriculture, forestry, including harvesting, tree planting, and portable sawmills, detached residence with not more than two dwelling units, temporary uses in accordance with Part 9, Division 8. Permitted accessory uses include: bed and breakfast, home businesses address, home occupation, temporary uses in accordance with Part 9, Division 8.

#### 4.3.4 Pacific North Coast Integrated Management Area

Encompassing an area of 102,000 km<sup>2</sup> the Pacific North Coast Integrated Management Area (PNCIMA) is one of five national Large Ocean Management Areas managed under Canada's Oceans Action Plan (DFO 2017, PNCIMA 2017). Within the PNCIMA, ecosystem-based management guides marine activities and resource development. In the near term, five plan priorities have been identified: governance arrangements for implementation; marine protected area network planning; monitoring and adaptive management; integrated economic opportunities; and, tools to support plan implementation (current tools include 'risk assessment tools' and 'cumulative effects framework'; PNCIMA 2017).

#### 4.3.5 Marine Plan Partnership for the North Pacific Coast

The Marine Plan Partnership for the North Pacific Coast (MaPP) is a partnership initiative between the Province of British Columbia and 16 member First Nations that is implementing marine use plans for the MaPP region (divided into four subregions: Haida Gwaii, North Coast, Central Coast, and North Vancouver Island; MaPP 2019). MaPP Plans provide recommendations for marine management, uses, activities, and protection and are intended to inform economic development and stewardship of British Columbia's coastal marine environment (MaPP 2019).

The North Coast Marine Plan covers an area extending from Portland Inlet in the north to the south end of Aristazabal Island and is bounded by the coastal boundaries of the Kitimat-Stikine and North Coast Regional Districts to the east and the Haida Gwaii MaPP plan area to the west. Over this area the North Coast Marine Plan prescribes four<sup>4</sup> overarching themes, 14<sup>5</sup> topic-specific general management directions, and subdivides the plan into three management zones (general, special, and protection) that together guide sustainable management of marine resource and activities (MaPP 2017).

#### 4.3.6 First Nation Marine Plans

The Cedar LNG Project area is located within the traditional territory of the Haisla Nation. Marine use planning is currently under development that would cover that area.

Shipping activities are located within the management areas of several First Nation marine use plans. These plans include:

- Haisla Nation—marine use planning is currently under development
- Interim Land and Marine Resource Plan of the Allied Tsimpshian Tribes of Lax Kw'alaams Band
- Metlakatla Draft Marine Use Plan
- Kitsumkalum Marine Use Plan

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<sup>4</sup> Ecosystem-based management, governance, cumulative effects assessment, and climate change adaption and mitigation

<sup>5</sup> Compliance and enforcement; monitoring; marine protection; marine pollution; marine response; tenured activities: land policies and procedures; tenured activities: renewable energy; tenured activities: shellfish and marine plant aquaculture; tenured activities: marine-based forestry operations; tourism and recreation; marine fisheries economy; economic well-being; heritage sites and First Nations cultural areas; First Nations resource use and management.



- Gitxaala Marine Use Plan
- Gitga'at Marine Use Plan

Publicly available information on these plans is limited.

## 4.4 Water Use

The Cedar LNG Project Area is not located near a municipal water supply. Freshwater for process and potable water as well as potential make-up water for the power generation facility (if required) will be supplied using desalination, groundwater, surface water, or a combination thereof. The estimated flow required for the Project is expected to be up to approximately 0.25 m<sup>3</sup>/s. Potential options for water sources are still being determined. Freshwater may be stored on-site with storage capacity based on demand and supply (e.g., firewater demand for occupied buildings). Depending on the source, water for domestic use may require on-site treatment to comply with drinking water standards. Alternatively, potable water may be brought to the site via barge or truck.

# 5.0 Regulatory Context

## 5.1 Past and Present Environmental Studies in the Region

Several LNG and marine projects in the Kitimat area have initiated or completed federal and provincial environmental assessments. These include:

- LNG Canada Export Terminal (received its EAC and positive federal decision in 2015; currently under construction)
- Rio Tinto Terminal A Extension (received its EAC in 2015; currently under construction)
- Kitimat LNG (received its EAC in 2006, substantially started construction in 2015 and currently pursuing a complex amendment under BCEAA with a request for substitution under the *Canadian Environmental Assessment Act, 2012*)
- Northern Gateway Pipelines (subject to an environmental assessment by Review Panel between 2006 and 2014; project was rejected by the federal government in 2017)
- Douglas Channel LNG (initiated a screening under the *Canadian Environmental Assessment Act*, but did not meet requirements under the Regulations Designating Physical Activities once the *Canadian Environmental Assessment Act, 2012* was enacted)

The LNG Canada environmental assessment included consideration of three proposed LNG terminals, a proposed oil refinery, and a proposed oil export terminal in Kitimat, and marine transportation associated with proposed projects in both Kitimat and Prince Rupert. The EAO Assessment Report did not identify any significant cumulative effects as a result of the LNG Project in combination with other past, current and reasonably foreseeable projects.

The Kitimat LNG and Northern Gateway projects both assessed potential environmental effects of pipelines in the same shared corridor that is proposed for the pipeline providing feed gas to the LNG facility. Both environmental assessments concluded that the pipelines would not result in significant adverse environmental effects and that they could proceed with permitting.

In addition, the BC Ministry of Environment commissioned a study of the Kitimat Airshed to learn about potential effects to human and environmental receptors from acidifying emissions related to proposed development in the region (ESSA Technologies et al. 2014). The Kitimat Airshed Study considered the existing Rio Tinto aluminum smelter as well as four proposed LNG terminals, a proposed oil refinery, gas turbine powered electrical generation facilities, and associated marine transportation and provides an evaluation of potential cumulative effects to the Kitimat Airshed under various development scenarios. Based on this study, the BC government concluded that “with proper management, Kitimat’s airshed can safely accommodate new industrial growth” (BC ENV 2014).

In 2014 the Ministry of Transportation and Infrastructure initiated the Kitimat West Douglas Channel Corridor Analysis to inform land use planning and permitting decisions related to infrastructure requirements for proposed projects in on the west side of Douglas Channel in Kitimat. This study included input from the Kitimat LNG Project (Chevron), the Northern Gateway Project (Enbridge), and Rio Tinto. The pipeline alignment selected for the Project was informed by this study.

## **5.2 Federal Financial Support**

No federal funding is anticipated for the proposed Project.

## **5.3 Permits, Licenses, Approvals and Authorizations**

This Project will be provincially regulated. In addition to an EAC and positive federal Decision Statement, the Project will require a range of other approvals, including from the Oil and Gas Commission and other regulatory agencies (Table 11).



TABLE 11 ANTICIPATED KEY PERMITS AND APPROVALS

Permit	Legislation	Receiving Party	Trigger(s)
Federal			
Export License	<i>National Energy Board Act—Part VI (Oil and Gas)</i>	National Energy Board (NEB)	Required to export and sell LNG product outside of Canada
Decision Statement	IAA	IAAC	Required for projects that exceed the thresholds in the Physical Activities Regulations (see Section 1.5).
Canadian Register of Vessels	<i>Canada Shipping Act</i>	Transport Canada	Required for vessels > 15 gross tonnes used for commercial purposes, that require marine mortgages, have an engine of 10 hp (7.5 kw) or more. A vessel is mandated to be registered if it is not a pleasure craft; is wholly owned by qualified persons; is not registered, listed or otherwise recorded in a foreign state. May be applicable to the nearshore LNG production unit.
Coasting Trade License	<i>Coasting Trade License Act</i>	Transport Canada	Required to bring a foreign flagged vessel into Canadian waters.
Marine Facility Security Assessment and Security Plan	Marine Transportation Security Regulations	Transport Canada	Required for marine facilities located in a maritime zone of Part 1 of the <i>Oceans Act</i> . This regulation applies to Canadian vessels of over 100 tonnes; carrying over 12 passengers; or towing a barge astern or alongside or pushing ahead if the barge is carrying certain dangerous cargoes.
Aeronautical Obstruction Clearance	Canadian Aviation Regulations	Transport Canada	Required to address issues such as marking, lighting and use of tall cranes that may at times require aeronautical obstruction clearance. This clearance specifies the location of new structures that may pose a hazard to aviation.
Explosives Transportation Permit	<i>Explosives Act</i>	Natural Resources Canada	Required for the transportation of explosives via flatbed trailer truck.
Explosives User Magazine License	<i>Explosives Act</i> , Explosives Regulation	Natural Resources Canada	Required if planning to use Type E & I explosives
Approval Letter	Explosives Regulation	Natural Resources Canada	Required for employees who will be working with explosives.
Radio License	<i>Radio Communication Act</i>	Industry Canada	Required if planning on using radio frequencies and major communication method
Scientific Fish Collection	Fishery Regulations and Management of Contaminated Fisheries Regulations	Fisheries and Oceans Canada (DFO)	Required if collecting federally regulated fish (e.g., undertaking a fish salvage).
Request for Review (under Section 35)	<i>Fisheries Act</i>	Fisheries and Oceans Canada (DFO)	Required for work being conducted in or near water bodies that support fish that are part of or support a commercial, recreational or Aboriginal fishery.
Ministerial Authorization	<i>Fisheries Act</i>	Fisheries and Oceans Canada (DFO)	Required if <i>Request for Review</i> (above) triggers the need for a paragraph 35(b) authorization. Not currently anticipated based on limited interaction between marine infrastructure and marine fish and fish habitat.
Notice to the Minister	<i>Navigation Protection Act</i>	Transport Canada (NPP)	Required for all proposed works (other than a designated work) on Navigable Waters.
Approval to Interfere with Navigation	<i>Navigation Protection Act</i>	Transport Canada (NPP)	Required if Notice to Minister (above) determines significant interference is likely to occur from proposed works.
Provincial			
EAC	<i>Environmental Assessment Act</i>	EAO	Required for projects that exceed the thresholds in the Reviewable Projects Regulation (see Section 1.5).
LNG Facility Permit	LNG Facility Regulation	BC Oil and Gas Commission (OGC)	Required to move forward with development of any LNG facility.
Modular Units			Required when planning to construct a modular unit.
Modular Units from Outside BC			Required when bringing in modular units constructed outside of BC.
Investigative Use Permit	<i>Land Act</i>	OGC	Required to assess suitability of the area for proposed project. Grants temporary access to Crown land sites for data gathering and testing
License of Occupation			Required if planning to occupy Crown land for over two years, to be used for oil and gas activities.
Temporary Occupation of Crown Land			Required for oil and gas activity on Crown land.



TABLE 11 ANTICIPATED KEY PERMITS AND APPROVALS

Permit	Legislation	Receiving Party	Trigger(s)
Section 10 Use Approval for short term water use	Water Sustainability Act	OGC	Required for diversion or use of water for up to 24 months from single or multiple sites.
Section 11 Approval for changes in and about a stream		OGC	Required if construction and operation may create changes in and about a stream.
Water Licence		OGC	Required to acquire long-term water rights to divert and use water.
Section 12 Alteration to Site	Heritage Conservation Act	OGC	Required for any alteration to an archaeological site once the inspection and investigation are complete.
Road Permit	Oil and Gas Activities Act	OGC	Required for use of roads on private land to carry out oil and gas activities.
Aggregate Operations and Borrow Pit Approval		OGC	Required for excavation/use of clay, rock or similar materials. for construction or maintenance of oil and gas infrastructure that are not sourced from a borrow pit.
Waste Discharge Permit (Water)	Environmental Management Act; Oil and Gas Waste Regulation	OGC	Required to discharge waste into the environment, as a Schedule 1 activity. Code of practice authorization is required to discharge waste into the environment as a Schedule 2 activity
Waste Discharge Permit (Air)	Environmental Management Act; Oil and Gas Waste Regulation	OGC	Required to discharge waste into the environment, as a Schedule 1 activity. Code of practice authorization is required to discharge waste into the environment as a Schedule 2 activity
Sewage Discharge Authorization	Environmental Management Act, Public Health Act	Ministry of Environment and Climate Change	Required for discharges to ground (>22.7 m³/d) and most discharges to water and reclaimed water uses requiring authorization under the Environmental Management Act.
Alternative Safety Approach Plan	Safety Standards Act	Technical Safety BC	Required for projects that deviate from CSA code.
Design Registration		Technical Safety BC	Required for specific pressure equipment.
Operating Permit		Technical Safety BC	Required when operating or maintaining equipment identified under the Safety Standards General Regulations (i.e., typically includes industrial plants).
Installation Permit		Technical Safety BC	Required for all LNG facilities moving forward to ensure safe operation and design of facilities.
Class 8 Special Type Operating Permit		Technical Safety BC	Required for all LNG facilities moving forward to ensure safe operation and design of facilities.
Municipal/Regional			
Building Permit	Kitimat Municipal Code	District of Kitimat	Required for construction of buildings within District of Kitimat land.
Development Permit		District of Kitimat	Required if the project conflicts with rules in the Municipal Code or Official Community Plan or is located within a development permit area.
Zone Amendment	Official Community Plan	District of Kitimat	Required to amend the type of zoning where LNG facility is to be built (i.e., if not in an industrial zone).
Application for Health Approval	Public Health Act	Northern Health Authority	Required when obtaining an operating permit for a public water system or water hauling truck (general service – industrial).
Holding Tank Permit	Sewerage System Regulation	Northern Health Authority	Required if planning to establish sewage holding tank. Holding tanks are regulated under Section 4 and 5 of the BC Sewerage System Regulation.
Section 7 Approval for water supply system construction	Drinking Water Protection Act	Northern Health Authority	Required if planning to construct own water supply system on site.  Construction permit required for a new or modification to a water supply system. "Minor" construction can be applied for if construction is an extension to service a single lot with a pipe diameter ≥ 75 mm or to service up to five lots.
Section 8 Approval for water supply system operation		Northern Health Authority	Required after construction is complete in order to operate water supply system on site.

## 6.0 Environmental Setting

Existing conditions in the Cedar LNG Project Area and transmission line corridor are well understood and have been characterized through numerous previous projects and studies. Section 5.1 provides a summary of past and current environmental studies in the area. Cedar will conduct site-specific environmental studies to validate existing information.

The following sections provide an overview of the natural, biological and human environment setting in the vicinity of the Project.

### 6.1 Natural Setting

#### 6.1.1 Climate and Air Quality

Kitimat is located within an area that is influenced by Pacific maritime air streams that result in mild wet winters and cool moderately humid summers. Small seasonal temperature differences are experienced. 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 is generally very good due to prevailing winds. Air quality in Kitimat is influenced nearby industrial facilities. Due to the industrial history of Kitimat, local air quality and meteorological data have been extensively monitored for more than 20 years. There are currently four active monitoring stations in or near the Kitimat townsite and Kitimaat Village. At one location near the Rio Tinto site, SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, hydrogen sulphide, and ozone are monitored on a continuous basis.

#### 6.1.2 Greenhouse Gases

GHG emissions from industry are federally and provincially monitored in Canada. At a federal level, GHG emissions are reported via the GHG Reporting Program under section 46 of the *Canadian Environmental Protection Act, 1999*, and GHG emissions within British Columbia are reported by the *Greenhouse Gas Industrial Reporting and Control Act*. Both laws require industrial facilities to report their annual GHG emissions if they emit more than 10,000 tonnes of CO<sub>2</sub>e per year. Those annual reports are then included in the provincial and national GHG inventories alongside other emission categories.

Currently, British Columbia's GHG inventory does not include the category of LNG facilities (Government of British Columbia 2018); however, such oil and gas emissions can be considered under the industry category. Provincial inventory emissions indicate 40% are from the industry section, 38% from the transportation sector and 22% from building sector.

GHG reduction targets within British Columbia have been legislated since 2007 under the *Greenhouse Gas Reduction Target Act*. GHG targets are set as 40%, 60% and 80% below the 2007 GHG emission levels by 2030, 2040 and 2050, respectively. In 2014, British Columbia implemented the *Greenhouse Gas Industrial Reporting and Control Act* which establishes a GHG emission intensity benchmark for LNG facilities of 0.16 tonnes CO<sub>2</sub>e/tonne LNG produced.

### 6.1.3 Acoustic Environment

The existing acoustic environment within the Cedar LNG Project Area is characterized by variable sound from the natural environment such as wind, waves and marine and terrestrial wildlife as well as anthropogenic sound. Sources of anthropogenic sound include marine traffic, air traffic, and other human activity. The closest residential houses are approximately 3 km east of the LNG facility in Kitimaat Village.

Noise levels in the area are generally consistent with rural areas. However, noise levels to the north, near Kitimat, are influenced by nearby industrial facilities.

## 6.2 Biological Setting

### 6.2.1 Freshwater and Aquatic Resources

Several watercourses are present in the Cedar LNG Project Area and along the pipeline and transmission line corridors, including Moore Creek, Anderson Creek and Beaver Creek. These streams and their tributaries flow into the Kitimat River estuary and Kitimat Arm. Most of the watercourses in the Cedar LNG Project Area are inhabited by fish. Known commercial, recreational or Aboriginal (CRA) fish species include coho salmon (*Oncorhynchus kisutch*), chinook salmon (*O. tshawytscha*), chum salmon (*O. keta*), pink salmon (*O. gorbuscha*), coastal cutthroat trout (*O. clarkii clarkii*), rainbow trout (*O. mykiss*), and Dolly Varden (*Salvelinus malma*). None of these species are listed under the *Species at Risk Act*, and coastal cutthroat trout are provincially blue-listed. Habitat at the watercourse crossings may provide spawning, rearing or overwintering habitat for CRA and CRA-supporting species.

### 6.2.2 Marine Resources

The Project is located within a coastal fjord containing turbid surface waters and hypoxic (low oxygen) deep water. Sediment loading occurs from major watercourses in the area such as the Kitimat River. The foreshore environment in the Cedar LNG Project Area is a mixture of bedrock, sand and gravel, beyond which steep and rocky walls lead to approximately 100 m depth where the substrate changes to soft sediment.

Kelp (e.g., bull kelp, *Nereocystis luetkana*) and eelgrass (*Zostera spp.*) species form important seasonal habitat for fish and invertebrates and are likely to be found within the Cedar LNG Project Area. Important estuarine habitat exists north of the Cedar LNG Project Area and migratory fish species such as Pacific salmon (*Oncorhynchus spp.*) and Pacific eulachon (*Thaleichthys pacificus*) pass through during spawning migration and juvenile out-migrations. Pacific herring (*Clupea pallasii*) are also known to use Kitimat Arm for spawning and rockfish (*Sebastes spp.*) may be found at depth along the rocky fjord wall and soft sediment. Other fish species (Pacific halibut, *Hippoglossus stenolepis*; Pacific sandlance,

*Ammodytes hexapterus*; ronquil, *Ronquilus spp.* eelpout, *Lycodes spp.*; sculpin, family Cottidae; ratfish, *Hydrolagus coliei*; and flatfish, Family Pleuronectidae) are likely to be found within the Cedar LNG Project Area. Invertebrate species such as Dungeness crab (*Metacarcinus magister*), Pacific blue mussel (*Mytilus trossulus*), barnacles (e.g., *Semibalanus spp.*), sea urchins (*Strongylocentrotus spp.*) sea cucumber (e.g., *Apostichopus californicus*), snails (*Littorina spp.*), and limpets (*Lottia spp.*) use the intertidal and subtidal environments within the project area either seasonally or year-round. Other species of interest like northern abalone (*Haliotis kamtschatkana*) or glass sponge reefs (Class Hexactinellida) could be found within the project area. Marine mammals (resident and Bigg's killer whales, *Orcinus orca*; humpback whales, *Megaptera novaeangliae*; Steller's sea lion, *Eumetopias jubatus*; Dall's porpoise, *Phocoenoides dalli*; harbour porpoise, *Phocoena phocoena*; harbour seal, *Phoca vitulina*) are also found in Douglas Channel.

### 6.2.3 Vegetation and Wetlands Resources

The western shore of Kitimat Arm is in the sub-montane variant of the Coastal Western Hemlock (CWH) Very Wet Maritime Subzone (vm1). The CWHvm1 has a wet, humid, mild, oceanic climate and occupies an extensive area at elevations below 400 m. Zonal forests are dominated by western hemlock (*Tsuga heterophylla*), amabilis fir (*Abies amabilis*), and western redcedar (*Thuja plicata*) with a thick shrub understory of conifer regeneration and blueberries (*Vaccinium*), with a sparse herb layer of bunchberry (*Cornus canadensis*), deer fern (*Struthiopteris spicant*), and spiny wood fern (*Dryopteris expansa*), with a carpet of feather and leafy mosses (Banner et al. 2003).

Wetter forested site units dominate the landscape in the CWHvm1, even on sloping terrain. Wetter forests are dominated by amabilis fir, western redcedar, western hemlock, Sitka spruce (*Picea sitchensis*), and yellow cedar (*Cupressus nootkatensis*). Understory vegetation includes devil's club (*Oplopanax horridus*), foamflower (*Tiarella*), salmonberry (*Rubus spectabilis*), and oak fern (*Gymnocarpium dryopteris*). Lanky (*Rhytidiadelphus loreus*) and leafy mosses and green sphagnum are common (Banner et al. 2003).

The British Columbia Conservation Data Centre (2019) reports 12 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 uncorrelated
2. Sitka spruce/Salmonberry, Ecological Unit CWHvm1/09
3. Sitka sedge/peat moss wetland fen, Wetland community Wf51

Nine 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—western redcedar/salmonberry, Ecological Unit CWHvm1/07
5. Amabilis fir—Sitka spruce/Devil's club, Ecological Unit CWHvm1/08
6. Black cottonwood—red alder/Salmonberry, Ecological Unit CWHvm1/10



7. Western redcedar—Sitka spruce/skunk cabbage, Ecological unit CWHvm1/14
8. Labrador tea/western bog-laurel bog/peat mosses, Wetland community Wb50
9. Sitka willow/Sitka sedge swamp, Wetland community Ws06

## 6.2.4 Wildlife and Wildlife Habitat

The Cedar LNG Project Area is characterized by coastal coniferous forests, riparian areas, rocky shorelines, and deep marine water. Terrestrial ecosystems in the Kitimat area support a wide variety of wildlife species, including mammals (e.g., grizzly bear [*Ursus arctos*], black bear [*Ursus americanus*], Pacific marten [*Martes caurina*]), raptors (e.g., bald eagle [*Haliaeetus leucocephalus*], osprey [*Pandion haliaetus*]), forest birds (e.g., marbled murrelet [*Brachyramphus marmoratus*], olive-sided flycatcher [*Contopus cooperi*], western screech owl [*Megascops kennicottii kennicottii*]), and amphibians (e.g., western toad [*Anaxyrus boreas*], coastal tailed frog [*Ascaphus truei*]). Nearshore marine ecosystems support many species of shorebirds, wading birds, waterfowl, and marine birds (e.g., great blue heron [*Ardea herodias fannini*], surf scoter [*Melanitta perspicillata*]).

Several wildlife species that are known to occur in the Kitimat area are species of conservation concern and are listed federally on Schedule 1 of the *Species at Risk Act* or on the provincial Red or Blue list. Species of conservation concern that have previously been documented in the area include grizzly bear, little brown myotis (*Myotis lucifugus*), marbled murrelet, northern goshawk (*Accipiter gentilis laingi*), western screech owl, and coastal tailed frog. Habitat in the Cedar LNG Project Area may support one of more of these species of conservation concern.

## 6.3 Human Environment Setting

### 6.3.1 Socio-Economic Setting

#### 6.3.1.1 REGIONAL SETTING

The Regional District of Kitimat-Stikine (RDKS) provides local government services to an area of 100,000 km<sup>2</sup> in northwestern British Columbia. In 2016, the population of RDKS was estimated at 37,367 persons (less than a 1% increase from 2011), of whom roughly 36% identified themselves as Indigenous (Statistics Canada 2017). RDKS includes the City of Terrace, Village of Hazelton, Nisga'a (Nisga'a land), District Municipalities of Kitimat, New Hazelton, and Stewart, RDKS Electoral Areas A, B, C (Part 1 and 2), D, E, and F, and the Indian Reserves of Babine 17, Bulkley River 19, Coryatsaqua (Morice town) 2, Dease Lake 9, Gitanmaax 1, Gitanyow 1, Gitsegukla 1, Gitwangak 1, Guhthe Tah 12, Hagwilget 1, Iskut 6, Kispiox 1, Kitamaat 2, Kitasoo 1, Kitselas 1, Kitsumkaylum 1, Kshish 4, Kulspai 6, Morice town 1, Sik-e-dakh 2, Tahltan 1, Telegraph Creek.



The economic base of the RDKS in 2016 was weighted toward non-basic industries<sup>6</sup>, employing 51% of the labour force (Statistics Canada 2017). Of non-basic industries, employment was greatest in retail trade (accounting for 11.2% of the employed labour force), followed by accommodation and food services (10.9%; Statistics Canada 2017). Employment in basic industries<sup>7</sup> accounted for 45.7% of the labour force with employment greatest in health care and social assistance (11.3%), followed by construction (10.9%; Statistics Canada 2017). Employment in non-classified North American Industry Classification System (NAICS) industries accounted for 3.3% of the employed labour force (Statistics Canada 2017).

For the year ended December 31, 2018, the RDKS posted an annual net surplus of nearly \$3.6 million with revenues of \$36.2 million and expenditures of \$32.6 million (RDKS 2019). Roughly 72% of 2018 revenue was generated through taxation (25% of revenue), grants (23%) and revenue from own sources (24%; RDKS 2019). Of the 47 expenditure lines included in the RDKS five-year (2019-2023) Financial Plan roughly 66% of expenditures were associated with five line items (Skeena Ice Area [36%], Hazeltons & Steward area solid waste [10%], general government expenditures [8%], and Queensway sewer utility [3%]; RDKS 2019)

### 6.3.1.2 LOCAL SETTING

#### Haisla Nation

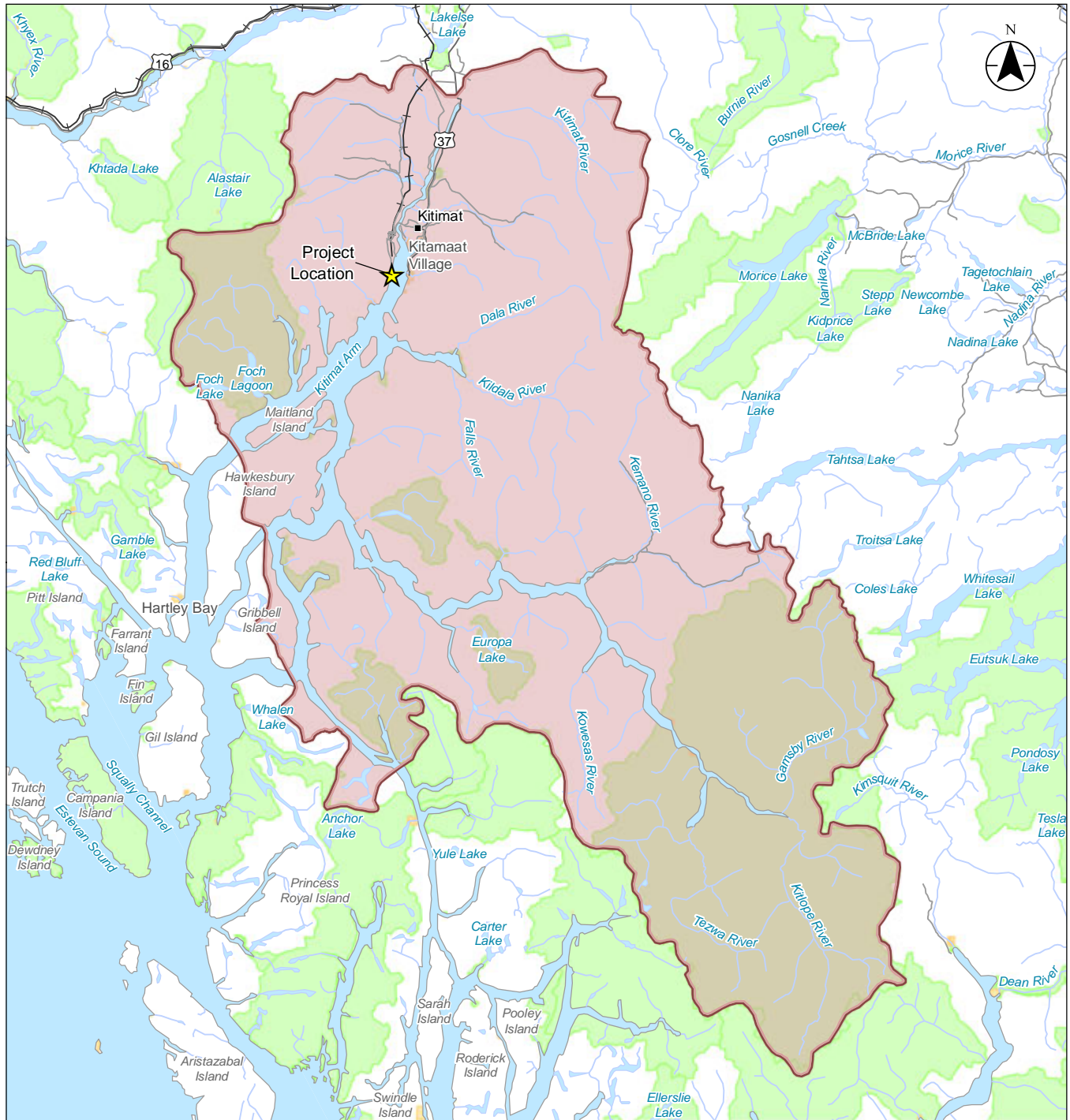
Through its 19 reserve/settlement areas<sup>8</sup> Haisla Nation encompasses an area covering 726 ha (Indigenous and Northern Affairs Canada [INAC] 2019a), with a traditional territory spanning approximately 1,295 km<sup>2</sup> that encompasses the Kitimat River, portions of Douglas Channel north of Princess Royal Channel, the Kemano River, and surrounding lands (see Figure 8). As of June 2019, the total registered population of Haisla Nation was 1,944 persons (INAC 2019b). Of the total registered population, roughly 32% live on Haisla Nation reserve lands while 65% live off reserve lands (2.3% live on other First Nation reserve lands and 0.1% on Crown lands; INAC 2019b).

Within Haisla Nation, Kitamaat Village (Statistics Canada Census Subdivision Kitamaat 2) is the most populated area. In 2016 Kitamaat Village had an estimated population of 525 persons, up 2.1% from 2011 (Statistics Canada 2017). Approximately 98% of the population self-identified as Indigenous in 2016 (Statistics Canada 2017).

<sup>6</sup> Non-basic industries are broadly characterized as the “service” sector as they generally sell services within a region. Non-basic industries are therefore not considered primary economic generators.

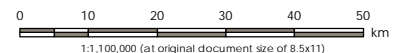
<sup>7</sup> Basic industries generate much of their revenue from sales to customers located outside of the region and are therefore the primary economic generators (because they bring in income from outside of the region). Components of the public sector funded from provincial and federal sources also have some characteristics of basic sectors because they involve currency inflow from outside the region.

<sup>8</sup> Bees 6, Crab River (Crab Harbour) 18, Gander Island 14, Giltoyees 13, Henerson's Ranch 11, Ja We Yah's 99, Jugwees (Minette Bay) 5, Kemano 17, Kildala River (Thala) 10, Kitamaat 1, Kitamaat 2, Kitasa 7, Kitlope 16, Kuaste (Mud Bay) (Kildala Arm) 8, Misgatlee 14, Tahla (Kildala) 4, Toeshka (Eagle Bay) 12, Walth 3, Wekellals 15



Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia;  
 Natural Resources Canada

- Highway
- Road
- Railway
- Watercourse
- Waterbody
- First Nations Reserve
- Park, Ecological Reserve, Protected Area, or Conservancy Area
- ★ Project Location
- Haisla Traditional Territory



Project Location: Kitimat, British Columbia  
 Project Number: 12321301  
 Prepared by: ICARDINAL on 20190716  
 Discipline Review by: JMUNDY on 20190816

Client/Project/Report: Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.: 8  
 Title: Haisla Traditional Territory

The economic base of Kitimaat Village is primarily non-basic, employing 57.5% of the labour force (Statistics Canada 2017). Of non-basic industries, employment is greatest in public administration (accounting 12.5% of the employed labour force), followed by retail trade, administrative and support services, and accommodation and food services (each accounting for 10.0% of the employed labour force [30% total]; Statistics Canada 2017). Employment in basic industries accounted for 37.5% of the labour force with employment greatest in construction (12.5%), followed by manufacturing (10.0%; Statistics Canada 2017). Employment in non-classified NAICS industries accounted for 5.0% of the employed labour force (Statistics Canada 2017).

### **District of Kitimat**

The District of Kitimat covers an area of approximately 240 km<sup>2</sup>. In 2016, the population of the District of Kitimat was 8,131 persons, down 2.5% from 2011 (Statistics Canada 2017). In 2016, roughly 12% of the population self-identified as Indigenous (Statistics Canada 2017). The District of Kitimat is the second most populated municipality in the RDKS (second to the City of Terrace).

The economic base of the District of Kitimat is primarily basic, employing 54.0% of the labour force (Statistics Canada 2017). Of basic industries, employment is greatest in manufacturing (accounting 19.9% of the employed labour force), followed by construction (16.5%; Statistics Canada 2017). Employment in non-basic industries accounted for 44.0% of the labour force with employment greatest in retail trade (8.7%), followed by accommodation and food services (7.2%; Statistics Canada 2017). Employment in non-classified NAICS industries accounted for 2.0% of the employed labour force (Statistics Canada 2017).

At the time of writing, 2018 financial information was still under public review. For the year ended December 31, 2017, the District of Kitimat posted an annual net surplus of roughly \$3.2 million with revenues of \$31.9 million and expenses of \$28.7 million (District of Kitimat 2018). In 2017, 82% of revenues were generated through taxation and grants in lieu. Of the 10 expense lines reported in the District of Kitimat's 2017 Annual Report, 76% of expenses were attributed to recreation and cultural services (23%), protective services (22%), transportation services (18%), and general government expenses (13%; District of Kitimat 2018).

### **City of Terrace**

The City of Terrace covers an area of approximately 57 km<sup>2</sup>. In 2016, the population of Terrace was 11,643 persons, up 1.4% from 2011 (Statistics Canada 2017). In 2016, roughly 24% of the population self-identified as Indigenous (Statistics Canada 2017). Terrace is the most populated municipality in the RDKS.

The economic base of Terrace is primarily non-basic, employing 58.1% of the labour force (Statistics Canada 2017). Of non-basic industries, employment is greatest in retail trade (accounting 14.8% of the employed labour force), followed by accommodation and food services (11.8%; Statistics Canada 2017). Employment in basic industries accounted for 40.4% of the labour force with employment greatest in health care and social assistance (13.4%), followed by accommodation education services (9.7%; Statistics Canada 2017). Employment in non-classified NAICS industries accounted for 1.4% of the employed labour force (Statistics Canada 2017).

For the year ended December 31, 2018, Terrace posted an annual net surplus of \$2.6 million with revenues of \$27.7 million and expenditures of \$25.1 million (City of Terrace and Carlyle Shepherd & Co.

2019). Roughly 72% of 2018 revenue was generated through taxes (56%) and user fees and sales of goods and services (16%). Of 12 expenditure lines included in Terrace's 2018 Audited Consolidated Financial Statements - Statement of Operations, roughly 72% of expenditures were associated with for line items (protective services [23%], leisure services [17%], transportation and transit [16%], and amortization of tangible capital assets [16%]; City of Terrace and Carlyle Shepherd & Co. 2019)

### 6.3.2 Indigenous Groups Setting

The Cedar LNG Project Area is located within Haisla Nation's traditional territory. The traditional territories of the following First Nations are intersected by or in proximity to the marine shipping route:

- Haisla Nation
- Gitga'at Nation
- Gitxaala First Nation
- Lax Kw'alaams Band
- Metlakatla First Nation
- Kitselas First Nation
- Kitsumkalum First Nation

Métis are another Indigenous Group that could potentially be affected or have an interest in the Project. A summary of Haisla Nation is provided in Section 7.3. Summaries of the remaining Indigenous Groups are provided in the following sections.

#### 6.3.2.1 GITGA'AT NATION

Gitga'at Nation is based in Hartley Bay (IR 4 and 4A) approximately 50 km southwest of Kitimat and 125 km south of Prince Rupert and has a registered population of 777. There are 15 Gitga'at Nation reserves totaling approximately 641 ha. Hartley Bay is recognized as the home community with approximately 180 residents, and most of the remaining population live in Prince Rupert, Vancouver and on Vancouver Island. Gitga'at Nation's asserted territory encompasses roughly 7,500 km<sup>2</sup> and includes the lower Douglas Channel, Whale Channel, Wright Sound, and Lewis Pass to Caamano Sound on British Columbia's North and Central Coast (Figure 9).

#### 6.3.2.2 GITXAALA NATION

Gitxaala Nation is based in the Village of Kitkatla on Dolphin Island in Kitkatla Channel, located approximately 120 km west of Kitimat and 55 km south of Prince Rupert. The Gitxaala Nation has approximately 2,000 members, of which 25% live on reserve. Gitxaala Nation has 21 reserves covering 1,885 ha; the majority of the area is the Dolphin Island 1 reserve where the Village of Kitkatla is located. The Gitxaala Nation's asserted traditional territory covers just over 3,000 ha encompassing the northern extent of its fishing territory on the Nass River, stretching south to the coastal islands just north of Kitasu Bay (Figure 10). The western edge of its territory extends seaward abutting against the marine territories of the Haida Nation. To the east, the territory extends to the mainland shore of Grenville Channel, where it meets Haisla and Gitga'at territories.

### **6.3.2.3 LAX KW'ALAAMS BAND**

Lax Kw'alaams Band is based in Lax Kw'alaams (formally Port Simpson) near the north end of the Tsimpsean Peninsula. Lax Kw'alaams Band has approximately 3,500 members, of which 20% live on reserve land. There are 78 Lax Kw'alaams reserves throughout the asserted traditional territory, covering approximately 11,900 ha. Its asserted traditional territory encompasses the lands and waters between tributaries of the Skeena River, the height of land east of the Zymoetz River, and the Kitsumkalum River (Figure 11). It includes Nass Bay and Nass River to the west, and Wales and Pearse Islands, the Dundas and Stephens Islands groups as well as lands and waters at the mouth of the Skeena River, stretching south along Grenville Channel to the north.

### **6.3.2.4 METLAKATLA FIRST NATION**

Metlakatla First Nation is based in Metlakatla, on the south half of Tsimpsean 2 reserve near Prince Rupert. The Nation has approximately 900 members, of which 10% live on reserve land in Metlakatla. The Metlakatla has 16 reserves, totaling 3,460 ha. Its asserted traditional territory extends from the coastal islands in eastern Hecate Strait to Lakelse Lake near Terrace (Figure 12). Portland Canal and Observatory Inlet mark the northern extent of the boundary, and the headwaters of the Ecstall River mark the southern borders. Its territory includes the lower portions and the mouth of the Skeena River and its tributaries.

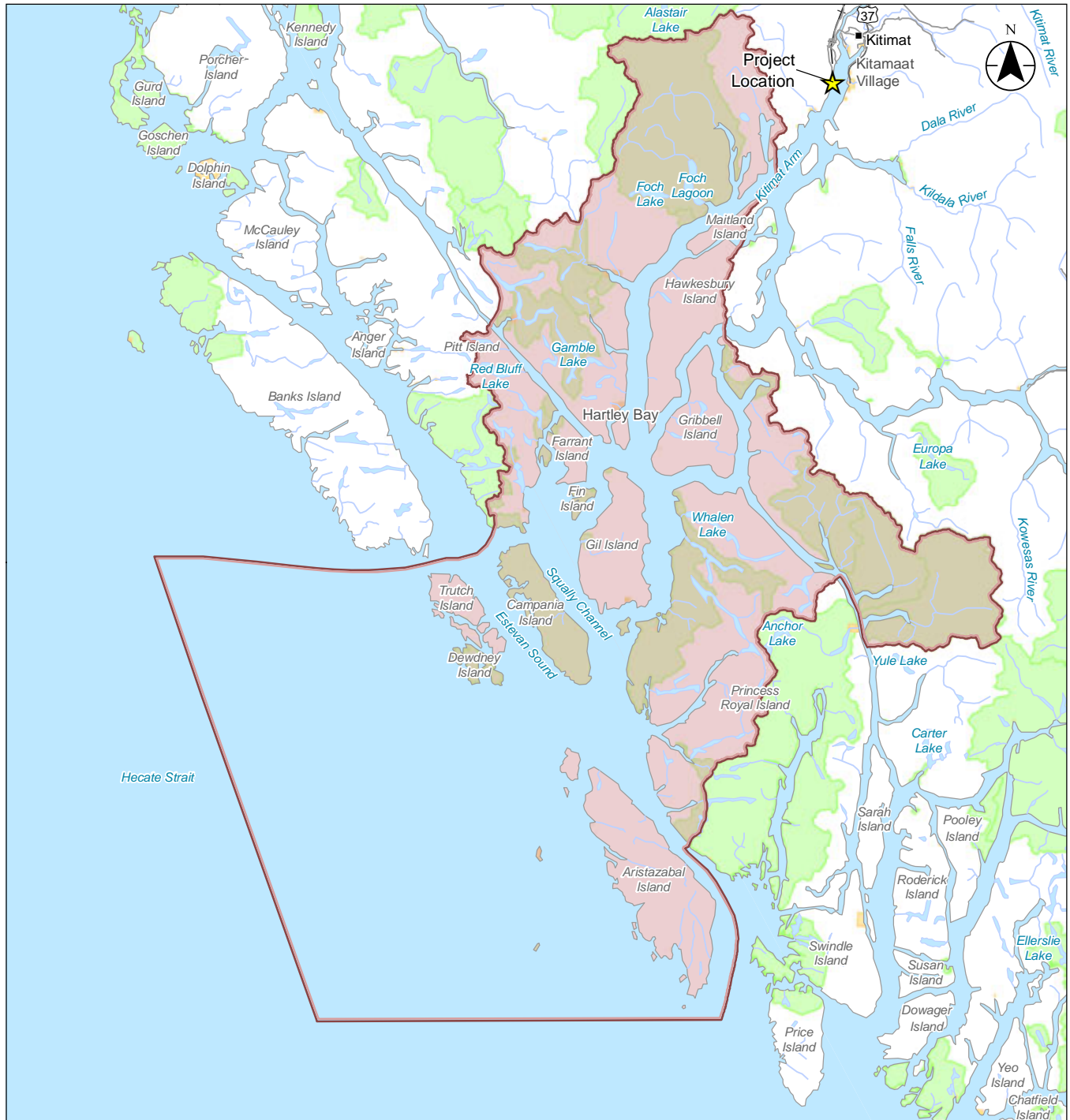
### **6.3.2.5 KITSELAS FIRST NATION**

Kitselas First Nation has a registered population of 686 members, of which approximately 45% live on two reserves: Kitselas IR 1 and Kulsapai IR 6. These reserves are located along the Skeena River; IR 1 is just outside of Terrace, and IR 6 is in the Kitselas Canyon to the east of Terrace. Kitselas First Nation has 10 reserves covering approximately 1070 ha; one reserve (Port Essington) is jointly administered with Kitsumkalum First Nation. The Kitselas First Nation's asserted territory includes the watersheds of the Skeena and Kitimat rivers from Lorne Creek in the east to the Skeena and Kitimat estuaries (Figure 13). In addition to this, the Kitselas First Nation has previously stated that it has traditional harvesting areas in coastal areas of the Prince Rupert Port area, the lower Skeena River and its estuary, and in the Nass River.

### **6.3.2.6 KITSUMKALUM**

Kitsumkalum is based near Terrace and has a registered population of 769 members. About 35% of its population lives on reserve land, primarily in the main community at Kitsumkalum IR 1. Kitsumkalum has four reserves totaling approximately 600 ha of land, including a co-managed reserve at Port Essington. Kitsumkalum has identified its traditional territory as the areas surrounding the Kitsumkalum and Zymacord watersheds, as well as the Cedar River watershed (Figure 14). The Kitsumkalum has also asserted the use of areas outside these territories, including Lakelse River, Cheweanlaw, Skeena River, Ecstall River and locations along Grenville Channel, Edy Pass, Stephens Island and Work Channel. Kitsumkalum also asserts shared territory down to Low Inlet in Grenville Channel and Cape George in the Hecate Strait, stretching north to the Alaska and Nisga'a Nation borders.

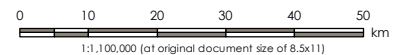




**Notes**  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia;  
 Natural Resources Canada

- Highway
- Road
- Railway
- Watercourse
- Waterbody
- First Nations Reserve
- Park, Ecological Reserve,  
Protected Area, or  
Conservancy Area

- ★ Project Location
- Gitga'at Traditional Territory



Project Location: Kitimat, British Columbia  
 Project Number: 12321301  
 Prepared by: TCARDINAL on 20190716  
 Discipline Review by: JMUNDY on 20190816

Client/Project/Report:  
 Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.

**9**

Title

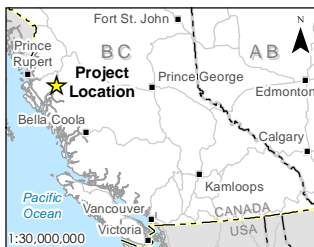
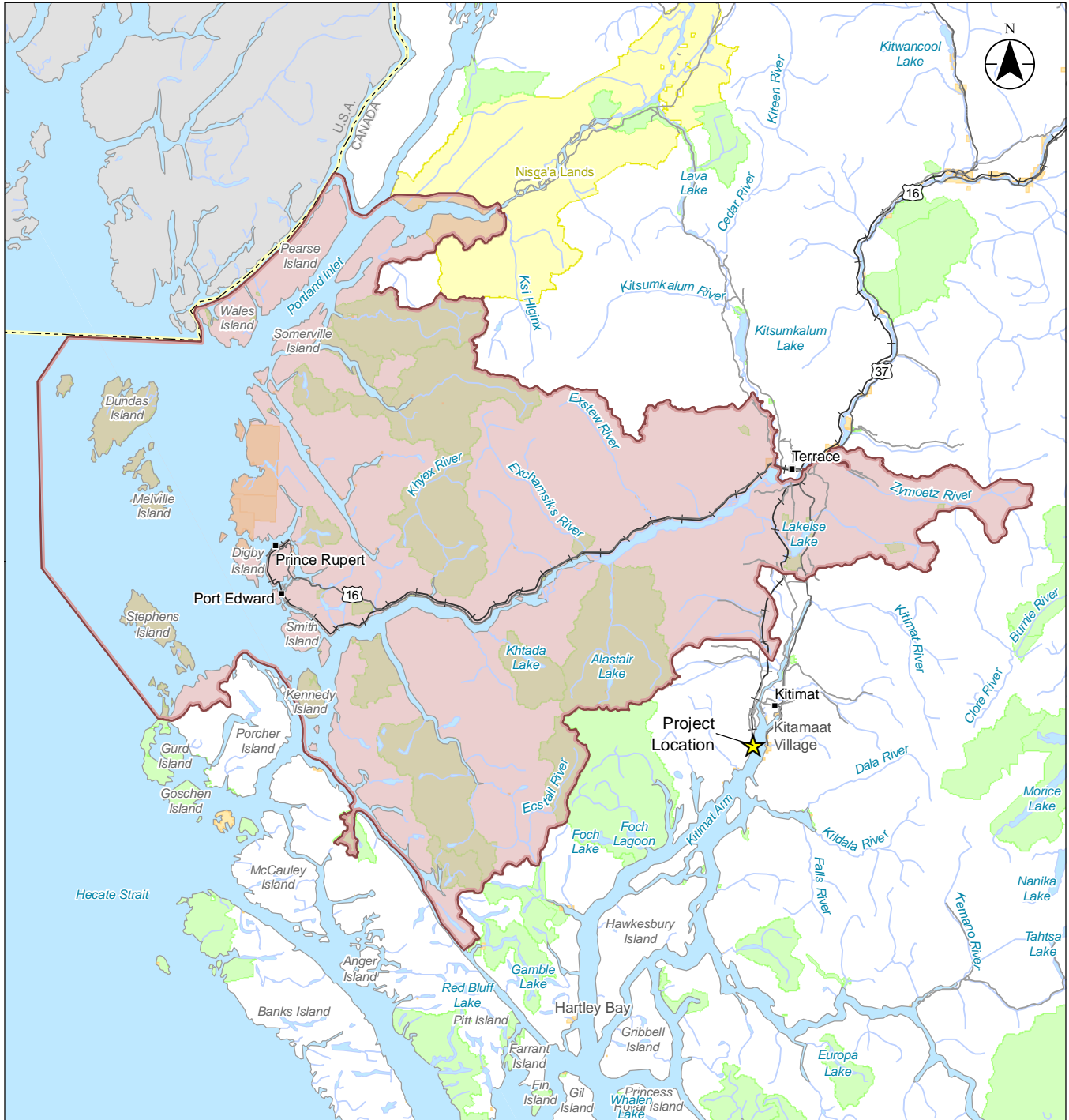
**Gitga'at Traditional Territory**



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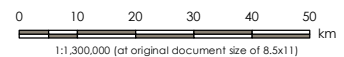


**Gitxaala Traditional Territory**



**Notes**  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

- Highway
- Road
- Railway
- Watercourse
- Waterbody
- First Nations Reserve
- Park, Ecological Reserve, Protected Area, or Conservancy Area
- Treaty Lands
- ★ Project Location
- Lax Kw'alaams Traditional Territory



Project Location: Kitimaat, British Columbia  
 Project Number: 123221301  
 Prepared by: TCARDINAL on 20190716  
 Discipline Review by: JMUNDY on 20190816

Client/Project/Report: Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.











11

Title

Lax Kw'alaams Traditional Territory





- |   |   |   |                                  |
|---|---|---|----------------------------------|
|  | Highway   |  | Project Location                 |
|  | Road  |  | Metlakatla Traditional Territory |
|  | Railway   |   |                                  |
|  | Watercourse   |   |                                  |
|  | Waterbody   |   |                                  |
|  | First Nations Reserve   |   |                                  |
|  | Park, Ecological Reserve,<br>Protected Area, or<br>Conservancy Area |   |                                  |
|  | Treaty Lands  |   |                                  |



Project Location                      Project Number 123221301  
Klimate,                      Prepared by TCARDINAL on 20190716  
British Columbia                      Discipline Review by JMUNDY on 20190816











Client/Project/Report  
Cedar LNG Export Development Ltd  
Cedar LNG Project  
Project Description

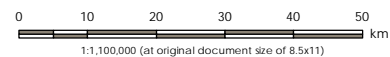
Figure No. \_\_\_\_\_

11  
Title

Metlakatla Traditional Territory



- |   |   |   |                                |
|---|---|---|--------------------------------|
|  | Highway   |  | Project Location               |
|  | Road  |  | Kitselas Traditional Territory |
|  | Railway   |   |                                |
|  | Watercourse   |   |                                |
|  | Waterbody   |   |                                |
|  | First Nations Reserve   |   |                                |
|  | Park, Ecological Reserve,<br>Protected Area, or<br>Conservancy Area |   |                                |
|  | Treaty Lands  |   |                                |



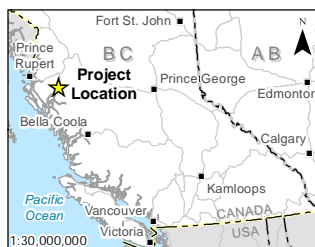
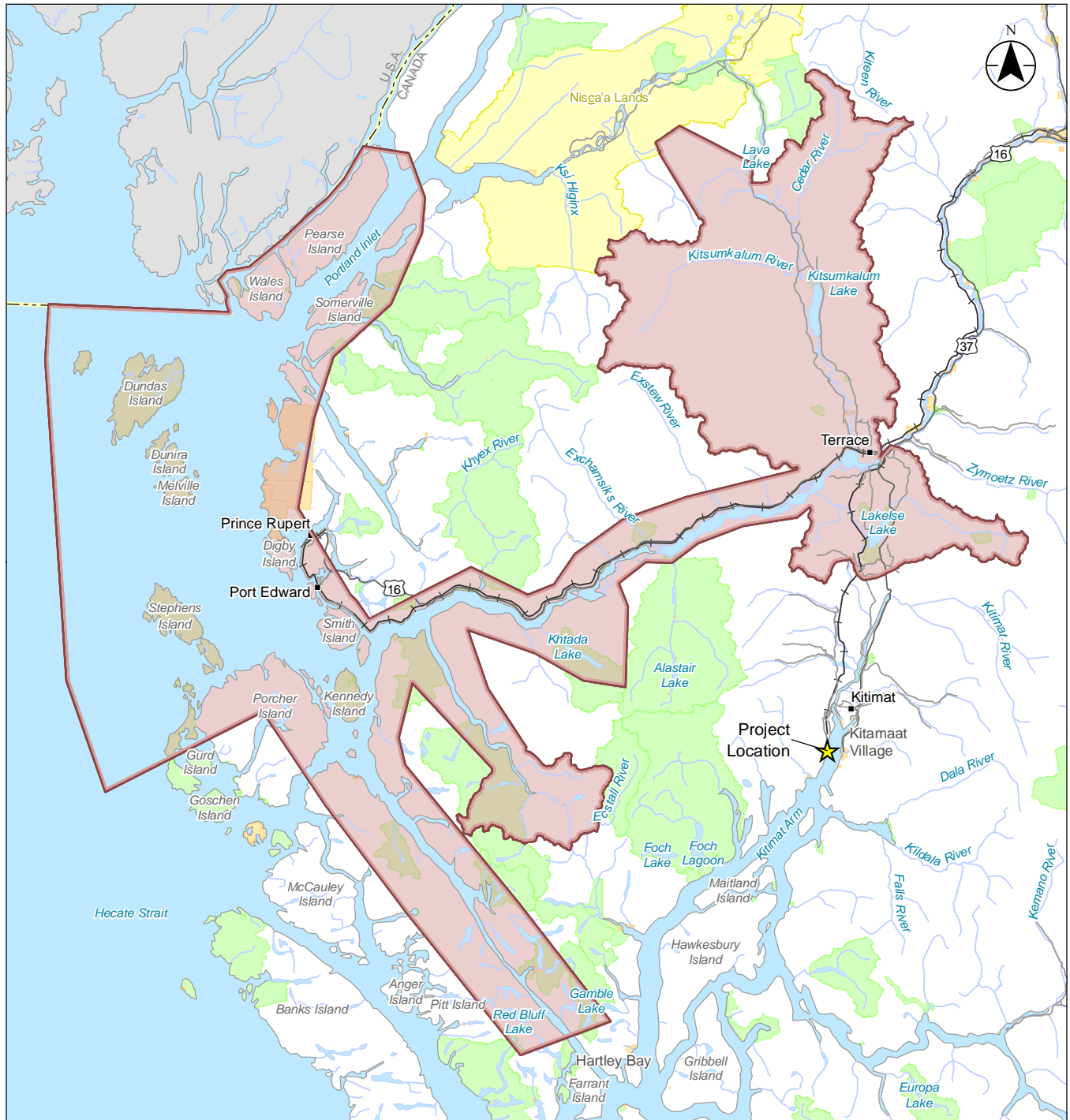
Project Location	Project Number 123221301
Kitimat,	Prepared by ICARDINAL on 20190716
British Columbia	Discipline Review by JMUNDY on 20190816

Client/Project/Report  
Cedar LNG Export Development Ltd  
Cedar LNG Project  
Project Description

Figure No.

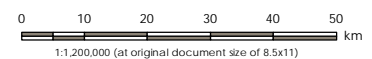
13

KitseLas Traditional Territory



Notes  
 1. Coordinate System: NAD 1983 BC Environment Albers  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

- Highway
- Road
- Railway
- Watercourse
- Waterbody
- First Nations Reserve
- Park, Ecological Reserve, or Protected Area
- Treaty Lands
- ★ Project Location
- Kitsumkalum Traditional Territory



Project Location: Kitimat, British Columbia  
 Project Number: 123221.301  
 Prepared by: TCARDINAL on 20190716  
 Discipline Review by: JMUNDY on 20190816

Client/Project/Report: Cedar LNG Export Development Ltd  
 Cedar LNG Project  
 Project Description

Figure No.

14

Title

Kitsumkalum Traditional Territory

### 6.3.2.7 MÉTIS

Métis in British Columbia are represented by Métis Nation British Columbia which represents thirty-eight Métis Chartered Communities. Three of these communities are within the northwest region including the Northwest BC Métis Association based in Terrace. Métis Nation British Columbia is recognized as the official governing organization for Métis in British Columbia, and its aim is to support and develop opportunities for its communities.

## 6.3.3 Archaeological and Heritage Setting

Archaeological and heritage sites recorded in the vicinity of the Project encompass a range of sites defined under the *Heritage Conservation Act* (HCA) as having “heritage value to British Columbia, a community or an Aboriginal people”. The HCA automatically extends legal protection to archaeological sites with evidence of human habitation or use before AD 1846, burial places with historical or archaeological value, Aboriginal rock art, and heritage ship and aircraft wrecks. This protection applies to sites on provincial Crown and private land. Sites that are not protected under the HCA, such as historic places post-1846 AD, may still have heritage value to communities or Indigenous groups.

BCEAA and IAA require assessment of physical cultural heritage, such as historic heritage sites and paleontological sites. The IAA defines heritage as “physical and cultural heritage” and “any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance”.

According to the Provincial Heritage Register, there are numerous archaeological sites recorded along Kitimat Arm in the general vicinity of the Project. Most of these sites are culturally modified tree sites; with lithic scatters, shell middens, and human burials also represented in the archaeological record of the area. While there are no archaeological or heritage sites recorded in Provincial Heritage Register within the Cedar LNG Project Area, the entire footprint has not been subject to archaeological impact assessment. Any outstanding areas will be subject to an archaeological impact assessment as part of the regulatory process.

## 6.3.4 Human Health Setting

The health status of people in the Kitimat area is typical of suburban regions in British Columbia. The overall health status in the Kitimat area is lower than the average for British Columbians, which is influenced by lower levels of access to health care services typically experienced in suburban regions of the province (e.g., shortage of doctors and related professions).

The air quality in the Kitimat region is characterized as very good, with industrial facilities located away from major population centers. The Kitimat River serves as the potable water source for the District of Kitimat. There is limited development upstream from the water intake, and the water is generally considered to be very good quality and low in chemical contaminants. However, the water system is characterized as high-risk due to the regular presence of waterborne pathogens. Raw water is disinfected with chlorine prior to being pumped into the water distribution system.

The seafood harvested from Kitimat Arm is an important local food source for residents and the local Haisla Nation, particularly for people living on reserve in Kitimaat Village, located on the eastern shoreline. Salmon, Dungeness crab, halibut and eulachon (oolichan) are all important traditional marine country foods that help to maintain food security among those who live off the land.



## 7.0 Potential Environmental, Economic, Social Heritage and Health Effects

The following subsections provide a preliminary overview of Project activities that have the potential to result in environmental, social, economic, heritage and health effects. No feasibility studies have been conducted pertaining to the potential effects of the Project; however, the environmental assessments for the Kitimat LNG and LNG Canada projects provide an indication of the types of effects that may result from development of an LNG facility in Kitimat Arm. Potential cumulative effects and measures to mitigate and manage residual and cumulative effects are also described.

The Project is located more than 140 km from the United States border, and based on past environmental assessments in the Kitimat area, trans-boundary effects on lands outside of British Columbia or Canada are not predicted to occur. The two areas with greatest potential for trans-boundary effects are employment and economy and GHGs. It is possible that the project will utilize international workers for positions requiring LNG experience (particularly in the start-up phase), although the priority will be to first source workers from elsewhere in British Columbia, then Canada. GHGs are considered in the context of provincial, national and international emission inventories.

### 7.1 Potential Environmental Effects

Construction, operation and decommissioning of the Project have potential to result in environmental effects through land clearing for temporary workspace and installation of permanent infrastructure, emissions from construction activities and operation of the LNG facility, and shipping activities. Table 12 provides a summary of anticipated potential effects of the Project on the environment based on an understanding of the types of activities required for construction, operation and decommissioning of the Project and the current environmental setting of the area.

Although the Project is not located on federal lands, it is possible that some of the environmental effects identified in Table 12 may extend to federal lands. For example, air emissions may disperse to nearby federal lands; see Table 10 for a summary of federal lands in proximity to the proposed Project. The EAC application will evaluate potential for environmental effects to occur on federal lands and characterize such effects.

Best practices and mitigation measures to avoid and reduce potential effects of the Project will be incorporated and considered in Project design. Examples include:

- Cedar has selected the floating nearshore LNG production unit for the Project. Locating the majority of Project infrastructure on this vessel will reduce the Project footprint and associated clearing.
- Cedar has selected air cooling as the cooling technology for the Project rather than seawater cooling. This avoids the potential for entrainment or impingement of marine fish and larvae as well as the discharge of warm water to Douglas Channel.
- Cedar is making the Project “electric ready” in preparation for the outcome of discussions with BC Hydro regarding feasibility of full electrification of the Project.



- The third-party pipeline providing feed gas to the LNG facility will be co-located in a shared corridor with other pipelines, following routing established through a MOTI-led corridor study.

As the Project progresses through the environmental assessment process, additional or revised mitigation measures will be incorporated into the Project design. Mitigation measures will be developed in accordance with applicable provincial and federal regulations and permit requirements, best management practices, and specific measures identified through the environmental assessment process.

Prior to construction, a Construction Environmental Management Plan will be developed that will specify the mitigations and controls to be implemented through construction as well as describe environmental monitoring requirements. Additional management plans may also be developed (e.g., emergency response plan, access management plan, marine fish management plan) as determined to be required through the environmental assessment. Cedar will retain environmental monitor(s) to verify compliance with the management plans as well as the effectiveness of the mitigation measures.

The Project has the potential to contribute cumulatively to potential effects on the environment associated with past, present and reasonably foreseeable future projects and activities in the region. These may include forestry, power, and oil and gas projects and activities. Additional information on previous environmental studies completed in Kitimat are found in Section 6.1.

**TABLE 12 POTENTIAL ENVIRONMENTAL EFFECTS OF THE PROJECT**

Component of the Biophysical Environment	Potential Project Effects	Project Activities and Anticipated Pathway of Effects
Air Quality	<ul style="list-style-type: none"> <li>Increase in ambient concentrations of criteria air contaminants, including SO<sub>2</sub>, NO<sub>x</sub>, carbon monoxide and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>)</li> </ul>	<p>Construction: land clearing, power generation, fuel combustion and vehicle traffic</p> <p>Operation: power generation (if required), fuel combustion, flaring, incineration, fugitive emissions, marine support vessels and vehicle traffic. Operational emissions will be lower in the preferred (electrified) option and higher in the alternative (power generation) option.</p> <p>Decommissioning: fuel combustion, demolition, backfilling and removal of infrastructure</p>
Noise	<ul style="list-style-type: none"> <li>Increased noise levels causing nuisance, annoyance and sleep disturbance to people, as well as displacement and sensory disturbance to wildlife.</li> </ul>	<p>Construction: operation of equipment and vehicles during earthworks and construction, installation of piles (if required), blasting (if required)</p> <p>Operation: operation of the LNG facility, flaring, loading of carriers</p> <p>Decommissioning: operation of equipment</p>
Greenhouse Gas	<ul style="list-style-type: none"> <li>Increase the emission of GHGs including CO<sub>2</sub>, methane, nitrous oxide expressed as CO<sub>2</sub>e</li> </ul>	<p>Construction: land clearing, site preparation, fuel combustion and vehicle traffic</p> <p>Operation: stationary combustion of fossil fuel, flaring, venting and fugitive emissions, power generation (if required) and shipping of products. Operational emissions will be lower in the preferred (electrified) option and higher in the alternative (power generation) option.</p> <p>Decommissioning: dismantling of infrastructure and reclamation activities</p>
Freshwater Fish and Fish Habitat	<ul style="list-style-type: none"> <li>Fish mortality or harmful alteration, disruption or destruction of fish habitat.</li> </ul>	<p>Construction of watercourse crossings could disturb stream beds and banks, alter riparian vegetation and release deleterious substances (e.g., sediment, hydrocarbons). Decommissioning will have similar impacts as those during construction.</p> <p>Extraction of water from streams (if selected as the water source) will reduce flows in the affected watercourses and potentially reduce the availability of downstream fish habitat.</p> <p>Extraction of groundwater may affect streamflows in nearby watercourses and potentially reduce the availability of downstream fish habitat.</p>

**TABLE 12 POTENTIAL ENVIRONMENTAL EFFECTS OF THE PROJECT**

Component of the Biophysical Environment	Potential Project Effects	Project Activities and Anticipated Pathway of Effects
Marine Fish and Fish Habitat	<ul style="list-style-type: none"> <li>• Fish mortality or harmful alteration, disruption or destruction of fish habitat.</li> <li>• Behavioural change caused by sensory disturbances.</li> </ul>	<p>Construction and operation of the nearshore LNG production unit, mooring dolphins and bollards, marine jetty or jetties, marine offloading facility, and workboat moorage in the marine environment has potential to alter habitat quality for marine vegetation, displace or alter marine fish habitat types within the Project footprint, shade marine plants, and cause sensory disturbances that could kill, displace or alter habitat use by marine fish and mammals. Marine shipping has potential to affect marine mammals and fish through underwater noise; however, the Northern Gateway and LNG Canada environmental assessments found the project-specific and cumulative effects on marine mammals from shipping were not significant.</p> <p>Decommissioning will have similar impacts as those during construction.</p>
Vegetation Resources	<ul style="list-style-type: none"> <li>• Change in the abundance of plant species of interest</li> <li>• Change in the abundance of ecological communities of interest</li> <li>• Change in wetland functions</li> </ul>	<p>Construction of terrestrial Project components will result in the direct loss or alteration of vegetation, which may potentially include plant species at risk, traditionally used plant species, and native plant communities including provincially listed ecological communities, old forest, and wetland communities. Invasive plant species may be introduced or spread as a result of Project activities that disturb the ground.</p>
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> <li>• Change in the availability and/or suitability of wildlife habitat, increased mortality risk, and changes to movement patterns</li> </ul>	<p>Project activities have potential to affect migratory and non-migratory birds and terrestrial wildlife. Construction of Project components will remove habitat and alter habitat suitability for some wildlife species. Mortality risk for wildlife may increase during construction due to increased human presence, use of heavy equipment, vegetation clearing, and collision with vehicles or infrastructure. Movement of wildlife may change during construction in response to perceived barriers or increased sensory disturbance.</p> <p>Construction and operation of the nearshore LNG production unit and jetty/jetties are likely to alter shoreline and nearshore habitat and may change habitat availability and suitability for marine birds. Mortality risk and movement patterns of marine birds may also change due to use of artificial lighting and increased vessel traffic.</p> <p>Decommissioning activities are expected to result in similar effects pathways to wildlife.</p>



## 7.2 Potential Social and Economic Effects

Construction, operation and decommissioning of the project have potential to result in social and economic effects through the changes in land and marine use and the creation of employment opportunities and local population increase from construction and operation of the Project. Table 13 provides a summary of anticipated potential social and economic effects of the Project based on an understanding of the types of activities and workforce required for construction, operation and decommissioning of the Project, and the current human environment setting of the area.

**TABLE 13 POTENTIAL SOCIAL AND ECONOMIC EFFECTS OF THE PROJECT**

Social and Economic Pillar	Potential Project Effects	Project Activities and Anticipated Pathway of Effects
Land Use	<ul style="list-style-type: none"> <li>• Change in private property and tenured land use</li> <li>• Change in non-tenured land use</li> </ul>	Project use of lands may be incompatible with overlapping occurrences and uses of private property and Crown land (tenured and non-tenured use). The presence of construction and operational workforces and mobile equipment (including associated noise and emissions) may result in short-term changes in the quality of experience of engaging in existing land uses near the Project.
Marine Use and Navigable Waters	<ul style="list-style-type: none"> <li>• Change in marine navigation</li> <li>• Change in marine fisheries and other uses</li> </ul>	<p>Construction of the new marine terminal and related infrastructure will result in new permanent marine structures. These structures and the associated control zones could result in changes in navigation in the vicinity of these marine works. Additional large shipping traffic (LNG carrier traffic) in or along the shipping route could also affect navigation.</p> <p>Shipping traffic could reduce the quality of experience of fishing and marine recreation. Project workers employed during the construction phase may also engage in recreational fishing in the vicinity of other fishers. Construction and operation of marine infrastructure, including the safety zones, will also preclude fishing, recreation, and tourism within the immediate vicinity.</p>
Socio-Community	<ul style="list-style-type: none"> <li>• Change in community infrastructure and services</li> <li>• Change in accommodation availability</li> <li>• Change in transportation infrastructure</li> <li>• Change in community health and wellness</li> </ul>	Construction, operation, closure and remediation of the Project could increase demand for accommodations, community infrastructure and services, and demand on transportation infrastructure. The Project may adversely affect the social and cultural wellbeing of local residents as a result of the presence of a temporary workforce, which could disrupt community life. Workers who secure employment with the Project may benefit from increased disposable income and skillsets.
Economy and Employment	<ul style="list-style-type: none"> <li>• Change in regional labour force</li> <li>• Change in regional business</li> <li>• Change in provincial economy</li> </ul>	Project expenditures and employment during construction, operation, and closure and reclamation of the Project could result in changes to the regional labour force and business activity as well as the provincial economy.

Mitigation measures may be recommended to enhance benefits and reduce or mitigate adverse effects of the Project. These mitigation measures may include:

- Development and implementation of a project benefits plan, social management plan, traffic and access management plan, emergency response plan, and marine activities plan
- Development and use of a community, public, and stakeholder engagement plan with particular consideration given to marine users, including recreationalists, commercial tourism operators, fishers, Transport Canada, DFO, and relevant stakeholders.
- Provision of an appropriately scaled onsite medical clinic
- Implementation of an alcohol and drug policy
- Installation of appropriate marine navigation aids

Management plans will be developed as determined to be required through the environmental assessment. Cedar will retain environmental monitor(s) or other qualified professionals to verify compliance with the management plans as well as the effectiveness of the mitigation measures.

The Project will contribute cumulatively to potential effects on social and economic conditions through expenditures and changes in land and marine use and demand for labour, accommodations, community infrastructure and services, and transportation infrastructure. These changes in addition to the presence of the Project's temporary workforce could contribute to cumulative effects on community health and wellbeing.

## 7.3 Potential Heritage Effects

The provincial HCA automatically extends legal protection to archaeological sites with evidence of human habitation or use before AD 1846, burial places with historical or archaeological value, Aboriginal rock art, and heritage ship and aircraft wrecks. This protection applies to sites on Provincial Crown and private land. Sites that are not protected under the *Act* may still have heritage value. BCEAA and IAA require assessment of any change to the environment on physical and cultural heritage and any structure, site or thing that is of historical or archaeological significance.

Project activities have the potential to result in direct and indirect effects on archaeological and heritage sites during ground-disturbing activities including vegetation and tree clearing, as summarized in Table 14. An archaeological impact assessment will be conducted for portions of the project footprint that have not been previously assessed to identify any unrecorded sites that may be present, assess their significance, evaluate potential project-related impacts, and provide management recommendations, as necessary.

**TABLE 14 POTENTIAL HERITAGE EFFECTS OF THE PROJECT**

Heritage Pillar	Potential Project Effects	Project Activities and Anticipated Pathway of Effects
Cultural and Heritage Resources	Loss of information about or alteration to site contents or context	Construction will involve tree clearing and ground disturbing activities that could adversely affect archaeological and heritage resources

Site avoidance is typically the preferred mitigation measure; however, if avoidance is not feasible other mitigation options (e.g., systematic data recovery) will be considered. Recommended mitigation measures will be reviewed with the appropriate regulatory authorities and discussed with Haisla Nation. Alterations to any archeological sites protected by the HCA would at a minimum require prior issuance of a Section 12 alteration permit issued from the Archaeology Branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

Management plans will be developed as determined to be required through the environmental assessment. Cedar will retain environmental monitor(s) or other qualified professionals to verify compliance with the management plans as well as the effectiveness of the mitigation measures.

The HCA requires that all projects, including the proposed Project, mitigate for destruction or disturbance of legally protected culturally modified trees and archaeological sites. As such, there is limited potential for the Project to interact cumulatively with archaeological and heritage resources.

## 7.4 Potential Human Health Effects

Human health in the context of an environmental assessment is defined as the health effect from exposure to chemicals in the environment; socio-community considerations such as community health and wellbeing are addressed in the Social pillar under BCEAA.

Human health is influenced by people's interaction with the environment. The quality of air that people breathe and the quality of food and water that people consume influence their overall health status. If there are reductions in the quality of air, soil, water, or food attributed to the Project, the resulting change in human health relative to existing conditions will be characterized. Factors that contribute to human health include changes to the availability and consumption patterns for traditionally harvested foods from the land, including wild plants, wild game, fish, and other seafoods.

The potential health risk pathway associated with the Project will be characterized. A human health risk assessment will be conducted to quantify the risk to human health and characterize the incremental change in health risk that the Project may have on local people and temporary land users (e.g., recreational land users).

**TABLE 15 POTENTIAL HEALTH EFFECTS OF THE PROJECT**

Valued Component	Potential Project Effects	Project Activities and Anticipated Pathway of Effects
Human Health	Change to human health	Construction, operation, and decommissioning activities may release chemicals of concern into the environment. People who are exposed to chemicals of concern through air inhalation, food and water ingestion, and dermal contact may experience a change in their health risk.

Mitigation measures may be recommended to reduce or mitigate the release of chemicals of concern to the environment, which will indirectly reduce the effect on human health. These mitigation measures may include:

- Managing emissions and discharges to the air, soil and water
- Managing access disruptions to areas used for the harvest of traditional country foods or traditional medicines.

Management plans will be developed as determined to be required through the environmental assessment. Cedar will retain environmental monitor(s) or other qualified professionals to verify compliance with the management plans as well as the effectiveness of the mitigation measures.

The Project will contribute cumulatively to potential effects on health conditions, through emissions to the local airshed. This contribution will be smaller for the preferred option (full electrification) and larger for the alternative option (power generation). Cumulative effects to the local airshed and associated health concerns have been previously characterized through the Kitimat Airshed Study, which considered the existing Rio Tinto aluminum smelter as well as four potential LNG terminals, a proposed oil refinery, gas turbine powered electrical generation facilities; and through the LNG Canada environmental effects assessment which considered cumulative effects from the existing Rio Tinto aluminum smelter as well as three proposed LNG terminals, an oil export terminal, and a proposed oil refinery.

## 7.5 Potential Impacts of Project-Related Changes on Indigenous Peoples

Potential impacts on Indigenous peoples as a result of Project-related changes to the environment include effects on:

- Physical and cultural heritage, through Project tree clearing and ground disturbing activities that could adversely affect archaeological and heritage resources.
- Current use of lands and resources for traditional purposes, including the use of land and water for cultural activities, through effects on preferred harvested species, or changes in access to or use of preferred sites.

- Structure, site or thing that is of historical, archaeological, paleontological or architectural significance, through Project related clearing and ground disturbance activities

Potential changes to the health, social or economic conditions of Indigenous peoples as a result of carrying out of the Project include changes to:

- Human health, from exposure to chemicals of concern that the Project may release into the environment.
- Socio-economic conditions, through potential interference with marine fisheries and shoreline harvesting, interference with marine recreation and tourism, or change in diet and nutrition.

As the Project progresses through the environmental assessment process, Cedar is committed to engaging and consulting with potentially affected Aboriginal groups to understand how they may be affected by Project activities.

## 7.6 Potential Effects in Relation to *Impact Assessment Act* Requirements

As required by the Information and Management of Time Limits Regulations, the following sub-sections describe the potential for changes caused as a result of carrying out the Project to fish and fish habitat and marine plants as defined in the *Fisheries Act*, and migratory birds, as well as the potential for environmental changes on federal lands, in a province other than the province in which the Project is proposed to be carried out, or outside of Canada. Potential effects of environmental changes on Indigenous peoples are discussed in Section 7.5.

**Fish and Fish Habitat**—The Project has the potential to cause adverse effects to fish and fish habitat, as defined in the *Fisheries Act*, including:

- Harmful alteration, disruption or destruction of fish habitat due to the Project infrastructure and changes in water quality and quantity
- Changes to fish food and nutrient content
- Fish mortality
- Changes in behaviour of fish

**Aquatic species**—Potential Project-related effects to aquatic species, as defined in the *Species at Risk Act*, include:

- Changes in habitat quality
- Loss of habitat from shading of marine vegetation and construction and decommissioning of infrastructure
- Mortality associated with Project construction

**Migratory Birds**—Potential Project-related effects to migratory birds, as defined in the *Migratory Birds Convention Act*, include:

- Direct loss of habitat and potential habitat due to Project footprint

- Indirect loss of habitat and potential habitat due to sensory disturbance
- Behavioural response due to sensory disturbance
- Mortality (direct and indirect)

## 8.0 Engagement and Consultation with Aboriginal Groups

“Aboriginal Interests” are defined by the EAO as potential or established Aboriginal rights, including title, and treaty rights. Cedar understands that identifying and recommending measures to address potential adverse effects to Aboriginal Interests from the Project, or from its cumulative interaction with other past, present or reasonably foreseeable projects, will be an important element of the environmental assessment and the fulfillment of the Crown’s common law duty to consult and accommodate.

Subject to any different direction from regulators, Cedar anticipates that the following Indigenous groups will be engaged in consultations related to the Project:

- Haisla Nation
- Gitxaala Nation
- Gitga’at Nation
- Lax Kw’alaams Band
- Metlakatla First Nation
- Kitselas First Nation
- Kitsumkalum
- Metis Nation of BC

The Haisla Nation Chief Councillor, on behalf of Cedar LNG, has had preliminary engagements with most of these Indigenous groups. Introductory letters have been sent to each group and follow-up meetings have occurred with Gitxaala Nation, Lax Kw’alaams Band, Metlakatla First Nation, Kitselas First Nation, and Kitsumkalum. Initial feedback has been positive, and Cedar is committed to ongoing dialogue as the Project progresses.

The main elements for active engagement and consultation with Aboriginal groups will include:

- Regularly scheduled project updates, conference calls and meetings with First Nation administrative staff, consultants, elders and other members of Aboriginal groups (through the Working Group and otherwise)
- Conducting community meetings, open houses and workshops where requested
- Facilitating opportunities to participate in collecting baseline information, as well as review and input into the information

Working-level Project effects consultation undertaken by Cedar will be complemented by higher level engagements between Haisla Nation and other Indigenous Groups. Haisla Nation has previous experience and established relationships engaging some of these groups on other major projects being undertaken within the Haisla territory by companies that have entered into agreements with the Haisla Nation.

If the Project is subject to substitution under IAA, engagement with Indigenous groups will include consideration of “current use of lands and resources for traditional purposes”, as required by the *Act*.

Cedar 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.

Based on a review of the effects determinations from other projects with similar types of Project activities, potential impacts on established or asserted Aboriginal rights, title, and other interests as a result of the Project are expected to focus on shipping activities and may include:

- Impacts to harvesting activities as a result of potential impacts of Project shipping on marine birds and marine resources
- Impacts to culturally important sites, trails and travelways as a result of Project shipping

Cedar intends to engage with the above Aboriginal groups regarding established or asserted Aboriginal rights, title and other interests (including current use for traditional purposes) that may be affected by the Project.

## 9.0 Engagement and Consultation with Governments, the Public and Other Parties

The Haisla Nation has had preliminary discussions with government representatives regarding the Project since 2012. This includes recent meetings with the Deputy Minister of Energy, Mines and Petroleum Resources, the EAO and CEA Agency to provide an informal early introduction to the Project. In meetings with the EAO and CEA Agency the opportunities for substitution were also discussed, with a key focus on timelines for upcoming regulatory changes to provincial and federal environmental assessment processes.

Cedar has initiated commercial discussions with Rio Tinto and Coastal GasLink regarding easement agreements for the pipeline and transmission line, and natural gas supply. The Cedar LNG Project Area is owned in fee simple by an affiliate of Haisla Nation except for some submerged Crown land for which a lease will be obtained.



## 10.0 References

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# Appendix A

## Tables of Concordance



**TABLE A-1 BCEAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
<b>GENERAL INFORMATION AND CONTACT(S)</b>		
1. The name of the proposed project and a two-to-three paragraph description of its nature and general location.	1.0	
2. A list of government ministries, Aboriginal groups, and other parties, including the public, that were consulted prior to the preparation of the Project Description.	1.1, 8.0, 9.0	
3. Proponent contact information, including name, mailing address, phone and fax numbers, email address, and website URL. Include the name of a contact person for the EA.	1.4	Table 1
4. Corporate information, including particulars of company incorporation, whether the company is private or publicly traded, and partners' names (if applicable).	1.0	
5. The names of other projects or facilities owned or operated by the proponent (or its parent, subsidiary, or affiliated company) in BC, including any other projects in respect of which an EA certificate has been applied for or issued.	n/a	
6. A description of corporate policies regarding environment, health, safety, sustainability, local hiring and procurement, and/or Aboriginal and stakeholder engagement, if any.	1.1	
7. The names, qualifications, and summary of relevant experience of qualified persons responsible for preparing the information provided in the Project Description.	Appendix B	
<b>PROJECT OVERVIEW</b>		
8. A description of the project purpose and rationale.	1.3	
9. The size, dimensions, and capacity of the proposed project and its components.	2.0	
10. A description of the major components and ancillary activities associated with all phases of the proposed project, including construction, operation, and decommissioning and reclamation, if applicable. Include the purpose of each component and options if the final site layout and design/route selections are not yet made.	2.1, 2.2	Table 4



**TABLE A-1 BCEAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
11. A description of utilities and infrastructure requirements, including any new facilities or modifications to existing facilities that are required in order for the proposed project to proceed. Identify the owners/developers of those other facilities, if other than the proponent.	2.1	
12. A description of activities related to transportation and shipping of materials to or from the site, in the construction, operation and decommissioning phases of the project. Include loading locations, the use of existing or new transportation corridors and frequency and timing of shipping.	2.2	
13. Number of construction jobs and operating jobs (in person years or full time equivalents), and a description of any proposed workforce accommodation.	2.4	
14. Estimated cost for construction and decommissioning of the project, as well as projected annual operating costs.	2.4	
15. Project schedule, including the anticipated date of application for an EA certificate if one is determined to be required, anticipated <sup>1</sup> construction start date and duration, timing and duration of main activities, duration of commissioning, if applicable, operational in-service date, expected life of the project, and timing of eventual decommissioning and reclamation, if applicable.	2.3	
16. Indication of the current stage of project design (e.g., conceptual, feasibility, preliminary, detailed) and an identification of any major technical, economic, or other data gaps pertinent to design.	2.1	
<b>EMISSIONS, DISCHARGES, WASTE</b>		
17. A description of expected emissions, effluents, discharges, wastes, and other disturbances associated with all phases of the project, including potential accidents and malfunctions, their sources and locations.	3.0	Table 6, Table 7
<b>CONSTRUCTION, OPERATION, DECOMMISSIONING AND ABANDONMENT PHASES AND SCHEDULING</b>		
18. If proponents are planning to proceed in stages they should provide a description of all proposed stages, including the approximate timing of proposed expansion or modifications and the components and activities associated with each stage.	n/a	

**TABLE A-1 BCEAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
<b>PROJECT LOCATION, LAND AND WATER USE</b>		
19. Provide the latitude and longitude (degrees, minutes, seconds) of the Project and maps at an appropriate scale showing the proposed project's location in relation to neighboring communities, Indian Reserves, established or asserted traditional territories of Aboriginal groups, major natural and anthropogenic landscape features, and environmentally sensitive areas.	4.2	Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 7, Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, Figure 13, Figure 14
20. A description of the land required for the proposed project, including whether the project is located in whole or in part on private lands, provincial or federal Crown lands, or Indian Reserve lands. Include as well the applicable zoning, Agriculture Land Reserve designation, land and resource management plans, and other land use designations (e.g., parks and protected areas) and the legal land descriptions and/or tenure numbers of those lands, if known.	4.2	Figure 6
21. A description of past uses of the land required for the proposed project, including whether the site has been previously developed.	1.2	
22. A description of water requirements for the project, if applicable, and the proposed source of water.	4.4	
<b>REGULATORY CONTEXT</b>		
23. The type and size of the proposed project, with specific reference to the thresholds set out in the Reviewable Projects Regulation.	1.5	Table 3
24. Whether the provisions of the federal Physical Activities Regulations apply. Materials supporting those conclusions, including any correspondence received from the Canadian Environmental Assessment Agency (Agency), can be included as an appendix. If a determination from the Agency has not yet been received but it is felt that the project will not be federally designated, please provide the rationale for that conclusion.	1.5	Table 2
25. If the proposed project is located in an area subject to a treaty or related agreement between BC and a First Nation, whether there are other EA or regulatory requirements pursuant to the treaty or agreement that are expected to apply.	n/a	

**TABLE A-1 BCEAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
26. A list of other required provincial, federal, or municipal approvals, permits, licences, tenures, or other authorizations and their status if any have been applied for.	5.3	Table 11
<b>POTENTIAL ENVIRONMENTAL, ECONOMIC, SOCIAL, HERITAGE AND HEALTH EFFECTS</b>		
27. Identification of any sensitive or vulnerable environmental, economic, social, heritage, or health values that may be affected by the project.	6.0, 7.0	
28. A list of existing data, including monitoring reports, previous EAs, regional studies, and/or other sources of information that support the understanding of the existing conditions and potential effects of the proposed project.	5.1	
29. A summary of key conclusions of any feasibility studies undertaken that may be pertinent to understanding the potential effects of the proposed project, if applicable.	5.1, 7.0	
30. A brief description of the potential environmental, economic, social, heritage, and adverse health effects that may result from the project.	7.0	Table 12, Table 13, Table 14, Table 15
31. A preliminary assessment of any anticipated cumulative effects.	7.1, 7.2, 7.3, 7.5	
32. A preliminary assessment of any anticipated trans-BC-boundary effects.	7.0	
33. Initial measures or practical means to prevent or reduce the potential effects to an acceptable level. Include measures that could be integrated into project design, compliance with applicable regulations, standards, codes of practice, or Best Management Practices, corporate management systems, and/or project-specific measures that will be implemented.	7.1; 7.2; 7.3; 7.4	
34. A brief description of proposed monitoring programs that will be implemented to confirm the effects of the project and the effectiveness of mitigation, if known	7.1; 7.2, 7.3, 7.4	
<b>ENGAGEMENT AND CONSULTATION WITH ABORIGINAL GROUPS</b>		
35. A list of Aboriginal groups including treaty nations whose established or asserted traditional territories overlap with or may be affected by the project and its components or activities, and if known, a summary of information regarding established or asserted Aboriginal rights, title, and other interests, including current use for traditional purposes, that may be affected by the project.	6.3.1.2, 6.3.2, 8.0	

**TABLE A-1 BCEAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
36. For each Aboriginal group identified above, a summary of engagement activities that have been carried out, a description of issues that have been raised with respect to the project, and an explanation of how those issues have been or will be addressed by the proponent.	8.0	
37. A preliminary assessment of potential impacts on established or asserted Aboriginal rights, title, and other interests	7.5; 8.0	
<b>ENGAGEMENT AND CONSULTATION WITH GOVERNMENTS, THE PUBLIC AND OTHER PARTIES</b>		
39. A summary of consultation activities that have been carried out with provincial and federal agencies and local governments.	9.0	
40. A summary of consultation activities that have been carried out with landowners, other commercial, industrial, agricultural, and recreational land users, as well as the public. Provide a table identifying the issues that have been raised by those parties with respect to the project, and an explanation of how those issues have been or will be addressed by the proponent	9.0	

**TABLE A-2 IAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
<b>PART A—GENERAL INFORMATION</b>		
1 The project's name, type or sector and proposed location.	1.0	
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.	1.4	Table 1
3 A summary of any engagement undertaken with any jurisdiction or other party, including a summary of the key issues raised and the results of the engagement, and a brief description of any plan for future engagement.	1.5, 8.0, 9.0	
4 A list of the Indigenous groups that may be affected by the carrying out of the project, a summary of any engagement undertaken with the Indigenous peoples of Canada, including a summary of key issues raised and the results of the engagement, and a brief description of any plan for future engagement.	8.0	
5 Any study or plan, relevant to the project, that is being or has been conducted in respect of the region where the project is to be carried out, including a regional assessment that is being or has been carried out under section 92 or 93 of the <i>Act</i> or by any jurisdiction, including by or on behalf of an Indigenous governing body, if the study or plan is available to the public.	5.1	
6 Any strategic assessment, relevant to the project, that is being or has been carried out under section 95 of the <i>Act</i> .	1.5	
<b>PART B—PROJECT INFORMATION</b>		
7 A statement of the purpose of and need for the project, including any potential benefits.	1.3	
8 The provisions in the schedule to the Physical Activities Regulations describing the project, in whole or in part.	1.5	Table 2
9 A list of all activities, infrastructure, permanent or temporary structures and physical works to be included in and associated with the construction, operation and decommissioning of the project.	2.1, 2.2	Table 4
10 An estimate of the maximum production capacity of the project and a description of the production processes to be used.	1.0, 2.1.6	Table 4
11 The anticipated schedule for the project's construction, operation, decommissioning and abandonment, including any expansions of the project.	2.3	Table 5

**TABLE A-2 IAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
12 A list of		
(a) potential alternative means of carrying out the project that the proponent is considering and that are technically and economically feasible, including through the use of best available technologies; and	2.1	
(b) potential alternatives to the project that the proponent is considering and that are technically and economically feasible and directly related to the project.	1.3	
<b>PART C—LOCATION INFORMATION</b>		
13 A description of the project's proposed location, including	4.0	
(a) its proposed geographic coordinates, including, for linear development projects, the proposed locations of major ancillary facilities that are integral to the project and a description of the spatial boundaries of the proposed study corridor;	4.0	
(b) site maps produced at an appropriate scale in order to determine the project's proposed general location and the spatial relationship of the project components;		Figure 1, Figure 2, Figure 3, Figure 4, Figure 5
(c) the legal description of land to be used for the project, including, if the land has already been acquired, the title, deed or document and any authorization relating to a water lot;	4.2	Table 8 Figure 6
(d) the project's proximity to any permanent, seasonal or temporary residences and to the nearest affected communities;	4.0	
(e) the project's proximity to land used for traditional purposes by Indigenous peoples of Canada, land in a reserve as defined in subsection 2(1) of the <i>Indian Act</i> , First Nation land as defined in subsection 2(1) of the <i>First Nations Land Management Act</i> , land that is subject to a comprehensive land claim agreement or a self-government agreement and any other land set aside for the use and benefit of Indigenous peoples of Canada; and	4.2	Table 10
(f) the project's proximity to any federal lands.	4.2	Table 10
14 A brief description of the physical and biological environment of the project's location, based on information that is available to the public.	6.0, 6.1, 6.2	
15 A brief description of the health, social and economic context in the region where the project is located, based on information that is available to the public or derived from any engagement undertaken.	6.3	



**TABLE A-2 IAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
<b>PART D—FEDERAL, PROVINCIAL, TERRITORIAL, INDIGENOUS AND MUNICIPAL INVOLVEMENT</b>		
16 A description of any financial support that federal authorities are, or may be, providing to the project.	5.2	
17 A list of any federal lands that may be used for the purpose of carrying out the project.	4.2	
18 A list of any jurisdictions that have powers, duties or functions in relation to an assessment of the project's environmental effects.	1.5	
<b>PART E—POTENTIAL EFFECTS OF THE PROJECT</b>		
19 A list of any changes that, as a result of the carrying out of the project, may be caused to the following components of the environment that are within the legislative authority of Parliament:		
(a) fish and fish habitat, as defined in subsection 2(1) of the <i>Fisheries Act</i> ;	7.6	
(b) aquatic species, as defined in subsection 2(1) of the <i>Species at Risk Act</i> ; and	7.6	
(c) migratory birds, as defined in subsection 2(1) of the <i>Migratory Birds Convention Act</i> , 1994.	7.6	
20 A list of any changes to the environment that, as a result of the carrying out of the project, may occur on federal lands, in a province other than the province in which the project is proposed to be carried out or outside Canada.	7.1	
21 With respect to the Indigenous peoples of Canada, a brief description of the impact—that, as a result of the carrying out of the project, may occur in Canada and result from any change to the environment—on physical and cultural heritage, the current use of lands and resources for traditional purposes and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, based on information that is available to the public or derived from any engagement undertaken with Indigenous peoples of Canada.	7.5	
22 A brief description of any change that, as a result of the carrying out of the project, may occur in Canada to the health, social or economic conditions of Indigenous peoples of Canada, based on information that is available to the public or derived from any engagement undertaken with Indigenous peoples of Canada.	7.5	
23 An estimate of any greenhouse gas emissions associated with the project.	3.1	
24 A list of the types of waste and emissions that are likely to be generated—in the air, in or on water and in or on land—during any phase of the project.	3.1, 3.2	Table 6 Table 7

**TABLE A-2 IAA CONCORDANCE TABLE FOR PROJECT DESCRIPTION REQUIREMENTS**

Information Requirement	Document Section	Tables & Figures
<b>PART F—SUMMARY</b>		
25 A plain-language summary of the information that is required under items 1 to 24 in English and in French.		

# Appendix B

## Responsible Authors of the Project Description



**TABLE B-1 RESPONSIBLE AUTHORS OF THE PROJECT DESCRIPTION**

Name and Qualification	Project Role	Relevant Experience
Tony Brady <sup>1</sup>	President	
Nathan Gloag, B.Eng. (civil); Grad. Dip. Legal Studies <sup>1</sup>	Engineering and Construction aspects	More than 18 years of experience in the development and execution of major capital projects throughout the energy, renewable power, infrastructure, oil and gas sectors
Amanda Zinter <sup>1</sup>	Initial draft	17 years of experience in energy projects and 9 years of environmental and regulatory consulting experience focusing on the oil and gas sector in British Columbia, including work on six LNG import terminals
Ward Prystay, M.Sc., R.P.Bio. <sup>2</sup>	BCEAA and IAA requirements, senior review	26 years of environmental consulting experience focusing on environmental assessment in the oil and gas sector, including work on eight LNG import and export terminals in Canada
Jennifer Mundy, B.Sc., R.P.Bio. <sup>2</sup>	BCEAA and IAA requirements	13 years of environmental consulting experience focusing on environmental assessment in the oil and gas sector, including four LNG import and export terminals
April Hauk, B.Sc., EP <sup>2</sup>	Air Quality	14 years of experience related to assessment and permitting for oil and gas pipelines and facilities
Sandra Banholzer, M.Sc. <sup>2</sup>	Acoustic Environment	6 years of experience including acoustic baseline studies and environmental assessments for oil and gas facilities.
Tim Edgell, Ph.D., R.P.Bio. <sup>2</sup>	Marine Environment	16 years of experience in marine ecosystem baseline studies and assessments
Stephen Roberts, B.Com., MREM <sup>2</sup>	Socio-economic Resources	11 years of experience conducting social and economic analyses, community engagement, and traditional use studies in support of land use planning and environmental assessments, including three LNG projects
Rebecca Wilson, M.Sc., R.P.Bio. <sup>2</sup>	Wildlife Resources	7 years of experience including baseline studies and environmental assessments for pipelines and facilities
Libby McMillan, M.Sc. <sup>2</sup>	Marine Water Quality and Environment	5 years of experience in marine ecosystem research and assessments including water quality analysis and reporting
Laura Trudell, B.C.D., Adv. Dip. GIS <sup>2</sup>	GIS Specialist	7 years of experience providing GIS solutions in the environmental planning and natural resources sectors from map production to custom spatial analyses.

**TABLE B-1 RESPONSIBLE AUTHORS OF THE PROJECT DESCRIPTION**

Name and Qualification	Project Role	Relevant Experience
Courtney Tiechko, B.Sc. <sup>2</sup>	Freshwater Fisheries	5 years of experience in environmental consulting focused on freshwater fisheries
Rachel Keeler, M.Sc., R.P.Bio. <sup>2</sup>	Freshwater Fisheries	15 years of environmental consulting experience focusing on baseline and environmental assessments of freshwater fish and aquatic resources for developments such as pipelines, transmission lines, and roads.
Gillian Mathews B.Sc., M.Sc. <sup>2</sup>	Greenhouse Gas	6 years of experience including greenhouse gas baseline studies, verifications and environmental assessments for oil and gas facilities
Meghan O'Neill, B.Sc., R.P.Bio. <sup>2</sup>	Vegetation and Wetland Resources	10 years of environmental consulting experience conducting vegetation and wetland baseline studies and assessments for pipelines and facilities, including wetland functions field work on LNGC in 2016
Sean McKnight, RPCA <sup>2</sup>	Archaeological and Heritage Resources	15 years of experience including archaeological assessments and permitting for pipelines and facilities
Ryan Spady, RPCA <sup>2</sup>	Archaeological and Heritage Resources	17 years of experience including archaeological assessments and permitting for pipelines and facilities
Rick Lee, M.Sc., MBA, R.P.Bio. <sup>2</sup>	Human Health	15 years of human health risk assessment experience including environmental assessments for three LNG projects
NOTES: <sup>1</sup> Cedar <sup>2</sup> Stantec Consulting Ltd.		