WCC LNG

Project description

ExxonMobil Imperial

Table of Contents

List of Tables

Appendix A: List of Figures

Appendix B: List of Photos

Appendix C: Migratory Bird Species Known to Occur within the Project Area

Abbreviations

AGRU	Acid Gas Removal Unit
API	American Petroleum Institute
BC CDC	British Columbia Conservation Data Centre
BCEAA	*British Columbia Environmental Assessment Act*
BC EAO	British Columbia Environmental Assessment Office
BC MoE	British Columbia Ministry of Environment
CD	chart datum
CEAA	*Canadian Environmental Assessment Act*
CEA Agency	Canadian Environmental Assessment Agency
cm	centimetres
CO_2	carbon dioxide
CSRS	Canadian Spatial Reference System
DFO	Department of Fisheries and Oceans
DL	District Lot
DWT	dead weight tonnage
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EMCL	ExxonMobil Canada Ltd.
Exxon Mobil Corp	Exxon Mobil Corporation
FEED	Front End Engineering Design
gcfd	billion cubic feet per day
GHG	greenhouse gas
H_2S	hydrogen sulfide
ha	hectares
ICG	International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk

IBA	Important Bird Area
IMO	International Maritime Organisation
IORL	Imperial Oil Resources Limited
km	kilometres
LNG	liquid natural gas
m	metres
m^3	cubic metres
MARPOL	International Convention for the Prevention of Pollution from Ships
mm	millimetres
MW	Megawatts
MOF	Materials Offloading Facility
Mol	Symbol for the unit of measurement Mole
MTA	million metric tonnes per annum
NHSDA	Northwest Health Service Delivery Area
NO_2	nitrogen dioxide
NOx	nitrous oxides
O_3	ozone
OCIMF	Oil Companies International Marine Forum
OIMS	Operations Integrity Management System
PID	parcel identifier number
PJ	petajoules
PM	particulate matter
Project	WCC LNG Project
PRPA	Prince Rupert Port Authority
RO	reverse osmosis
SARA	*Species at Risk Act*
SIGTTO	Society of International Gas Tanker and Terminal Operators

SLUPA	Strategic Land Use Planning Agreement
SOLAS	Safety of Life at Sea
SQCRD	Skeena-Queen Charlotte Regional District
TERMPOL	Technical Review Process of Marine Terminal Systems and Transshipment Sites

Table of Concordance (CEAA Requirements)

Project Description Requirements		WCC LNG PD Section
Guide to Preparing a Description of a Designated Project under the *Canadian Environmental Assessment Act, 2012* (June 2014)		
1.0	**General Information and Contact(s)**	
1.1	Describe the nature of the designated project, and proposed location (2–3 paragraphs; note that additional location details are to be provided in section 3).	1.1, 3.1
1.2	Proponent information	1.4
1.2.1	Name of the designated project.	1.1, 1.4
1.2.2	Name of the proponent.	1.4
1.2.3	Address of the proponent.	
1.2.4	Chief Executive Officer or equivalent (include name, official title, email address and telephone number).	
1.2.5	Principal contact person for purposes of the project description (include name, official title, email address and telephone number).	
1.3	Provide a list of any jurisdictions and other parties including Aboriginal groups and the public that were consulted during the preparation of the project description. (A description of the result of any consultations undertaken is to be provided in sections 6 and 7.)	1.5, 6
1.4	Provide information on whether the designated project is subject to the environmental assessment and/or regulatory requirements of another jurisdiction(s).	1.6
1.5	Provide information on whether the designated project will be taking place in a region that has been the subject of an environmental study. Proponents are advised to contact the Agency during the preparation of the project description for information regarding any regional environmental studies that may be relevant.	1.6.1.4
2.0	**Project Information**	
2.1	Provide a general description of the project, including the context and objectives of the project. Indicate whether the designated project is a component of a larger project that is not listed in the Regulations Designating Physical Activities.	1.1, 1.2

Project Description Requirements		WCC LNG PD Section
2.2	Indicate the provisions in the schedule to the Regulations Designating Physical Activities that describe the designated physical activities that are proposed to be carried out as part of the designated project.	1.6.1.2
2.3	Components and activities Provide a description of the components associated with the designated project, including:	2
2.3.1	The physical works associated with the designated project (e.g., large buildings, other structures, such as bridges, culverts, dams, marine transport facilities, mines, pipelines, power plants, railways, roads, and transmission lines) including their purpose, approximate dimensions, and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the designated project.	2.1, 2.2
2.3.2	Anticipated size or production capacity of the designated project, with reference to thresholds set out in the Regulations Designating Physical Activities, including a description of the production processes to be used, the associated infrastructure, and any permanent or temporary structures. The production capacity does not refer to the planned production capacity of a project but the maximum production capacity based on the project's design and operating conditions.	2.1
2.3.3	If the designated project or one component of the designated project is an expansion, describe the size and nature of the expansion with reference to the thresholds set out in the Regulations Designating Physical Activities	N/A

Project Description Requirements		WCC LNG PD Section
2.3.4	A description of the physical activities that are incidental to the designated project. In determining such activities, the following criteria shall be taken into account: • nature of the proposed activities and whether they are subordinate or complementary to the designated project; • whether the activity is within the care and control of the proponent; • if the activity is to be undertaken by a third party, the nature of the relationship between the proponent and the third party and whether the proponent has the ability to "direct or influence" the carrying out of the activity; • whether the activity is solely for the benefit of the proponent or is available for other proponents as well; and, • the federal and/or provincial regulatory requirements for the activity. Should an EA be required for the designated project, the Agency will take these criteria into consideration in determining the activities that are incidental to the designated project.	2.1.2, 2.1.15, 2.1.16, 2.2
2.4	Emissions, discharges and waste Provide a description of any waste that is likely to be generated during any phase of the designated project and plans to manage that waste, including the following:	2.4
2.4.1	Sources of atmospheric contaminant emissions during the designated project phases (focusing on criteria air contaminants and greenhouse gases, or other non-criteria contaminants that are of potential concern) and location of emissions.	2.4.1
2.4.2	Sources and location of liquid discharges.	2.4.2
2.4.3	Types of wastes and plans for their disposal (e.g., landfill, licenced waste management facility, marine waters, or tailings containment facility).	2.4.2
2.5	Construction, operation, decommissioning and reclamation phases and scheduling. Provide a description of the timeframe in which the development is to occur and the key project phases, including the following:	2.3
2.5.1	Anticipated scheduling, duration and staging of key project phases, including preparation of the site, construction, operation, decommissioning and reclamation.	2.3

Project Description Requirements		WCC LNG PD Section
2.5.2	Main activities in each phase of the designated project that are expected to be required to carry out the proposed development (e.g., activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sediments, infilling, and installing structures).	2.2
3.0	**Project Location**	
3.1	Provide a description of the designated project's location including:	—
3.1.1	Coordinates (i.e., longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the facility or, for a linear project, provide the beginning and end points.	3.1
3.1.2	Site map/plan(s) depicting location of the designated project components and activities. The map/plan(s) should be at an appropriate scale to help determine the relative size of the proposed components and activities.	Figure 1 Figure 2A Figure 2B Figure 3A Figure 3B Figure 6

Project Description Requirements		WCC LNG PD Section
3.1.3	Map(s) at an appropriate scale showing the location of the designated project components and activities relative to existing features, including but not limited to: • watercourses and waterbodies with names where they are known; • linear and other transportation components (e.g., airports, ports, railways, roads, electrical power transmission lines and pipelines); • other features of existing or past land use (e.g., archaeological sites, commercial development, houses, industrial facilities, residential areas and any waterborne structures); • location of Aboriginal groups, settlement land (under a land claim agreement) and, if available, traditional territory; • federal lands[1] including, but not limited to National parks, National historic sites, and reserve lands; • nearby communities; • permanent, seasonal or temporary residences; • fisheries and fishing areas (i.e., Aboriginal, commercial and recreational); • environmentally sensitive areas (e.g., wetlands, and protected areas, including migratory bird sanctuary reserves, marine protected areas, National Wildlife areas, and priority ecosystems as defined by Environment Canada); and, • Provincial and international boundaries.	Figure 2A Figure 2B Figure 3A Figure 3B Figure 6
3.1.4	Photographs of work locations to the extent possible.	Appendix B
3.1.5	Proximity of the designated project to: • any permanent, seasonal or temporary residences; • traditional territories, settlement land (under a land claim agreement) as well as lands and resources currently used for traditional purposes by Aboriginal peoples; and, • any federal lands.	3.1.2, 3.2

[1] As defined in CEAA 2012, "federal lands" means

(a) lands that belong to Her Majesty in right of Canada, or that Her Majesty in right of Canada has the power to dispose of, and all waters on and airspace above those lands, other than lands under the administration and control of the Commissioner of Yukon, the Northwest Territories, or Nunavut;

(b) the internal waters of Canada (in any area of the sea not within a province), the territorial sea of Canada (in any area of the sea not within a province), the exclusive economic zone of Canada, and the continental shelf of Canada; and

(c) reserves, surrendered lands and any other lands that are set apart for the use and benefit of a band and that are subject to the Indian Act, and all waters on and airspace above those reserves or lands.

Project Description Requirements		WCC LNG PD Section
3.2	Land and Water Use To the extent that is known at this time, describe the ownership and zoning of land and water that may be affected by the project, including the following.	3.1.1
3.2.1	Zoning designations.	3.1.1
3.2.2	Legal description of land to be used (including information on sub-surface rights) for the designated project, including the title, deed or document and any authorisation relating to a water lot.	3.1.1
3.2.3	Any applicable land use, water use (including ground water), resource management or conservation plans applicable to or near the project site. Include information on whether such plans were subject to public consultation.	3.1.2, 3.1.3
3.2.4	Describe whether the designated project is going to require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Aboriginal peoples.	3.1, 3.2.4, 3.2.5, 3.2.7
4.0	**Federal Involvement – Financial Support, Lands and Legislative Requirements**	
4.1	Describe whether there is any proposed or anticipated federal financial support that federal authorities are, or may be, providing to support the carrying out of the designated project.	1.7
4.2	Describe any federal lands that may be used for the purpose of carrying out the designated project. This is to include any information on any granting of interest in federal land (i.e., easement, right of way, or transfer of ownership).	
4.3	Provide a list of any federal permits, licences or other authorisations that may be required to carry out of the project.	1.6.2
5.0	**Environmental Effects**	
5.1	A description of the physical and biological setting, including the physical and biological components in the area that may be adversely affected by the project (e.g., air, fish, terrain, vegetation, water, wildlife, including migratory birds, and known habitat use).	4

Project Description Requirements		WCC LNG PD Section
5.2	A description of any changes that may be caused as a result of carrying out the designated project to: (a) fish and fish habitat, as defined in the *Fisheries Act*; (b) marine plants, as defined in the *Fisheries Act*; and, (c) migratory birds, as defined in the *Migratory Birds Convention Act*, 1994.	5
5.3	A description of any changes to the environment that may occur, as a result of carrying out the designated project, on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada.	5.4
5.4	A description of the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the designated project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	3.2.4, 3.2.5, 3.2.7, 3.2.10, 5.3, 6.1.2, 6.1.3, 6.1.5
6.0	**Proponent Engagement and Consultation with Aboriginal Groups**	
6.1	A list of Aboriginal groups that may be interested in, or potentially affected by, the designated project.	3.2.4, 3.2.5, 3.2.7, 6.1.2
6.2	A description of the engagement or consultation activities carried out to date with Aboriginal groups, including: • names of Aboriginal groups engaged or consulted to date with regard to the designated project; • date(s) each Aboriginal group was engaged or consulted; and, • means of engagement or consultation (e.g., community meetings, mail or telephone).	6.1.4
6.3	An overview of key comments and concerns expressed by Aboriginal groups identified or engaged to date, including any responses provided to these groups.	6.1.5
6.4	A consultation and information-gathering plan that outlines the ongoing and proposed Aboriginal engagement or consultation activities, the general schedule for these activities and the type of information to be exchanged and collected (or, alternatively, an indication of why such engagement or consultation is not required).	6.1.6

Project Description Requirements		WCC LNG PD Section
7.0	**Consultation with the Public and Other Parties (other than Aboriginal consultation included above)**	
7.1	An overview of key comments and concerns expressed to date by stakeholders and any responses that have been provided.	6.2.3, 6.2.4
7.2	An overview of any ongoing or proposed stakeholder consultation activities.	6.2.5
7.3	A description of any consultations that have occurred with other jurisdictions that have environmental assessment or regulatory decisions to make with respect to the project.	N/A
8.0	**Summary of the Project Description**	
—	Proponents are to include as part of the project description a standalone section that summarises the information identified in Sections 1 to 7 of this Guide. Under CEAA 2012, the Agency is required to consult the public on a summary of the project description that has to be posted on the Agency's Internet site in both of Canada's official languages as required under the Official Languages Act. As a result, in order to be in a position to initiate the screening phase in a timely manner, the summary is to be prepared and submitted to the Agency in both English and French.	Provided as a separate document

Concordance Table (BC EAO Requirements)

	PD Requirements	WCC LNG PD Section
BC EAO's Guidelines for Preparing a Project Description for an Environmental Assessment in British Columbia		
	Proponent Information	
1	The proponent's name and the representative managing the project.	1.4
2	Contact information, including a mailing address, phone and fax numbers, and email addresses.	
3	Corporate information, including a website address, particulars of company incorporation, and partners' names (if applicable).	
	General Background Information	
4	The type and size of the project, with specific reference to the thresholds set out in the Reviewable Projects Regulation.	1.6.1.1
5	Project purpose and rationale.	1.2
6	Estimated capital cost.	2.5
7	Number of construction jobs (in person years) and operating jobs (actual number).	2.5
8	Location (latitude and longitude).	3.1
	Project Overview	
9	A brief description of the major on-site and off-site project components, including options if the final site selections are not yet available.	2.1
10	A conceptual site plan and map(s) at sufficient scale to allow for clear location of all major components of the project (proponents may wish to include photographs if these would be helpful to understanding the nature and location of the proposed project).	Figure 1 Figure 2A Figure 2B Figure 3A Figure 3B Figure 6 Appendix B, Photos 1-5
11	The project's duration, including decommissioning if appropriate.	2.3
12	The project's potential environmental, economic, social, heritage, and health effects (in general terms).	5

Land Use Setting		
13	A general description of existing land use in the vicinity of the project site.	3.1.1, 3.1.2, 3.1.3
14	Whether the project and its components are situated on private or Crown land.	3.1.1
15	Information about First Nations interests where asserted claims to rights or title are known.	6.1.2, 6.1.3
Consultation Activities		
16	A summary of consultation activities that have been carried out with:	6
16(a)	First Nations	6.1.4, 6.1.5
16(b)	the public	6.2.3, 6.2.4
16(c)	local governments	6.2.2, 6.2.4
Proposed Development Schedule		
17	A tentative schedule for submitting an application for an environmental assessment certificate and developing the project (should a certificate be issued).	2.3
Required Permits		
18	A list of required permits, if known.	1.6.2, 1.6.3, 1.6.4

1 GENERAL INFORMATION AND CONTACTS

1.1 Project Summary

WCC LNG Project Ltd. (WCC LNG Project) is proposing the development and operation of the WCC LNG project (the "Project") at Tuck Inlet, within the city limits of Prince Rupert, BC. The proposed Project will include production, storage, transfer, and loading of LNG onto LNG vessels for marine transportation to offshore markets.

The proposed Project will involve the development of a liquefied natural gas (LNG) plant and export facility, and the use of shipping routes in BC coastal waters (see location of Project in Figure 1 in Appendix A). The information provided in this Project Description for the Project is reflective of a preliminary design basis and will be subject to ongoing studies and optimisations.

Natural gas will be delivered to the facility through a third party (yet to be determined) pipeline connected to the flowing gas market pipeline system. The Project is proposing an LNG facility with an initial capacity of up to 15 million metric tonnes per annum (MTA) and ultimately a maximum production of up to 30 MTA, or approximately 180,000 cubic metres (m^3) of LNG per day. It is anticipated that LNG vessels, with an approximate capacity of 125,000 to 266,000 m^3, will be used to transport the LNG, resulting in an approximate 330 to 430 carrier loadings per year at full 30 MTA capacity. WCC LNG Project is currently investigating the geotechnical and environmental site characteristics and evaluating concepts for its proposed LNG plant at Tuck Inlet. Development options under consideration include a marine-based barge-mounted concept and an onshore concept (Figures 2A and 2B, Figures 3A and 3B, and Figures 4 and 5 of Appendix A). These development options are discussed within the Project components and activities of Sections 2.1 and 2.2.

A barge-mounted LNG facility will consist of up to five floating barges with production capacity of approximately 6 MTA each or higher pending results of process optimisation studies. A layout of a barge-mounted LNG facility is shown in Figures 2A and 2B, and an artist's conceptual rendering is shown in Figure 4 of Appendix A. Each barge would be permanently moored along the shoreline at Tuck Inlet. It is expected that the LNG liquefaction process and compression facilities will be powered using the inlet natural gas as the fuel source. Onshore support facilities for the barge-mounted concept would be located entirely within District Lot (DL) 444, property currently owned by Prince Rupert Legacy Inc., within the limits of the City of Prince Rupert. Onshore infrastructure for the barge-mounted concept would likely include non-process support facilities and the tie-in to the natural gas pipeline. Total estimated area of the onshore facilities at the Project site, for the barge-mounted concept with minimised onshore facilities, is approximately 30 hectares (ha). This could be higher if additional facility scope is moved onshore during the Front End Engineering Design (FEED) phase.

An onshore LNG facility will maintain similar production levels and the same ultimate capacity as the barge-mounted concept. For this concept, the Project is considering placing all of the inlet processing, liquefaction, and storage facilities onshore in addition to the support facilities. Offloading facilities will remain offshore. For the onshore concept, the facility and construction staging areas will be cleared for site preparation, and rock/material removed or filled to develop foundation support areas for the plant equipment and support facilities. Equipment, supplies, modules, and temporary facilities will be transported to the site and offloaded at the Materials Offloading Facility (MOF). Approximately 400 ha of the onshore lot will be required for the development of the onshore concept. A layout of an onshore LNG facility is shown in Figures 3A and 3B, and an artist's rendering of the onshore concept is shown in Figure 5 of Appendix A.

The Project is currently evaluating development options while gathering geotechnical data and environmental baseline data at the Tuck Inlet site. Through ongoing community and regulatory engagement, WCC LNG Project will continue to advise stakeholders as the project basis evolves through careful study of alternatives. On completion of the evaluation of alternatives, the Project will select the final concept prior to commencing more detailed pre-FEED and FEED studies.

There are two shipping routes identified that could serve the proposed Project site within Tuck Inlet from the Pacific Ocean via Dixon Entrance through Chatham Sound and into Brown Passage (Figure 6 in Appendix A). The LNG vessels will navigate either north or south of Lucy Island and south of Kinahan Islands, and then north between Kaien and Digby islands towards Prince Rupert harbour and toward the Project site along Tuck Inlet.

The proposed Project and the Project site have the following general characteristics, along with anticipated potential Project-related environmental, social, economic, heritage, and health effects:

- The Project onshore facilities will be constructed on DL 444, currently owned by Prince Rupert Legacy Inc., within the limits of the City of Prince Rupert and the adjacent foreshore. The Province of British Columbia Consultative Areas Database (GeoBC, 2014) identifies the Metlakatla, Lax Kw'alaams, Kitselas, Kitsumkalum, and Gitxaala as having Aboriginal interests at Tuck Inlet. The site, located within DL 444, is referred to as "the Project site" in this document.
- The Project site is approximately 144 km by road from the Aboriginal community of Kitselas, approximately 144 km by road from the Aboriginal community of Kitsumkalum, located at Kitsumkalum 1 and approximately 75 km by water and 63 km by air from the Gitxaala Aboriginal community, located at Kitkatla on Dolphin Island 1.
- The Project site has existing deep-water vessel berthing capability.
- The Project site is connected to existing safe navigation shipping routes in the Pacific Ocean.
- LNG shipping will likely be undertaken by the buyers or third parties under contract with the LNG buyers, and will adhere to existing Canadian, international, and WCC LNG Project safety standards and practices, including use of BC coastal pilots and assist tugs and vessels within Canadian waters for inbound and outbound traffic. Vessel size will be dependent on the ships operated and/or chartered by the LNG buyers, but is expected to be up to 140,000 dead weight tonnage (DWT) with a capacity of up to 266,000 m^3.
- The Project site is approximately 12 kilometres (km) (by water) from the First Nation community of Metlakatla, located on S 1/2 Tsimpsean 2, and 29 km (by road and ferry) from the First Nation community of Lax Kw'alaams, located on and adjacent to Lax Kw'alaams 1. The closest Indian Reserves to the Project site, all originally set aside for the Metlakatla First Nation for fishing purposes, are Shoowahtlans 4 adjacent to DL 444 at the outlet of Shawatlan Lake (about 3 km from the south end of the Project footprint by water via Fern Passage), Wilnaskancaud 3 on northeastern Kaien Island (about 4 km from the south end of the Project footprint), and Tuck Inlet 89 at the head of Tuck Inlet (approximately 9 km from the north end of the Project footprint).
- The Project will not use federal funding.

- The Project will implement best practices and mitigation measures to avoid and limit potential effects to environmental, economic, social, health, and heritage resources.
- The Project will undergo all required permitting and statutory regulatory approvals processes, including an environmental assessment prior to initiating construction.
- The Project site is located in the geomorphic region known as the Hecate Lowlands on the western extremity of the Coast Mountains (Kitimat Range) in British Columbia. The Project area is situated in the Coastal Western Hemlock Biogeoclimatic Ecosystem Classification zone, Very Wet Hypermaritime Central subzone variant. The Project site slopes steeply up from Tuck Inlet. Above this steep westerly frontal slope, the topography is undulating and somewhat flatter. Portions of the site are poorly drained, with several open swampy areas and small lakes and drainage channels in a pattern that reflects the underlying bedrock structure. Numerous small tributaries with small catchments are located throughout the site. The site has an established forest and brush cover, except in the open swampy areas. Shallow bedrock and open swamp areas typically do not support tree growth, and are indicated by small, stunted or dead trees.

This Project Description has been prepared in accordance with the British Columbia Environmental Assessment Office (BC EAO) *Guidelines For Preparing A Project Description For An Environmental Assessment In British Columbia* (BC EAO, 2013a), and the Canadian Environmental Assessment (CEA) Agency *Guide to Preparing a Description of a Designated Project under the CEAA, 2012* (CEA Agency, 2014).

1.2 Project Purpose and Rationale

The proposed Project is planning to leverage gas sourced from the established Western Canada liquid flowing gas market, supplied from the large unconventional gas resource base in the Western Canadian Sedimentary Basin, in order to meet increasing energy demand in Asian and global markets. Exxon Mobil Corporation has significant experience in the global LNG industry and a successful track record of safely and reliably developing and operating large-scale LNG projects, and hence is well positioned to participate in building a successful LNG industry in BC. Between 2000 and 2010, global trade of LNG doubled, and is expected to increase another 50% by 2020 based on International Energy Agency analysis. Increased demand for natural gas in emerging Asian economies such as in China, India, and Southeast Asia, combined with abundant, cost competitive, gas resources in Western Canada, has created an opportunity to grow a new LNG export industry in Western Canada. British Columbia's advantages for participating in the global trade of LNG include low ambient temperatures on the north coast, proximity to international markets where natural gas is in high demand, and extensive gas resources from the Western Canadian Sedimentary Basin to support the export industry.

The purpose of the proposed Project is to receive, process, and liquefy natural gas, and to store and transfer LNG to marine carriers for export to offshore markets. The proposed Project is located within a deep-water harbour, within approximately 0.5 km of the City of Prince Rupert's northern developed boundary, and is advantageously located to ship LNG to international markets through existing marine shipping and navigation channels from Tuck Inlet to the Pacific Ocean.

Asian and global LNG markets offer a new long-term opportunity for Canadian gas. Since natural gas deregulation in Canada began in 1985, Canadian producers have been able to obtain ever-improving access to

North American markets. However, they have largely remained excluded from international markets. The development of unconventional resources in North America has resulted in abundant natural gas supplies. Building a globally competitive and sustainable LNG export industry will provide an opportunity for Canadian resources to access attractive international markets and will generate significant benefits for Canada and BC, including additional revenues and employment opportunities.

WCC LNG Project believes that Canada and BC are well positioned to further grow domestic gas production and provide globally competitive and sustainable LNG exports to attractive Asian and global markets. WCC LNG Project seeks to participate in building a successful LNG industry in BC and export up to 30 MTA of LNG from the proposed LNG facility to international customers in global markets using the LNG export licence held by WCC LNG Ltd. The international LNG customers will be responsible for obtaining all of the necessary import authorisations to permit delivery to a terminal facility and resale to local distributors and end use customers.

1.3 Project Site Alternatives

Early screening of site alternatives began in 2011, with desktop investigations across the full length of the BC coast. After initial screening, eight LNG plant and export facility locations were identified and underwent an alternatives analysis. As shown in Figure 7 in Appendix A, four of the locations were in the Kitimat area along Douglas Channel, and four locations were in the Portland Channel area near Prince Rupert. The following eight LNG plant and export facility site options were reviewed:

1) Grassy Point, near Lax Kw'alaams (formerly referred to as Port Simpson);
2) Digby Island, Port of Prince Rupert;
3) Bish Creek, Douglas Channel, Kitimat;
4) Miskatla Inlet, Douglas Channel, Kitimat;
5) Markland Point, Douglas Channel, Kitimat;
6) Kildala Arm, Douglas Channel, Kitimat;
7) Tuck Inlet, Prince Rupert; and
8) Nasoga Gulf, Portland Channel.

The eight options, including a preliminary overview of their characteristics, are summarised in Table 1.

Table 1: Summary of WCC LNG Project Siting Alternatives

Option	Location	Characteristics
Grassy Point	Northern portion of Tsimpsean Peninsula, across bay from Lax-Kw'alaams	- Crown land - Relatively open to ocean - Undeveloped with no access - Flexibility for barge and onshore facilities

Option	Location	Characteristics
Digby Island	East side of Digby Island ~5 km from Prince Rupert	- Crown land - Proximity to airport, Dodge Cove, and Prince Rupert - Flexibility for barge and onshore facilities
Bish Creek	West side of Douglas Channel, ~11 km from Kitimat	- Crown land - Proximity to other industrial proposals and to Kitimat
Miskatla Inlet	East bank of small arm of Douglas Channel, ~35 km south of Kitimat	- Crown land - Environmentally sensitive area - Concern expressed by Haisla Nation
Markland Point	Douglas Channel southwest of Bish Creek, 20 km from Kitimat	- Crown land - Undeveloped with no access
Kildala Arm	East side of Douglas Channel, ~20 – 30 km from Kitimat	- Crown land - Remote site - Undeveloped with no access
Tuck Inlet	Northern end of Prince Rupert harbour	- Land owned fee simple by City of Prince Rupert - Near existing port facilities and community - Flexibility for barge and onshore facilities
Nasoga Gulf	Southeast side of Portland Inlet	- Within Nisga'a Nation treaty lands - Undeveloped with no access

Based on the initial alternatives analysis, the following three alternatives were selected for further study:

- Markland Point, Douglas Channel, Kitimat;
- Tuck Inlet, Prince Rupert; and
- Grassy Point, mouth of Portland Channel.

Additional engineering and environmental studies were undertaken on these alternatives. Based on engineering, environmental, and economic factors, Tuck Inlet was chosen as the preferred location for the LNG plant and export facility. The decision also included input from Aboriginal groups and the City of Prince Rupert, and the results of environmental field studies.

1.4 Contact and Proponent Information

The applicant, WCC LNG Project Ltd. (WCC LNG Project or Proponent) is a federal corporation with its current shareholders being WCC LNG Holdings Ltd. The shareholders of WCC Holdings Ltd. are ExxonMobil Canada Ltd. (EMCL) and Imperial Oil Resources Limited (IORL). EMCL is a federal corporation, and is a wholly owned Canadian affiliate of Exxon Mobil Corporation (Exxon Mobil Corp). IORL is an Alberta corporation and is a significant operating affiliate of Imperial Oil Limited (Imperial), one of Canada's largest public corporations. While a public company, Imperial is a related entity of Exxon Mobil Corp. WCC LNG Project, EMCL, IORL and Imperial have their headquarters at 237 Fourth Avenue SW in Calgary, Alberta.

Exxon Mobil Corp. has more than 40 years of LNG project development experience, with interests in liquefaction capacity of approximately 65 million tonnes per year in Qatar, Indonesia, and Papua New Guinea. Exxon Mobil Corp. and its affiliates were involved in PT Arun in Indonesia, which was one of the world's first major LNG export facilities. Together with its co-venturers, Exxon Mobil Corp. has been a driving force in transforming the LNG market into a more efficient global business, delivering LNG to 22 countries in 2013 without incident. Exxon Mobil Corp.'s experience spans the entire value chain, including natural gas production, liquefaction, shipping, regasification terminals, and LNG and gas marketing. Successfully linking these value chain elements distinguishes Exxon Mobil Corp. from its competitors and provides a reliable offering to suppliers and buyers. Since 2005, Exxon Mobil Corp. and its affiliates have been participating in the construction and operation of several major LNG developments in Qatar, Australia, and Papua New Guinea (PNG). Exxon Mobil Corp. and its affiliates' ownership in these projects equals or exceeds 25% working interest. ExxonMobil and its affiliates, together with its co-venturers, have an LNG production capacity of approximately 65 million tonnes per annum. In early 2014, ExxonMobil started up the PNG LNG Project ahead of schedule and within full funding under very challenging conditions.

After more than a century, Imperial continues to be an industry leader in applying technology and innovation to develop Canada's energy resources responsibly. As Canada's largest petroleum refiner, a major producer of crude oil and natural gas, a key petrochemical producer, and a leading fuels marketer from coast to coast, the company remains committed to high standards across all areas of its business. ExxonMobil is the majority shareholder of Imperial, holding 69.6% of the shares.

WCC LNG Project will leverage the extensive experience of both ExxonMobil and Imperial to develop the project resource in a safe and environmentally responsible manner that integrates community engagement into every aspect of the business. The Project's goals are represented in the following principles:

"OIMS is how we work!"

- Our Operations Integrity Management System (OIMS) is a structured approach to managing the safety, security, health, and environmental risks that we face. There are 11 Elements, each one containing expectations critical to maintaining Operations Integrity. We have taken the 11 Elements and developed management systems tailored to the risks associated with all aspects our business, with a particular emphasis on design, construction, and operations.

"Nobody Gets Hurt"

- We are relentless in our focus on safety, because nothing is more important.
- Our commitments are documented in our safety policy, health policy, environment policy, and the product safety policy, which are put into practice through our disciplined management framework, OIMS.
- Emergency response plans are in place at all our facilities. Should an emergency occur, local trained personnel are deployed, supported by regional and North American emergency response teams and a senior management emergency support group to control the situation, minimise impacts and restore normal operations in as short a time as possible.

"Protect Tomorrow. Today."

- We are committed to achieving excellent environmental performance. It is our goal to operate responsibly everywhere we do business by implementing scientifically sound and practical solutions that

take into account the economic and social needs of the communities where we operate. Our corporate environment policy and the *Protect Tomorrow. Today.* initiative serve as the foundation of our efforts.

- We have developed a robust environmental management process and have integrated this process into project management systems. These systems provide a structured and disciplined approach that aligns our environmental priorities with business objectives.
- We seek to visibly demonstrate our environmental commitment. We encourage our leaders and team members to continually improve our environmental performance. We also support our leaders looking for opportunities to actively engage external stakeholders on environmental issues when appropriate.
- To meet our environmental goals, we establish environmental standards, assess risks, research new technologies and adhere to applicable laws and regulations.
- We invest in technology and innovation to address the environmental and economic challenges of developing energy sources. In 2013, Imperial invested $200 million in research and technology. ExxonMobil has invested more than US$5 billion in research and development since 2008.

"A Partner in the Community"

- We recognise public trust and confidence are earned through performance, open communication, and community engagement.
- Engaging with our stakeholders in open and honest dialogue is a critical part of the way we do business and essential in helping us to understand concerns, share information and build strong relationships. In carrying out these activities, we are guided by five principles: inclusion, respect, timeliness, responsiveness, and accountability.
- By investing in communities where we live and work, we believe we can make a positive and lasting contribution to Canadians. Imperial invested $17 million in 2013 to support Canadian communities where it operates and ExxonMobil contributed US$269 million to communities.
- Many of our operations and development opportunities are located within Aboriginal communities or on their traditional lands. We support communities in areas where we explore, develop and operate, and strive to establish lasting relationships built on mutual trust and respect.[2]

We have strived to reach the highest standards for protecting the environment and maintaining operational excellence for more than a century. Our continued success is driven by a commitment to continuously innovate processes, training, and technologies, along with an ever-present respect for the communities in which we operate. The contact information for the Proponent is provided in Table 2.

Table 2: Contact Information

Proponent	WCC LNG Project Ltd.
Address	237 Fourth Avenue SW Calgary, AB, Canada T2P3M9

[2] *IOL Aboriginal Relations Guiding Principles and Guidelines available at: http://www.imperialoil.ca/Canada-English/Files/ThisIs/AR_guiding_principles.pdf*

President	C. T. Khoo
Principal Contact	Mike Bigler WCC LNG Safety, Health and Environment / Regulatory Manager Toll free: 1-855-338-9931 Email: info@wcc-lng.ca
Alternate Contact	Paul Ericsson WCC LNG Environmental and Regulatory Lead Toll free: 1-855-338-9931 Email: info@wcc-lng.ca
Website	www.exxonmobil.com/wcclng

1.5 Interested Parties

Parties and stakeholders that may be potentially interested in, or affected by, the proposed Project include federal and provincial agencies, local government representatives, community and economic organizations, environmental non-government organizations, local businesses, and Aboriginal groups. Aboriginal and public consultations are summarised in Sections 6.1 and 6.2.

1.6 Regulatory Context

Potential requirements under the *Canadian Environmental Assessment Act* (CEAA) and the *British Columbia Environmental Assessment Act* (BCEAA) associated with the proposed Project are outlined below. In addition, the proposed Project will require several permits, approvals, and authorisations from provincial, federal, and municipal agencies, which are summarised in Sections 1.6.2 through 1.6.4.

1.6.1 Environmental Assessment

1.6.1.1 British Columbia Environmental Assessment Act (BCEAA)

Environmental assessments (EAs) are intended to provide a single integrated framework to address a broad range of environmental, health, heritage, economic, social, and Aboriginal issues and concerns of various regulatory agencies and public stakeholders. The BCEAA requires that certain major projects in British Columbia obtain an Environmental Assessment Certificate (EAC) before they can proceed. The BCEAA is administered by the British Columbia Environmental Assessment Office (BC EAO), an independent provincial agency that coordinates assessment of the effects of projects under the BCEAA.

The proposed Project is expected to require a provincial EA because it exceeds the following threshold under Part 4 (Table 8) of the Reviewable Projects Regulation:

> "*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*"

This 3 petajoule (PJ) threshold is equivalent to approximately 118,000 m^3 of LNG. At full build-out, the proposed Project is expected to require a minimum storage capacity of approximately 1,000,000 m^3.

At full build-out, the proposed Project is expected to process natural gas a rate of approximately 141.5 million m^3/day or 5.0 billion cubic feet per day (gcfd).

Other potentially applicable thresholds for a provincial environmental assessment include:

- A marine port facility, other than a ferry terminal, as set out in Part 8 (Table 14) of the Reviewable Projects Regulation:

  If construction of the facility entails dredging, filling or other direct physical disturbance of:

  (a) >1,000 m of linear shoreline, or

  (b) >2 ha of foreshore or submerged land, or a combination of foreshore and submerged land, below the natural boundary of a marine coastline or marine estuary".

- A power plant, as set out in Part 4 (Table 7) of the Reviewable Projects Regulation, if it has a rated nameplate capacity of >50 Megawatts (MW).

With reference to the Reviewable Project Regulations: The proposed Project constitutes a reviewable project, pursuant to Part 4 (Electricity Projects), Part 4 (Petroleum and Natural Gas Projects), and Part 8 (Marine Port Facilities – other than Ferry Terminals) of the Reviewable Projects Regulation (B.C. Reg. 370/02), since the proposed Project may generate at least 50 MW of electrical power, will have the capability to store an energy resource, other than electricity, in a quantity that can yield by combustion ≥ 3 PJ of energy, and consists of a new marine port facility, or a modification to an existing marine port facility, the construction of which may entail dredging, filling or other direct physical disturbance of ≥ 2 ha of foreshore or submerged land, below the natural boundary of a marine coastline or marine estuary.

1.6.1.2 Canadian Environmental Assessment Act

The CEAA is the legal basis for the federal EA process. The CEAA is administered by the Canadian Environmental Assessment Agency (CEA Agency), an independent federal body accountable to Parliament through the federal Minister of Environment. The CEA Agency is responsible for conducting the federal environmental assessment and providing coordination for other federal, provincial, and local government regulatory agencies, Aboriginal peoples, industry and public stakeholders.

CEAA legislation underwent review under Bill C-38, with a revised *Act* enacted on July 1, 2012. The CEA Agency guidance document for preparing Project Descriptions was updated in June 2014. Under the new legislation, only projects designated by regulation or by Ministerial order are subject to review under the CEAA. It is anticipated that the proposed Project will be subject to the federal EA process under CEAA 2012 because it exceeds the following thresholds of the Regulations Designating Physical Activities:

> Section 2(a): "*A new fossil fuel-fired electrical generating facility with a production capacity of 200 MW or more*."
>
> The proposed Project is expected to require development of natural gas-fired or steam turbine generators to meet the electrical power supply requirements of the liquefaction process. Based on current definition, at full build-out, the power supply system will provide approximately 500 MW. WCC LNG Project may consider other options for normal or backup power from third party sources, such as the BC Hydro electrical transmission grid.

Section 14(d): *"Facility for the liquefaction, storage or regasification of liquefied natural gas, with a liquefied natural gas processing capacity of 3 000 t/day or more or a liquefied natural gas storage capacity of 55 000 t or more."*

The proposed Project is expected to have an LNG processing capacity of approximately 100,000 tonnes/day, or 5.0 gcfd of natural gas, and a minimum storage capacity of approximately 500,000 tonnes, which exceeds the thresholds set out in the regulation.

Section 24(c): "*Marine terminal designed to handle ships larger than 25 000 DWT unless the terminal is located on lands that are routinely and have been historically used as a marine terminal or that are designated for such use in a land-use plan that has been the subject of public consultation*."

The threshold would apply since the proposed Project is being designed to accommodate vessels weighing 70,000 to 140,000 tonnes and it is not located on lands that are routinely and have been historically used as a marine terminal or that are designated for such use in a land-use plan that has been the subject of public consultation.

1.6.1.3 Substitution

It is anticipated that that the province will request the federal Minister of Environment to approve the substitution of the BCEAA process for the CEAA 2012 process. A Memorandum of Understanding between the CEA Agency and BC EAO on the Substitution of Environmental Assessment (2013) addresses the conduct of substituted EAs in BC. If substitution is approved for the Project, it is expected that the BC EAO will conduct the EA in accordance with the conditions set out in the Substitution Decision, and at the end of the assessment process, the BC EAO will provide its report to both the provincial and federal Ministers for their consideration and approval decision.

1.6.1.4 Past and Current Environmental Studies in the Region

Two EAs have recently been conducted in the Prince Rupert Region: The 2013 Fairview Container Terminal Phase II and the 2012 Canpotex Potash Terminal Project on Ridley Island.

In addition, a number of LNG projects in the Prince Rupert Region are currently within the EA and review process:

- Pacific Northwest LNG (provincial EAC granted November 25, 2014, although federal decision under CEAA is still pending);
- Prince Rupert LNG;
- Aurora LNG; and
- Grassy Point LNG.

Publicly available information from these studies, and any incidental projects in addition to grey literature and scientific literature, will be reviewed and incorporated as appropriate. Where necessary, project-specific studies on the human and biophysical environments will be conducted to support a Project environmental impact assessment.

1.6.2 Federal Permits, Approvals, Licences, and Authorisations

In addition to the federal EA approval discussed in Section 1.6.1.2, federal permits, approvals and authorisations that could potentially be applicable to the proposed Project are summarised in Table 3 below.

Table 3: Federal Permits and Approvals Potentially Applicable to the Proposed Project

Permit/Approval	Responsible Agency	Federal Statute	Project Activity
Export Licence (obtained March 18, 2014)	National Energy Board	National Energy Board Act	To export LNG outside of Canada to international markets; export licences are typically approved for 25-year terms.
Fisheries Act Authorization	Fisheries and Oceans Canada	Fisheries Act	• LNG marine terminal facilities along the foreshore of Tuck Inlet • Construction of the intake structure • Temporary and permanent docks • Temporary and permanent onshore infrastructure in and around streams
Navigation Protection Act Approval	Transport Canada	Navigation Protection Act	• LNG marine terminal facilities • Offloading docks • Water intake structure
Certificates of Compliance	Transport Canada	Marine Transportation Security Act and Regulations	Operation of the LNG facility, port, and carriers.
Disposal at Sea Permit	Environment Canada	Canadian Environmental Protection Act and Disposal at Sea Regulation	Marine disposal of dredged material
Explosive Licences and Permits	Natural Resources Canada	Explosives Act, and Regulations	• Explosive Licence required for factories and magazines • Explosive Permit required for vehicles used for the transportation of explosives

The Prince Rupert Port Authority (PRPA) is responsible for issuing three permits within PRPA boundaries including dive permits, hot work permits, and dangerous goods permits. Depending on the nature of work activities, one or more of these permits may be required to complete the work and to enable shipping within PRPA jurisdictions.

In addition to the federal permits summarised above, WCC LNG Project is planning to request a Technical Review Process of Marine Terminal Systems and Transshipment Sites (TERMPOL) review. Initially developed to address oil tankers, TERMPOL has been expanded to include transportation of LNG. The TERMPOL process, which is voluntary, is conducted by Transport Canada and supports its review and approval of projects and issuance of permits such as those required under the *Navigation Protection Act*. The process is initiated by the Proponent submitting a request for TERMPOL review. The Director General for Marine Safety then establishes a

TERMPOL Review Committee for the specific project. As the review proceeds, the applicant is required to submit information which generally constitutes a risk assessment of the proposed facility and its operations.

The purpose of a TERMPOL review is to identify the navigational risks posed by shipping certain commodities and by the shipping activity itself. By identifying the areas of potential risk, project changes or shipping requirements can be identified to reduce or eliminate the risks of collisions, groundings, etc. by that potential risk. Undertaking such a risk assessment of the shipping and port operations is part of due diligence. An increasingly common alternative to the TERMPOL process is to engage a specialist contractor to undertake a detailed risk assessment outside of TERMPOL. The quality of such a risk assessment will cover all aspects of TERMPOL but can be done faster than the committee-based TERMPOL process. In the context of an EA, doing so is advantageous because the project can be modified at an earlier stage to address key risk factors. Although no specific approvals or permits are required, adherence to shipping requirements under the *Canada Shipping Act*, *Canada Transportation Act*, *Transportation of Dangerous Goods Act*, *Marine Liability Act*, and *Marine Transportation Security Act* will likely be required as part of the EA and/or TERMPOL review for the proposed Project.

1.6.3 Provincial Permits, Approvals, and Licences

In addition to the EAC discussed in Section 1.6.1.1, provincial permits, approvals, authorisations, and licences that could potentially be applicable to the proposed Project are summarised in Table 4 below. The Project is proposed to be located entirely within private lands owned by the City of Prince Rupert and in adjacent marine areas. No use of provincial Crown land is anticipated.

Table 4: Provincial Permits and Approvals Potentially Applicable to the Proposed Project

Permit/Approval	Responsible Agency	Provincial Statute	Project Activity
LNG Facility Permit	BC Oil and Gas Commission	*Oil and Gas Activities Act and Regulation*	Construction and operation of the LNG facility
Crown Licence of Occupation	BC Oil and Gas Commission	*BC Land Act*	Occupation of foreshore area along east side of Tuck Inlet for LNG marine terminal facilities
Waste Discharge Permit	BC Oil and Gas Commission	*Environmental Management Act* Oil and Gas Waste Regulation	Facility air emissions, effluent discharges, and waste disposal
Heritage Inspection and Investigation Permit	BC Ministry of Forests, Lands and Natural Resource Operations, Archaeology Branch	*Heritage Conservation Act*	• Archaeological surveys to support Project environmental impact assessment on provincial Crown land • Systematic study and data recovery from a project archaeological site

Permit/Approval	Responsible Agency	Provincial Statute	Project Activity
Heritage Site Alteration Permit	BC Ministry of Forests, Lands and Natural Resource Operations, Archaeology Branch	*Heritage Conservation Act*	Alteration of project archaeological site
Wildlife Act Permit	BC Ministry of Environment, Environmental Stewardship Division	*Wildlife Act*	Wildlife surveys and sampling of wildlife and their habitat
Construction Permit for a Potable Water Well	BC Ministry of Health, Northern Health Authority	*Drinking Water Protection Act*	Exploration of a well for domestic water use
Water System Construction Permit	BC Ministry of Health, Northern Health Authority	*Drinking Water Protection Act*	Construction of a potable water system
Drinking Water System Operations Permit	BC Ministry of Health, Northern Health Authority	*Drinking Water Protection Act*	Operation of a potable water system
Short Term Use of Water Permit	BC Ministry of Environment, Water Stewardship Branch	*Water Act*	Short-term use of water approval from freshwater streams and lakes for construction purposes
Water Act Approval	BC Ministry of Environment, Water Stewardship Branch	*Water Act*	For changes in and about a stream including diversions, storage, and use of water
Water Licence	BC Ministry of Environment, Water Stewardship Branch	*Water Act*	For construction and operation of Project activities requiring diversion of surface waters

1.6.4 Municipal Permits

The onshore facilities are planned to be located on fee simple (private) land owned by and leased from Prince Rupert Legacy Inc., within the City limits of the City of Prince Rupert. Depending on construction conditions and methodologies, municipal permits that may be required include noise permits, blasting permits, permits to construct, excavation permits, tree cutting permits, and/or open-air burning permits.

1.7 Federal Funding and Land Involvement

The Project does not require federal funding support from federal authorities as shown in Figures 2A and 2B and Figures 3A and 3B in Appendix A, the loading wharf/dock for the proposed Project will be located within federal land under the jurisdiction of the PRPA. Depending on the Project configuration selected, one of the loading berths may also be located within PRPA land. Shipping for the Project will pass through areas under the PRPA jurisdiction. Potential marine-based effects on the area of federal land under the jurisdiction of PRPA are expected to include impacts from dredging and construction of the berthing/wharf/dock facilities during construction and decommissioning, and vessel and LNG carrier movements during operation of the facility. A summary of potential effects to the marine environment is provided in Section 5.2, Table 14 in the row referring to Marine Biological Resources. Effects to the air quality above federal land in proximity to the Project site will be assessed as part of the environmental assessment. Land-based environmental effects are anticipated to be localized to the Project area and are not expected to affect federal land, but will be considered in the environmental assessment.

The PRPA is a federal port authority defined under the *Canada Marine Act* 2001. It operates commercial and industrial operations and shipping movement in Prince Rupert harbour. The PRPA is governed by a board of directors with full control over Port decisions, with a mandate to facilitate and expand the movement of cargo and passengers through the Port of Prince Rupert (Government of Canada, 2014). Projects proposed for locations under the jurisdiction of a port authority were formerly subject to federal environmental assessment under the former CEAA's Canada Port Authority Environmental Assessment Regulations. These regulations no longer apply under the new CEAA 2012. In addition, the PRPA is no longer a Responsible Authority under CEAA 2012; however, as a federal authority it is required to determine whether the Project will cause detrimental environmental impacts prior to making a decision. The PRPA will provide specialist or expert information and knowledge, if requested to do so by the CEA Agency or the province under a Substitution Agreement.

Since the first commercial delivery in 1964, more than 75,000 cargoes have been delivered without major safety incident (International Group of LNG Importers, 2014). A total of 885 vessels enter the Port of Prince Rupert annually: 443 ferries, 251 bulk carriers, 130 containers, 31 tugs/barges, 25 cruise ships, and 5 tankers (DNV, 2013). Therefore, the estimated annual vessel traffic associated with the WCC LNG Project will represent an approximate increase in vessel traffic of 50%.

The largest vessels currently using Prince Rupert harbour are bulk carriers of up to 87,000 DWT (DNV, 2013). Some LNG carriers for the proposed Project will be larger than current marine traffic, ranging from 70,000 to 140,000 DWT (See Section 2.1.15).

Lands reserved to First Nations in proximity to the Project area are discussed in Sections 3 and 6.

1.8 International Standards

The Project will comply with all relevant applicable international standards, including for example, the International Joint Commission's Air Quality Agreement. In 1991, Canada and the US signed a bilateral Air Quality Agreement with the purpose of addressing shared issues related to trans-boundary air pollution. The objective of this agreement is to control trans-boundary air pollution between the two countries through establishing and implementing specific objectives for limiting air emissions (International Joint Commission).

For projects that have the potential to cause significant trans-boundary air pollution, the relevant jurisdiction is required to appropriately assess the project, provide notification to the other party, and implement mitigation measures as appropriate.

2 PROJECT INFORMATION

2.1 Project Components

The proposed WCC LNG Project major components are similar for both the onshore and marine-based barge-mounted options. The permanent facilities and infrastructure for the WCC LNG Project are described below and key differences between the onshore and marine-based barge-mounted concepts are noted when applicable.

LNG Facility	• Natural Gas Supply from third-party pipeline • Inlet Gas Receiving System • Natural Gas Pre-treatment Process to remove CO_2, H_2S, water, heavy hydrocarbons, and mercury from the pipeline gas • Natural Gas Liquefaction Trains producing up to 30 MTPA • LNG Storage of up to five 200,000 m^3 onshore storage tanks (onshore concept) • Process Heat and Cooling Systems • Power Supply System • Process Control Systems • Fire Protection and Safety Systems • Safety, Shutdown and Depressurization Systems • Safety Flare and Vent Systems
Support Facilities and Infrastructure	• Road or marine access to site • Boundary fencing and cleared perimeter area • Drainage System • Sanitary Sewage System • Materials Storage • Administration Building • Emergency Response Facilities • Central Control Room • Maintenance Workshops • Permanent Camp • Access road and bridge (optional, by others)
Marine Infrastructure	• LNG Storage of approximately 320,000 m^3 in hull storage tanks per barge (barge-mounted concept) • LNG Barge and Mooring Facilities connected to road or causeway via access trestles (barge-mounted concept) • LNG Transfer and Offloading Infrastructure at each barge (barge-mounted concept) or from access trestle with up to three berths (onshore concept) • LNG Shipping including route, navigation approach, vessel berthing, and operational safety zones • Materials Offloading Facility
Temporary Facilities	• Temporary or Pioneer docks • Surface sediment run off controls • Laydown areas and module haul road • Construction Offices • Emergency Response Facilities • Construction Camp supplemented by flotel if required for 500 to 8000 workers • Fuel Storage • Workshops and Warehouses • Construction Power generation and supply • Potable and Fire Water Systems • Concrete Batch Plant • Sanitary Sewage Treatment Plants

All activities described in Section 2.1 will be in the care and control of WCC LNG unless otherwise stated.

2.1.1 LNG Facility

The LNG facility will consist of inlet gas receiving, natural gas treatment (carbon dioxide [CO_2] and hydrogen sulphide [H_2S] removal, heavy hydrocarbon removal, mercury removal, dehydration), liquefaction, and LNG storage and offloading facilities. An illustration of the facility components, natural gas flow path, and supporting utilities and buildings is provided below.

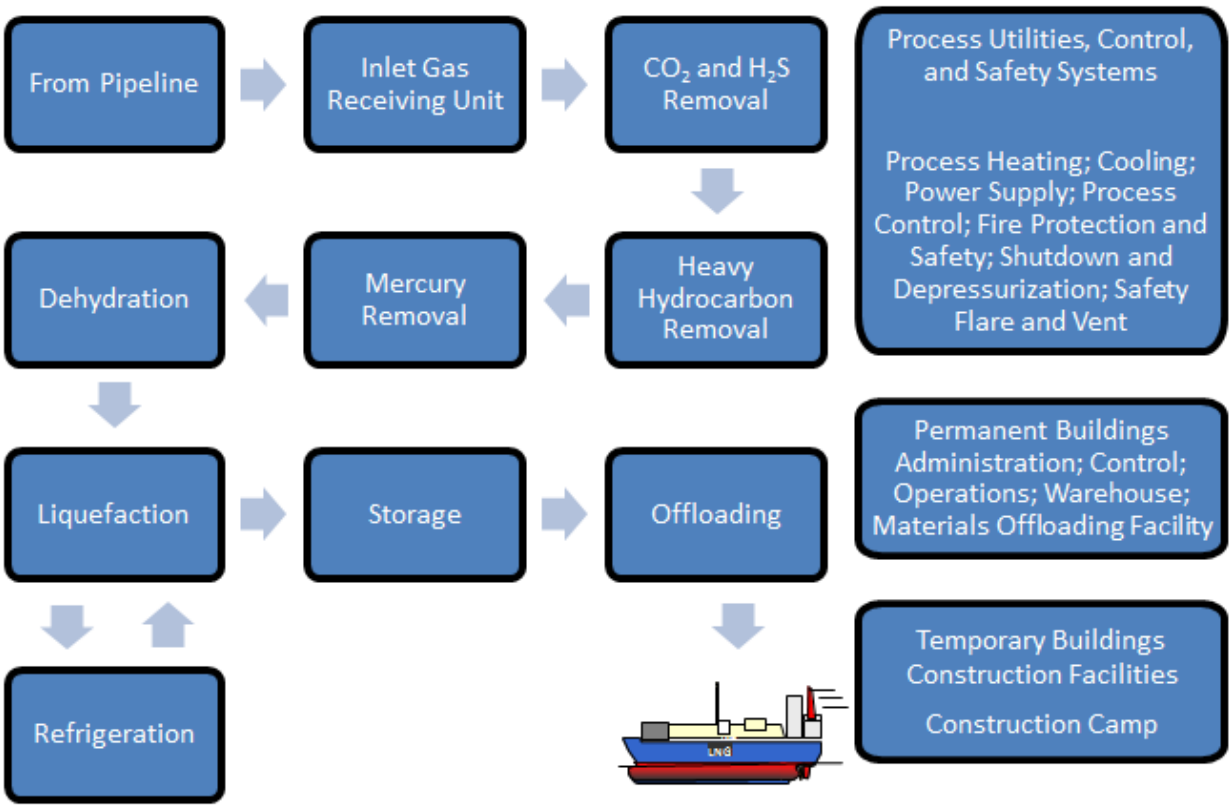

Illustration of the Facility Components, Natural Gas Flow Path, Supporting Utilities, and Buildings

In a marine-based barge-mounted facility, inlet receiving, heavy hydrocarbon removal, mercury removal, dehydration, liquefaction, storage, and offloading will all be located on barges. Figure 8 provides a 3-dimensional rendering of a conceptual design of a barge-mounted LNG unit.

In an onshore facility, the production units have the same function; however, the intention is that all facilities will be located onshore, with the exception of a marine facility to offload LNG onto an LNG carrier.

2.1.2 Natural Gas Supply

The Project will be supplied with natural gas sourced from the Western Canada Sedimentary Basin, including fields in eastern BC and western Alberta. Natural gas will be transported to the LNG facility via a pipeline that will be built and operated by a third-party pipeline company to connect the LNG facility to an existing pipeline network in northeastern BC, and therefore the pipeline operation will not be in the care and control of WCC LNG. The third-party gas supply pipeline is not part of this Project Description and it is understood that separate Environmental Assessment Certificates for each of two such pipelines were granted by the BC Environmental Assessment Office on November 25, 2014. It is also understood that neither of these natural gas pipeline projects will require a federal environmental assessment pursuant to CEAA 2012, following the coming into force of the *Regulations Amending the Regulations Designating Physical Activities* on October 24, 2013.

Both proposed pipeline projects are considered viable alternatives for WCC LNG's gas supply. WCC LNG Project will actively pursue potential industry sharing synergies through the third-party pipeline provider.

2.1.3 Inlet Gas Receiving System

The pipeline will terminate at a pipeline receiving station located within the property boundary of the LNG facility. The receiving station will include a metering station and pigging facilities, as well as appropriate safety systems. The pigging facilities will be used to confirm operability and assess the condition of the pipeline. Pipeline pigging operations will not affect other operations at the LNG facility.

The natural gas entering the LNG facility will meet gas pipeline specifications. Table 5 provides typical composition of the feed gas in Mol %. There will be some variability in the feed gas as it will be produced from more than one area of the Western Canada Shale Basin.

Table 5: Feed Gas Composition

Component	Typical Feed Gas Composition (Mol %; Dry Basis)
Nitrogen	0.57
Methane (C1)	95.40
Ethane (C2)	2.64
Propane (C3)	0.58
i-Butane (i-C4)	0.09
n-Butane (n-C4)	0.10
i-Pentane (i-C5)	0.03
n-Pentane (n-C5)	0.02
CO_2	0.56
H_2S	<4 ppm
Mercury	Nil

2.1.4 Natural Gas Pre-treatment Process

To meet LNG product specification, carbon dioxide (CO_2), hydrogen sulfide (H_2S), water, heavy hydrocarbons and mercury must be removed to acceptable levels in the gas pre-treatment facilities. The gas pre-treatment facilities will consist of the following:

- Inlet Gas Receiving Unit – The feed gas to the LNG processing facilities needs to be maintained within a specified temperature and pressure range. The inlet gas receiving unit heats the feed gas to the required temperature and regulates the pressure to the processing facilities.
- Acid Gas Removal Unit (AGRU) – The AGRU removes CO_2 and H_2S with an amine-based solvent. The CO_2 and H_2S stream is then sent to an acid gas incineration unit that incinerates the H_2S and traces of hydrocarbons that could be present with the CO_2 and H_2S.
- Dehydration Unit – The dehydration unit removes water from the feed gas stream to avoid freezing in the downstream cryogenic units. The feed gas passes through molecular sieves and the water is removed via adsorption. The molecular sieves are regenerated with heated dry gas. The condensed water will be disposed of in compliance with regulatory requirements. The molecular sieve beds typically have a lifespan of about four years and are then replaced.
- Mercury Removal Unit – Mercury must be removed from the feed gas stream as mercury could cause degradation of aluminum used in the LNG process equipment. The level of mercury within the feed gas is expected to be negligible. However, the mercury removal unit ensures the integrity of the downstream LNG process equipment. The mercury is removed by passing the feed gas through a bed consisting of catalyst or sulfur impregnated carbon. The expected lifespan of the mercury removal bed is six years.
- Heavy Hydrocarbon Removal – The method for removal of heavy hydrocarbons (e.g., ethane, propane, i-butane, n-butane, i-pentane, n-pentane, and C6+ including benzene) which may freeze at cryogenic temperatures is expected to utilise molecular sieve beds.

2.1.5 Natural Gas Liquefaction Process

After the natural gas has been treated, it will enter the liquefaction section of the facility where it will be chilled to approximately -160°C and liquefied. The liquefied gas exits the main cryogenic heat exchanger under pressure. The LNG is reduced in pressure before being sent to the LNG storage tanks. Natural gas vapors resulting from the reduction in pressure are recovered and used as fuel for the LNG facility. Actual LNG production per LNG train will be determined during the next phase of the planning process. Gas turbine drivers will be used to power the refrigerant compressors.

The liquefaction process, its configuration and the exact number of liquefaction trains will be selected as part of Pre-FEED activities. The project is considering liquefaction processes such as Air Products and Chemicals Incorporated (APCI) Single Mixed Refrigerant (SMR), Dual Mixed Refrigerant (DMR) or Propane Pre-cooled Mixed Refrigerant processes (C3MR).

For the onshore concept, up to five trains each producing approximately 6 MTA is being considered. For the marine-based barge-mounted concept, the facility will consist of up to five barges each with production capacity

of approximately 6 MTA per barge. For both cases, production per train or barge could be higher pending results of process optimisation studies.

2.1.6 Process Heat System

The LNG facility has two major process units that require process heat: the amine reboiler in the AGRU and the dehydration regeneration gas heater. Both of these heat loads involve use of a heating medium in a closed loop to transfer the heat from the source to the end user. Waste heat recovery units installed in the exhaust of the gas turbines will provide the heat source to the heating medium. The waste heat recovery units will use hot oil to extract heat from the gas turbine exhaust gas prior to dispersion in the atmosphere. As an alternative, steam may be considered as the heating medium.

2.1.7 Cooling Systems

The Project is considering both air-cooled and water-cooled systems for process cooling.

- Air-cooled systems include fan-cooled heat exchangers that would be mounted on the liquefaction facilities and pipe racks.
- A water-cooled system uses a closed loop freshwater system cooled by seawater for the process heat exchangers. For the closed loop freshwater cooling system water source, it is assumed that seawater will be desalinated using reverse osmosis (RO) packages to produce freshwater. Alternative sources of freshwater such as the Prince Rupert municipal water supply may be also considered to fill the closed loop system. This system will require water for a first fill, limited top-up and refills after periodic maintenance. The seawater used for cooling will be returned to environment.
- A combination of air-cooled and water-cooled systems may also be considered to reduce cooling water requirements and area required for air fin coolers.

2.1.8 Power Supply System

The power generation system will supply the LNG facility with electric power. The main power generation system will consist of gas-turbine-driven generator sets or steam turbine generators and provide for all normal electrical loads. Based on current definition, at full build-out, the power supply system will provide approximately 500 MW. WCC LNG Project may consider other options for normal or backup power sources, such as the BC Hydro electrical grid. The power will be used for the operations facilities, support facilities, housing facilities, and other utilities.

2.1.9 Process Control Systems

The central control room will house equipment to monitor and control the process and utility operations at the WCC LNG Project facility. The central control room will also contain environmental monitoring equipment, an internal and external communications suite and a telecommunications system. The central control room will be

able to evaluate, monitor and manage any emergency or unusual event at the facility. Local shutdown facilities will be provided to control and manage shutdown and equipment isolation near the point of failure.

2.1.10 Fire Protection and Safety Systems

Fire protection, safety measures (e.g., emergency response plan, operating procedures), and safety systems/equipment (e.g., fire water pumps, hydrants, fire extinguishers, high expansion foam systems, gas detection and cryogenic leak detection) will be used to actively protect facility personnel, construction and operations equipment, and the surrounding areas and resources. Protection, safety systems, and planning will be used to avoid, limit, and mitigate injury or damage from incidents associated with the release of LNG product or associated vapor.

2.1.11 Safety, Shutdown and Depressurization Systems

A safety-instrumented system will operate to manage the safety, shutdown, and gas depressurization processes for the site. The system will include separate components for each LNG train and will include a combination of manual and automatic shutdown processes.

2.1.12 Safety Flare and Vent Systems

The LNG facility will include on-site safety flaring or gas venting for emergency purposes. Safety flaring or gas venting will only occur during emergency scenarios to reduce gas pressure at the LNG facility. Any such safety flaring is expected to be of short duration and is not anticipated to occur during normal operation.

For an onshore development, a common flare system is being considered for all production trains as well as a flare for the LNG tanks and vapor return from the LNG carriers, i.e., two or more onshore flares. For a barge-mounted unit, each barge will have its own flare system.

2.1.13 LNG Barge and Mooring Facilities

The marine-based barge-mounted concept consists of up to five barges, which will consist of process and storage facilities. The barges will be permanently moored with ancillary equipment and connections installed to connect the natural gas supply from shore to the barges.

The mooring and berthing arrangements and facility requirements include jetty platform, access trestle, breasting dolphins, mooring dolphins and fendering system. Each unit will be accessible from the shore by jetties. The jetties connected to a road or causeway will provide access for personnel and vehicles as well as the feed gas line, communications cables, and control cables.

The mooring system will be laid out and designed with consideration of the following operating parameters:

- Permanent vessel mooring for the barge-mounted LNG facility to safely withstand and endure extreme weather events and wind and marine environmental conditions on site;

- Water depth and adequate vessel under-keel clearance;
- Siting of the marine terminal infrastructure to avoid and limit potential impacts from berthed and transiting vessels to Tuck Inlet;
- Siting of the marine terminal infrastructure to enable continuation of the current navigational passage; and
- Siting of the marine terminal infrastructure to provide an adequate safety buffer during all operations.

2.1.14 LNG Storage

For the marine-based barge-mounted concept, LNG will be stored either on permanently moored barges or in an onshore storage facility, each with an expected storage capacity of approximately 320,000 m^3.

For the onshore concept, it is currently anticipated that storage of LNG will require up to five LNG storage tanks, approximately 200,000 m^3 each at the 30 MTA full build-out.

The final storage capacity will be decided once the development concept is finalised. This will be based on the LNG carrier size and sufficient buffer storage capacity.

2.1.15 LNG Transfer and Offloading Infrastructure

For the marine-based barge-mounted concept, LNG will be offloaded from the barge storage tanks onto the LNG carriers through use of mechanical swivel arm offloading systems capable of an offloading rate of approximate 12,000 m^3 per hour. LNG carriers ranging from 125,000 to 266,000 m^3 in capacity will berth alongside the barges for transfer of LNG. The fendering system will be located along each barge for berthing LNG carriers and provide a point of contact for the moored vessels. Mooring points will be provided along each barge. Mooring dolphins will provide additional connection points for berthed LNG carriers.

For the onshore concept, an access trestle and berths for berthing and loading LNG carriers will be in place. The location of the trestle, berths and associated infrastructure will optimise safe access for the LNG carriers. The berths will accommodate berthing of up to three LNG carriers at full build-out. Berths will be equipped with mooring dolphins and energy-absorbing fender units to absorb vessel berthing impacts. Each berth will be provided with loading arms for transferring the LNG onto the carriers and a vapor return arm for transferring boil-off gas.

2.1.16 Shipping Activities

The Project anticipates that shipping will occur on LNG carriers spanning the following approximate dimensions:

Length (metres [m]): 240 – 350

Beam (m): 40 – 55

Draft (m): 11 – 12.5

Capacity (km^3): 125 – 266

Deadweight (MT): 70,000 – 140,000

LNG carriers will be compliant with all applicable International Maritime Organization (IMO) requirements, classification rules, and international requirements (e.g., International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk [ICG], International Load Line, Safety of Life at Sea [SOLAS], International Convention for the Prevention of Pollution from Ships [MARPOL], Canadian marine safety navigation requirements [e.g., TERMPOL]), as well as industry body guidelines (e.g., Society of International Gas Tanker and Terminal Operators [SIGTTO], Oil Companies International Marine Forum [OCIMF], American Petroleum Institute [API]).

The Project is proposing approximately 330 to 430 carrier loadings per year corresponding to approximately 30 MTA LNG production. It is assumed that three or more tugs will be used for berthing LNG carriers alongside each LNG berth/barge, pending further analysis.

Although cargo transportation arrangements have not yet been defined, the party responsible for care, safety and control of the LNG product once it leaves the WCC LNG facility and marine terminal, will vary depending on the contractual arrangement between WCC LNG and its customers. WCC LNG will not own or operate LNG carriers; rather, WCC LNG, its affiliated companies and LNG customers will contract LNG carriers owned and operated by third party shipping companies under various terms and conditions to maintain shipping capacity and manage LNG inventory and production.

In some circumstances, LNG carriers not contracted by WCC LNG or its affiliated companies may be used, including where LNG is purchased Free on Board (FOB) from the WCC LNG facility by a third party customer. In such circumstances, WCC LNG will require the contracted shipping carriers to comply with all applicable national, international, and WCC LNG shipping and safety requirements when at, or near, the WCC LNG facility and marine terminal. When FOB is used, WCC LNG will transfer ownership of the LNG product as it leaves the WCC LNG marine terminal. In this circumstance, WCC LNG would transfer care, safety and control of cargo transportation operations to the buyer/shipper, which would be subject to the specific terms of LNG sale and national and international regulatory standards and practices for shipping.

In the circumstance where WCC LNG contracts through an ex-ship delivery (DES) agreement, WCC LNG or its affiliated companies would be responsible for transport of the LNG product and retain ownership of the LNG until transfer to its customer transfer port. In such circumstances, WCC LNG or its affiliated companies will contract with the third party shipping carriers and will require them to comply with all applicable national, international, and WCC LNG affiliate shipping and safety requirements during the voyage at sea and when at, or in proximity to, the WCC LNG facility and marine terminal.

2.1.17 Shipping Route

There are two routes to reach the proposed Project site within Tuck Inlet from the Pacific Ocean, via the Dixon Entrance near Triple Island Pilot Station through Chatham Sound and into Brown Passage. The LNG carriers will navigate either north or south of Lucy Island and south of Kinahan Islands, and then north between Kaien and Digby islands towards Prince Rupert harbour and toward the Project site along Tuck Inlet. Refer to Figure 6 for an overview of the potential shipping routes. These are the standard routes for existing shipping traffic into coal,

grain, and container terminals in the area. LNG carrier activities during transit will be compliant with all applicable laws and regulations.

2.1.18 Navigational Approach

LNG carrier navigation during transit will comply with all applicable laws and regulations. LNG carriers visiting the proposed terminal will transit in accordance with the *Canada Shipping Act* (Government of Canada, 2001), along with laws and regulations administered by Transport Canada and the Pacific Pilotage Authority. Designated inner and outer harbour anchorages may be used for both LNG and other support vessels with locations provided in the Port Information Guide (Prince Rupert Port Authority, 2014), consistent with applicable laws and regulations. Currently, inner harbour anchorages are restricted to vessels 250 m in length or less (Prince Rupert Port Authority, 2014).

2.1.19 Vessel Berthing

As indicated above, LNG carrier berthing activities will be conducted with assistance from tugs and will be compliant with all applicable IMO requirements, classification rules, international requirements (e.g., IGC, International Load Line, SOLAS, MARPOL), and Canadian marine safety navigation requirements (e.g., TERMPOL), as well as industry body guidelines (e.g., SIGTTO, OCIMF).

The Project plans to use BC Coastal Pilots Ltd. to support the safe inbound and outbound transit of LNG carriers, consistent with applicable marine navigation laws and regulations. During pilotage, LNG carriers will be piloted by Canadian pilots and escorted by tethered tugs. Inbound LNG carriers will pick up BC Coast Pilots at the designated pilot boarding station (e.g., Triple Island Pilot Station). In addition, and in the event of propulsion loss during transit, adequate propulsion redundancy will be provided by the tethered escorting tugs.

Designated inner and outer harbour anchorages may be used for both LNG carriers and other support vessels with locations provided in the Port Information Guide (Prince Rupert Port Authority, 2014), consistent with applicable laws and regulations.

2.1.20 Operational Safety Zones

WCC LNG Project will perform TERMPOL studies to determine the appropriate safety zones; however, the anticipated safety zone will be compliant with all applicable Canadian laws and regulations, and will be consistent with industry best practices.

2.1.21 Materials Offloading Facility

The Materials Offloading Facility (MOF) is a permanent dock that will be used to transfer personnel, materials, and equipment to the facility during construction and operation.

2.1.22 Third Party Road and Bridge Access

The primary access option currently under consideration for the WCC LNG Project is marine access via the MOF. A proposed road and bridge is being considered by regional authorities to serve multiple LNG plants and, if built, would enable land access to the WCC LNG Project site. Any such road would be developed under the care and control of the sponsoring government regulatory authority who would be responsible for environmental assessment of that project. In the event the authorities build a road and bridge, appropriate discussion with the developing authority for the road would occur at that time. The routing of any such access is yet to be determined and is outside the scope of the WCC LNG Project.

2.2 Project Activities

During the construction phase, the Project will have temporary facilities and infrastructure including:

- A construction camp and associated facilities that include waste collection and disposal, power generation, and water and food storage;
- Fuel and water storage;
- Power supply facility for construction;
- Marine offloading facilities;
- Laydown area for staging construction materials; and
- On-site concrete batch plant.

All construction activities will be conducted by third parties under contract to WCC LNG. WCC LNG will maintain care and control of all construction activities.

2.2.1 Site Preparation

Site Clearance

Site clearance will begin with the establishment of surface sediment runoff controls and securing of the site perimeter. Once these environmental and public safeguards are established, and the regulatory requirements are fulfilled, the removal of vegetation from the development footprint will commence. Commercial viability of vegetation will be pre-determined and, if such, an arrangement established for the removal with all considerations to safety and subsequent works. Non-commercial vegetation will be moved to designated stockpile areas for later disposal. Topsoil, organic materials, and any other unusable spoil material will be moved to stockpile areas for later disposal in accordance with local regulations. All current in situ materials will be evaluated and tested for potential reuse as aggregate and fill material; suitable materials will be harvested, processed and stockpiled for utilisation as building materials.

Preliminary data indicate variable depths to bedrock of surface organics and softer soil deposits across the site. It is anticipated that most buildings and process facilities will be founded on bedrock through a combination of excavating the softer surface soils, blasting and levelling bedrock, placement of suitable structural fill material, and piling through the weaker surface materials. More detailed studies will be undertaken to determine the existing site soil and rock quality conditions. The results of these studies will then be used to optimise the construction methods, excavation and fill quantities, and foundation design for the permanent facilities. It is expected that approximately 30 to 50 ha will be cleared for the minimum onshore support facilities case and approximately 400 ha for a full onshore development.

Drainage System

Improvement of the site drainage is critical to the early stage of site preparation. Existing natural drainage channels will be leveraged. Swamps and ponds that need to be drained will be drained by ditching or pumping excess water to existing drainage channels.

During site clearance and the construction phase of the Project, temporary erosion and sediment control will be put in place to ensure runoff water meets local regulatory discharge requirements.

A permanent storm water drainage system will be included in the designed civil works of the facility. A separate controlled area, capture, drainage and treatment system will be provided for all hydrocarbon or chemical exposure areas.

Sanitary Sewage System

To support construction and potential onshore operational activities on the Project site, a sanitary sewage treatment plant will be installed and commissioned. It will be tested to ensure liquid discharge meets regulatory requirements.

Waste Management

Prior to the commencement of construction, a waste management plan will be developed that ensures all wastes will be managed in accordance with applicable policies and regulations. Various options for waste treatment and disposal are being studied.

Dredging

The locations of the Materials Offloading Facility (MOF), the LNG berthing areas and the turning basin for the LNG tankers may need to be dredged to accommodate the drafts of the vessels. However, this will be subject to verification of bathymetric data and transportation requirements. Dredging operations, if required, will be conducted in accordance with all regulatory permit requirements and in manners similarly utilised throughout British Columbia waters. All necessary permits for dredged material disposal will be secured.

Site Access

The Project site is currently only accessible by water. There are no active roads or electrical or natural gas services on the site. During the construction period, both marine and land-based access routes are being considered for the Tuck Inlet site. Marine access is being considered via a temporary dock; from the temporary dock, a road will be built to a temporary laydown and potential pioneer camp area. Access will shift from the temporary dock to the MOF following the MOF's completion.

An alternative option for site access is via temporary access road(s). From the Project site, the access road option will require a bridge to either cross Prince Rupert harbour directly to the south into the City of Prince Rupert, or cross further to the southeast at Butze Rapids, before joining onto Highway 16. The routing of the access road(s) and tie-in point(s) to the existing road system will be evaluated and a preferred route will be

selected to minimise environmental and socio-economic impacts while maintaining a reasonably direct access to the site. First Nations and other relevant stakeholders will be consulted to determine preferred access routes. Depending on a planned infrastructure corridor decision by the provincial government, the Project may take advantage of and potentially participate in developing road access.

During operation, permanent access to the plant facilities and loading terminals will be constructed capitalising on the temporary facilities placed for construction.

Materials Storage

Storage areas for fuels and other potentially hazardous chemicals will be appropriately designed and constructed to comply with the BC Fire Code and National Fire Code for secondary containment with appropriate consideration for standoff from the water conservation area.

2.2.2 LNG Facility Concepts

The execution activities are similar for both the LNG barge-mounted and onshore LNG facility concepts. The main relevant activities are the fabrication of the LNG process modules, pre-commissioning of the modules, integration and hook up of the modules, and eventual commissioning of the full LNG facility. For both concepts, site preparation and construction activities will be similar. However, the type and scale of the activities will be different.

LNG barges and the modules they support will be constructed in a shipyard or fabrication yards that will be selected for the Project based on the capacity and capability to execute the work scope. The hull will be equipped with LNG storage as well as other equipment, structures, and tanks necessary to support the operation of the facility.

This execution approach provides efficient construction of the LNG processing and production unit with a substantial portion of the work being complete prior to arriving at the site for installation and commissioning. The modular approach will better balance the demand for labour at the site, the availability of which may be constrained by competing resource projects.

Transportation of LNG Barges and Facility Equipment to the Site

LNG barges will be towed to the site for final hook up and commissioning. Towing tugs, escort tugs, and support vessels will be required. By this time, the site will have been prepared to accept the barges and vessels, and the mooring system will be complete to accept the LNG barges. The tow to the site will be undertaken within predefined weather windows to ensure the barges can be safely towed and moored at the facility. Other equipment required at the site (e.g., site vehicles, construction equipment, onshore facility components) will be transported by vessels or marine barges and offloaded to laydown areas defined for the Project. Transport by road may also supplement marine transport of materials to the site once roadways are developed.

Site Construction Activities

The onshore element of the site construction process is also based on the use of modules, where possible, for onshore portions of the facility. Elements of the onshore facility that cannot be modularised will be built or assembled on site.

Similar onshore activities will be utilised regardless of whether the facility is based on a near shore approach with onshore elements or an onshore approach with a near shore elements, the primary difference being magnitude of the work scopes. Regardless of approach, marine loading facilities for LNG export and MOF for marine delivery of all land-based work scope materials, equipment, supplies, and personnel will be similarly required but differing in design.

Under the near shore approach, hook-up of the LNG barges will be made at the marine terminal connection points in accordance with the final mooring configuration design. Additionally, the barge-mounted processing facilities will be connected to an onshore gas supply and associated utilities.

Construction will be executed 7 days per week, with most of the work scheduled during daytime hours. Construction activity during nighttime hours will be as required and planned so as to control light, noise and vibration. Mitigation measures to control potential effects on wildlife and marine mammals during the construction phase will be considered. Activities such as tree-clearing will be limited to time periods outside of the critical life stages for impacted wildlife, where practicable (e.g., not during mating season for birds or amphibians). Blasting, if required, or other high decibel construction noise will be mitigated when marine mammals are in the area and will be mitigated to reduce disruption to the local community whenever possible.

Construction activities may include, but are not limited to, the following major areas:

- Site preparation;
- Construction of the MOF;
- Potential dredging of MOF, berth areas, and turning basin;
- Onshore facilities including:
    - Temporary construction facilities, camp, module haul road, and other infrastructure;
    - Administration, control, and operations buildings;
    - Permanent camp;
    - Utility and power facilities;
    - Process and storage facilities (onshore option);
    - Erection of other onshore facilities and structures; and
    - Gas inlet facilities.
- Marine facilities including:
    - Pile installation;
    - Erection of the jetties;
    - Installation of interface piping, electrical, and instrumentation;
    - Installation of remaining operational systems equipment; and
    - Mechanical and electrical installation.
- Systems pressure and integrity testing.

Construction Sequencing

The construction work sequence will be further defined during the early planning stages and the development of the detailed construction activity plan. The work sequence will be driven by the requirements for mechanical completion, marine facility integration, integration, commissioning, and start-up, ensuring that early system requirements are recognised and that the construction planning is structured towards the sequential systems completion necessary to meet the construction and commissioning plan.

As the Project evolves, the onshore facilities critical path items will focus on the pioneer dock, early site work, temporary utilities, MOF, camp facilities, marine facilities, permanent buildings, utilities, and finally will focus on the LNG process modules or LNG barges and their integration into the overall facility.

There will be contracting and subcontracting of construction activities that provide work opportunities to local contractors and specialty construction services providers, as well as storage, housing, and other project support and supply requirements. The contracting and subcontracting plan will be defined during Project development.

Materials Offloading Facility (MOF)

The MOF is a permanent dock that will be used to transfer personnel, materials, and equipment to the facility during construction and operation. Construction of the MOF will involve both onshore and offshore construction work scopes. Localised dredging is expected to be required and dredging methodologies will be dependent on geotechnical findings. Floating barges and cranes will be utilised, and sea pilings, sheet piling, and other types of foundation support will be required as determined by the geotechnical information when it becomes available. The MOF will be primarily used during construction but will also meet operational and maintenance requirements once the facilities go on-stream. There may be short periods during safety-critical operations when access around the MOF and within the channel will be temporarily restricted (typically less than 24 hours).

The large tidal fluctuations, minimisation, of dredging requirements and maintenance of a low-gradient route from the MOF to the site for transportation of heavy equipment and prefabricated modules will impose specific siting considerations and limitations.

A temporary dock will be used in the early construction phase of the Project and will be key in establishing early access.

Civil Works, Foundations and Structures

Civil works for onshore facilities will begin with site clearing and preparation, excavation to bedrock, and dewatering. Any underground utility and power lines will then be installed. Foundation work, which could include a combination of piles, placement of structural fill, and levelling of bedrock, will then be completed across the site for the process facilities, buildings, tankage, utilities, power generation, and other supporting structures and equipment that are located onshore.

Following completion of underground and foundation work, the final grade work will be commenced as per the approved plans. Due to varying relief across the site, the final grade elevation is not expected to be uniform throughout the site; however, the facility design will seek to optimise use of the existing site topography when locating equipment relative to the surrounding environment.

Civil works for marine facilities will proceed in parallel with the onshore civil and foundation installation program. Civil construction activities for the marine facilities may involve seabed levelling, drilling, and driving piles for foundations.

Permanent Camp

The development strategy for the Project's LNG facilities is currently under review. The accommodations requirement cannot be quantified at this time; however, the workforce accommodation strategy will be to minimise impact as much as is reasonably practicable. For example, accommodation requirements presenting higher environmental impact, such as permanent housing, will be sized appropriate to the workforce levels necessary for the safe operations and maintenance of the operating facilities with minor additional capacity to accommodate visitors and senior support staff for major maintenance and turnaround activities. Early installation of these facilities for utilisation during construction is a means of reducing overall project impact. Major maintenance and turnaround workforce accommodations may be accomplished through marine-based facilities or by dedicated areas for temporary multilevel modularised facilities mobilised during maintenance periods.

The construction workforce accommodation requirements will be transitional and likewise provided in accord with a minimally invasive philosophy. The intent is to size based on expected levels of workforce. Short-term labour peaks can be addressed through self-sufficient marine-based accommodation units or temporary modular units. Multi-storey units may be utilised to minimise plot area needed for accommodations.

The accommodation requirements implementation strategy is expected to be as follows:

- Initial accommodation requirements will utilise local establishments within Prince Rupert, as available, and personnel will be ferried daily between the Port of Prince Rupert and a new landing established at the Project site.
- The second phase will be to utilise self-sufficient marine-based accommodation facilities (flotels) stationed near shore.
- The third phase will consist of installation of permanent accommodation facilities and utilities that will serve the site-assigned operations and maintenance personnel, with allowances for some additional visitors and migrant staff that will be engaged in turnaround and major maintenance activities. Utilities will be provided via a modular approach that is based upon installing a number of "standard" capacity packages for each service plus additional package capacity to serve some of the maintenance and turnaround requirements.
- The fourth phase of accommodation requirements will be accomplished by construction and/or installation of facilities consisting of multi-storey prefabricated modular elements that will be installed on site on prepared foundations. Camp utilities will similarly be provided via a modular approach. Utilities distribution will likely be sub-surface in most cases to ensure unrestricted high-load movements and reliability of services.

All facilities will be provided in accordance with national and local code requirements as a minimum basis.

The philosophy of the onshore facilities has been to minimise the number of people who need to work on and operate the facility; hence, the permanent housing located onshore will be optimised. The permanent housing will be built using prefabricated modules that can be transported to the site on barges or trucks depending on the availability of local roads. An alternative to providing on-site permanent housing could be existing housing or new construction in Prince Rupert area; however, an essential personnel contingent must be accommodated at site.

Potable and Fire Water System

Potable water and fire water will be provided by a system similar to those provided in typical municipalities. A reverse osmosis (RO) system will be used to treat water if it is taken out of the channel adjacent to the LNG facility. Water handling equipment will be installed, connected, and tested, as required. The potential to use City water as potable water source will be considered.

Support Facilities

The support facilities consist of offices, emergency response facilities and equipment, machine shops, warehouses and other similar types of structures. For the most part, these buildings will be constructed using modules that can be barge or truck transported. The interior of the modules will likely be completed at a factory, including wiring, plumbing and built-in furniture to minimise the amount of construction required in the field. At the job site, the modules will be lifted using a crane and placed on the foundation. If a multi-storey building is being constructed, the modules may also be stacked as required.

Mooring Facilities (Barge-mounted Concept)

The mooring facilities will be designed and engineered to account for site-specific conditions (e.g., wind environment, marine sea conditions, bathymetry and foreshore geology). The LNG barges will be moored at the facilities and will be maintained in position during all weather and sea conditions that will be experienced on site. Construction of the mooring system will occur at the Project site and will involve the construction of new foundations, mechanical connections, and wiring connections between the barges and the facilities onshore. The details of the mooring system will be developed during the FEED phase of the Project and will be designed for the specific facility design. Construction activities may include piling, excavation, and placement of reinforced concrete bases at the connection points and placing/building any associated jetties and facilities on the jetties. During site work, construction barges and lifting equipment will be required on site and in the water to execute the construction and installation of these facilities.

Temporary Construction Facilities

Transportation infrastructure needed to support movement of equipment and people to and from the site will include an on-site marine ferry dock, MOF, and access roads, along with an area to store and maintain construction vehicles. There is no existing active infrastructure at the site and therefore the primary initial access to the site will be via water. However, alternative options will also be evaluated.

Construction support facilities will include warehouses, laydown areas, construction offices, construction camp, fuel storage, fabrication workshops, utilities, and concrete batch plant. All buildings will be prefabricated, climate controlled, insulated structures. Mobile equipment, generators, and vehicles will be powered by liquid fuels.

Initially, an accommodation barge, such as a flotel, will likely be used as a pioneer camp until longer term facilities are established. The flotel will support the camp construction and site preparation workers and flotel support staff. Flotels may also be utilised to address peak manpower requirements to balance the amount of longer-term usage of temporary facilities. The Project will also consider utilising local housing to supplement camp requirements.

The construction camp will provide longer-term housing for approximately 500 to several thousand workers depending on the degree of near shore versus onshore work scope decisions. The construction camp will be built using modules; however, stand-alone utilities that are being provided for the support facilities and the permanent camp may also be utilised by the construction camp, as available. The construction camp will likely be supplied with a reverse osmosis (RO) water system that is appropriately sized to provide potable and fire water to the camp, in addition to any water required for facility construction activities. The construction camp may be built in stages and a staged approach will complement progressive buildup in staffing to support construction activities. Following completion of construction of the facility, the construction camp will be either fully decommissioned or partially decommissioned and sized for maintenance and shutdown purposes.

Laydown areas are required for:

- Batch plants;
- Civil engineering material and materials preparation;
- Steel structures and piping;
- Equipment;
- Electrical cables;
- Instrument cables;
- Insulation; and
- Building materials.

The construction office area will include:

- Offices for Project team;
- Offices for the main contractor;
- Offices for the subcontractors;
- Emergency response equipment and personnel, first aid facility, and ambulance service;
- Safety training facilities;
- Canteen and mess hall; and
- Utility area, water storage, and fuel station.

Many of these facilities will be provided for construction period use of the permanent facilities.

A concrete batch plant may be built for construction work. Local suppliers for concrete may also be considered, as well as potential operators of the plant. Batching of raw materials will, where appropriate and possible, be done in a closed system to prevent emissions to the atmosphere prior to batching water being introduced. Aggregates and rock materials may be sourced from aggregate suppliers or, depending on available supply, a rock quarry may be established specifically for the Project. In addition to the cement, sand, and aggregate required for concrete batching and rock crushing, additional aggregate and rock materials may be required for:

- Final grading;
- Surfacing temporary access roads, working pads, and sheeting;
- Road sub-base and base materials; and
- Marine coastal armour and scour protection.

Packaged sanitary sewage treatment plants will be installed to treat sanitary waste from the construction camp and to treat sewage from other temporary construction facilities prior to discharge. The treatment of sanitary sewage will meet all applicable regulatory requirements. Portable toilets will be supplied and maintained by a

licensed contractor will be available on site, with off-site disposal to an appropriately licensed facility, during construction work and prior to establishment of a permanent sanitary treatment plant.

Construction Emissions / Waste Management

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

Vegetative materials and wood debris may be offered to local businesses or be chipped, while other organics may be piled and drained prior to being burned or disposed of at an appropriate disposal site. Overburden from the site could be temporarily stockpiled on site and, as appropriate, transported to an approved disposal area on land. Sand and gravel will be salvaged and incorporated into the cut-fill balance, where possible. Should dredging be required during Project construction, consideration will be given to using the dredged material for fill areas if practical, but some may require disposal at sea. Any ocean disposal plan will obtain an Ocean Disposal Permit from Environment Canada under the *Canadian Environmental Protection Act*, and will use an active Disposal at Sea site as specified by Environment Canada. The active Disposal at Sea site closest to the WCC LNG project site is understood to be the Brown Passage site west of Prince Rupert, although the actual site to be used for ocean disposal will be designated in the permit.

Construction-related air emissions will be managed by ensuring all construction equipment and vehicles are properly maintained and have required pollution control devices (e.g., catalytic converters). The currently proposed approach for construction-related waste water and sewage management is to treat discharges as required by regulations before final disposal.

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

Commissioning and Start-up

Once all the primary and utility connections, including gas connection, are completed, commissioning activities will go forward at the facility.

The schedule of systems completion will focus on early completion of systems that may provide beneficial support to safety and improved ease of construction activities of subsequent facilities.

Commissioning will include the installation of operating chemicals and lubricants to operational requirements; start-up and testing of all systems prior to operation will be undertaken to determine the functionality of safety systems and shutdown systems, along with operational control parameters. Integration testing will be done to ensure that the electrical connections and control system and safety systems operate as designed.

Upon completion, the commissioning activities will verify that facilities can begin production and storage, while operating within the appropriate design specifications. Start-up and commissioning will involve introducing process fluids and hydrocarbons into the production facility to produce LNG. Upon completion of commissioning, with appropriate inspection, witness and approval by the applicable regulators, the facility will start operations.

2.2.3 Facility Operations and Maintenance

The facilities will operate 24 hours per day. Facility maintenance will be performed in a manner that allows LNG production 365 days per year. Operating staff will monitor LNG production and make process adjustments to optimise production based on gas composition, ambient conditions and market demand. LNG operations will include the following:

- LNG production and storage;
- LNG carrier cool down and loading;
- Offloading of LNG refrigerants, fuel oil, chemicals, and other production materials; and
- Tug boats, supply vessels, ferryboats, and other marine crafts needed to support the LNG facility.

Routine maintenance and inspection activities will be performed on a systematic basis. These activities include the following:

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

2.2.4 Project Decommissioning and Reclamation

WCC LNG Project expects that decommissioning and reclamation requirements will be established as part of the EA and review process. These decommissioning requirements will be followed at the end of the Project's operational life. Project decommissioning and reclamation will comply with applicable federal and provincial legislation and requirements at that time. The current draft provincial LNG Facility Regulations specify Notification of Cessation of Operation and Site Restoration requirements for decommissioning of LNG facilities.

Exxon Mobil Corp. has Decommissioning General Practices (Exxon Mobil Corp., 2012) that WCC LNG Project will apply to the development of a decommissioning and reclamation plan prepared in consultation with the federal and provincial regulatory authorities, the City of Prince Rupert and potentially affected Aboriginal groups. The ultimate objective of the Project's "Decommissioning and Reclamation Plan" will be to return the land to productive and stable condition when the Project is complete.

The marine infrastructure including the LNG barges, mooring facilities, LNG transfer and offloading facilities, access trestle, mooring and breasting dolphins will be removed. Affected areas will be restored to an ecologically productive and safe condition, consistent with terms and conditions of applicable regulatory permits and approvals.

2.3 Project Schedule

The preliminary schedule including the construction, operation, and decommissioning and reclamation phases of the Project is summarised below in Table 6 for the initial development phase. All activities will be scheduled and completed in accordance with the EAC and terms and conditions of applicable federal and provincial regulatory approvals and local government bylaws.

Table 6: WCC LNG Project Preliminary Schedule

Project Phase	Year
Data acquisition and engineering studies (including FEED)	2014 – 2017
Field studies and environmental assessment process	2014 – 2016
Construction of initial phase	2017 – 2024
Operations and maintenance • Minimum of 25 year design life • Extended operating life	 2024 – 2048 2048 – 2058
Construction of remaining phases	2025 – 2030
Decommissioning and reclamation	2048 or later

2.4 Emissions, Wastes, Noise, and Light

2.4.1 Air Emissions

Construction Phase

Air emissions will be generated from construction activities and the operation of construction equipment. Dust or particulate matter (PM) will be the primary air emissions from construction activities, especially during site preparation and construction activities (e.g., clearing, grading, and compaction of the Project site and during construction of buildings and other structures). The dispersion of dust effects on air quality during construction are considered to be local and intermittent and mitigation measures will be put in place to limit the migration of dust beyond the project boundaries.

Combustion of diesel and gasoline fuels from construction equipment will also release atmospheric emissions such as nitrous oxides (NOx), hydrocarbons, carbon dioxide (CO_2), PM and sulfur dioxide (SO_2). However, these emissions are expected to be temporary and intermittent during the construction phase of the Project, thereby producing low-level and localised reductions in air quality.

The Project will strive to minimise emissions in the construction phase using accepted mitigation technologies and practices. At a minimum, a modern fleet of construction equipment will be used that will comply with all appropriate regulations with regard to atmospheric emissions. The following lists several construction practices that may be used to minimise emissions. Practices such as these will be considered in the construction of the Project:

- adherence to a tailored air quality management plan as agreed during the permitting phase;
- regular maintenance of construction equipment:

- minimizing vehicle idling:
- development of an efficient on-site road system:
- minimised burning of slash materials generated during site clearing;
- use of ultra-low sulphur diesel fuel:
- regular maintenance of on-site roads to minimise fugitive dust:
- use of crew shuttles to minimise the number of vehicles present on the site;
- the avoidance of materials subject to international bans due to toxicity concerns or depletion of the ozone layer, where applicable; and
- use of targeted monitoring programs to demonstrate compliance with applicable air quality standards

Operational Phase

Air emissions will be generated primarily from the gas turbines, thermal oxidisers, flares, backup diesel generators, LNG carriers, and marine support vessels, and comprise mainly atmospheric emissions such as NOx, hydrocarbons, CO, CO2 (greenhouse gasses [GHGs]), PM, and SO2. Onshore operational equipment will produce atmospheric emissions from combustion of fuels, such as diesel and natural gas. Marine and support vessel equipment will similarly produce atmospheric emissions from fuel combustion, such as diesel, bunker oil, and boil-off gas. Sources of GHGs may include road traffic, site maintenance and cleaning, and mechanical equipment operations.

Operational emissions including GHGs will be mitigated using a suite of proven technologies and good management practices. Appropriate monitoring and management plans will be developed in due course, commensurate with the design of the Project. The following will be used as appropriate during the operation of the Project:

- adherence to a tailored air quality management plan as agreed during the permitting phase;
- low-NO_X burners in fired-equipment consistent with current regulatory guidance;
- use of ultra-low sulphur diesel fuel in diesel-fired equipment e.g., back-up power generation;
- use of sweet natural gas as primary fuel;
- minimised vehicle idling;
- the avoidance of materials subject to international bans due to toxicity concerns or depletion of the ozone layer, where applicable;
- designed minimal flaring and venting;
- adherence to an equipment preventative maintenance program to maximize equipment efficiency; and
- targeted monitoring programs to demonstrate compliance with the applicable criteria.

Decommissioning and Reclamation Phase

Air emissions during site closure will be generated primarily from combustion of fuels, such as diesel and natural gas. Sources of CO_2 (GHGs) may include road traffic, site maintenance and cleaning, and mechanical equipment operations. In addition, GHGs may be released because of decommissioning activities, such as demolition and the operation of equipment. Combustion of diesel and gasoline fuels from on-site equipment will also release atmospheric emissions such as NOx, hydrocarbons, CO, PM and SO_2.

The dispersion of dust effects on air quality during decommissioning are considered to be local and intermittent. However, these emissions are expected to be temporary during the decommissioning phase of the Project, thereby producing low-level and localised reductions in air quality. Emissions from the decommissioning phase of the project are expected to be similar in scope and lower in magnitude than the emissions anticipated in the construction phase of the Project. Similar emissions mitigation and management philosophies will be adopted in the decommissioning phase as will be in the construction phase. Like the construction phase of the Project, the following practices may be used to minimise emissions during decommissioning:

- adherence to a tailored air quality management plan as agreed during the permitting phase;
- regular maintenance of equipment;
- minimizing vehicle idling;
- use of ultra-low sulphur diesel fuel, where available;
- regular maintenance of on-site roads to minimise fugitive dust;
- use of crew shuttles to minimise the number of vehicles present on the site; and
- use of targeted monitoring programs to demonstrate compliance with applicable air quality standards.

2.4.2 Solid and Liquid Waste Discharges

Construction Phase

Typical liquid and solid construction waste includes biomass waste (chipped vegetative material), excavated overburden, organic material (e.g., peat), large boulders, dredged seabed material, wood, scrap metal, concrete, unserviceable batteries, used motor and hydraulic oils, contaminated filters, used chemical cleaning fluids, paints, and other waste items considered as hazardous by jurisdictional authorities.

During construction, stormwater and any potential accidental discharges will be directed to a site temporary stormwater drainage system established during site preparation. Precautions will be taken during construction to avoid hydrocarbon spills, both onshore and in near shore areas. However, given that small hydrocarbons (fuel, grease and oils) or other substance releases from construction equipment are possible, the potential for such spills to enter nearby waterways will be controlled through the following:

- Trained fuel-handling personnel;
- Spill prevention procedures;
- Installing spill containment and clean-up equipment on barges and ferries; and
- Maintaining spill cleanup equipment in accordance with contingency plans.

Available water supplies will be used where possible to minimise extraction of water from nearby waterways for construction activities (e.g., dewatering, spent hydrotest water, water from maintenance shops, equipment wash water). Once the water is no longer reusable, it will be treated on site and monitored to ensure compliance with applicable permit requirements prior to being released to the environment. Sanitary sewage treatment will meet all applicable regulatory requirements. The collection and disposal of the waste will be in accordance with regulatory requirements, with off-site disposal to an appropriately licensed facility.

A Construction Waste Management Plan will be developed for the Project that describes procedures to minimise, segregate, safely store, and dispose of all wastes. A waste reduction program will also be

implemented to reduce the volume of wastes generated during construction by systematically assessing opportunities for reduction at source, reuse, recycling and recovery of materials, or converting waste into useable materials. These wastes will be collected in an on-site segregated, secured, and contained area in accordance with the waste management plan.

Operational Phase

Typical liquid wastes include treated sanitary wastewater (sewage and grey water), clean stormwater, contaminated stormwater, water contaminated in the LNG processes, water discharge from process sources, waste lubricating oil, spent solvents, and waste biological treatment facility sludge.

Typical solid wastes include domestic wastes (including food wastes from site personnel and LNG carriers berthing at the facility), paper/cardboard waste (from administration and packaging), wood and scrap metal from maintenance facility, solvent or hydrocarbon contaminated wastewater and surface runoff, mercury removed during the natural gas treatment process, waste catalyst and adsorbents, and used cartridge filters and batteries.

Processes will be designed with the intent to avoid or minimise the generation of wastes in accordance with the following strategies:

- Applying processes that convert materials efficiently;
- Instituting good housekeeping and operating practices;
- Instituting procurement measures that recognise opportunities to return usable materials; and
- Minimising hazardous waste generation by implementing stringent waste segregation.

In addition to the above waste avoidance or minimisation strategies, the total amount of waste is expected to be reduced through the implementation of waste recycling plans.

During operation of the facility, stormwater and accidental discharges will be directed to a drainage system established during site preparation. Precautions will be taken during operations to avoid hydrocarbon spills, both onshore and in near shore areas. However, given that small spills of hydrocarbons (fuel, grease, and oils) or other substances released from on-site equipment are possible, the potential for such spills to enter nearby waterways will be controlled through the following:

- Trained fuel-handling personnel;
- Spill prevention procedures;
- Installation of spill containment and clean-up equipment on barges and ferries; and
- Maintenance of spill cleanup equipment in accordance with contingency plans.

Process discharges during operation will be treated as required by regulations before final disposal, either at sea or transported off site for disposal. The potential for spills to enter marine waters or freshwater ponds and streams will be controlled through operating procedures and an expanded emergency response plan developed in conjunction with future phases of the Project.

Waste materials generated after the implementation of feasible waste avoidance, minimisation, recycling, and reuse measures will be treated and disposed of in accordance with relevant legislation and the Project waste management plan. Appropriate measures will be taken to avoid potential impacts to human health and the environment. Selected waste management approaches may include the following:

- On-site or off-site biological, chemical, or physical treatment of the waste material to render it non-hazardous prior to final disposal; and
- Treatment or disposal at approved facilities specially designed to receive the waste.

Decommissioning and Reclamation Phase

Typical solid and liquid wastes during decommissioning include unserviceable batteries, used motor and hydraulic oils, contaminated filters, medical waste, used chemical cleaning fluids, paints, fuels, trash, food wastes, sanitary waste, equipment and facilities wash down water, dust suppression water runoff and stormwater runoff.

During site closure, stormwater and any accidental discharges will be directed to a pre-established drainage system. Precautions will be taken during operations to avoid hydrocarbon spills, both onshore and in near shore areas. However, given that small spills of hydrocarbons (fuel, grease and oils) or other substances released from on-site equipment are possible, the potential for such spills to enter nearby waterways will be controlled through the following:

- Trained fuel-handling personnel;
- Spill prevention procedures;
- Installation of spill containment and clean-up equipment on barges and ferries; and
- Maintenance of spill cleanup equipment in accordance with contingency plans.

2.4.3 Light Emissions

Construction Phase

Construction activities will be predominantly undertaken during daylight hours, though nighttime work will be conducted on a regular basis. Light emissions during nighttime construction activities will be based on mobile and fixed on-site lighting established for health and safety purposes. Light emissions will be mitigated appropriately using various methods that may include directional lighting, height of lighting and low lumen fixtures.

Operational Phase

Operational light emissions during nighttime activities will be based on mobile and fixed on-site lighting established for health and safety purposes. Light emissions will be mitigated through appropriate methods that may include directional lighting, height of lighting, and low lumen fixtures. Impacts from light emissions during operations are expected to occur in close proximity to the site.

Decommissioning and Reclamation Phase

Decommissioning activities will be predominantly undertaken during daylight hours, though nighttime work is expected to be conducted on a regular basis. Light emissions during nighttime decommissioning activities will be based on mobile and fixed on-site lighting established for health and safety purposes. Light emissions will be

mitigated through appropriate methods that may include directional lighting, height of lighting, and low lumen fixtures. The light emissions during decommissioning are considered local and intermittent.

2.4.4 Noise Emissions

Construction Phase

Construction noise will be generated through construction activities such as site clearing, grading and compaction of the Project site, pile-driving, blasting and construction of buildings and other structures, along with facility assembly, general equipment movement, bolt tightening, pneumatic testing, line cleaning, and pressure testing of pipework and pressure vessels on site. Adverse noise effects during construction are considered to be local and intermittent.

Operational Phase

During the operational phase, potential noise sources include:

- Process facility equipment, such as compressors, gas turbines, pumps, air coolers, and control valves;
- Vehicle traffic;
- Marine vessel operation including low frequency noise emitted by the exhausts and occasional navigational sound signals; and
- Loading of LNG carriers.

Appropriate noise mitigation measures will be used, including acoustical enclosures, insulation, and other noise reducing technology to ensure these are within acceptable limits.

Decommissioning and Reclamation Phase

Noise sources during closure will be generated primarily from combustion of fuels, such as diesel and natural gas. Adverse effects from noise during site closure are considered to be local and intermittent.

2.5 Project Capital Cost and Employment Estimates

The production capacity of the initial phase of the Project is expected to have up to a 15 MTA LNG production capacity. Cost estimates are in the early stages of being developed as part of concept selection studies, but it is expected that the capital cost for the project could range between $15 to $25 billion depending on further studies and the final concept. Subsequent phases could develop the fully planned capacity of ~30 MTA.

During the construction phase, it is expected that the on-site labour will peak between 1,000 and 6,000 workers depending on the final development plan. Depending on the concept selected, the employment levels could be in the range between 4,000 and 20,000 person-years.

The operations phase of the Project will create many types of potential employment opportunities as outlined below:

- Employees – During the initial development phase, the operation is expected to employ about 250 to 300 people across the following job types: facility staff (skilled technicians/operators, management and supervision, unskilled workers) and office staff (management, professional engineers, office support staff).
- Contracted employment – Many operational activities for the Project will be undertaken by contractors. These activities may include tug operators, boat pilots, cleaning and catering services, local transportation services, safety, audit and monitoring services. Expectations are that this will require from 50 to 150 people through the operating life of the Project.

Additional construction and operations employees will be required as subsequent development phases are included. WCC LNG Project will seek opportunities to hire locally and use local suppliers when and where possible.

3 PROJECT LOCATION

3.1 Site Location

The Project site sits on the eastern shore of Tuck Inlet on the Tsimshian Peninsula, within DL 444, currently owned by Prince Rupert Legacy Inc., and within the limits of the City of Prince Rupert. The southern boundary of DL 444 is approximately 0.5 km across Fern Passage from the northern edge of the City of Prince Rupert town site. The Project site will lie to the south and west within DL 444, with forested land adjacent to the north and east toward the Woodworth Lake Conservancy Area near DL 444's eastern boundary (Figure 1). Coordinates for the centre of the Project site are provided in Table 7. Photos of the Project site and immediate area are provided in Appendix B.

Table 7: WCC LNG Project Coordinates

Geographic Coordinate System	Location
Latitude and Longitude (NAD 83)	Lat: 54.354936 Long: -130.251114
Universal Transverse Mercator (UTM)	NAD 83, Canadian Spatial Reference System (CSRS) UTM 9N Easting: 418691 Northing: 6023734

The Project site will comprise the aforementioned freehold lands, either owned or leased by WCC LNG Project, and water lots along the eastern shore of Tuck Inlet and the northern shore of Fern Passage. WCC LNG Project will seek to acquire permits from the provincial government for use of these water lots.

3.1.1 Land Use, Ownership and Zoning

The Project site is identified as fee simple land in the North Coast Land and Resource Management Plan. The land portion of the Project site will be within the 848 ha of District Lot (DL) 444 (parcel identifier number [PID] 014-961-130) in the Prince Rupert City limits. Prince Rupert Legacy Inc. is the current owner of DL 444 and the City of Prince Rupert has approved a zoning application for DL 444 to zone the lot for LNG industrial purposes on December 3, 2014. WCC LNG Project has an option agreement for land acquisition within DL 444 from Prince Rupert Legacy Inc. The nearest residence to project boundary is approximately 900m away from the most southern point of the DL 444.

The western boundary of the Woodworth Lake Conservancy adjoins portions of the east and south boundaries of DL 444, which is a Schedule E Conservancy overlapping the City's watershed. Conservancies are legally designated by two means and, to date, all conservancies in BC have been established through naming on either Schedule E or F of the *Protected Areas of British Columbia Act* (SBC, 2000). These schedules are listings of the designated conservancies, including Woodworth Lake.

A reserve/notation for a watershed reserve overlies a small portion of the western edge of DL 444 (Crown Lands File no. 0220234). The area of the watershed reserve extends much further to the west on Crown lands as it covers the City of Prince Rupert's watershed, including its water source, Woodworth Lake. A right of way tenure for a water line extends from the site's southwestern boundary to Lake Shawatlan Lake (site of the City's water

treatment plant) and accommodates the City of Prince Rupert's water line that is adjacent to the southern boundary of DL 444.

WCC LNG Project intends to locate the LNG marine terminals on a foreshore lot, which may coincide with portions of DL 109. An incorporated entity holds a licence of occupation (Crown Lands File no. 6407657) to operate a log handling enterprise on a portion of DL 109.

In addition to LNG marine terminals, a materials offloading facility (MOF) is planned in the marine waters on the southern shore of the proposed Project site which, depending on results of metocean data collection and engineering studies, may be within the jurisdiction of the Prince Rupert Port Authority. WCC LNG Project will apply to the BC provincial government and/or the Prince Rupert Port Authority for one or more permits and/or tenures along the shores of the proposed Project site to accommodate the proposed marine facilities. There is a reserve/notation (Crown Lands File no. 6408648) for planning purposes that overlaps the western side of the DL 444. A Notation of Interest (Crown Lands File no. 6401182) for gas or oil pipeline planning overlaps the northern portion of the Project site and extends to Grassy Point on the Tsimshian Peninsula. Timber resources on the Project site are owned by the City of Prince Rupert. The timber resources on the surrounding Crown land lie within the North Coast Timber Supply Area, which is administered by the joint North Coast and Kalum District Offices in Terrace. Timber harvesting has not been permitted in the City's watershed. The Crown lands surrounding the Project site and on the opposite shore of Tuck Inlet lie within the trapline area of Trapline Holder no. TR0614T031.

3.1.2 First Nations Land Use Planning Agreements

Metlakatla First Nation, Lax Kw'alaams First Nation, Gitxaala Nation, Kitsumkalum First Nation and Kitselas First Nation have all entered into separate Strategic Land Use Plan Agreements for the North and Central BC Coast. These agreements stem from the North Coast Land and Resource Management Plan and the Central Coast Land and Resource Management Plan initiated by the provincial government in 2002. The goal was to promote economic and environmental sustainability with eco-system based management approaches to land use decision-making. The five Strategic Land Use Planning Agreements were signed on a government-to-government basis with the provincial government of BC and are available on the provincial website.

First Nations may have other land use plans or policy documents relevant to land use planning. Where appropriate, the Project intends to incorporate that information into the environmental assessment.

3.1.3 Proximity to Federal Lands

Table 8 identifies the proximity of the WCC LNG Project to the nearest federal lands, including lands administered by the PRPA, federal parks, and Indian Reserves.

Table 8: Proximity of the WCC LNG Project Site to Nearest Federal Lands

Federal Lands	Distance from WCC LNG Project Site (km)
First Nation Reserves	
Shoowahtlans 4	0.75 km
Wilnaskancaud 3	1.82 km
Lax Kw'alaams 1	6.43 km
Tuck Inlet 89	8.0 km
S ½ Tsimpsean 2	8.1 km
Prince Rupert Port Authority Lands	
Prince Rupert Port Authority Boundary	0 km
Federal Parks	
Gwaii Haanas National Park Reserve	200 km

Apart from PRPA land, which is adjacent to the site, the nearest federal land to the proposed WCC LNG Project site is the Shoowahtlans 4 First Nation reserve, which is located approximately 0.75 km away.

3.1.4 Marine Transportation

The Project site's southernmost shore borders the PRPA's northernmost boundary[3] (see Figure 9 in Appendix A). The Project's proposed supply wharf may extend across the shore and into marine waters that are under the jurisdiction of the Port. The LNG marine terminals may be located along the eastern shore face of Tuck Inlet, north of the Port's boundary.

The PRPA is divided into the Inner Harbour and Ridley Island / Outer Harbour for planning purposes (Prince Rupert Port Authority, 2011). The PRPA's 2020 Land Use Management Plan sets out a development focus for the Inner Harbour Planning District of supporting existing cruise ship operations and other uses that benefit from this area's proximity to downtown Prince Rupert. The development focus for the Ridley Island / Outer Harbour Planning District is for liquid and dry bulk commodity terminals and logistics industrial parks (Prince Rupert Port Authority, 2011). There is no designation for this area in the PRPA's 2020 Land Use Management Plan.

[3] The port's authority extends to the high water mark on lands within its boundaries.

Section 2.1.17 of this Project Description gives a description of the marine corridors that the LNG vessels will transit. These LNG vessels will enter and leave PRPA's jurisdiction at the entrance to Tuck Inlet.

Lax Kw'alaams Ferry Corp. (owned by Lax Kw'alaams First Nation) operates a scheduled ferry service in Tuck Inlet between Aero Point Cove in Prince Rupert and the head of Tuck Inlet. Other marine vessel activity in Tuck Inlet is low, consisting of recreational watercraft and log boom hauling tugs.

There are several marine facilities adjacent to, or within, the Prince Rupert Port Authority's boundaries that generate steady volumes of marine traffic. These facilities (from north to south) include Seal Cove Water Aerodrome, Rushbrook Floats / Marina, Atlin Dock, Northland Cruise Terminal, Lightering Dock, Ocean Dock, Westview Terminal, Canadian National AquaTrain, Alaska/BC Ferries Terminal, Fairview Terminal, Prince Rupert Grain Terminals, and Ridley Terminals Inc.

In terms of larger vessels, there were 885 vessel movements in 2011 within the Port's boundaries, over a third of which were BC Ferries vessels travelling to Haida Gwaii and Vancouver Island (DNV, 2013). Alaska Marine Highway System ferries contributed 14% of total movements of the larger vessels. Container ship traffic using the Fairview Container Terminal generated 15% of total movements, followed by 14% for bulk cargo vessels using the Ridley Island terminals. Table 9 presents data by large vessel type, cargo type, port destination, 2011 actual vessel movements, and a 2015 projection. The forecast is for a 21.5% increase in large vessel movements over the 2011 level. The recently completed Pinnacle Wood Pellet Project at Westview Terminal and the under-construction Canpotex Potash Terminal on Ridley Island will affect future traffic.

Table 9: Vessel Movements in Prince Rupert

Type of Vessel	Cargo Type	Destination	Vessel Movements in 2011	Forecasted Vessel Movements in 2015
Bulker	Grain	PR Grain/Ridley Isl.	112	90
Bulker	Coal/Wood Pellets	Ridley Terminals Inc.	107	180
Bulker	Logs	Anchorages D, V, E	32	37
Tanker	Wax	Fairview	5	6
Container	Containers	Fairview Container Terminal	130	260
Tug/Barge	Chemicals/ LP Gas	Canadian National Aquatrain	31	31
Ferry – BC	Passengers	BC Ferry Terminal	320	320
Ferry – Alaska	Passengers	Alaska Ferry Terminal	123	123
Cruise	Passengers	Northland Terminal	25	28
Total			**885**	**1,075**

Source: DNV (2013).

It is expected that one or more LNG processing and marine terminal facilities will be established in the Prince Rupert area. Along with WCC LNG Project, Pacific Northwest LNG and Prince Rupert LNG are currently seeking environmental approvals for facilities in the Prince Rupert area. Pacific Northwest LNG received its provincial EAC on November 25, 2014, although the federal decision under CEAA is currently pending. At full build-out, Prince Rupert LNG and Pacific Northwest LNG forecast approximately 130 and 350 LNG carrier visits per year, respectively, or approximately 260 and 700 movements (Prince Rupert LNG, 2014; Pacific Northwest LNG, 2014). Nexen's proposed Aurora LNG Project forecasts approximately 160 to 320 LNG carrier (up to Q-Flex size) visits each year to transport the LNG to overseas markets. (Aurora Liquefied Natural Gas Ltd., 2014).

The majority of vessel traffic in the Inner Harbour is from the movements of recreational and fishing boats. The PRPA installed cameras for monitoring vessel traffic at a few locations in the Porpoise Harbour area. At the channel location, 54% (3,707) of the recorded vessels were recreational boats, 36% (2,449) were fishing boats and 10% (722) were commercial vessels over the April to November 2013 period. The intensity of vessel traffic was seasonal; most movements occurred in July by a wide margin, followed by August, September, and then October.

3.1.5 Past and Current Environmental Studies in the Region

The Project is not located in a region of the province that has been subjected to a regional environmental study as defined in CEAA 2012. Section 4b of the Prescribed Information for the Description of a Designated Project Regulations, and Section 1.0 (5) of *the Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012* specify that relevant "information concerning any environmental study that is being or has been conducted of the region where the project is to be carried out" be included in the Project Description.

The following LNG and pipeline projects within the Prince Rupert region are currently in the environmental assessment and review process:

Project Name	Proponent	Environmental Assessment Status
Pacific Northwest LNG	Pacific Northwest LNG Limited Partnership	EAC granted November 25, 2014 Federal decision under CEAA pending
Aurora LNG	Nexen Energy ULC, INPEX Corporation, and JGC Corporation	Pre-Application; Project Description submitted
Prince Rupert LNG	Prince Rupert LNG Ltd., subsidiary of BG International Ltd.	Pre-Application; Project Description submitted
Prince Rupert Gas Transmission Project	Prince Rupert Gas Transmission, subsidiary of TransCanada Pipelines	EAC granted November 25, 2014
Grassy Point LNG	Woodside Energy Holdings Ltd.	Pre-Application: Project Description submitted
Westcoast Connector Gas Transmission Project	Westcoast Connector Gas Transmission Ltd. on behalf of Spectra Energy Transmission and BC International	EAC granted November 25, 2014

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

3.2 Socio-Economic Setting

The Project site is located in the municipality of the City of Prince Rupert, which in turn is located within the Skeena-Queen Charlotte Regional District, in northwestern British Columbia. Other communities located nearby include the District of Port Edward, the Lax Kw'alaams First Nation community, and the Metlakatla First Nation community. For further information on the location of Aboriginal communities with potential interests in the Project, see Section 3.2.4, 3.2.5 and 6.1.2.

The general economic trend in the northwest BC region for more than 10 years had been downward due to weakening demand for the region's wood products and the associated closure of several sawmills and pulp mills. The regional unemployment rate was 7% to 8% from 2005 through 2008, but increased to more than 10% by 2010; this was accompanied by a lower labour force participation rate. In the past two years, the regional unemployment rate has fallen sharply and is projected to continue trending downward. Global economic forces have generated high interest levels in major projects proposals for the region and these large-scale industrial projects will have the ability to underpin economic growth in the region over the next decade.

Most of the new investment and associated heightened economic activity in the region is tied regionally to new mine, LNG, oil and pipeline developments, and increased port traffic. Export of Canadian raw and semi-processed products to Asia and Asian market supply of consumer products to North America has created an important two-way growth engine for the ports of Prince Rupert and Kitimat. Northwest BC's favourable proximity to Asian markets and railway linkages to major markets in Canada and the United States have fuelled port-based investments and increased shipping activity.

At least 10 LNG facility projects are in the planning stages for northwest BC and the Government of BC has estimated that construction of 5 LNG projects over a nine-year construction phase from 2013 to 2021 could generate average annual employment of approximately 11,000 direct full-time equivalent jobs and approximately 2,500 direct long-term jobs when operating. The Northwest Transmission Line with its southern terminus in Terrace has stimulated new mine and hydroelectricity development in the region.

Regional business conditions have improved following the post-recession slump. For example, after a steep decline in the pace of business formations following the recession, business incorporations in the northwest BC region have since rebounded. Overall within the region, incorporations rose for a third consecutive year in 2012. The increasing passenger traffic at the Northwest Regional Airport and Prince Rupert Airport since 2010 speaks to the upswing in general business interest in the area.

3.2.1 Skeena-Queen Charlotte Regional District

The Skeena-Queen Charlotte Regional District (SQCRD) is a partnership of four electoral areas and five municipalities that provide local government services to some 18,561 residents living on the North Coast of British Columbia and Haida Gwaii (BC Stats, 2013), within the traditional territories of the Tsimshian and Haida

First Nations. The SQCRD administers services ranging from solid waste management and recycling to land use planning, water supply and public safety.

The Regional Board of Directors is composed of two types of representatives: Electoral Area Directors and Municipal Directors. Electoral Area Directors are elected to a three-year term to serve specific unincorporated rural areas. Municipal Directors are first elected to a municipal council for a three-year term and are then appointed by their council to the Regional Board for a one-year term. The board meets once per month, every third Friday.

In the SQCRD, member municipalities along with registered societies provide fire protection services to residents within prescribed areas of its region. The SQCRD Emergency Program provides the direction and coordination required to respond and recover from major emergencies or disasters in the rural (i.e., electoral) areas of the Regional District. The SQCRD program is in place to assist incident commanders when emergencies exceed their response capabilities, training, or available resources.

The economy of the SQCRD was traditionally focused on forestry, fishing and activities related to trade and shipment at the Port of Prince Rupert. With the relative collapse of these two industries, the region has tried to diversify its economy with initiatives into tourism, energy and port infrastructure development.

3.2.2 District of Port Edward

The District of Port Edward is a small community located 15 km southeast of Prince Rupert. It consists of approximately 18,387 ha, bordered by the Skeena River, Inverness Passage and mountains north of Highway 16. It is accessible by road and by water.

The population of Port Edward is approximately 551 (BC Stats, 2013). There are over 200 houses in Port Edward and 38 mobile homes. There is one small apartment complex.

The Port Edward Volunteer Fire Department responds to medical calls, vehicle accidents and fires within its District. Medical and Government services are obtained in Prince Rupert. The elementary school provides K – 5 education. Older students commute to Prince Rupert for middle and high school.

Forestry and fishing provide most of the employment opportunities for the residents of Port Edward. These industries are located in Port Edward and in Prince Rupert. Many residents commute to Prince Rupert and to nearby Ridley Island. Tourism also provides some employment through fishing charters and the North Pacific Cannery Village Museum.

The District has upgraded its recreation facilities with improvements to the community centre. This facility contains a hall with meeting, wedding, kitchen and washroom facilities. It has a seating capacity of about 250 people.

3.2.3 City of Prince Rupert

The land portion of the Project site will be within the Prince Rupert City limits. The City of Prince Rupert has a population of 12,342 (BC Stats, 2013), which is on Kaien Island and linked by bridge to the BC mainland. The District of Port Edward, Electoral Area A of SQCRD, and the First Nation communities of Lax Kw'alaams and

Metlakatla are near the Project site. The total population of the Prince Rupert area is approximately 14,000, including almost 5,000 Aboriginal persons living in the City of Prince Rupert.

There are no residences or commercial facilities on the Project site. The minor level of economic activity occurring in Tuck Inlet consists of log handling, recreational fishing, and ferry transport. The closest residential area and commercial hub to the Project Site is located in the Seal Cove area of Prince Rupert.

The study area communities of Prince Rupert, Port Edward, Lax Kw'alaams and Metlakatla are situated in the Northwest Health Service Delivery Area (NHSDA) and Prince Rupert Local Health Area of the Northern Health Authority. The Northern Health Authority and the new First Nations Health Authority provide a number of services to promote health and wellness in the communities near the Project.

There is a 24-bed hospital and four medical clinics in Prince Rupert. Both the Lax Kw'alaams and Metlakatla communities have small health centres. Basic health indicators for the NHSDA suggest that while perceived mental health is viewed more positively than the provincial average, physical health indicators suggest poorer health than the BC average (Statistics Canada, 2013). Premature mortality is also substantially higher in the NHSDA than in the rest of BC, including higher levels of deaths due to unintentional injuries and self-inflicted injuries, as well as higher levels of mortality due to cancer and disease (Statistics Canada, 2013).

Vessels accessing the Project site from the direction of Prince Rupert will traverse through waters under the PRPA's jurisdiction. For more on the PRPA, see Section 1.6.2, 1.7, and 3.2.6

Bulk cargo and container vessel, barge, fishing boat, water taxi, and ferry traffic is regular and well established in the Port's Outer and Inner Harbour areas. BC Ferries operates scheduled services between its terminal in the southern portion of the Inner Harbour and Skidegate on Haida Gwaii and Port Hardy on Vancouver Island. Alaska Marine Highway System also has a regularly scheduled ferry run that stops in Prince Rupert. Over the 2004 – 2011 period, approximately 50,000 to 100,000 cruise ship passengers annually stopped at the Port's Northland Terminal during the summer months on their way to view Alaska glaciers.

Prince Rupert has expanded its leisure and adventure tourism base over the past 15 years. Key drivers have been the longstanding ferry services, a scheduled passenger train service between Prince Rupert and Edmonton provided by VIA Rail and the Northland Cruise Ship Terminal, which opened in 2004. Grizzly bear viewing and whale watching activities occur in the Prince Rupert area.

Prince Rupert is the local regional service centre and hosts retail businesses and hotel accommodations, a Northwest College satellite campus, the Metlakatla Development Corporation operated Coastal Training Centre, and an airport on Digby Island that has scheduled air passenger services by Hawkair and Air Canada to Vancouver.

3.2.4 Metlakatla Reserve and Community

The Project site is approximately 12 km (by water) from the community of Metlakatla, located on S 1/2 Tsimpsean 2 on the northeastern end of Digby Island and the southwestern portion of the Tsimpsean Peninsula.

Metlakatla is located 7 km west of Prince Rupert and is accessible by water and air. The Metlakatla Ferry Service operates a ferry between the Metlakatla community and Prince Rupert.

Three Indian Reserves set aside for Metlakatla for fishing purposes are located within the vicinity of the Project. The closest Indian Reserve to the Project area, Shoowahtlans 4, lies adjacent to DL 444 at the outlet of Shawatlan Lake, about 3 km from the south end of the Project footprint by water (via Fern Passage). Wilnaskancaud 3, on northeastern Kaien Island (fronting Fern Passage), lies about 4 km from the south end of the Project footprint. At the head of Tuck Inlet, approximately 9 km upstream of the Project footprint, is Tuck Inlet 89.

3.2.5 Lax Kw'alaams Reserve and Community

The Project site is approximately 29 km (by road and ferry) from the community of Lax Kw'alaams, located on and adjacent to Lax Kw'alaams 1.

Lax Kw'alaams is located approximately 35 km from Prince Rupert. The community is accessible by air, ferry, or water taxi from Prince Rupert. The Spirit of Lax Kw'alaams Ferry leaves at scheduled times from Aero Point in Prince Rupert and arrives at Tuck Inlet, approximately a 40 minute drive from the community.

Local businesses, services and infrastructure in the community include the Coast Tsimshian Academy, a Grade 1 – 10 school, a fire hall, a health clinic, a bed and breakfast, a maintenance store, confectionaries, a nursery, a post office, an RCMP detachment, an updated recreation centre with 1,350 square metre swimming pool and a hotel.

3.2.6 Prince Rupert Port Authority

The Prince Rupert Port Authority (PRPA) is largely situated within the City of Prince Rupert in northwestern BC. The PRPA is an autonomous and commercially self-sufficient business enterprise with a mandate to facilitate and expand the movement of cargo and passengers through the Port of Prince Rupert. The PRPA is responsible for the overall planning, development, marketing and management of the commercial port facilities. Its vision is to be a leading trade corridor gateway between North America and Asian markets.

The PRPA's area of jurisdiction includes 965 ha of land, 14,000 ha of harbour area and more than 350 km of coastline. This includes:

- Prince Rupert's inner harbour;
- Ridley Island and surrounding waters;
- Waters extending to the high water mark to the Tsimshian Peninsula;
- Large water area around the south, east and west of Digby Island; and
- Coast Island, Kinahan Islands, Kitson Island, and Lelu Island.

Like most commercial ports in Canada, the PRPA operates under the provisions of the *Canada Marine Act* and related regulations. This regulatory framework gives the PRPA the authority to operate the Port in Prince Rupert harbour. While the PRPA is authorised under federal legislation, it maintains its own Board of Directors, which is responsible for the management of its activities. The PRPA operational guidelines state that any ship over 350 gross tonnes is subject to compulsory pilotage.

The PRPA is dedicated to ensuring the safe movement of vessels and goods through the harbour. A collaborative effort between the Canadian Coast Guard's Marine Traffic Services, Pacific Pilotage Authority, BC Coast Pilots, SMIT Marine, and PRPA exerts positive control over every vessel, ensuring round-the-clock safeguards.

While the system works effectively right now, the PRPA wants to ensure these high safety standards continue as the Port grows over the next 20 years. The PRPA has started a review of its practices and procedures in light of anticipated growth and a potential variety of new cargoes. Potential measures under consideration include additional anchorage designations, patrol boat escorts, tug availability and escorts, navigation corridors and traffic separation, "no-go" zones, berth design requirements, radar coverage, and navigational aid enhancements. The PRPA is currently seeking public comments regarding port, marine, and navigational safety.

The PRPA released its 2020 Land Use Management Plan designed to guide the Port's short-term development (Prince Rupert Port Authority, 2011). The plan notes that in 2012, there were approximately 430 vessel calls. By 2020, PRPA Chief Executive Officer Don Krusel expects that number to triple. The PRPA plans include:

- Expansion of Fairview Container Terminal;
- Development of a new potash bulk commodity terminal on Ridley Island;
- Provision for another bulk terminal on Ridley Island;
- General cargo terminal on Ridley Island;
- New short sea shipping terminal;
- Redevelopment on Inner Harbour terminals for light industrial commodities; and
- Logistics industrial park (export and import), as well as a general marine industrial park.

The Project site's southernmost shore borders the PRPA's northernmost boundary. The Project's proposed supply wharf will extend across the shore and into marine waters that are under the jurisdiction of the Port. The southernmost barge may be located along the eastern shore face of the Tuck Inlet, north of the Port's boundary.

Vessels accessing the Project site from the direction of Prince Rupert will traverse through waters under the PRPA's jurisdiction.

3.2.7 Land and Resource Use

Information on current ownership of the Project site and its local government land use designations is presented in Section 3.1. The Project site is only accessible by water. There are no roads or electrical or natural gas services on the site. The western boundary of the Woodworth Lake Conservancy adjoins almost the full length of the Project site's eastern boundary (and DL 444), which is a Schedule E Conservancy overlapping the City of Prince Rupert's watershed (Figure 9 in Appendix A). Conservancies are legally designated by two means and to date all conservancies in BC have been established through naming on either Schedule E or F of the *Protected Areas of British Columbia Act* (SBC, 2000). These schedules are listings of the designated conservancies, including Woodworth Lake.

A reserve/notation for a watershed reserve overlies a small portion of the western edge of the Project site (Crown Lands File no. 0220234). The area of the watershed reserve extends much further to the west on Crown lands, as it covers the City of Prince Rupert's watershed, including its water source, Woodworth Lake. A right of way tenure for a water line extends from the site's southwestern boundary to Lake Shawatlan Lake (site of the

City's water treatment plant) and accommodates the City of Prince Rupert's water line that is adjacent to the southern boundary of the Project site.

There is a reserve/notation (Crown Lands File no. 6408648) for planning purposes that overlaps the western side of the Project site. A Notation of Interest (Crown Lands File no. 6401182) for gas or oil pipeline planning overlaps the northern portion of the Project site and extends to Grassy Point on the Tsimshian Peninsula. Timber resources on the Project site are owned by the City of Prince Rupert. The timber resources on the surrounding Crown land lie within the North Coast Timber Supply Area, which is administered by the joint North Coast and Kalum District Offices in Terrace. Timber harvesting has not been permitted in the City's watershed. The Crown lands surrounding the Project site and on the opposite shore of Tuck Inlet lie within the trapline area of Trapline Holder no. TR0614T031.

Aboriginal and recreational fishing are known to occur in Tuck Inlet. Neither commercial fishing nor commercial seafood harvesting currently take place in Tuck Inlet. Recreational hunting, fishing, and hiking are likely to be limited on the Project site and in Crown land areas adjacent to the Project site due to their challenging terrain and access restrictions into the City's watershed.

See Section 6.1.3 for further information relating to the current use of lands and resources for traditional purposes and Aboriginal Interests.

3.2.8 Visual Resources

Scenic components of the environment have a value to individuals, to society and to the economy of a region, particularly in an area where scenic landscapes provide the context for tourism and recreation activities. The Project site's visual resources are characterised by the regional landscape context of complex coastline, steep topography, and predominantly intact, dense coastal coniferous forest. Visible evidence of existing land use near the Project site is related to existing residential, commercial, and industrial development.

3.2.9 Human Health

Country foods play an important role in the health and wellbeing of First Nations in BC, not only as a source of nutrition, but also in regard to cultural wellness (First Nations Health Authority, 2013; Office of the Provincial Health Officer, 2007). The majority of protein source for BC coastal Aboriginal communities comes from marine resources, including but not limited to salmon, eulachon, halibut, clams, seaweed, octopus, and herring roe-on-kelp. Other resources relied upon by Aboriginal peoples for traditional purposes are identified in Section 6.1.3.

3.2.10 Heritage Resources

Consistent with Section 5(1)(c) of CEAA 2012, the term "heritage resources" is used to collectively describe any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance.

There are currently seven recorded archaeological sites within the Project site, four of which are at the north end of the lot and are unlikely to be affected by the Project. Based on the types of archaeological and historical sites that have been identified within and in the vicinity of the Project site, it is expected that shell middens, culturally

modified tree sites, caves/rock shelters, rock art, artifact scatters, and heritage wrecks may be located within the Project area. Historical and architectural resources may include structures and refuse related to a known historical sawmill and possibly other commercial or residential structures, trails, or vessel remains.

A review of Prince Rupert - Skeena Geology Map 1472A indicates that the Project area consists of metamorphic bedrock such as schists, quartzite, and marble that are unlikely to be suitable for the preservation of fossils.

4 ENVIRONMENTAL SETTING

4.1 Climate

The Project site is located in the Pacific climate region, which experiences high annual rainfall and relatively mild seasonal variations in temperatures due to the moderating effects of the Pacific Ocean. Given the complex terrain in the area, the climate can vary considerably over short distances. Two major Pacific Ocean climate patterns, the Pacific Decadal Oscillations and El Nino, influence the region's year-to-year climate variability.

Climate normal data from the Environment Canada Prince Rupert airport station indicates that daily average monthly temperatures vary throughout the year from 1°C in January to 13.5°C in August. In summer, daily maximum and minimum temperatures vary between 8°C and 17°C. In the winter, daily maximum and minimum temperatures vary between -2°C and 6°C. The area experiences relatively high precipitation, with an average of 2,469 millimetres (mm) rainfall and 126 centimetres (cm) snowfall per year (2,594 mm per year total precipitation). Snowfall generally occurs from November through April, with the highest monthly average snowfall of 41 cm occurring in January. Precipitation is greatest in the fall and winter seasons. The average annual wind speed is 13 km/h. The prevailing (strongest and most frequent) wind direction is from the southeast, except in June and July when the most frequent direction is from the west (Environment Canada, 2014; Stucchi and Orr, 1993).

4.2 Air Quality

Ambient air quality data from a short monitoring program undertaken by the British Columbia Ministry of Environment (BC MoE) in the Prince Rupert area between April and August 2013 indicated that ambient concentrations of NO_2, SO_2, $PM_{2.5}$, PM_{10}, CO, and O_3 were consistently below the BC ambient air quality criteria.

The main sources of existing air emissions in the Prince Rupert area include regional shipping activities and terminal activities within the Prince Rupert harbour. Local sources of air emissions include vehicle transport and heating, including wood burning.

4.3 Acoustic Environment

A number of human activities within Prince Rupert harbour contribute to the acoustic environment around the proposed project location. These activities include loading and unloading of vessels at the Prince Rupert harbour, commercial shipping, passenger ferry traffic, recreational boating, fishing vessel traffic, and aircraft, including floatplane activity. In addition to human activity, natural sounds from wind, rain, waves, and marine wildlife contribute to the acoustic environment.

4.4 Geology and Geomorphology

The Project area is located in the geomorphic region known as the Hecate Lowlands on the western edge of the Coast Mountains (Kitimat Range) in British Columbia. The region has been subjected to major sea level changes and isostatic following several periods of glaciation. The regional bedrock geology comprises metamorphic rocks, predominantly schists, into which younger rocks have intruded.

The Project site slopes steeply up from Tuck Inlet to Geodetic elevations of 40 to 100 m in the southwestern portion of the site and to a peak of approximately 240 m elevation to the northwest. Above the steep shoreline slope, the topography is undulating and somewhat flatter. Available Canadian Hydrographic Service bathymetric information suggests that the steep shoreline slopes continue down below water level to elevations of about -30 to -50 m (Chart Datum; Canadian Hydrographic Service, 1995). The base of the inlet is relatively flat at elevations on the order of -50 to -55 m. Fern Passage to the southwest of the site is much shallower.

The Project site is poorly drained with several open swampy areas, small lakes, and numerous small tributaries with small catchments. The site has an established forest and brush cover, except in the open swampy areas. Exposed or shallow bedrock and open swamp areas typically do not support tree growth and are characterised by small, stunted or dead trees.

The primary natural hazards present at the site are rock falls/slides along the inlet slope and earthquakes and related tsunamis. The site is located in an area of moderate seismicity, with known regional historical earthquake activity. The largest recorded earthquake in the region was the M 8.1 event on the Queen Charlotte Fault to the west of Haida Gwaii in 1949, some 220 km west of the Project area. Very large earthquakes are also associated with the Cascadia Subduction zone, which is located off Vancouver Island some 400 km to the southwest of the site. Subduction events could have magnitudes of M 8 or greater, but given the large epicentral distance, the ground motions induced by a subduction event are unlikely to control design.

4.5 Hydrogeology and Surface Water Hydrology

4.5.1 Groundwater and Soils

Discontinuous, thin soil layer overlying bedrock is anticipated based on available surficial geology mapping (Map 1557A, 1:50,000; Geological Survey of Canada, n.d.). The site is located in a region that contains characteristics of a moderate geothermal potential with deep seated faults and late Tertiary volcanic complexes.

Mineral soils within the Project site may range from sandy to gravelly textures, with some surface horizons of silt and clay veneers overlying gravel and bedrock (Weiland, 2000). Organic soils are also expected associated with low-lying areas characterised as wetlands (e.g., bogs, fens, marshes), which tend to remain water-saturated for prolonged periods in coastal climates.

Groundwater flow is likely controlled primarily by bedrock topography and terrain features. Limited groundwater potential is expected in shallow overburden and fractured bedrock where there is sufficient recharge potential. The forested setting of the site suggests that groundwater flow through root networks may be a factor in subsurface runoff generation during rainfall events.

Publicly available resources indicate that the BC MoE has mapped no aquifers within the Project area and no registered water wells have been identified. Potential groundwater discharge areas include local streams, lakes, wetlands, and the marine environment.

4.5.2 Surface Water Hydrology and Water Quality

The Project site is located within the North Pacific Coastal Freshwater Eco-Region and contains a number of small lakes, wetlands, and creeks. Average annual runoff for a Water Survey of Canada hydrometric station,

located approximately 15 km southwest from the Project site, is 23 cm. Typical of local coastal watersheds, the highest stream flow in the Kloiya River occurs between October and March.

Five small watersheds are fully or partially contained within the Project site boundary. The majority of these watersheds drain west into Tuck Inlet.

The largest of the watersheds that is entirely contained within the site boundary is Unnamed Creek A. Unnamed Creek A is located near the centre of the property on the west side, is approximately 1.6 km long, and has a 92 ha catchment area. North of Unnamed Creek A, a small drainage area slopes steeply down into Tuck inlet; two smaller unnamed and intermittent watercourses have been identified within this area.

At the southern end of the Project area, three small unnamed creeks flow southwest to Prince Rupert harbour. From the centre of the site along the east side, Unnamed Creek B flows roughly south for approximately 3.5 km to Fern Passage. A small wetland is located on the lower reach of Unnamed Creek B. The majority of the Unnamed Creek B watershed (total catchment area of 317 ha) is located within the Project area. A small area in the southeastern portion of the Project footprint intersects with a small unnamed creek that drains into Shawatlan Lake.

The northern half of the Project area covers approximately half of the Scissors Creek watershed. The Scissors Creek watershed (total catchment area of 513 ha) drains into Osborne Cove, which is located at the mouth of Tuck Inlet.

Shawatlan Lake is a backup water supply source for the City of Prince Rupert. The City's primary water supply source, Woodworth Lake, is located approximately 4 km to the east of the Project site. Water from Woodworth Lake is transferred by gravity to the Shawatlan Lake Treatment Facility, where it is treated prior to distribution to the City of Prince Rupert.

4.6 Vegetation

The Project area lies within the Hecate Lowland Ecosection, an area of low relief underlain by granitic bedrock with rocky uplands and boggy lowlands (Demarchi, 2011). The Project area is in the Coastal Western Hemlock Biogeoclimatic Ecosystem Classification zone, Very Wet Hypermaritime Central subzone variant. This subzone is characterised by mild temperatures and heavy rainfall, with forests generally dominated by western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and yellow-cedar (*Chamaecyparis nootkatensis*), although shore pine (*Pinus contorta var. contorta*) and mountain hemlock (*Tsuga mertensiana*) are sometimes abundant (Banner et al., 1993).

The well-developed shrub layer typically consists of salal (*Gaultheria shallon*), blueberry (*Vaccinium* spp.), and false azalea (*Menziesia ferruginea*). Deer fern (*Blechnum spicant*) and cordilleran bunchberry (*Cornus unalaschkensis*) typically dominate the poorly developed herb layer, while step moss (*Hylocomium splendens*) and lanky moss (*Rhytidiadelphus loreus*) are the most dominant and often abundant mosses (Banner et al., 1993).

Extensive slope and blanket bogs are a characteristic and predominant feature of the CWHvh2 subzone. The Hecate Lowlands in particular are more commonly forested and non-forested wetlands rather than productive upland forest (Banner et al., 1993). Vegetation within these "blanket mire complexes" is characterised by

variable growth and cover of yellow-cedar and shore pine, with a shrub layer consisting of common juniper (*Juniperus communis*), sweet gale (*Myrica gale*), and Labrador tea (*Rhododendron groenlandicum*) (MacKenzie and Moran, 2004). The herb layer is typically dominated by tufted clubrush (*Trichophorum cespitosum*) and narrow-leaved cotton-grass (*Eriophorum angustifolium*), but a diversity of species may be present. The moss layer is well developed, with a mix of upland species in elevated areas and *Sphagnum* spp. in wetter hollows.

Fens and marshes are less common and localised in the CWHvh2 subzone, occurring along riparian areas where high water tables prevent tree establishment (Banner et al., 1993). Vegetation is often dominated by a dense cover of willows (*Salix* spp.) and sedges (*Carex* spp.). In addition, many small estuaries made up of saltwater marshes occur within the CWHvh2 subzone.

The British Columbia Conservation Data Centre (BC CDC) *Species and Ecosystems Explorer* indicated that no historical occurrences of federally or provincially listed plant species were reported within the Project area (BC CDC, 2014). That same search indicated that 18 vascular and 15 non-vascular listed plant species have the potential to occur in the Project area (Table 10); none of these 33 plant species is federally listed under the *Species at Risk Act* (SARA) (BC CDC, 2014).

Table 10: Listed Plant Species with the Potential to Occur in the Project Area

Scientific Name	Common Name	BC List [(a)]	Listed COSEWIC [(b)]	Listed SARA [(b)]
Vascular Plants				
Arctanthemum arcticum ssp. *Arcticum*	arctic daisy	Red	No	No
Callitriche heterophylla var. *heterophylla*	two-edged water-starwort	Blue	No	No
Caltha palustris var. *radicans*	yellow marsh-marigold	Blue	No	No
Carex glareosa var. *amphigena*	lesser saltmarsh sedge	Blue	No	No
Carex gmelinii	Gmelin's sedge	Blue	No	No
Cornus suecica	dwarf bog bunchberry	Red	No	No
Eleocharis kamtschatica	Kamchatka spike-rush	Blue	No	No
Hippuris tetraphylla	four-leaved mare's-tail	Blue	No	No
Juncus arcticus ssp. *alaskanus*	arctic rush	Blue	No	No
Juncus stygius	bog rush	Blue	No	No
Lilaea scilloides	flowering quillwort	Blue	No	No
Malaxis brachypoda	white adder's-mouth orchid	Blue	No	No
Malaxis paludosa	bog adder's-mouth orchid	Blue	No	No
Micranthes nelsoniana var. *carlottae*	dotted saxifrage	Blue	No	No
Piperia candida	white-lip rein orchid	Red	No	No
Polystichum setigerum	Alaska holly fern	Blue	No	No
Sanguisorba menziesii	Menzies' burnet	Blue	No	No
Triglochin concinna	graceful arrow-grass	Red	No	No

Scientific Name	Common Name	BC List [(a)]	Listed COSEWIC [(b)]	Listed SARA [(b)]
Non-Vascular Plants				
Bryhnia hultenii	n/a	Red	No	No
Dicranodontium asperulum	n/a	Blue	No	No
Didymodon leskeoides	n/a	Red	No	No
Diphyscium foliosum	n/a	Blue	No	No
Entodon concinnus	n/a	Blue	No	No
Hageniella micans	n/a	Blue	No	No
Isopterygiopsis muelleriana	n/a	Red	No	No
Philonotis yezoana	n/a	Blue	No	No
Pleuroziopsis ruthenica	n/a	Blue	No	No
Pohlia columbica	n/a	Blue	No	No
Sphagnum aongstroemii	n/a	Blue	No	No
Sphagnum contortum	n/a	Blue	No	No
Sphagnum obtusum	n/a	Red	No	No
Sphagnum subobesum	n/a	Blue	No	No
Tetrodontium brownianum	n/a	Blue	No	No

Notes:

(a) Source: BC CDC (2014): Search criteria: Forest District = North Coast (DNC) AND BGC Zone = CWH. Restricted to Red, Blue, and Legally designated species

(b) C = Candidate; DD = Data deficient; E = Endangered; NAR = Not at Risk; SC = Special Concern; T = Threatened; XT = Extirpated; and XX = Extinct

In addition, the BC CDC (2014) reports 17 provincially listed ecological communities (4 red-listed and 13 blue-listed) with the potential to occur within the Project area. Four red-listed communities occur within the North Coast Forest District and the CWHvh2 subzone:

- Sitka spruce / false lily-of-the-valley (CWHvh2/04);
- Sitka spruce / tall trisetum (CWHvh2/09);
- Sitka sedge / peat-moss fen (CWHvh2/Wf51); and
- Sweet gale / Sitka sedge fen (CWHvh2/Wf52).

Thirteen blue-listed ecological communities occur within the North Coast Forest District and the CWHvh2 subzone:

- Western hemlock - Sitka spruce / lanky moss (CWHvh2/04);
- Western redcedar - Sitka spruce / sword fern (CWHvh2/05);
- Western redcedar - Sitka spruce / devil's club Very Wet Hypermaritime (CWHvh2/07);

- Red alder / salmonberry / common horsetail flood association (CWHvh2/10; CWHvh2/Fl51);
- Western redcedar - Sitka spruce / skunk cabbage (CWHvh2/13);
- Sitka spruce / salal (CWHvh2/14);
- Sitka spruce / Oregon beaked-moss (CWHvh2/15);
- Sitka spruce / Pacific reedgrass (CWHvh2/16);
- Sitka spruce / sword fern (CWHvh2/17);
- Sitka spruce / slough sedge (CWHvh2/18);
- Sitka spruce / Pacific crab apple (CWHvh2/19);
- Northern mannagrass Fen (CWHvh2/Wf00); and
- Sitka sedge - Pacific water-parsley (CWHvh2/Wm50).

Many of these provincially listed ecological communities are shoreline forests unique to the exposed coastline of the CWHvh2 subzone. The influence of salt spray, strong wind and waves, brackish water, and specific landforms yield a variety of the Sitka spruce "fringe forests" listed above, which are restricted to a narrow band along the land/sea interface (Banner et al., 1993).

4.7 Wildlife

The proposed site lies within provincial Wildlife Management Unit 6-14 of the Skeena Region (Government of BC, 2014). Wildlife Management Units are areas of land designated under Section 4(2) of the *BC Wildlife Act* (Government of BC, 1996) for the benefit of regionally and internationally important fish and wildlife species or their habitats and serve as the basis for management of populations and for fishing, hunting and trapping regulations. Wildlife Management Unit 6-14 is a large (1,326 km^2) unit, encompassing a portion of the northwest coast from Prince Rupert north to Stewart, BC (Government of BC, 2014).

Based on its location within the CWHvh2 biogeoclimatic zone variant, the Project area has the potential to support approximately 19 herptile, 327 avian, and 105 mammal species (Stevens, 1995).

A search of the BC CDC *Species and Ecosystems Explorer* indicated that 22 provincially and/or federally designated terrestrial wildlife species, including marine birds, are confirmed to occur or have the potential to occur in the Project area (Table 11; BC CDC, 2014).

Table 11: Listed Wildlife Species with the Potential to Occur in the Project Area

Scientific Name	Common Name	BC List [(a)]	Listed COSEWIC [(b)]	Listed SARA [(b)]
Amphibians				
Anaxyrus boreas	western toad	Blue	SC	SC
Ascaphus truei	coastal tailed frog	Blue	SC	SC

Scientific Name	Common Name	BC List [a]	Listed COSEWIC [b]	Listed SARA [b]
Birds				
Ardea herodias fannini	great blue heron, *fannini* subspecies	Blue	SC	SC
Accipiter gentilis laingi	northern goshawk, *laingi* subspecies	Red	T	T
Brachyramphus marmoratus	marbled murrelet	Blue	T	T
Contopus cooperi	olive-sided flycatcher	Blue	T	T
Cypseloides niger	black swift	Yellow	C	No
Dendragapus fuliginosus	sooty grouse	Blue	No	No
Euphagus carolinus	rusty blackbird	Blue	SC	SC
Falco peregrinus pealei	peregrine falcon, *pealei* subspecies	Blue	SC	SC
Fratercula cirrhata	tufted puffin	Blue	No	No
Hirundo rustica	barn swallow	Blue	T	No
Megascops kennicottii kennicottii	western screech-owl, *kennicottii* subspecies	Blue	T	SC
Patagioenas fasciata	band-tailed pigeon	Blue	SC	SC
Phalacrocorax pelagicus pelagicus	pelagic cormorant, *pelagicus* subspecies	Red	No	No
Ptychoramphus aleuticus	Cassin's auklet	Blue	C	No
Synthliboramphus antiquus	ancient murrelet	Blue	SC	SC
Uria aalge	common murre	Red	No	No
Mammals				
Gulo gulo luscus	wolverine, *luscus* subspecies	Blue	SC	No
Myotis lucifugus	little brown myotis	Yellow	E	No
Pekania pennant	Fisher	Blue	No	No
Ursus arctos	grizzly bear	Blue	SC	No

Notes:

(a) Source: BC CDC (2014): Search criteria: Animal AND Restricted to Red, Blue, and Legally designated species AND Forest District = North Coast (DNC) AND BGC Zone = CWH.

(b) C = Candidate; DD = Data deficient; E = Endangered; NAR = Not at Risk; SC = Special Concern; T = Threatened; XT = Extirpated; and XX = Extinct

The BC CDC (2014) reports two listed amphibian species, coastal tailed frog (*Ascaphus truei*) and western toad (*Anaxyrus boreas*), with potential to occur within the Project area. Coastal tailed frog records exist 40 km and 50 km to the southeast of Tuck Inlet and a coastal tailed frog Wildlife Habitat Area exists approximately 35 km to the southeast of Tuck Inlet (Government of BC, 2014). Western toad records exist approximately 80 km southeast and 70 km north of the Project area (Government of BC, 2014).

Portions of Tuck Inlet have been designated as Critical Habitat for marbled murrelet (*Brachyramphus marmoratus*) under the Recovery Strategy for Marbled Murrelet and critical nesting habitat as identified by

Environment Canada occurs within the Project area (Environment Canada, 2014). The closest Wildlife Habitat Area to Tuck Inlet is designated for marbled murrelet and is located approximately 12 km to the east on Work Channel (Government of BC, 2014). Surf scoter (*Melanitta perspicillata*) was recorded 13 km to the northeast of Tuck Inlet in 1993 (Government of BC, 2014). Bird abundance typically peaks along BC's coastline during the winter months of December to February (Badzinski et al., 2008). Coastal BC provides important bird habitat for many species throughout their annual cycle and is within the Pacific Flyway, a migration pathway used by ducks and geese from their breeding grounds to wintering areas (Bellrose, 1980).

An Important Bird Area (IBA) is located approximately 5 km from the Project area. IBA BC124: *Big Bay south to Delusion Bay* has an area of 145.26 km^2 (IBA Canada, 2013). BC124 includes the following habitats: tidal rivers/estuaries, mud or sand flats (saline), inlets/coastal features (marine) and coastal cliffs/rocky shores (marine). Important Bird Areas (IBAs) are established to conserve and monitor essential habitat for nationally significant congregations of birds. Provincially or federally listed avian species recorded at IBA BC 124 include surf scoter (BC – Blue listed), horned grebe (*Podiceps auritus*) (COSEWIC – Special Concern), western grebe (*Aechmophorus occidentalis*) (BC – Red listed, COSEWIC – Special Concern), Brandt's cormorant (*Phalacrocorax penicillatus*) (BC – Red listed), double crested cormorant (*Phalacrocorax auritus*) (BC – Blue listed), common mure (*Uria aalge*) (BC – Red listed), and marbled murrelet (BC – Blue listed, SARA and COSEWIC – Threatened) (IBA Canada, 2014).

Seasonal surveys for marine birds in the Project area were undertaken in September, October, and November of 2013. A total of eight marine bird species-at-risk were recorded at Tuck Inlet. Five of the eight listed species observed during the surveys were not included in the BC CDC *Species and Ecosystems Explorer* 2014 results presented in Table 11. Surf scoter, yellow-billed loon (*Gavia adamsii*), marbled murrelet, great blue heron (*Ardea herodias fannini*), and California gull (*Larus californicus*) are provincially blue-listed species (BC CDC, 2014) recorded during surveys. Western grebe and common murre are provincially red-listed species (BC CDC, 2014) that were recorded during surveys. Two of the listed species, marbled murrelet and great blue heron, are also listed provincially as Identified Wildlife. Marbled murrelet is listed federally as Threatened and great blue heron (*fannini* subspecies) as Special Concern under SARA Schedule 1 (Government of Canada, 2014).

The construction and operation of an LNG facility at Tuck Inlet has the potential to affect migratory birds as defined under the *Migratory Birds Convention Act* 1994. Most birds are protected while nesting under Section 34 of the Provincial *Wildlife Act.* Subsection 34(b) of the *Wildlife Act* also provides protection year-round to nests of the following species with potential to occur in the Project area: bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus pealei*), and osprey (*Pandion haliaetus*) (BC Breeding Bird Atlas, 2014). A species presence search within the Project area found 143 species of migratory birds known to occur within the Project area (BC Breeding Bird Atlas, 2014).

A species presence search within the Project area found 143 species of migratory birds known to occur within the Project area (Appendix C, BC Breeding Bird Atlas, 2014). Eleven of these 143 migratory bird species are designated as species at risk. Ancient murrelet (*Synthliboramphus antiquus*), band-tailed pigeon (*Patagioenas fasciata*), great blue heron (*fannini* subspecies), peregrine falcon (*pealei* subspecies), and rusty blackbird (*Euphagus carolinus*) are provincially blue listed and federally listed as Special Concern by COSEWIC and SARA, Western screech-owl (*kennicotti* subspecies, *Megascops kennicottii kennicottii*) is blue listed provincially and designated Threatened by COSEWIC and Special Concern by SARA. Barn swallow (*Hirundo rustica*) is provincially blue listed and designated Threatened by COSEWIC. Common nighthawk (*Chordeiles minor*),

marbled murrelet, Northern goshawk (*laingi* subspecies, *Accipiter gentilis laingi*) and olive-sided flycatcher (*Contopus cooperi*) are provincially blue listed and federally listed as Threatened by COSEWIC and SARA.

Provincially and/or federally listed mammal species that may occur within the Project area include little brown myotis (*Myotis lucifugus),* fisher (*Pekania pennanti)*, wolverine *luscus* subspecies (*Gulo gulo luscus*), and grizzly bear (*Ursus arctos*). Historical distribution records of little brown myotis between 1889 and 2007 confirm the possibility of occurrence within the Project area (BC MoE, 2008). Although rare in coastal areas, wolverine may occur in the Project area due to their large ranges and recent evidence of wolverine utilising coastal habitats (Shardlow, 2013). Fisher are considered "Identified Wildlife" under the *Forest Practices Code of British Columbia Act;* however, due to their high affinity for riparian habitats along floodplains, they are unlikely to occur within the Project area.

The Project area is within the Khutzeymateen Grizzly Bear Population Unit 797 (834,508 ha), which is reported to have a viable population of 66 individuals (Government of BC, 2014). The Khutzeymateen Valley is located approximately 45 km northeast of Prince Rupert and was established as a provincial park and no-hunting zone (44,300 ha) to protect grizzly bears and their habitat. Grizzly bear may occur in the Project area during the spring/summer foraging season.

4.8 Oceanography

The Project area occupies the central region in Tuck Inlet, a long and narrow inlet that is predominantly oriented northeast to southwest. Tuck Inlet is approximately 25 km long, extending from Prince Rupert harbour (west of the Project area) through Tuck Narrows (northeast of the Project site). Digby Island is west of Tuck Inlet and shelters the inlet entrance from exposure to Chatham Sound and the Pacific Ocean (Figure 1 in Appendix A). There are three open water channels providing water access to Tuck Inlet via Prince Rupert harbour:

- Venn Passage to the northwest;
- The main southern approach between Digby and Kaien Islands and to the east and south of Kaien Island through Fern Passage via Morse Basin; and
- Wainwright Basin connecting to Chatham Sound via Porpoise Harbour and Porpoise Channel.

The Skeena River watershed drains into Chatham Sound just south of Porpoise Channel and the main approach to Tuck Inlet. The bathymetry of Tuck Inlet consists of a U-shaped basin with average depths between 45 and 60 m. The Project area consists of a moderately steep shoreline reaching depths of approximately 50 m within 100 to 400 m offshore (10% to 45% gradients). There are no basins or sills in the immediate vicinity of the Project site. There are two small basins reaching depths of approximately 90 m southwest of the Project area at the entrance to Prince Rupert harbour and offshore of Cow Bay. Tuck Narrows, the only sill in Tuck Inlet, is northeast of the Project site and is approximately 12 m deep in the centre of the inlet and only 150 m wide at its constriction. Tuck Inlet is an average of 1 km wide near the Project area.

Water level changes in Tuck Inlet are controlled by large amplitude tides with an average range of 4.9 m (Akenhead, 1992). The recorded extreme high water level in Prince Rupert harbour was 8 m chart datum (CD) and the extreme low was -0.4 m CD (Fisheries and Oceans Canada, 2013). Storm surges recorded at the Prince Rupert tide gauge (1945 – 2003), observed as deviations between observed and predicted water levels, can be as high as 0.8 m (Abeysirigunawardena and Walker, 2008; Thompson et al., 2008). Tsunamis are another

potential source of short-term variance in water level. The current speeds in Tuck Inlet during the summer are expected to be within the range of 20 cm/s, similar to those recorded during studies in Prince Rupert harbour (Stucchi and Orr, 1993; AES, 1977); however, storm events were not captured during these studies.

4.9 Marine Aquatic Resources

4.9.1 Marine Sediment

Tuck Inlet can be considered a sediment-limited environment since only small creeks discharge directly into Prince Rupert harbour and Tuck Inlet. Additionally, the steep shorelines limit the accommodation space for beach development. Early reports of poor anchorage sites in Prince Rupert harbour suggested the presence of sediment comprised of a thin layer of mud overlying smooth rock (Akenhead, 1992). O'Loughlin (1972) reported typical granulometric compositions of 60% gravel, 30% sand, and 10% silt for the coastal sediments in southwestern BC.

4.9.2 Marine Biological Resources

Typical of the north coast of BC, the marine environment in Tuck Inlet is characterised by cold, nutrient-rich waters and strong tidal mixing that support a rich array of marine vegetation, invertebrates, fish, and marine mammals. Chatham Sound has been identified by the Department of Fisheries and Oceans (DFO) as an Ecologically and Biologically Significant Area due its concentrated phytoplankton biomass and high primary productivity as a result of tidal mixing.

Marine vegetation present in Tuck Inlet include macroalgal species such as rockweed (*Fucus spp*.), sea lettuce (*Ulva spp.*), bull kelp (*Nereocystis luetkeana*), and various understory kelp species such as sea colander (*Agarum sp.*) and laminarians (*Laminaria spp*), as well as marine several vascular plant species such as eelgrass (*Zostera marina)* and surf grass (*Phyllospadix scouleri*), and several saltmarsh-associated species such as Lyngby's sedge (*Carex lyngbyei*) and tufted hairgrass (*Deschampsia cespitosa*) (Lindstrom, 2009; Golder, 2014). Eelgrass beds and bull kelp assemblages are recognised as important rearing and foraging habitat for invertebrates and juvenile fish including salmon and smaller forage fish. Eelgrass also serves as key spawning habitat for Pacific herring (*Clupea pallasi*) during spring. Preliminary surveys indicate that both eelgrass beds and bull kelp assemblages are found in very limited quantities in the project area.

Chatham Sound and Prince Rupert Harbour support important migratory routes and rearing/staging grounds for several important marine fish[4] species, including juvenile and adult salmonids. The Shawatlan River contains all five species of Pacific salmon (*Oncorhynchus spp*.), as well as steelhead trout (*O. mykiss*), cutthroat trout (*O.clarkii clarkii*), and Dolly Varden char (*Salvelinus malma*). Therefore, these species inhabit the marine environment at the approach to Shawatlan River when returning to spawn as well as during juvenile out migration. The intertidal and the subtidal areas in the Project area may provide productive foraging, nursery and refuge habitat for salmonids, rockfish *(Sebastes* spp.) and important forage fish such as Pacific herring,

[4] Fish, as defined in the federal *Fisheries Act*, includes fish, shellfish, crustaceans, marine mammals, and other marine animals, including eggs, sperm, spawn, spat, larvae, and juvenile stages (Government of Canada, 1985).

eulachon (*Thaleichthys pacificus*), and capelin (*Mallotus villosus*). Pacific herring migrate inshore each spring to spawn in specific locations. Although Tuck Inlet has not been previously identified as a key herring spawn area, spawning has been recorded approximately 1 km south of the Project area (near Vigilant Island) (BCMCA, 2014). Other marine fish species of commercial, recreational, and Aboriginal importance occurring in the Project area include greenling (*Hexagrammos lagocephalus*), lingcod (*Ophiodon elongatus*), English sole (*Pleauronectes vetulus*), rock sole (*Pleuronectes bilineata*), Pacific cod (*Gadus macrocephalus*), sandlance (*Ammodytes hexapterus*), walleye Pollock (*Theragra chalcogramma*), pandalid shrimp (*Pandalus spp.*), Dungeness crab (*Cancer magister*), and tanner crab (*Cancer baerdii*),

Several species of marine mammal are known to occur in the Prince Rupert region, including killer whale (*Orcinus orca* - transient and northern resident ecotypes), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Dall's porpoise (*Phocoenoide dalli*), harbour porpoise (*Phocoena phocoena*), humpback whale (*Megaptera novaeangliae*), Steller sea lion (*Eumetopias jubatus*), and harbour seal (*Phoca vitulina*). Other marine mammals that occur less frequently in the Prince Rupert region include fin whale (*Balaenoptera physalus*), grey whale (*Eschrichtius robustus*), minke whale (*Balaenoptera acutorostrata*), and sea otter (*Enhydra lutris*). These species vary greatly in their seasonal occurrence and habitat use (BCCSN, 2013) within the Prince Rupert region.

A search of the BC CDC *Species and Ecosystems Explorer* indicated that 15 provincially and/or federally designated marine species have the potential to occur in the Project area (Table 12; BC CDC, 2014). This excludes any listed marine bird species, which are discussed in Section 4.7.

Table 12: Listed Marine Species with the Potential to Occur in the Project Area

Scientific Name	Common Name	BC List [(a)]	Listed COSEWIC [(b)]	Listed SARA [(b)]
Balaenoptera physalus	Fin whale	Red	T	T
Eumetopias jubatus	Steller sea lion	Blue	SC	SC
Haliotis kamtschatkana	Northern abalone	Red	E	E
Megaptera novaeangliae	North Pacific humpback whale	Blue	SC	SC
Orcinus orca	Northern resident killer whale	Red	T	T
Orcinus orca	Transient killer whale	Red	T	T
Phocoena phocoena	Harbour porpoise	Blue	SC	SC
Eschrichtius robustus	Grey whale	Blue	SC	SC
Acipenser medirostris	Green sturgeon	Red	SC	SC
Sebastes pinniger	Canary rockfish	-	T	-
Sebastes ruberrimus	Yelloweye rockfish	-	SC	SC
Thaleichthys pacificus	Eulachon	Blue	E	-

Notes:
(a) Source: BC CDC (2014): Restricted to Red, Blue, and Legally designated species
(b) C = Candidate; DD = Data deficient; E = Endangered; NAR = Not at Risk; SC = Special Concern; T = Threatened; XT = Extirpated; and XX = Extinct

4.10 Freshwater Aquatic Resources

Twenty-one watercourses are located within or adjacent to the proposed Project area, comprising two 3rd order, two 2nd order, and 17 1st order streams. These watercourses do not have existing fish and fish habitat information available, but several are expected to provide suitable and accessible fish habitat, particularly for resident and anadromous salmonid species. Anadromous and resident species are important for commercial recreational, and/or aboriginal fisheries. Specifically, the Scissors Creek watershed (watershed code 910-800600) is a 3rd order stream and likely contains considerable fish habitat in its mainstem as well as in the lower reaches of its larger tributaries. There are also several larger lake fed systems in the southern portion of the Project area that flow either into Fern Passage or the Shawatlan River watershed (watershed code 910-797600) that likely support both resident and anadromous fish species. The small, 1st order streams along the shoreline in the western portion of the project area are likely too steep to support fish except potentially in the short accessible sections near their mouths.

The Shawatlan River watershed is known to contain all five species of Pacific salmon (Chinook salmon, *Oncorhyncus tshawytscha*; chum salmon, *O. keta*; coho salmon, *O. kisutch*; pink salmon, *O. gorbuscha*; and sockeye salmon, *O. nerka*). It also supports anadromous steelhead trout (*O. mykiss*) and resident rainbow trout (*O. mykiss*), cutthroat trout (*O.clarki*), and Dolly Varden char (*Salvelinus malma*). Shawatlan Lake is a spawning location for sockeye salmon, and the Shawatlan River also supports spawning populations of Chinook, coho, pink, and sockeye salmon. Salmonid spawning and rearing habitat may also occur in tributaries to the Shawatlan River and Shawatlan Lake. Sticklebacks (Gasterosteidae) are also present in the Shawatlan watershed.

5 POTENTIAL PROJECT EFFECTS

The BC EAO guidelines require that the Project Description address potential environmental, social, heritage, economic, and health effects of the Project. Under CEAA 2012 and BCEAA, an EA will be conducted on the potential effects of the Project and will assess the likely residual effects after mitigation.

Appropriate mitigation strategies will be incorporated into the Project design and/or be implemented during construction, operation, and decommissioning to avoid or reduce the potential adverse effects of the Project. Activities leading to potential effects are summarised in Table 13 for the construction, operational, and decommissioning phases of the project; additional details of Project components and activities are described in Section 2.1 and 2.2.

Potential Project effects on migratory birds include: change in habitat (e.g., due to direct habitat loss, fragmentation, and/or indirect loss due to sensory disturbance such as light, noise, or air emissions), change in movement patterns, and change in abundance (e.g., due to site clearing, project related wildlife mortality, sensory disturbance, and/or interactions with waste materials).

Potential Project effects on fish include direct loss or alteration of habitats due to changes in water quality and/ or indirect loss due to sensory disturbance from artificial light, increased noise and/or vibration. Behavioural changes may occur leading to change in movement patterns, distribution, and abundance due to infrastructure, increased vessel traffic, and increased contaminants and sediment to the aquatic environment.

Potential effects to federally protected species, including fish, fish habitat, marine plants, and migratory birds, (as defined by the *Fisheries Act* (Government of Canada, 1985) and *Migratory Birds Convention Act* (Government of Canada, 1994) according to Project phase and activity are summarised in Appendix C; these potential effects will be described in detail during the EA process.

Cumulative effects are discussed in Section 5.4. Potential effects to federal lands and areas outside of BC are summarised in Section 1.7 and 5.3.

5.1 Socio-Economic Effects

Table 13: Preliminary Identification of Potential Socio-Economic Effects of the Project

Component	Project Activities	Potential Effects
Visual Resources	• **Construction:** clearing and vegetation removal; erection of near shore and onshore facilities to previously undeveloped site • **Operations:** existence of near shore or onshore LNG processing facility visible from Prince Rupert; lighting; flaring (for emergency purposes only); vessel movements in proximity to Prince Rupert • **Decommissioning:** demolition activities; rehabilitation of site	• Clearing and vegetation removal during construction could potentially result in visual disturbance and alteration to existing scenic values • Introduction of visible anthropogenic features may be inconsistent with current landscape character and alter existing scenic values • Indirect effects on cultural, recreation and tourism values closely related to activities that are related to visual quality and the enjoyment of visual resources

Component	Project Activities	Potential Effects
Socio-Economic	• **Construction:** during initial construction phase project, peak manning is estimated to be between 1,000 and 6,000 depending on final development plan • **Operations:** operations phase is expected to provide direct employment for approximately 250 – 300 people • **Decommissioning:** activities will require contractor services	• Increased job opportunities, financial growth and training opportunities could positively influence socio-economic well-being in the local communities • Project expenditures will accrue to individuals, businesses and communities in the local area and region, contributing to the development of the local and regional economies. • Risk of goods and services shortages and price inflation in the local area during the construction phase due to the Prince Rupert area's relatively small economy and the expected goods and services requirements of the Project • Increased demand for temporary accommodation and permanent housing from persons and their dependents who temporarily and/or permanently relocate to the local area for work • Higher demands on utility, health, emergency, transportation services, community services, and infrastructure from the temporary and/or permanent population increase, with potential implications for the capacity, resourcing and costs of these services • Adverse and beneficial effects on important determinants and parameters of community health and wellbeing, including disposable income, alcohol and drug abuse, crime, community connectedness, and stress, particularly during the construction phase
Land and Resource Use	• **Construction:** clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; noise and light from construction activities • **Operations:** vehicle and vessel traffic; road and infrastructure use and associated noise • **Decommissioning:** vehicle traffic; road and infrastructure removal; demolition activities	• Potential effects of LNG vessel traffic on marine commercial and recreational users' safety, level of mobility, and access to key marine areas

Component	Project Activities	Potential Effects
Marine Navigation	• **Construction:** possible dredging within berthing areas, turning basin, and MOF to accommodate drafts for LNG tankers and support vessels • **Operations:** increased vessel traffic within Prince Rupert Harbour by approximately 330 to 430 carrier loadings per year. WCC LNG Project to use BC coastal pilots to support safe inbound and outbound transit of LNG carriers, consistent with applicable marine navigation laws and regulations. Operational safety zones will be compliant with all applicable Canadian laws and regulations, and will be consistent with industry best practices. • **Decommissioning:** removal of marine infrastructure and support facilities and reclamation of disturbed areas. Reduction in overall frequency of vessel traffic.	• Generation of sediment and turbidity plumes during dredging operations required for berthing areas, turning basin, and MOF • Increased potential for direct and indirect impacts to marine mammals and migratory birds during vessel traffic movement • Potential for disruption to commercial, recreational, Aboriginal fishing activities
Human Health	• **Construction:** clearing; excavation; heavy vehicle traffic; road and infrastructure development; fuel and chemical handling and storage; noise and light from construction activities • **Operations:** vehicle and vessel traffic; road and infrastructure use and associated noise; fuel and chemical handling and storage • **Decommissioning:** vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities	• Air quality may be impacted from Project activities which can have a direct (via inhalation) or indirect (deposition onto soil, water, or plants and subsequent exposure via ingestion and dermal contact) effect on human health; physical activities including clearing, grading, compaction and blasting may increase dust levels in air • Potential effects to country foods with resulting impacts on human health • Increased light and noise emissions may have adverse effects on nearby populated areas • The availability of marine, shoreline, and terrestrial foods and traditional medicines may be restricted by various aspects of the Project during construction and operations • Increase in land-based traffic, increases in marine traffic and in-migration of workers may adversely affect local human health

Component	Project Activities	Potential Effects
Heritage Resources	• **Construction:** clearing; excavation; stockpiling; road and infrastructure development • **Operations:** vehicle and vessel traffic; road and infrastructure use • **Decommissioning:** vehicle traffic; road and infrastructure removal; demolition activities	• Physical disturbance or increased accessibility to archaeological or historical sites could result during clearing, site preparation, construction, operations, and decommissioning

5.2 Biophysical Effects

Table 14: Preliminary Identification of Potential Biophysical Effects of the Project

Component	Project Activities	Potential Effects
Air Quality and Climate	• **Construction:** emissions from land clearing, blasting, grading and earthworks, hauling, material handling, fuel combustion, power generation, vehicle traffic, shipping, flaring (for commissioning purposes only) • **Operations:** emissions from material handling, fuel combustion, power generation, vehicle traffic, combustion of acid gas removal unit gases and ancillary operations, shipping, flaring (for emergency purposes only) • **Decommissioning:** emissions from material handling, backfilling, contouring, fuel combustion, vehicle and supply vessel traffic, shipping, flaring (for emergency purposes only)	• Change in air quality in the Prince Rupert airshed due to increased emissions of criteria air contaminants, resulting in potential impacts on human health and wildlife o Primary substances of concern include nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), particulate matter ($PM_{2.5}$ and PM_{10}) and volatile organic compounds • Increase in greenhouse gas (GHG) emissions with potential impacts to local and global climate change (primarily during operational phase) o Primary substances of concern are methane and CO_2
Noise	• **Construction:** noise emissions from site clearing, subsurface rock removal and blasting for grading, compaction, pile-driving, construction of buildings and other structures, facility assembly, general equipment movement, bolt tightening, pneumatic testing, line cleaning and pressure testing of pipework and pressure vessels on site flaring (for commissioning purposes only); underwater blasting and/or dredging of marine sediment; installing infrastructure related to the facility and the terminal • **Operations:** noise emissions from process facility equipment, vehicle traffic and loading of LNG carriers; low frequency noise emissions from exhausts and vessel engine noise, navigational sound signals during marine vessel operations, flaring (for emergency purposes only) • **Decommissioning**: noise emissions from combustion of fuels and equipment and traffic due to demolition activities, flaring (for emergency purposes only)	• Increase in aboveground noise, resulting in disturbance to human populations and displacement and disturbance of wildlife • Increase in underwater noise, resulting in physical or biological disturbance to marine mammals.

Component	Project Activities	Potential Effects
Light	• **Construction:** light emissions from vehicles, construction camp, flaring (for commissioning purposes only) • **Operations and Decommissioning:** light emissions from vehicles, facilities, vessels, flaring (for emergency purposes only)	• Increase in light trespass and sky glow during nighttime hours, resulting in physical and biological disturbance to human populations and displacement and disturbance of wildlife
Surface Water Hydrology and Water Quality	• **Construction:** excavation; stockpiling; temporary resurfacing; installation of culverts; construction of access roads and onshore infrastructure; heavy vehicle traffic; fuel and chemical handling and storage; potential usage and withdrawal of freshwater; potential construction of a stormwater collection system and underground utilities; potential dewatering of the site • **Operations:** vehicle traffic; road and infrastructure use and updates; fuel and chemical handling and storage; potential operation of a sewage treatment plant • **Decommissioning:** vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities	• Alteration of drainage patterns and increase of impervious areas, which can lead to erosion, waterlogging, flooding and/or the sedimentation of local watercourses and estuaries, potentially resulting in reduced water quality in streams and lakes and impacts to wildlife and human health and/or recreational activities • Reduced water quality in streams and lakes due to accidental fuel or chemicals spills, resulting in impacts to wildlife and human health and/or recreational activities • Temporary and/or permanent alteration of stream flows and freshwater habitat due to usage and withdrawal of freshwater during construction (see Freshwater Biological Resources section below for potential effects) • Potential acidification of surrounding freshwater bodies due to SO_2 and NO_x emissions, resulting in reduced water quality in streams and lakes and impacts to wildlife and human health and / or recreational activities
Geology and Terrain	• **Construction:** clearing; blasting; grading and earthworks; potential dredging; Material Offloading Facility construction activities; vessel traffic • **Operations:** vessel traffic and associated shipping activities • **Decommissioning:** vessel traffic and demolition activities that may include clearing, blasting, grading and earthworks	• Alteration of the surrounding landscape • Acid rock drainage or metal leaching potential within excavated rock materials and exposed rock cuts, resulting in groundwater and surface water quality impacts • Impacts to coastline stability and erosion potential due to changes in tidal currents and waves

Component	Project Activities	Potential Effects
Groundwater	• **Construction:** excavation; stockpiling; temporary resurfacing; installation of culverts; construction of access roads and onshore infrastructure; heavy vehicle traffic; fuel and chemical handling and storage, potential usage and withdrawal of freshwater, potential construction of a stormwater collection system and underground utilities, potential dewatering of the site • **Operations:** vehicle traffic, road and infrastructure use and updates; fuel and chemical handling and storage; potential operation of a sewage treatment plant • **Decommissioning:** vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities	• Alteration of groundwater recharge and discharge locally due to an increase in impervious areas and construction of a stormwater collection system • Changes to groundwater levels and flows (particularly if dewatering is required), resulting in impacts to local groundwater dependent ecosystems • Impacts to groundwater quality and receiving streams, lakes, or reservoirs due to soil acidification or accidental chemical, fuel or sewage releases
Soils	• **Construction:** excavation activities including removing soil and overburden, stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development, fuel and chemical handling and storage; potential usage and withdrawal of freshwater • **Operations:** vehicle traffic; road and infrastructure use and updates; fuel and chemical handling and storage • **Decommissioning:** vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities	• Alteration, admixing, compaction and potential erosion of soil materials due to site clearing and the removal of vegetation cover and root mats • May create erosion on the Project site and create sedimentation impacts off site, resulting in water quality impacts • Contamination of soil materials by fuel or chemical spills during construction activities • Compaction or rutting of soils, particularly under wet conditions, due to heavy traffic • May involve restoration of the Project site through use of stockpiled soil materials and their distribution across the site.

Component	Project Activities	Potential Effects
Marine Biological Resources	• **Construction:** o underwater blasting and pile driving; o dredging of marine sediment; o installation of infrastructure related to the facility and the terminal, including erection of the jetties and Material Offloading Facility; o land-based site clearing; and o drainage system and sanitary sewage system.	• **Fish** o May alter water quality resulting in change in habitat use, physiology or alter mortality risk. o May cause direct effects on habitat change and physiology and altered mortality risk, and indirect effects due to altered water quality and increased underwater noise. • **Fish Habitat** o May result in changes in habitat quantity and quality including permanent loss of foreshore habitat and altered water quality. • **Marine Plants** o Activities may change water quality and reduced light availability resulting in potential plant loss or physiological change. o In-water/near shore activities may result in plant loss and/or physiological change including permanent loss of foreshore and riparian habitat and altered water quality. o Potential loss / alteration of habitat due to sensory disturbance effects (e.g., underwater noise)
	• **Operations:** o withdrawal of marine waters; o discharge of heated waters from water cooling process; o vessel traffic and associated noise and light, noise and light from onshore activities; o operation of LNG facility and supporting infrastructure; o operation of marine terminal; and o LNG shipping.	• **Fish** o Changes in lighting and underwater noise from vessels may result in changes in habitat use / behaviour. o Water cooling system may result in fish impingement and entrainment, and altered water quality. o Ballast water exchange may change community structure. • **Fish Habitat** o Increased sedimentation, turbidity, and/or accidental releases may change habitat quantity and quality. o Potential loss / alteration of habitat due to sensory disturbance effects (e.g., underwater noise) and due to potential invasive species colonization.

Component	Project Activities	Potential Effects
		• **Marine Plants** o Altered water quality and reduced light availability may result in physiological change or change in plant mortality risk. o Potential change in community structure from introduction of invasive species from ballast water exchange.
	• **Decommissioning:** o removal of marine infrastructure; o dismantling onshore facilities and supporting infrastructure; and o site clean-up and reclamation	• **Fish** o May alter water quality resulting in fish loss, physiological change or change in habitat use. • **Fish Habitat** o May change habitat quantity and quality. • **Marine Plants** o May alter water quality resulting in change in plant mortality risk, or physiological change.
Marine Mammals	• **Construction:** underwater blasting and pile driving; dredging of marine sediment; installing infrastructure related to the facility and the terminal including erection of the jetties • **Operations:** withdrawal of marine waters; discharge of heated waters from water cooling process; vessel traffic and associated noise • **Decommissioning:** removal of marine infrastructure; demolition activities	• Behavioural disturbance (displacement, avoidance, or communication masking) due to underwater noise or artificial light from project activities (e.g., pile driving, blasting, dredging, shipping). • Potential injury/mortality or behavioral disturbance (e.g., displacement or avoidance) due to interaction with Project during shipping activities • Potential effects associated with accidents and malfunctions, including unplanned spills to the marine environment • Changes to health, survivorship, or behavior due to indirect effects from the Project (e.g., changes in habitat quality, reduced prey availability) as a result of effluent discharges from Project vessels and onshore activities/infrastructure

Component	Project Activities	Potential Effects
Freshwater Biological Resources	• **Construction:** excavation, stockpiling, temporary resurfacing, installation of culverts, heavy vehicle traffic, road and infrastructure development, fuel and chemical handling and storage, usage and withdrawal of freshwater; permanent diversion of streams, dewatering of streams, lakes and wetland habitat. • **Operations:** vehicle traffic, road and infrastructure use and updates, fuel and chemical handling and storage • **Decommissioning:** vehicle traffic, road and infrastructure removal, fuel and chemical handling and storage, demolition activities	• Potential impacts to fish-bearing streams flowing into Tuck Inlet, Fern Passage, and Shawatlan Lake due to construction of the land-based terminal infrastructure • Reduction in suitable habitat due to consumption or diversion of water from the small streams in the Project footprint (e.g., water with sufficient depth and velocity) • Dust generation during the construction and decommissioning phases, which could potentially enter fish-bearing streams via runoff and lead to environmental effects on water quality, fish and fish habitat • Wastewater generated during construction, operation and decommissioning, once no longer reusable, will be treated on site and released back to the environment, which could potentially affect water quality, fish health, and fish habitat if discharged into streams
Terrestrial Vegetation and Wetlands	• **Construction:** excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; temporary workspace installation; fuel and chemical handling and storage; dewatering; potential usage and withdrawal of fresh water • **Operations:** vehicle traffic; road and infrastructure use and updates; fuel and chemical use • **Decommissioning:** vehicle traffic; road and infrastructure removal; demolition activities	• Clearing and vegetation removal during construction could potentially result in direct loss or change in ecological function of: wetlands, old growth forest, federally or provincially listed plant species, traditional use plant species, and/or provincially listed ecological communities • Indirect effects to terrestrial vegetation and ecosystems, change in wetland ecosystem function could result from changes in drainage patterns, dust deposition, airborne deposition of chemical compounds, proliferation of noxious/invasive species, etc.

Component	Project Activities	Potential Effects
Terrestrial Wildlife and Migratory Birds	• **Construction:** clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; fuel and chemical handling and storage; potential usage and withdrawal of freshwater; noise and light from construction activities • **Operations:** vehicle and vessel traffic; road and infrastructure use and associated noise; fuel and chemical handling and storage • **Decommissioning:** vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities	• Effects may occur from habitat loss or alteration resulting in change in habitat suitability; changes in mortality risk due to risks of collisions with infrastructure; alteration of movement patterns including displacement; disturbance due to lighting and noise

5.3 Potential Effects of Changes to the Environment on Aboriginal Peoples

The proposed Project may result in changes to the environment that may affect Aboriginal peoples in relation to the following *CEAA, 2012* subsection 5(1)(c) factors:

- Health and socio-economic conditions;
- 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.

Table 15 provides a preliminary identification of potential Project effects as a result of changes to the environment on Aboriginal peoples. This information is based on consultation and engagement efforts to date with Aboriginal groups, including information presented in Section 6.0 and information provided in Section 5.1 and 5.2 relating to potential socio-economic and biophysical effects. In the course of ongoing consultation, WCC LNG will work with Aboriginal groups to confirm and identify potential Project effects to subsection 5(1)(c) factors, including through Project-specific studies.

Table 15: Preliminary Identification of Potential Effects of Changes to the Environment on Aboriginal Peoples

Subsection 5(1)(c) Factor	Project Stage	Potential Effects
Health and Socio-Economic Conditions	**Construction, Operation, and Decommissioning**	• See Section 5.1 for potential changes in the environment, including Human Health and Socio-Economic conditions as a result of Project activities. How Aboriginal peoples may experience these changes specifically or differently from the general population will be considered in the assessment. • Potential effects of changes to the environment on Aboriginal peoples' health or socio-economic conditions as a result of Project activities may include, but may not be limited to possible increases in: o exposure to noise, light, and air emissions o exposure to biological resource contamination o levels of stress and annoyance from Project-related noise, vibration, light, or risk perception o food insecurity o road and vessel traffic safety risks o health inequity o job and contracting opportunities, financial growth and training opportunities o revenue loss associated with potential disruption to commercial marine and land-based activities (e.g., commercial fishing, eco-tourism) in which Aboriginal individuals or businesses participate
Physical and Cultural Heritage, including any Structure, Site or Thing of Historical, Archaeological, Paleontological or Architectural Significance	**Construction, Operation, and Decommissioning**	• See Section 5.1 for potential changes in Visual Resources and Heritage Resources as a result of Project activities that may affect the physical and cultural heritage of Aboriginal peoples, including any structure, site, or thing of historical, archaeological, paleontological or architectural significance. How Aboriginal peoples may experience these effects specifically or differently from the general population will be considered in the assessment. • As a result of Project activities, potential effects of changes to the environment on the physical and cultural heritage of Aboriginal peoples, including any structure, site, or thing of historical, archaeological, paleontological or architectural significance, may include but may not be limited to: o Physical disturbance to sites or landscapes / waterscapes of cultural importance o Displacement from or avoidance of ancestral sites or places of cultural importance as a result of increased public accessibility to these areas o Changed sense of place

Subsection 5(1)(c) Factor	Project Stage	Potential Effects
Current Use of Lands and Resources for Traditional Purposes	**Construction, Operation, and Decommissioning**	• Potential changes in the ability to access preferred locations for traditional purposes as a result of Project activities across all Project phases (e.g., navigational closures, safety exclusion zones, increased vessel traffic congestion) • Potential changes in presence or absence, abundance, or spatial distribution of preferred marine, freshwater, terrestrial, or other resources that are currently used for traditional purposes, such as marine fish (including invertebrates), marine plants, marine mammals, terrestrial vegetation and wildlife, migratory birds, and freshwater fish (see Section 5.2 for potential changes to these biological resources as a result of Project activities), leading to potential loss of fishing, hunting, trapping, or gathering opportunities across all Project phases • Potential changes in the quality of preferred resources that are currently used for traditional purposes, such as marine fish (including invertebrates), marine plants, marine mammals, terrestrial vegetation and wildlife, migratory birds, and freshwater fish (see Section 5.2 for potential changes to these biological resources as a result of Project activities), leading to avoidance of traditional foods or otherwise disrupting patterns of use and levels of consumption across all Project phases • Potential changes in the quality of experience associated with the current use of lands and resources for traditional purposes across all Project phases may include but may not be limited to: o Potential displacement from or avoidance of preferred locations as a result of sensory disturbance (e.g., increased noise, light), perceived health or safety risks (e.g., increased air emissions, vessel traffic), or changed sense of place o Potential interference with or loss of ability to achieve cultural purposes associated with use of specific locations or resources, such as intergenerational knowledge transfer of practices, customs, or traditions • See Section 6.1.3 for further information on current use of lands and resources for traditional purposes by Aboriginal groups identified in Section 6.1.2.

5.4 Cumulative Effects and Transboundary Effects

The environmental assessment will determine whether the construction and operation of the WCC LNG Project will result in potential effects outside of British Columbia or Canada (e.g., air quality effects, effects on marine mammals, introduction of invasive species, etc.). The proposed project location is more than 46 km from the United States border, and therefore, is unlikely to result in adverse air quality effects due to construction and operation emissions, although the extent and concentration of project-related emissions will be assessed as part of the scope of the environmental assessment to validate this conclusion. It is not expected that there will be any environmental effects of the project outside of British Columbia. A cumulative effects assessment will evaluate the contribution of past, present, and reasonably foreseeable projects within the regional study area of the proposed Project to the potential for significant adverse environmental effects.

Future projects and activities considered in the cumulative effects assessment will be restricted to those that:

- Have been publicly announced with a defined project execution period and with sufficient project details for assessment;
- Are currently undergoing an EA; and
- Are in a permitting process.

The cumulative effects assessment will examine the extent of spatial and temporal overlap with other project activities and those predicted for the Project. For example, the assessment will consider LNG carrier shipping routes and vessel traffic overlap between existing port facilities in the PRPA and proposed other and/or new LNG facilities adjacent or nearby to the Project. Where possible, the cumulative effects will be quantified in terms of the degree of change in the measurable parameter(s) where and when the interactions between the Project residual effects and the residual effects of other projects and activities are expected to occur.

6 ABORIGINAL, PUBLIC AND GOVERNMENT STAKEHOLDER ENGAGEMENT

6.1 Aboriginal Engagement

6.1.1 Principles of and Approach to Aboriginal Engagement

WCC LNG Project understands Aboriginal engagement is a broad term referring to the contact, communication, and consultation efforts with Aboriginal groups in regard to the proposed Project. WCC LNG Project understands that effective consultation is founded on respect: respect for the legal rights of Aboriginal people, as well as their traditional practices, activities, language, and decision-making processes.

WCC LNG Project approach to Aboriginal engagement is based on the following five principles:

1. We engage Aboriginal communities and their representatives in open and forthright consultation. We seek to understand Aboriginal perspectives on issues of mutual interest and to deal constructively with differing views.
2. Effective consultation is founded on respect: respect for the legal rights of Aboriginal people, as well as their traditional practices, activities, language and decision-making processes.
3. We support recruitment and development programs that enable Aboriginal people to meet the company's employment requirements and business needs.
4. We foster the development of Aboriginal businesses in ways that provide benefits to the company and to Aboriginal communities.
5. We create lasting relationships with Aboriginal communities by supporting initiatives that address community needs.

6.1.2 Potentially Affected Aboriginal Communities

According to the Government of British Columbia's Consultative Areas Database, the proposed Project footprint, surrounding area, and proposed shipping routes are within the traditional territories of the Lax Kw'alaams First Nation, Metlakatla First Nation, Kitselas First Nation, Kitsumkalum First Nation, and Gitxaala Nation. The location of the Project relative to the approximate boundaries of each nation's territory or consultative area is presented in Figures 10 through 14. The location of the main communities of each of these Aboriginal groups is presented in Table 16.

In addition to the above-referenced communities, during the site selection process, Project representatives also engaged other Aboriginal groups, including the Haisla Nation, the Nisga'a Lisims Government, Sliammon First Nation, and the Council of the Haida Nation. WCC LNG Project will remain responsive to these communities and other Aboriginal communities that may express an interest in the proposed Project activities.

The Aboriginal groups identified in Table 16 is not exhaustive or exclusive. WCC LNG Project acknowledges that there are other communities associated with these Aboriginal groups. Other Aboriginal groups that may be affected by the project include the Métis Nation British Columbia, the Coastal First Nations, and the BC Métis Federation (Table 17). WCC LNG Project intends to update this list as the project moves forward, with input from Aboriginal groups and regulatory agencies. Potential Project-related and cumulative effects to any Aboriginal community will be considered in the assessment.

Table 16: Location of Main Communities of Aboriginal Groups

First Nation	Location of Main Community
Lax Kw'alaams First Nation	The main Lax Kw'alaams community is located on Lax Kw'alaams 1, adjacent to the town of Port Simpson (now Lax Kw'alaams) on the northwest coast of the Tsimshian Peninsula. The Project site is approximately 29 km (by road and ferry) from the community of Lax Kw'alaams located on and adjacent to Lax Kw'alaams 1.
Metlakatla First Nation	The main Metlakatla community is located on S 1/2 Tsimpsean 2, on the southwest coast of the Tsimshian Peninsula along Metlakatla Pass (Venn Passage). The Project site is approximately 12 km (by water) from the community of Metlakatla located on S 1/2 Tsimpsean 2.
Kitselas First Nation	The main Kitselas community is located south and east of Terrace along the banks of the Skeena River. The Project site is approximately 144 km (by road) from the community of Kitselas.
Kitsumkalum First Nation	The main Kitsumkalum community is located west of Terrace at Kitsumkaylum 1 where the Kitsumkalum River and Skeena River meet. The Project site is approximately144 km (by road) from the community of Kitsumkalum.
Gitxaala Nation	The main Gitxaala community is located at Kitkatla on Dolphin Island 1, southwest of Prince Rupert harbour on Browning Entrance. The Project site is approximately 75 km (by water) and 63 km (by air) from the community of Kitkatla.

Table 17: Other Aboriginal Groups

Aboriginal Group	Description
Coastal First Nations	The Coastal First Nations – Great Bear Intiative is an umbrella organization that represents Wuikinuxv Nation, Heiltsuk, Kitasoo/Xaixais, Nuxalk Nation, Gitga'at, Metlakatla, Old Massett, Skidegate and Council of the Haida Nation
Métis Nation British Columbia	Métis Nation British Columbia develops opportunities for Métis chartered communities by implementing culturally relevant social and economic programs and services
BC Métis Federation	BC Métis Federation is a non-profit organization that works with Métis communities across the province to ensure the well-being of its members

6.1.3 Aboriginal Interests and the Current Use of Lands and Resources for Traditional Purposes

"Aboriginal Interests" are defined by the BC EAO as potential or established Aboriginal rights, including title, and treaty rights. WCC LNG Project 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 EA and the fulfillment of the Crown's common law duty to consult and accommodate.

WCC LNG Project also understands that, under a substituted or coordinated EA, effects of changes to the environment on Aboriginal peoples pursuant to subsection 5(1)(c) of CEAA 2012 will have to be considered including, but not limited to, their "current use of lands and resources for traditional purposes" (Current Use; see Section 5.3). WCC LNG Project recognises the distinction between Current Use and Aboriginal Interests (as defined above), and is working with each of the Aboriginal groups identified in Section 6.1.2 to understand whether and to what extent their Current Use and Aboriginal Interests may be affected by the Project or its cumulative interaction with other projects and activities that have been or will be carried out. The statutory and common law requirements to which Current Use and Aboriginal Interests each respectively pertain will be presented in the EA in a way that addresses both sets of requirements.

A review of available information, including EA documentation submitted to the Crown for other project EAs, indicates that each of the Aboriginal groups identified in Table 16 reports Current Use in Prince Rupert Harbour and shipping routes associated with the Project. Resources used by these Aboriginal groups include but are not necessarily limited to marine fish (including invertebrates), marine plants, marine mammals, terrestrial vegetation and wildlife, migratory birds, and freshwater fish. Visual and heritage resources in the area are also of importance.

Each of the Aboriginal groups identified in Table 16 is known to assert claims of Aboriginal title to the lands, waters, and resources within their territories (as indicated in Figures 10 through 14), as well as (or in the alternative) to Aboriginal rights related to the use of terrestrial, freshwater, marine, and other resources within these territories (CSR for the Proposed Fairview Terminal Phase II Expansion Project; Government of Canada, 2012). These potential Aboriginal rights include, but may not be limited to, fishing, hunting, trapping, and gathering activities for food, trade, ceremonies, medicines, and materials (Pacific Northwest LNG, 2014).

Based on the foregoing and information provided in Sections 3, 4, and 5 regarding the existing conditions of and potential Project effects to lands and resources at or near the Project area, WCC LNG Project anticipates the Project may affect Current Use and/or Aboriginal Interests that are linked to those lands and resources, as provisionally identified above., including their means of access and importance to cultural integrity. Given the marine aspects of the proposed Project and the known centrality of fishing to the Aboriginal groups identified above, WCC LNG Project is particularly attuned to the potential effects of the Project on this activity and the cultural context in which this activity is carried out.

Ongoing consultation for the Project with Aboriginal groups will seek to confirm and expand upon WCC LNG Project's current understanding of (1) Current Use and Aboriginal Interests in and around the Project area, including how this relates to shipping and/or other Project access routes; (2) the potential for adverse Project and cumulative effects on Current Use and/or Aboriginal Interests; and (3) the appropriate measures to avoid or mitigate such effects.

6.1.4 Aboriginal Engagement and Consultation Activities

Project representatives have been actively engaging and consulting with Aboriginal groups in northwestern BC since April 2012. This engagement and consultation has taken the form of individual and group meetings, written correspondence, emails, telephone communications with community leaders and technical and business representatives, as well as participation in local and regional Aboriginal community events.

To date, engagement and consultation with Lax Kw'alaams First Nation and Metlakatla First Nation have focused on a wide variety of topics including:

- Site selection;
- Potential business opportunities related to investigative work;
- The regulatory and permitting process;
- Updates on and participation in field studies and investigative work;
- Aboriginal interest and use studies;
- Capacity funding;
- Impacts to current and/or traditional use of areas in the Project area; and
- Potential Project-related agreements.

Engagement and consultation activities with the Gitxaala Nation, Kitselas First Nation, and Kitsumkalum First Nation have been largely introductory in nature, but have involved multiple meetings with all three groups. Discussions have centred upon:

- Site selection;
- Current land use;
- Capacity funding;
- The regulatory and permitting process; and
- Potential business opportunities.

There have also been communications with the Gitga'at First Nation and Tsimshian First Nation Treaty Society.

Communications with Aboriginal groups during the site selection phase included meetings with groups local to those sites, including the Haisla Nation, Sliammon First Nation, and Nisga'a Lisims Government. An introductory meeting with Métis Nation British Columbia has also taken place.

In addition, WCC LNG Project's intention is to provide local and regional First Nations with a copy of the Project Description, to provide context to its overall development approach, to undertake current interests and perspectives with respect to the proposed site and to seek input into how best to engage with communities moving forward. WCC LNG Project have also reviewed, or offered to review, key elements of the Project Description with the Lax Kw'alaams, Metlakatla, Kitsumkalum, Gitxaala and Kitselas First Nations prior to this submission to receive high level input.

6.1.5 Key Issues Identified by Aboriginal Groups to Date

WCC LNG Project has maintained records of all communications with Aboriginal groups over the course of engagement and consultation activities to date. Maintaining these records allows Project team members to track

and be responsive to their interests and concerns. A summary of the key interests and issues that have been heard to date from Aboriginal groups include those in Table 18 below. This list is a high-level summary and is not exhaustive.

Table 18: Summary of General Issues Identified through Aboriginal Consultation and Engagement

Capacity Funding	Support for Aboriginal participation in the environmental assessment process What activities are compensated by capacity funding Capacity limitations of First Nations time and resources
Opportunities and Impacts for Community Members	Education Training Employment Contracting and procurement Involvement in fieldwork and related studies Use of First Nation-owned businesses Socio-economic impacts Impacts to food harvesting, including access to harvesting areas
Renewable Energy	Development and use of First Nation-owned renewable energy sources
Agreements	Formalised agreements for continuing engagement Traditional land use and knowledge studies
Site Considerations	Unique weather patterns Potential for fish and fish habitat impacts Access to Tsimshian Peninsula Impacts and access to archeological resources Processes for identifying and addressing archaeological finds
Marine Impacts	Marine transportation Marine traffic management Water quality in Prince Rupert harbour Dredging and disposal at sea
Cumulative Effects	Comprehensive cumulative effects assessment
Adequacy of Research and Monitoring	Need for thorough baseline studies Need for long-term monitoring programs
Consultation	Clarity of First Nations consultation process between governments and jurisdictions, including multiple agencies

6.1.6 Ongoing Engagement and Consultation Methods

WCC LNG Project is developing an Aboriginal Consultation Plan, which will be submitted to the BC EAO for approval pursuant to Section 11 Order requirements. The goals of WCC LNG's Aboriginal Consultation Plan include:

- Building and maintaining positive, long-term relationships with Aboriginal groups potentially affected by the proposed Project;
- Ensuring that Aboriginal community input and concerns are gathered, understood, and integrated into Project design and execution as appropriate;
- Ensuring that concerns and issues with respect to environmental, social, economic, health, or heritage effects related to Aboriginal communities are addressed, as appropriate;
- Providing appropriate capacity funding to facilitate meaningful participation in the engagement and consultation process; and
- Fulfilling all federal and provincial regulatory requirements.

WCC LNG Project will continue to work with Aboriginal community leadership and representatives to identify the most appropriate methods of consultation and engagement going forward. Possible engagement initiatives include:

- One-on-one meetings with elected leadership and band representatives;
- Formal meetings with various community groups, such as youth and elders;
- Workshops on specific topics related to the Project;
- Open houses in communities;
- Issue-specific open houses or workshops;
- Coffee chats;
- Participatory advisory councils;
- Town halls;
- Presentations;
- Technical meetings;
- Tours and site visits;
- School presentations and career fairs; and
- Participation at community events.

WCC LNG Project will utilise various communications materials to ensure that Aboriginal community members have a deep understanding of the proposed projects. Possible communications materials include:

- Project website;
- Information email account;
- Toll-free telephone inquiry line;
- Social media platforms;
- Poster boards;
- Maps;
- 3D models;

- Visualization simulations;
- Fact sheets;
- Newsletters;
- Powerpoint presentations;
- Speeches; and
- Videos and animations.

6.2 Public and Government Stakeholder Engagement

6.2.1 Principles of Approach

WCC LNG Project understands stakeholder engagement is a broad term referring to the contact, communication, and consultation efforts with the public, stakeholders, and government agencies in regard to the proposed Project. WCC LNG takes a principled approach to stakeholder engagement.

WCC LNG Project knows that to be effective, our outreach efforts must be built on honest, transparent, accurate, and timely information. We listen to and engage with a broad range of individuals and organizations, including governments, regulators, industry, local communities, landowners, land users, shareholders, customers, suppliers, employees, non-governmental organizations, and Aboriginal groups to help identify and address issues of mutual concern and interest.

WCC LNG Project's stakeholder interactions are guided by the following principles:

Inclusion: We will provide an opportunity for stakeholders to be meaningfully involved in issues that affect them.

Respect: We will work to develop and maintain constructive relationships through positive interactions based on mutual respect, trust, and openness.

Timeliness: We will identify and involve stakeholders early in the process and provide timely opportunities for participation to understand expectations, interests, and concerns.

Responsiveness: We will encourage stakeholders' input to understand how they wish to be consulted. We will listen to stakeholder needs and interests and will strive to remain flexible and respond promptly.

Accountability: We will document agreements made with stakeholders to ensure commitments are met.

WCC LNG Project is committed to engaging with community and regional stakeholders before, during, and after the EA process. During the planning and permitting stages of the Project, Project representative have, and will continue to, consult a wide range of stakeholders. The consultation process will be broad and include persons and organizations potentially affected by the Project. The process of identifying, engaging, and consulting stakeholders will continue over the development stages of the Project.

Key Project stakeholders include:

- Interested residents of the City of Prince Rupert and District of Port Edward areas;
- Elected representatives from municipal, regional, provincial, and federal governments;
- Staff from municipal, regional, provincial and federal governments;
- Business and industry associations;

- Non-governmental organizations (NGOs);
- Community organizations;
- Land owners and land users;
- Local and regional educational institutions; and
- Health, protective, emergency and social service providers.

6.2.2 Government Engagement Activities

Since February 2012, WCC LNG Project representatives have engaged with elected representatives and government staff on various aspects of the project through in-person meetings, phone discussions, and email communications. In addition, WCC LNG Project representatives have attended local and industry functions to share information about the Project and LNG developments to build working relationships and further their understanding and knowledge of local conditions and issues of importance.

During these various engagement activities, Project representatives introduced the Project and began preliminary discussions around site selection, permitting and regulatory processes, Aboriginal engagement initiatives, updates on fieldwork and schedules, and various other items.

In terms of the Project, the list of municipal, regional, provincial, and federal agencies engaged to date includes:

Municipal and Regional Government:

- City of Prince Rupert;
- District of Port Edward; and
- Skeena-Queen Charlotte Regional District.

Provincial Government:

- BC Environmental Assessment Office;
- BC Oil and Gas Commission;
- BC Ministry of Natural Gas Development;
- BC Ministry of Finance;
- BC Ministry of Environment;
- BC Ministry of Aboriginal Relations and Reconciliation;
- BC Ministry of Energy and Mines;
- BC Climate Action Secretariat;
- BC Hydro;
- BC Ministry of Transportation and Infrastructure;
- BC Ministry of Forests, Lands and Natural Resource Operations;
- BC Ministry of Jobs, Tourism and Innovation; and
- BC Ministry of Justice.

Federal Government

- Canadian Environmental Assessment Agency;
- Prince Rupert Port Authority;

- Environment Canada;
- Natural Resources Canada;
- Aboriginal Affairs and Northern Development Canada; and
- Transport Canada.

During the site selection process, EMCL and IORL engaged other local and regional governments, including the District of Kitimat, the District of Stewart, the City of Terrace, the Northern Rockies Regional Municipality, and the Regional District of Kitimat-Stikine. WCC LNG Project will remain responsive to these local and regional governments and any others that may express an interest in the proposed Project activities.

In addition, WCC LNG Project's intention is to provide key regional stakeholders with a copy of the draft Project Description, to provide context to its overall development approach, to understand current interests and perspectives with respect to the proposed site, and to seek input into how best to engage with communities moving forward. WCC LNG Project have also reviewed key elements of the Project Description with the City of Prince Rupert and the Prince Rupert Port Authority prior to this submission to receive high level input.

6.2.3 Public Engagement Activities

Project representatives have engaged in consultation and public engagement activities with various stakeholders in the Prince Rupert area. This includes discussions with local businesses and service providers, the regional healthcare authority, community organizations, business associations, and other industry proponents active in the region.

The Project's public engagement activities to date include two separate community information sessions held in Prince Rupert. On July 24, 2014, and September 4, 2014, Project representatives invited community members in Prince Rupert and the surrounding area to come meet Project representatives and learn about the proposed Project. Topics covered in the open house included Project details, Project concept selection, anticipated timelines, regulatory requirements, safety, Aboriginal and community engagement, environmental considerations, and fieldwork and studies.

6.2.4 Key Issues Identified by Public and Government Stakeholders

Over the course of engagement, stakeholders, the public and government agencies have identified issues and concerns relating to the proposed Project. Table 19, includes summaries of these concerns. This list is a high-level summary and is not exhaustive.

Table 19: Summary of General Issues Identified through Public and Government Engagement

Environmental Effects	Air emissions Local watershed, water supply, and water quality Noise effects Visual effects Effects on marine life in Prince Rupert harbour Cumulative effects of all industrial development Impacts from upstream processes Increase in environmental impacts with a larger land footprint for the onshore concept
Visual Impacts	Height of onshore structures
Safety	Emergency response Marine and vessel safety Construction safety Potential aircraft restrictions Vessel speeds Potential aircraft restrictions due to height of onshore facilities
Social and Economic Impacts	Local hiring and training Utilising local business and service providers Effects on natural gas costs Effects on local services and infrastructure Benefits for local communities Effects on housing prices and availability Effects on local health infrastructure
Site Considerations	Unique weather conditions Proximity of site to the City of Prince Rupert Width of Tuck Inlet Increase in harbour traffic Road construction
Consultation and Engagement	Using local scientists and researchers Engaging local recreational and commercial marine users Frequency of community meetings Open communication about the Project Office in Prince Rupert
Liquefied Natural Gas	Source of gas to be exported Understanding of LNG operations Power supply to the facility Effects from upstream processes

6.2.5 Ongoing Engagement and Consultation Methods

WCC LNG project will continue to work with the public and stakeholder and government agency representatives to identify the most appropriate methods of consultation and engagement going forward.

Possible engagement initiatives include:

- Opening of community office – targeting Q1 2015;
- Ongoing one-on-one meetings with local and regional government officials;
- Meetings with local community groups;
- Workshops on specific topics related to the Project;
- Open houses;
- Issue-specific open houses or workshops;
- Town halls;
- Coffee chats;
- Participatory advisory councils;
- Presentations;
- Technical meetings;
- Tours and site visits;
- Focus groups;
- Small group meetings;
- School presentations and career fairs; and
- Participation at community events.

WCC LNG Project will utilise various communications materials to ensure that local and regional community members have a deep understanding of the proposed Project. Possible communications materials include:

- Community surveys;
- Project website;
- Information email account;
- Toll-free telephone inquiry line;
- Social media platforms;
- Poster boards;
- Maps;
- 3D models;
- Visualization simulations;
- Fact sheets;
- Newsletters;
- Powerpoint presentations;
- Speeches; and
- Videos and animations.

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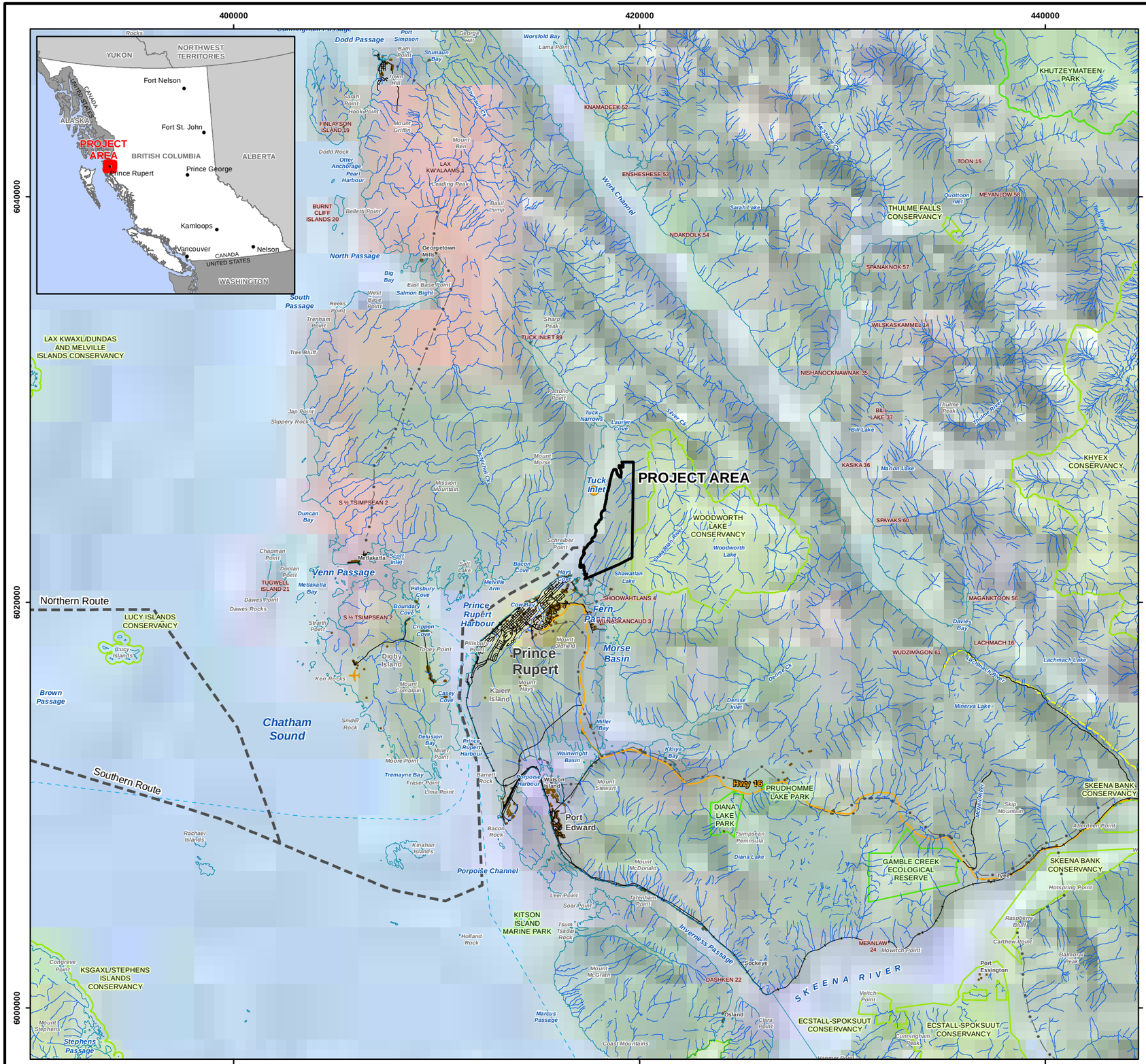
Appendices

Appendix A
Figures



LEGEND

- PROJECT AREA
- PROPOSED NAVIGATION ROUTE
- AIRPORT
- INACTIVE DISPOSAL AT SEA SITE
- HIGHWAY
- ROAD
- RAILWAY
- FERRY ROUTE
- PIPELINE
- TRANSMISSION LINE
- COASTLINE
- WATERCOURSE
- CITY / TOWN
- INDUSTRIAL BUILDING
- INDIAN RESERVE
- CONSERVANCY AREA
- PARK OR PROTECTED AREA
- RESIDENTIAL AREA
- VEGETATION
- WATERBODY

NOTES:
LOCATIONS OF PROPOSED NAVIGATION ROUTES ARE APPROXIMATE.

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WCC LNG PROJECT

PROJECT DESCRIPTION

LOCATION OF THE WCC LNG PROJECT SITE

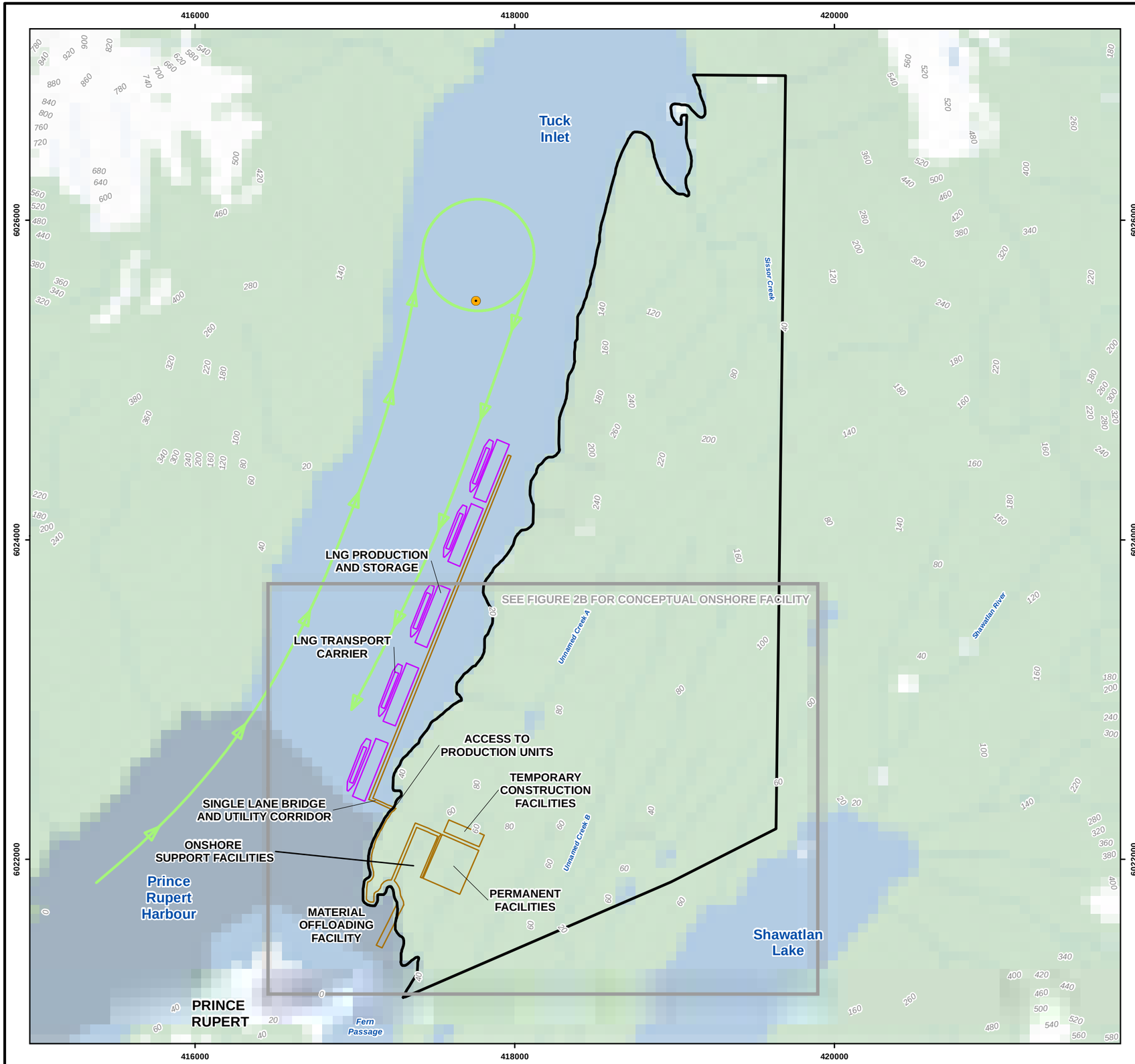
REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-22	A.L.

N

0 1,500 3,000 6,000
METRES
1:200,000
UTM NAD83 ZONE 9

PROJECT 1314220010
FIGURE 1

REV. 0



LEGEND

- PROJECT AREA
- INACTIVE DISPOSAL AT SEA SITE
- PRINCE RUPERT PORT AUTHORITY BOUNDARY
- CONCEPTUAL FACILITY ARRANGEMENT
- PROPOSED FLNG UNITS
- PROPOSED APPROACH AND TURNING BASIN
- CONTOUR (20m)
- COASTLINE
- WATERCOURSE
- VEGETATION
- WATERBODY

SOURCE:
PRINCE RUPERT AUTHORITY JURISDICTION AREA BOUNDARY PROVIDED BY PRINCE RUPERT PORT AUTHORITY ON MARCH 26, 2014. WATERBODY OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. DISPOSAL AT SEA SITES ACTIVE OBTAINED FROM ENVIRONMENT CANADA, INACTIVE FROM CANADIAN HYDROGRAPHIC SERVICES, FISHERIES AND OCEANS CANADA, FEB 2009. OTHER BASE DATA OBTAINED FROM EXXON MOBIL MARCH 2014. ONSHORE SUPPORT FACILITY PROVIDED FROM EXXON MOBIL NOVEMBER 2014.

WCC LNG PROJECT

PROJECT DESCRIPTION

PROPOSED NEAR SHORE PROJECT CONFIGURATION

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-23	A.L.

N

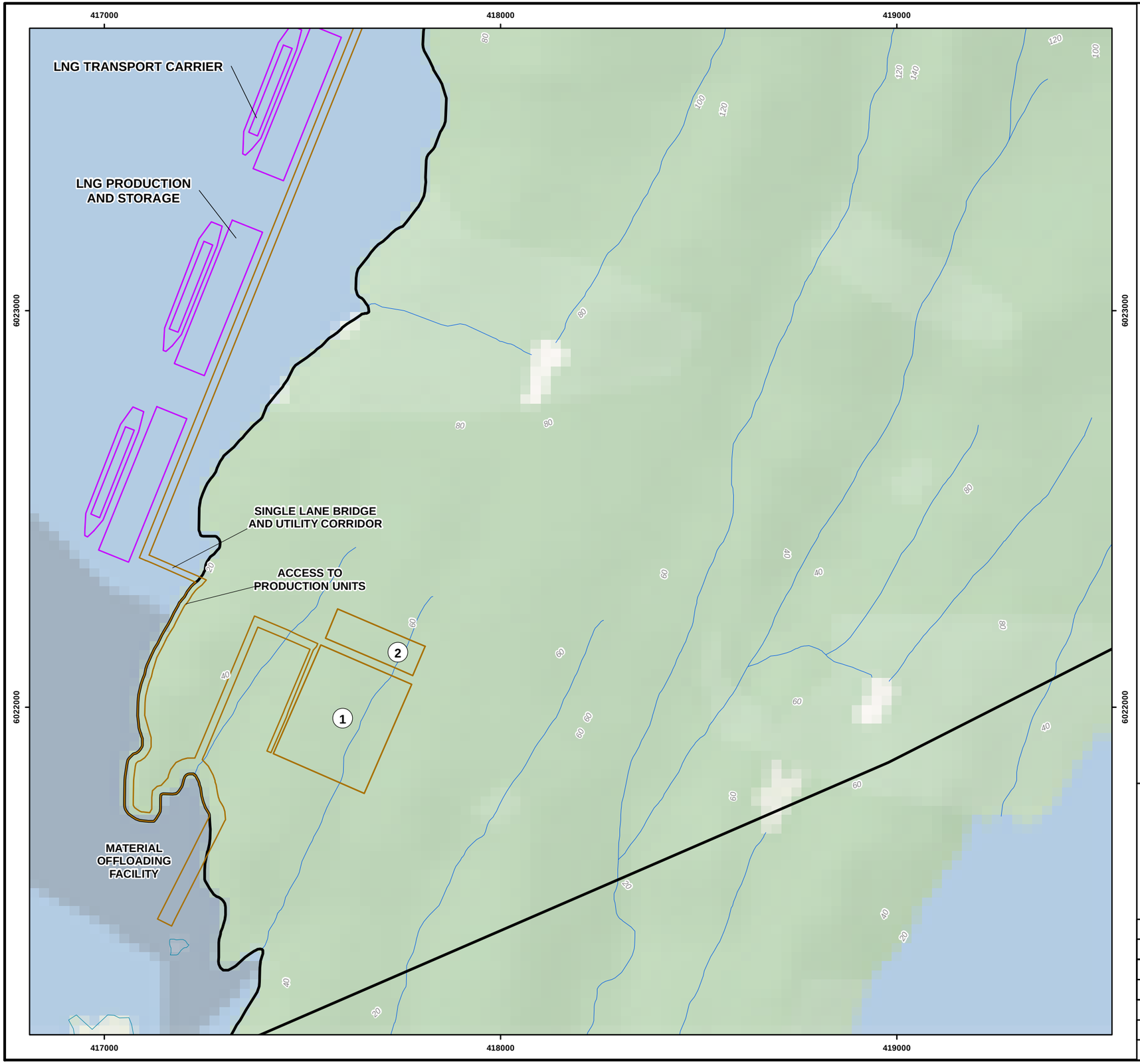
0 150 300 600
METRES
1:25,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 2A

REV. 0

SERVICE LAYER CREDITS: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors



LEGEND

- PROJECT AREA
- PRINCE RUPERT PORT AUTHORITY BOUNDARY
- CONTOUR (20m)
- WATERCOURSE
- VEGETATION
- WATERBODY
- CONCEPTUAL FACILITY ARANGEMENT
- PROPOSED FLNG UNITS
- (1) PERMANENT FACILITIES
  - CENTRAL CONTROL BUILDING
  - PERMANENT CAMP
  - SUPPORT FACILITIES
    - OFFICES
    - FIRE PROTECTION AND SAFETY
    - MAINTENANCE SHOP
    - WAREHOUSE
    - MEDICAL CENTRE/FIRST AID
  - STORAGE AREA
  - WASTE MANAGEMENT AREA
  - WASTERWATER TREATMENT FACILITIES
- (2) TEMPORARY CONSTRUCTION FACILITIES
  - WAREHOUSE
  - CONSTRUCTION OFFICES
  - CONSTRUCTION CAMP
  - WORKSHOP
  - UTILITIES
  - CONCRETE BATCH PLANT
  - CONSTRUCTION LAYDOWN AREA

SOURCE:
PRINCE RUPERT AUTHORITY JURISDICTION AREA BOUNDARY PROVIDED BY PRINCE RUPERT PORT AUTHORITY ON MARCH 26, 2014. WATERBODY OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. OTHER BASE DATA OBTAINED FROM EXXON MOBIL MARCH 2014. CONCEPTUAL ONSHORE FACILITY ARANGEMENT PROVIDED FROM EXXON MOBIL NOVEMBER 2014.

WCC LNG PROJECT

PROJECT DESCRIPTION

PROPOSED NEAR SHORE PROJECT CONFIGURATION
CONCEPTUAL ONSHORE FACILITES

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-23	J.W.

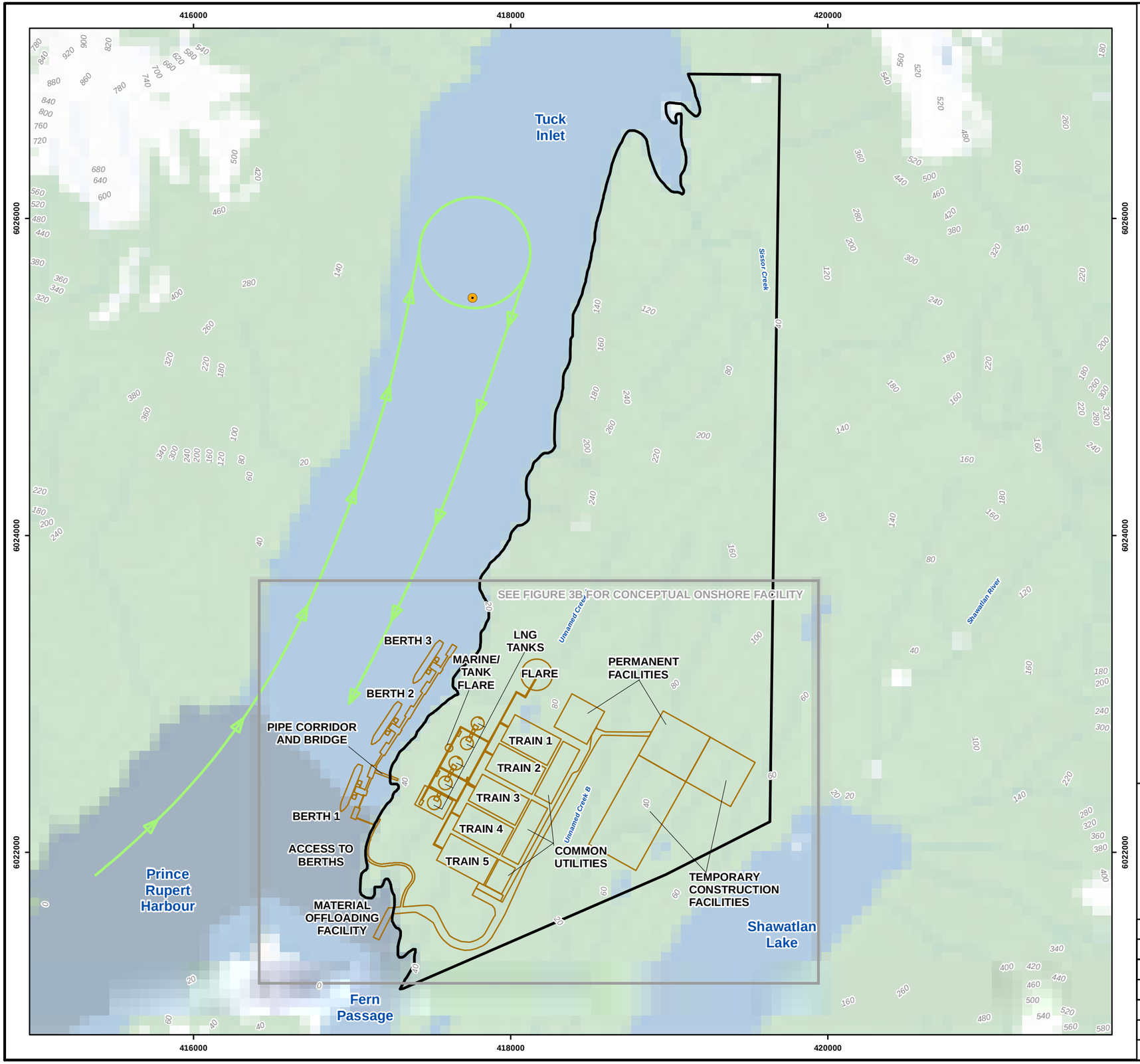
N

0 50 100 200
METRES
1:10,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 2B

REV. 0



LEGEND

- PROJECT AREA
- INACTIVE DISPOSAL AT SEA SITE
- PRINCE RUPERT PORT AUTHORITY BOUNDARY
- CONCEPTUAL FACILITY ARRANGEMENT
- PROPOSED APPROACH AND TURNING BASIN
- CONTOUR (20m)
- COASTLINE
- WATERCOURSE
- VEGETATION
- WATERBODY

SOURCE:
PRINCE RUPERT AUTHORITY JURISDICTION AREA BOUNDARY PROVIDED BY PRINCE RUPERT PORT AUTHORITY ON MARCH 26, 2014. WATERBODY OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. DISPOSAL AT SEA SITES ACTIVE OBTAINED FROM ENVIRONMENT CANADA, INACTIVE FROM CANADIAN HYDROGRAPHIC SERVICES, FISHERIES AND OCEANS CANADA, FEB 2009. OTHER BASE DATA OBTAINED FROM EXXON MOBIL AUGUST 2014. ONSHORE FACILITY PROVIDED FROM EXXON MOBIL NOVEMBER 2014.

WCC LNG PROJECT

PROJECT DESCRIPTION

PROPOSED ONSHORE PROJECT CONFIGURATION

REV	DESCRIPTION	DATE	INITIALS
P	FINAL	23-12-04	A.L.

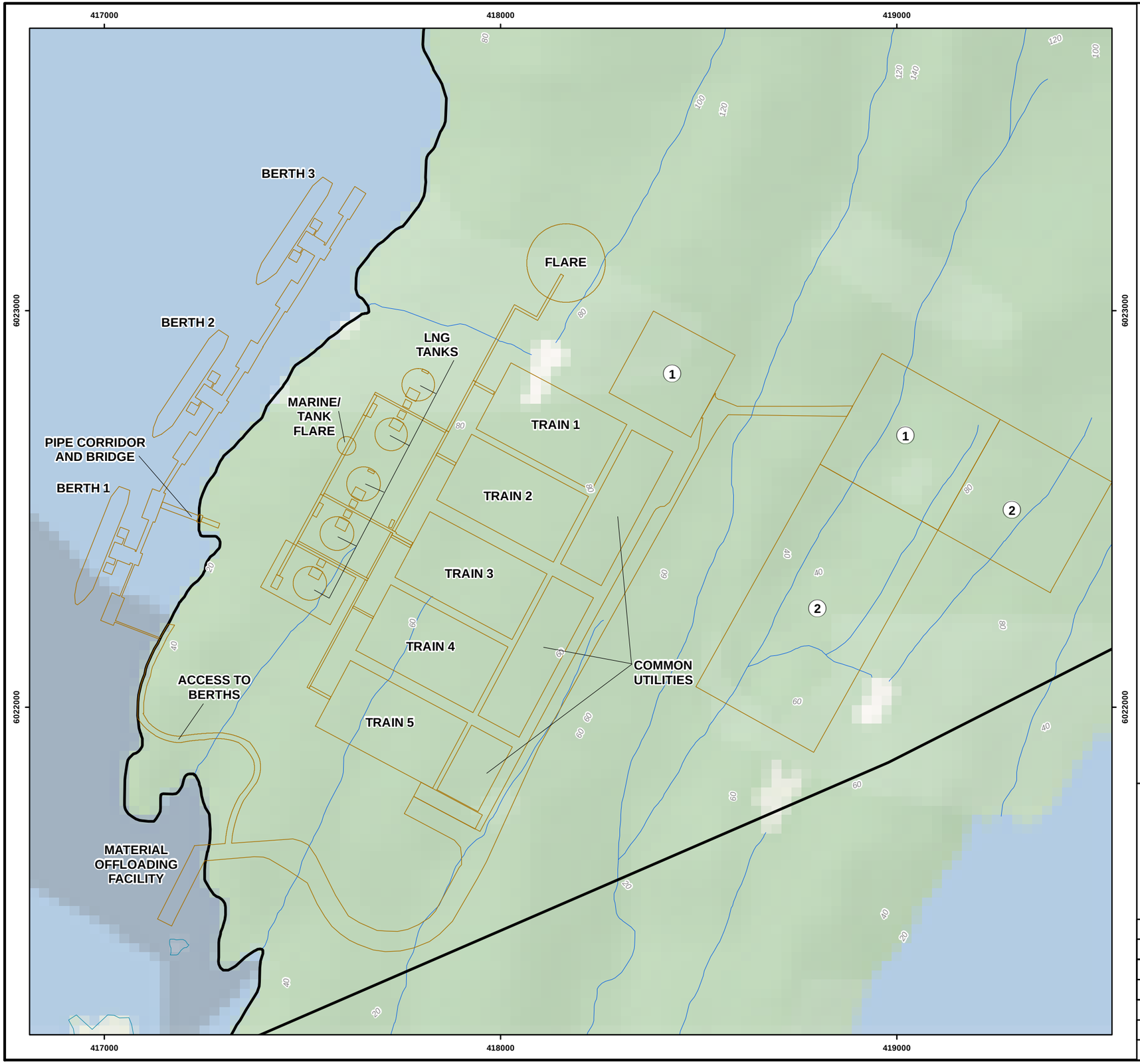
N

0 150 300 600
METRES
1:25,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 3A

REV. 0



LEGEND

- PROJECT AREA
- PRINCE RUPERT PORT AUTHORITY BOUNDARY
- CONTOUR (20m)
- WATERCOURSE
- VEGETATION
- WATERBODY
- CONCEPTUAL FACILITY ARANGEMENT
- (1) PERMANENT FACILITIES
  - CENTRAL CONTROL BUILDING
  - PERMANENT CAMP
  - SUPPORT FACILITIES
    - OFFICES
    - FIRE PROTECTION AND SAFETY
    - MAINTENANCE SHOP
    - WAREHOUSE
    - MEDICAL CENTRE/FIRST AID
  - STORAGE AREA
  - WASTE MANAGEMENT AREA
  - WASTEWATER TREATMENT FACILITIES
  - INLET GAS RECEIVING SYSTEM AREA
  - INLET GAS RECEIVING UNIT
  - ACID GAS REMOVAL UNIT
  - DEHYDRATION UNIT
  - MERCURY REMOVAL UNIT
  - HEAVY HYDROCARBON REMOVAL
- (2) TEMPORARY CONSTRUCTION FACILITIES
  - WAREHOUSE
  - CONSTRUCTION LAYDOWN AREA
  - CONSTRUCTION OFFICES
  - CONSTRUCTION CAMP
  - WORKSHOP
  - UTILITIES
  - CONCRETE BATCH PLANT

SOURCE:
PRINCE RUPERT AUTHORITY JURISDICTION AREA BOUNDARY PROVIDED BY PRINCE RUPERT PORT AUTHORITY ON MARCH 26, 2014. WATERBODY OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. OTHER BASE DATA OBTAINED FROM EXXON MOBIL AUGUST 2014. ONSHORE FACILITY PROVIDED FROM EXXON MOBIL NOVEMBER 2014.

WCC LNG PROJECT

PROJECT DESCRIPTION

PROPOSED ONSHORE PROJECT CONFIGURATION
CONCEPTUAL ONSHORE FACILITES

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-23	J.W.

N

0 50 100 200
METRES
1:10,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 3B

REV. 0

NOTES:
IMAGE IN THIS FIGURE IS FOR ILLUSTRATION PURPOSES ONLY AND IS NOT TO SCALE.
RENDERINGS ARE CONCEPTUAL ARTISTS IMPRESSIONS.

SOURCE:
3D IMAGE PROVIDED BY EXXON MOBIL DECEMBER 2014.

WCC LNG PROJECT

PROJECT DESCRIPTION

NEAR-SHORE CONCEPT RENDERING
(CONCEPTUAL ARTIST'S IMPRESSIONS)

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-04	M.E.

PROJECT 1314220010

FIGURE 4

REV.

0

SERVICE LAYER CREDITS:

NOTES:
IMAGE IN THIS FIGURE IS FOR ILLUSTRATION PURPOSES ONLY AND IS NOT TO SCALE.
RENDERINGS ARE CONCEPTUAL ARTISTS IMPRESSIONS.

SOURCE:
3D IMAGE PROVIDED BY EXXON MOBIL DECEMBER 2014.

WCC LNG PROJECT

PROJECT DESCRIPTION

PROJECT ONSHORE CONCEPT RENDERING
(CONCEPTUAL ARTIST'S IMPRESSIONS)

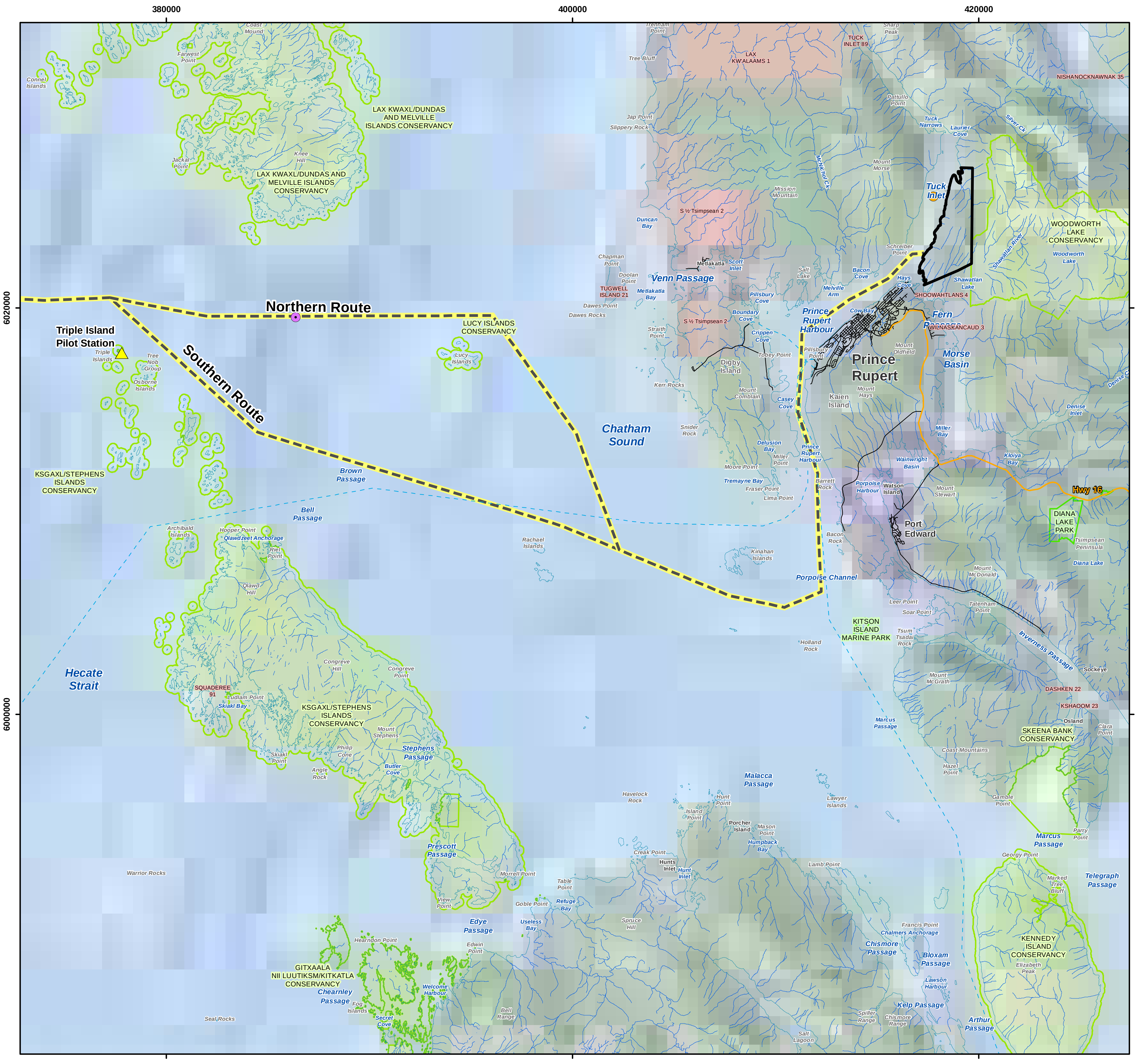
REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-04	M.E.

PROJECT 1314220010

FIGURE 5

REV.

0



LEGEND

- PROJECT AREA
- ACTIVE DISPOSAL AT SEA SITE (BROWN PASSAGE)
- INACTIVE DISPOSAL AT SEA SITE
- PILOT STATION
- POTENTIAL NAVIGATION ROUTE
- HIGHWAY
- ROAD
- FERRY ROUTE
- COASTLINE
- WATERCOURSE
- CITY / TOWN
- INDIAN RESERVE
- CONSERVANCY AREA
- PARK OR PROTECTED AREA
- VEGETATION

NOTES:
LOCATIONS OF PROPOSED NAVIGATION ROUTES ARE APPROXIMATE.

SOURCE:
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WCC LNG PROJECT

PROJECT DESCRIPTION

PROPOSED MARINE SHIPPING ROUTES

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-22	J.W.

N

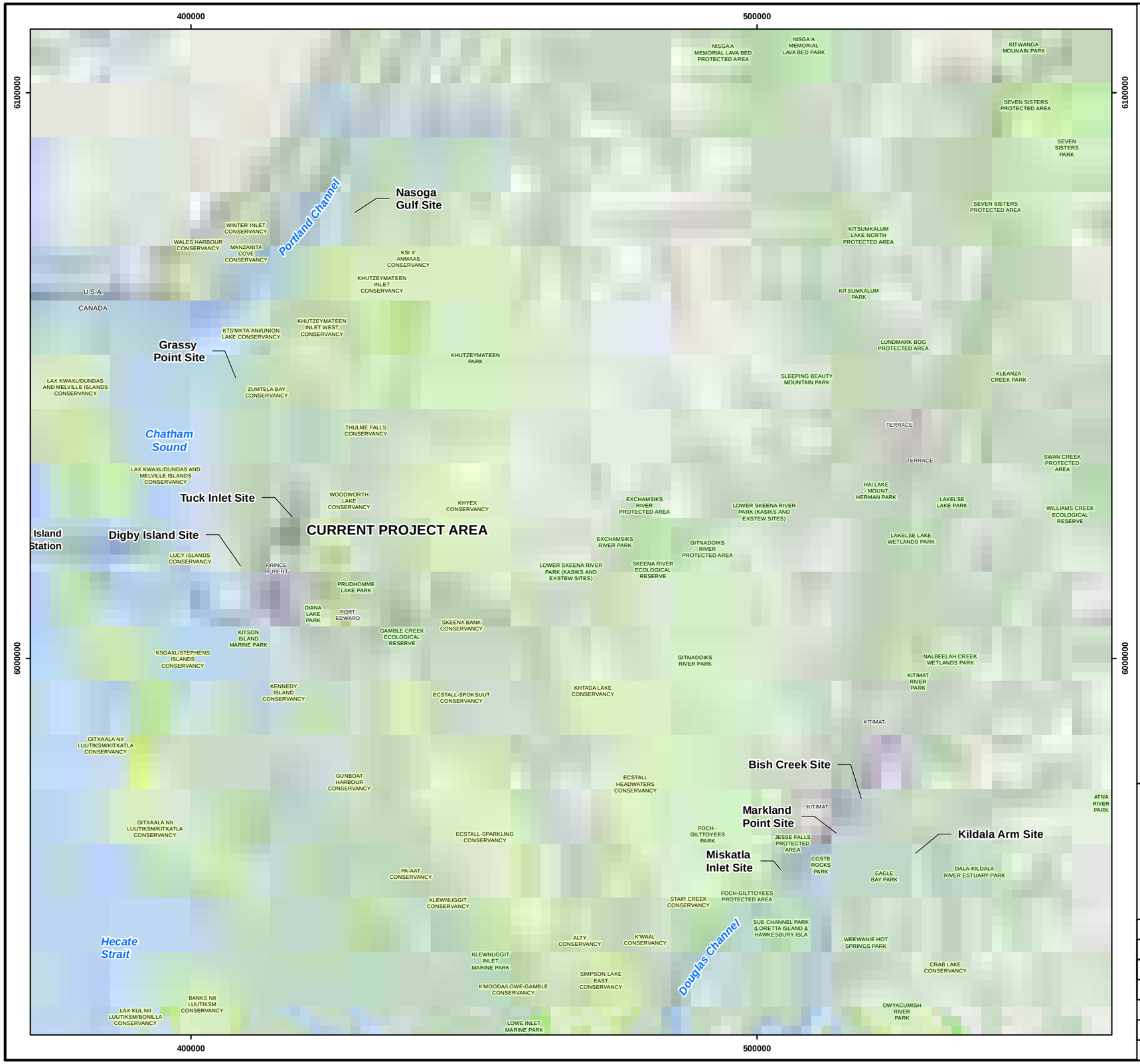
0 1,500 3,000 6,000
METRES
1:200,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 6

REV. 0

SERVICE LAYER CREDITS:



LEGEND

- INITIAL PROJECT ALTERNATIVE
- CURRENT PROJECT AREA
- CANADIAN AND UNITED STATES BORDER
- HIGHWAY
- RAILWAY
- PROPOSED NAVIGATION ROUTE
- PILOT STATION
- ACTIVE DISPOSAL AT SEA SITE (BROWN PASSAGE)
- INACTIVE DISPOSAL AT SEA SITE
- FERRY ROUTE
- CITY / TOWN
- CONSERVANCY AREA
- PARK OR PROTECTED AREA
- VEGETATION
- WATERBODY

SOURCE:
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WCC LNG PROJECT

PROJECT DESCRIPTION

LOCATION OF INITIAL EIGHT PROJECT SITE ALTERNATIVES

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-23	A.L.

N

0 5,000 10,000 20,000

METRES

1:700,000

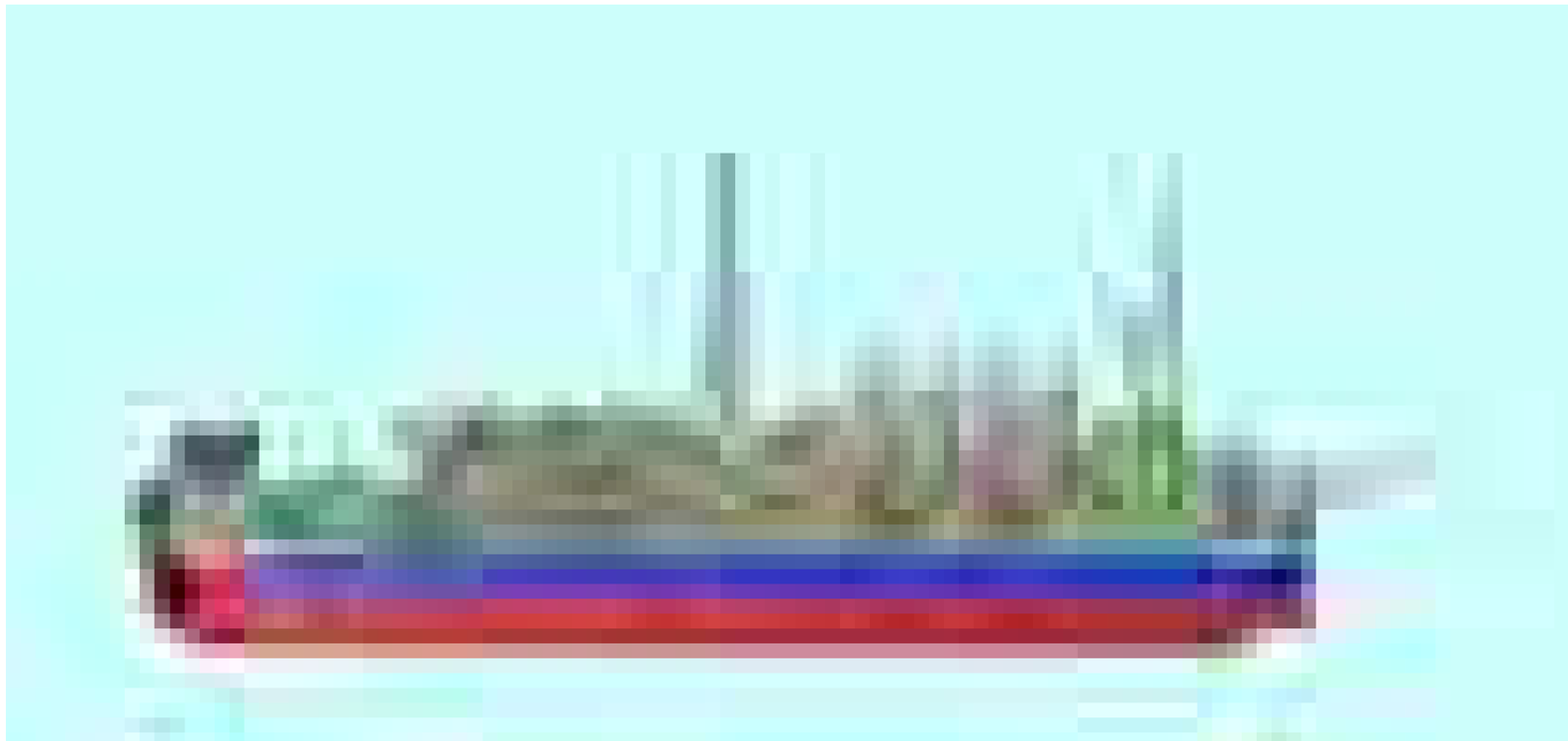
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 7

REV. 0

SERVICE LAYER CREDITS: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors



NOTES:
IMAGE IN THIS FIGURE IS FOR ILLUSTRATION PURPOSES ONLY AND IS NOT TO SCALE.

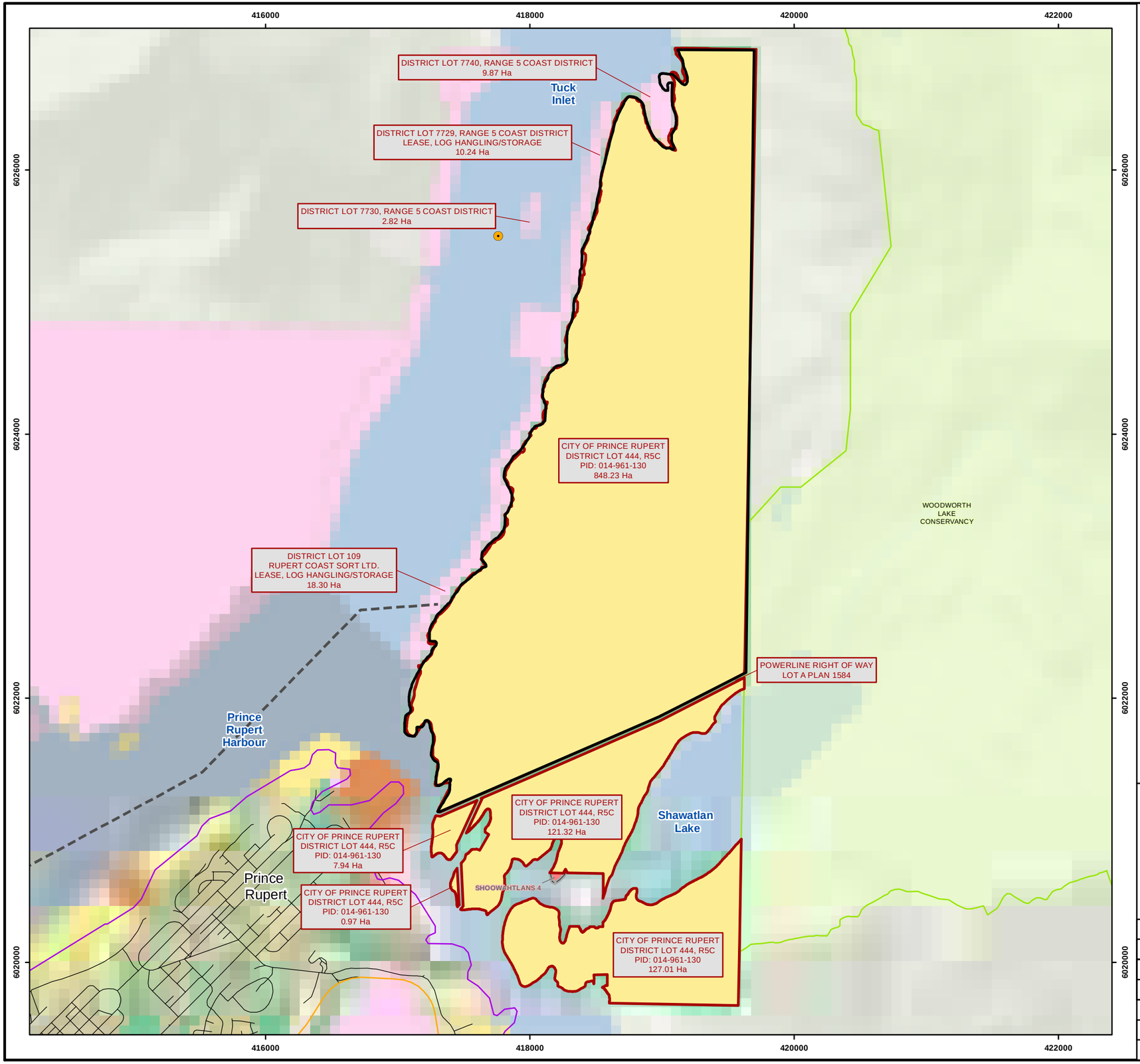
SOURCE:
3D IMAGE PROVIDED BY EXXON MOBIL JUNE 2014.

WCC LNG PROJECT

PROJECT DESCRIPTION

3D RENDERING OF A CONCEPTUAL DESIGN OF A BARGE-MOUNTED LNG UNIT

REV	DESCRIPTION	DATE	INITIALS	
				PROJECT 1314220010 / FIGURE 8 — REV. 0
0	FINAL	14-12-04	M.E.	



LEGEND

- PROJECT AREA
- DISTRICT LOT 444
- INACTIVE DISPOSAL AT SEA SITE
- PROPOSED NAVIGATION ROUTE
- HIGHWAY
- ROAD
- CITY / TOWN
- INDIAN RESERVE

LAND OWNERSHIP

- CROWN FEDERAL
- CROWN PROVINCIAL
- CROWN MUNICIPAL
- PRIVATE
- UNKNOWN
- CONSERVANCY AREA
- PARK OR PROTECTED AREA
- PRINCE RUPERT PORT AUTHORITY BOUNDARY
- WATERBODY

NOTES:
LOCATIONS OF PROPOSED NAVIGATION ROUTES ARE APPROXIMATE.
THE DISTRICT LOTS SHOWN ARE WITHIN THE CITY LIMITS OF PRINCE RUPERT.
NEAREST RESIDENCE TO PROJECT LOCATION IS LOCATED APPROXIMATELY 900M FROM THE SOUTHERNMOST BOUNDARY OF THE PROJECT AREA

SOURCE:

WCC LNG PROJECT

PROJECT DESCRIPTION

LAND AND WATER TENURE

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-23	J.W.

N

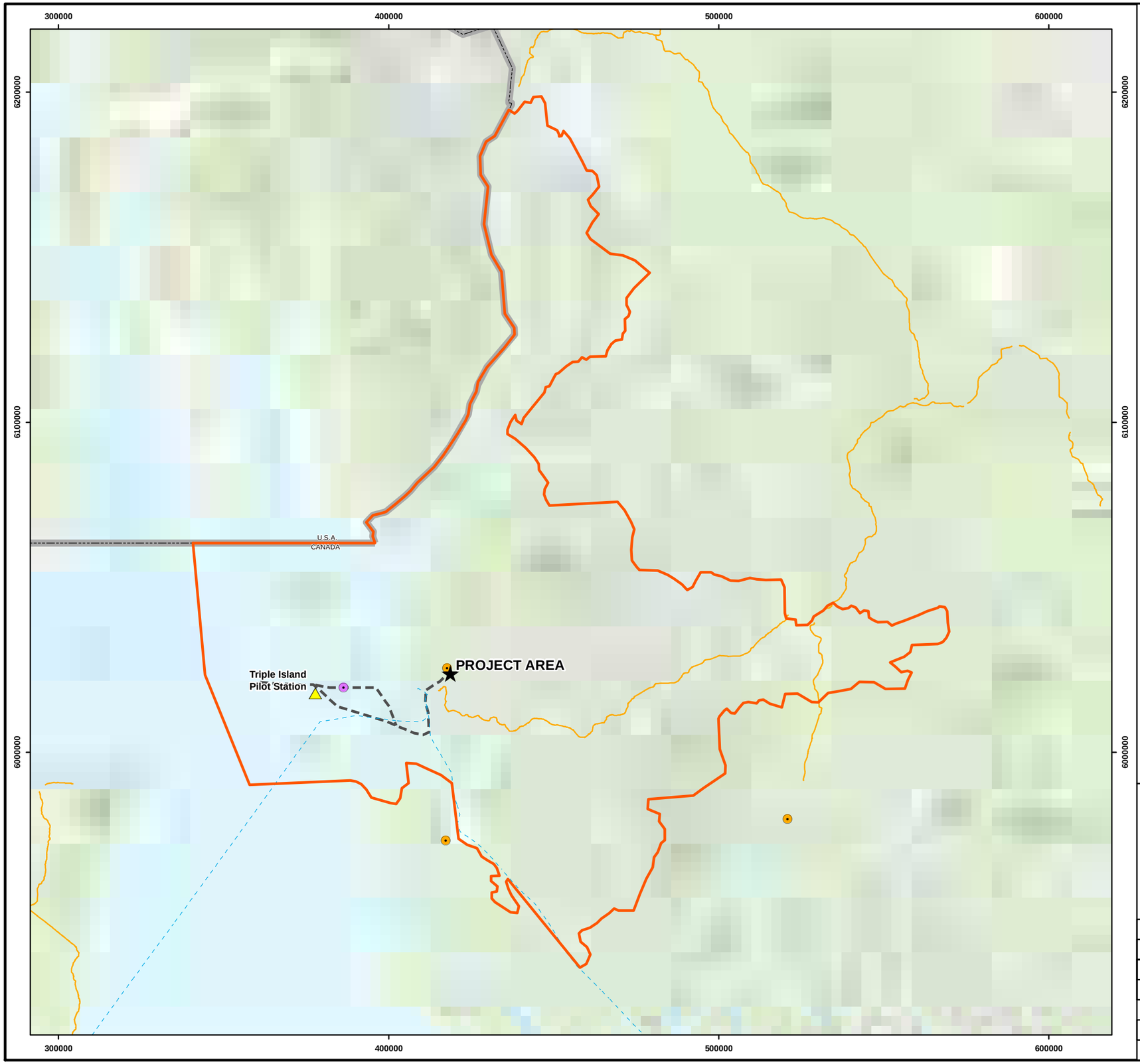
0 250 500 1,000
METRES

1:30,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 9

REV.
0



LEGEND

- PROJECT AREA
- ACTIVE DISPOSAL AT SEA SITE (BROWN PASSAGE)
- INACTIVE DISPOSAL AT SEA SITE
- PILOT STATION
- CANADIAN AND UNITED STATES BORDER
- HIGHWAY
- FERRY ROUTE
- POTENTIAL NAVIGATION ROUTE
- METLAKATLA CONSULTATIVE BOUNDARY

NOTES:
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PROJECT DESCRIPTION

METLAKATLA CONSULTATIVE BOUNDARY

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-22	J.W.

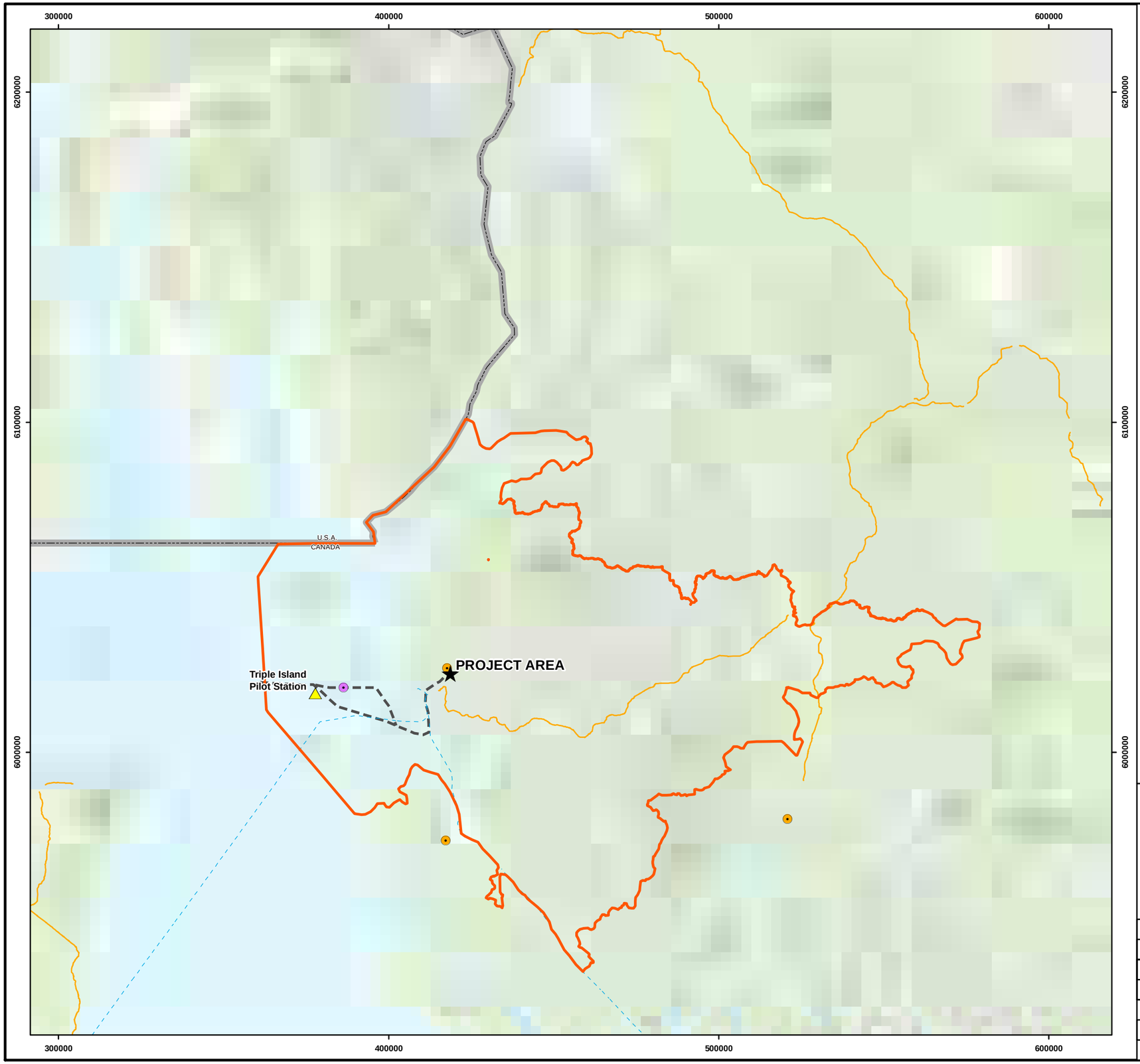
N

0 10 20 40
KILOMETRES
1:1,200,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 10

REV. 0



LEGEND

- PROJECT AREA
- ACTIVE DISPOSAL AT SEA SITE (BROWN PASSAGE)
- INACTIVE DISPOSAL AT SEA SITE
- PILOT STATION
- CANADIAN AND UNITED STATES BORDER
- HIGHWAY
- FERRY ROUTE
- POTENTIAL NAVIGATION ROUTE
- LAX KW'ALAAMS CONSULTATIVE BOUNDARY

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SOURCE:
LAX KW'ALAAMS CONSULTATIVE BOUNDARY DIGITIZED FROM CONSULTATIVE BOUNDARY MAP PROVIDED BY LAX KW'ALAAMS BAND JUNE 4, 2014 . ROADS, FERRY ROUTES, AND RAILWAYS OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. DISPOSAL AT SEA SITES ACTIVE OBTAINED FROM ENVIRONMENT CANADA, INACTIVE FROM CANADIAN HYDROGRAPHIC SERVICES, FISHERIES AND OCEANS CANADA, FEB 2009. POTENTIAL NAVIGATION ROUTES COLLECTED BY GOLDER (2013).

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PROJECT DESCRIPTION

LAX KW'ALAAMS CONSULTATIVE BOUNDARY

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-22	J.W.

N

0 10 20 40
KILOMETRES
1:1,200,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 11

REV.
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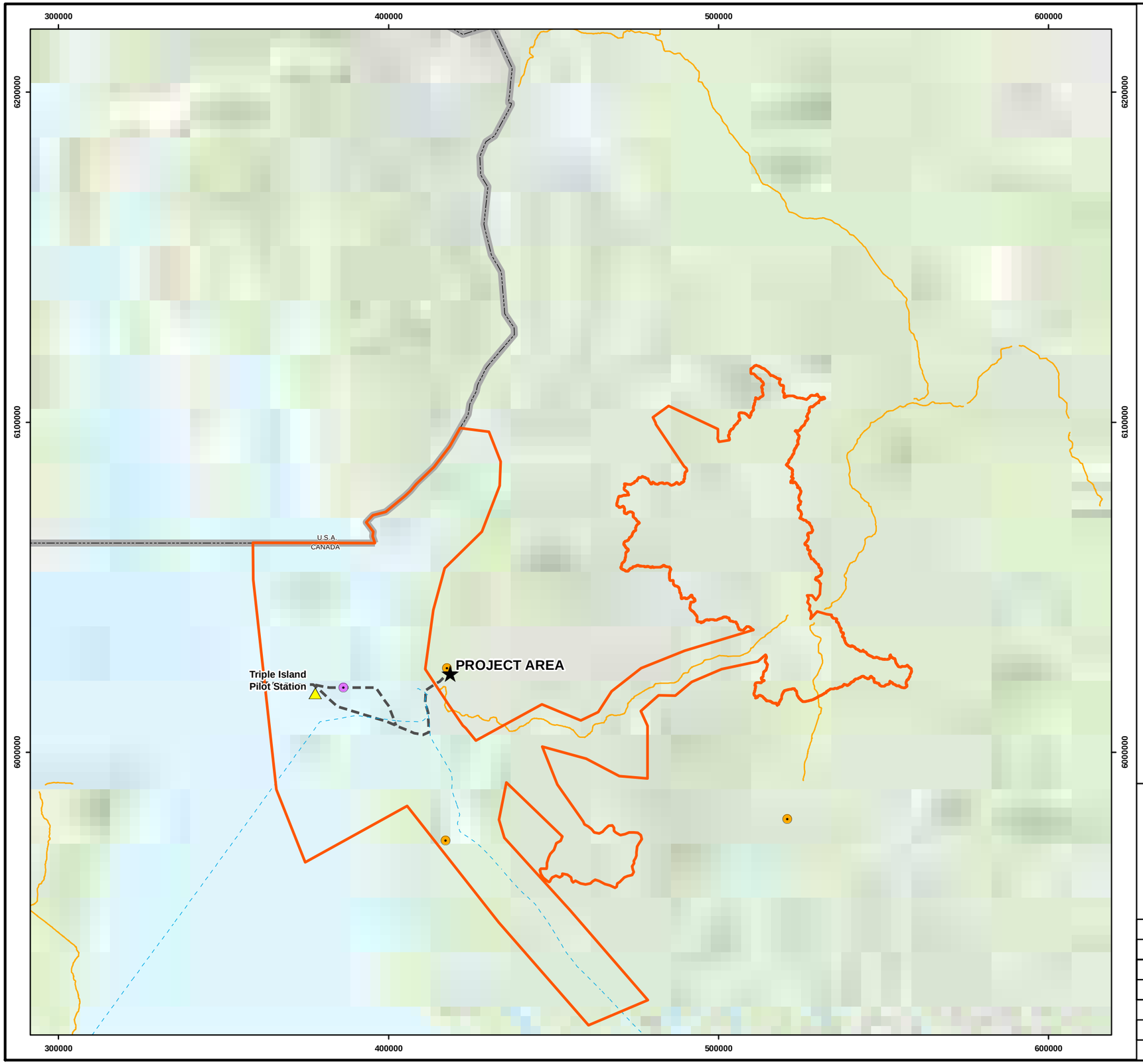

LEGEND

- PROJECT AREA
- ACTIVE DISPOSAL AT SEA SITE (BROWN PASSAGE)
- INACTIVE DISPOSAL AT SEA SITE
- PILOT STATION
- CANADIAN AND UNITED STATES BORDER
- HIGHWAY
- FERRY ROUTE
- POTENTIAL NAVIGATION ROUTE
- KITSUMKALUM CONSULTATIVE BOUNDARY

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SOURCE:
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PROJECT DESCRIPTION

KITSUMKALUM CONSULTATIVE BOUNDARY

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-22	J.W.

N

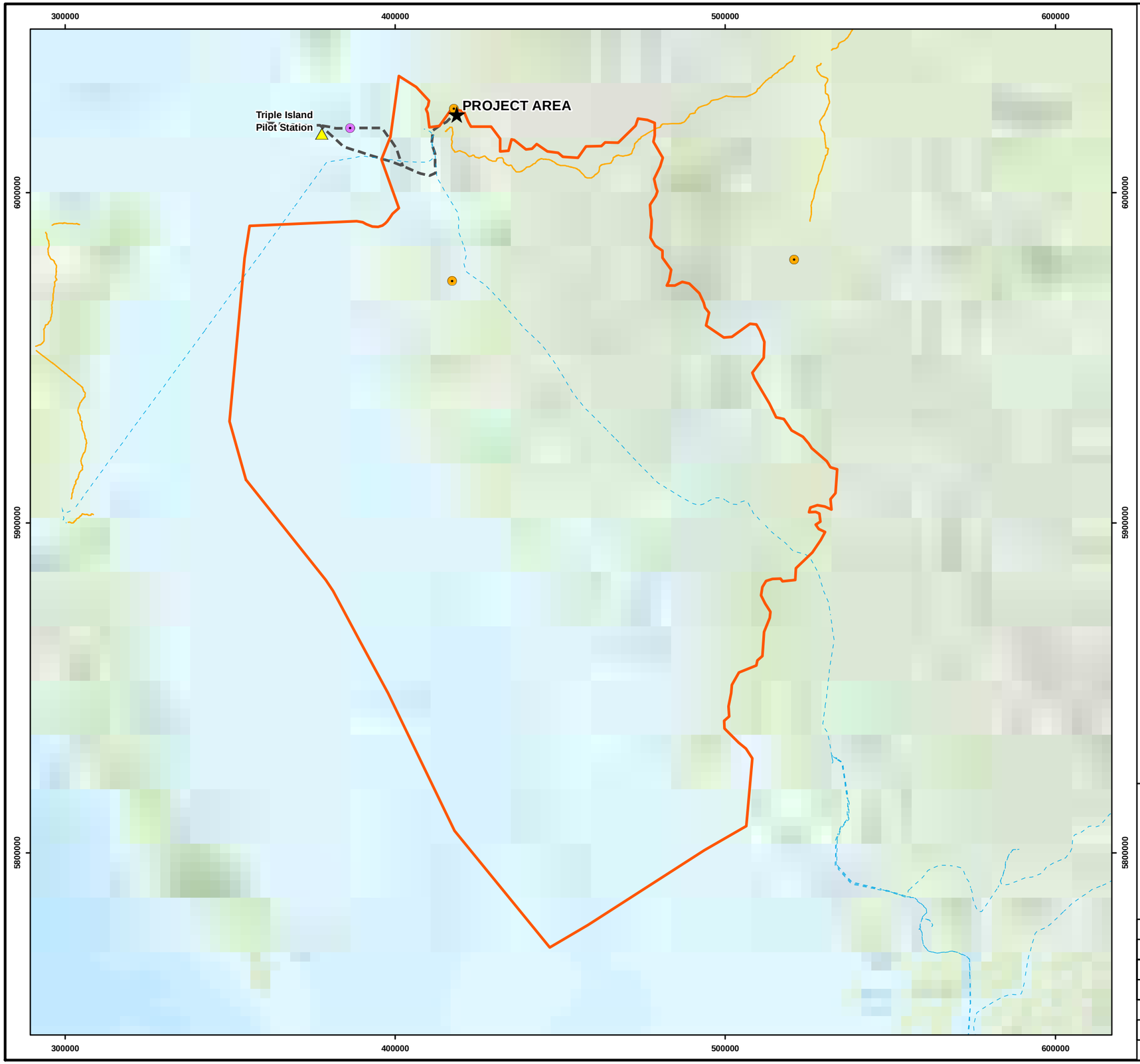
0 10 20 40
KILOMETRES
1:1,200,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 12

REV.
0

SERVICE LAYER CREDITS: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors



LEGEND

- PROJECT AREA
- ACTIVE DISPOSAL AT SEA SITE (BROWN PASSAGE)
- INACTIVE DISPOSAL AT SEA SITE
- PILOT STATION
- CANADIAN AND UNITED STATES BORDER
- HIGHWAY
- FERRY ROUTE
- POTENTIAL NAVIGATION ROUTE
- GITXAALA CONSULTATIVE BOUNDARY

NOTES:
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SOURCE:
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WCC LNG PROJECT

PROJECT DESCRIPTION

GITXAALA CONSULTATIVE BOUNDARY

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-22	J.W.

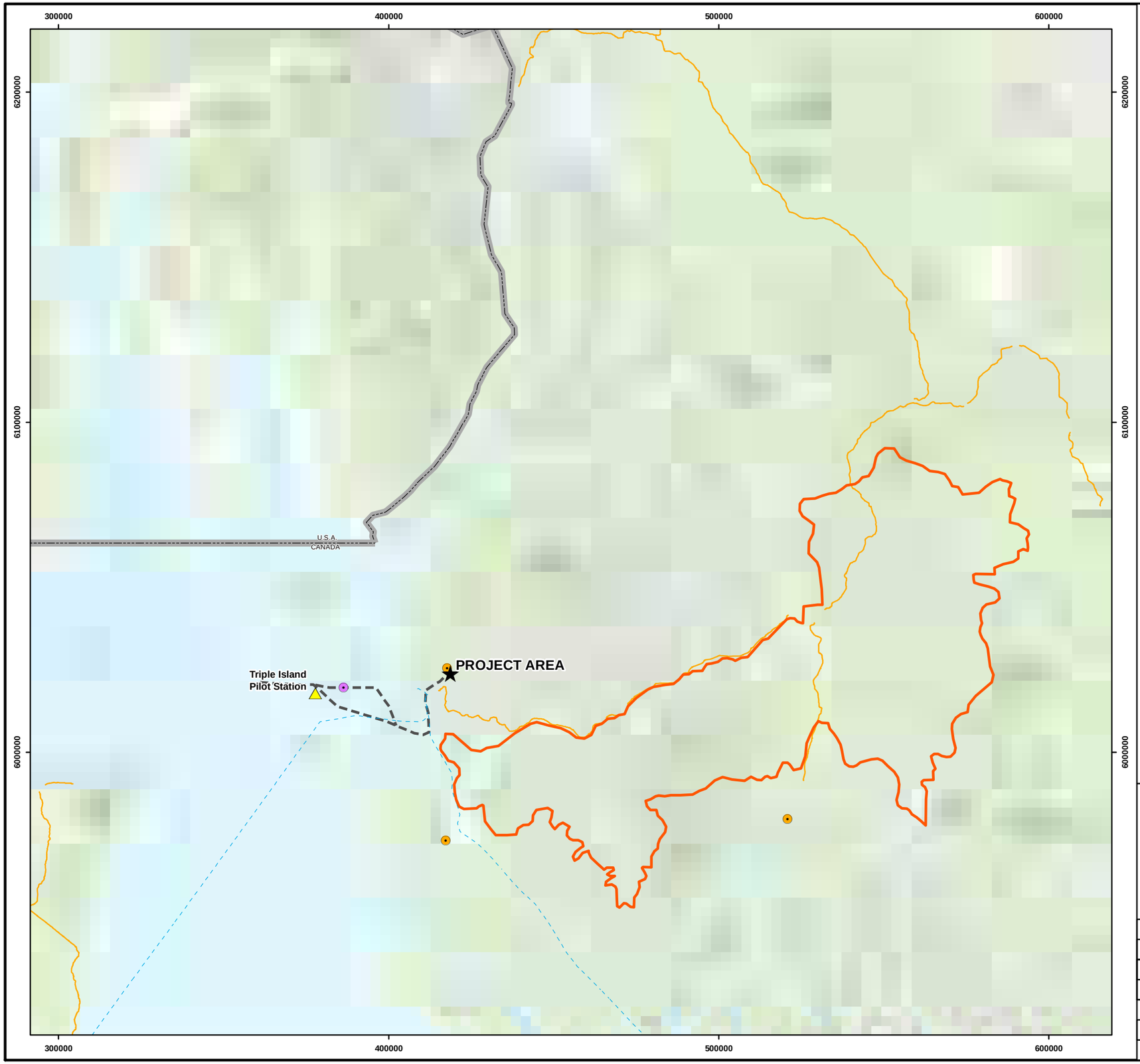
N

0 10 20 40
KILOMETRES
1:1,200,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 13

REV.
0



LEGEND

- PROJECT AREA
- ACTIVE DISPOSAL AT SEA SITE (BROWN PASSAGE)
- INACTIVE DISPOSAL AT SEA SITE
- PILOT STATION
- CANADIAN AND UNITED STATES BORDER
- HIGHWAY
- FERRY ROUTE
- POTENTIAL NAVIGATION ROUTE
- KITSELAS CONSULTATIVE BOUNDARY

NOTES:
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SOURCE:
KITSELAS CONSULTATIVE BOUNDARY DIGITIZED FROM KITSELAS-BRITISH COLUMBIA (2011). ROADS, FERRY ROUTES, AND RAILWAYS OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. DISPOSAL AT SEA SITES ACTIVE OBTAINED FROM ENVIRONMENT CANADA, INACTIVE FROM CANADIAN HYDROGRAPHIC SERVICES, FISHERIES AND OCEANS CANADA, FEB 2009. POTENTIAL NAVIGATION ROUTES COLLECTED BY GOLDER (2013).

WCC LNG PROJECT

PROJECT DESCRIPTION

KITSELAS CONSULTATIVE BOUNDARY

REV	DESCRIPTION	DATE	INITIALS
0	FINAL	14-12-22	J.W.

N

0 10 20 40
KILOMETRES

1:1,200,000
UTM NAD83 ZONE 9

PROJECT 1314220010

FIGURE 14

REV. 0

SERVICE LAYER CREDITS: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Appendix B
Site Photographs

Photograph 1: Shoreline and Cove Southwest Corner of DL 444 in the Vicinity of Proposed Marine Offloading Facility

Photograph 2: Forest Habitat Found throughout DL 444

Photograph 3: Shoreline along Western Boundary of DL 444 in the Vicinity of Proposed Barge-Mounted LNG Locations

Photograph 4: Shoreline along Northwest Boundary of DL 444 North of Proposed Barge-Mounted LNG Locations

Photograph 5: Shoreline along Northwest Boundary of DL 444 North of Proposed Barge-Mounted LNG Locations

Appendix C

Migratory Bird Species Known to Occur within the Project Area

Table 1: Species of Migratory Birds with the Potential to Occur in the Project Area

Scientific Name	Common Name	BC List	Listed COSEWIC	Listed SARA
Accipiter gentilis laingi *	Northern Goshawk, *laingi* subspecies	Red	T (2013)	1-T (2003)
Accipiter striatus	Sharp-shinned Hawk	Yellow	NAR (1997)	-
Actitis macularius	Spotted Sandpiper	Yellow	-	-
Aegolius acadicus	Northern Saw-whet Owl	Yellow	-	-
Agelaius phoeniceus	Red-winged Blackbird	Yellow	-	-
Aix sponsa	Wood Duck	Yellow	-	-
Anas americana	American Wigeon	Yellow	-	-
Anas crecca	Green-winged Teal	Yellow	-	-
Anas platyrhynchos	Mallard	Yellow	-	-
Anser albifrons	Greater White-fronted Goose	Yellow	-	-
Anthus rubescens	American Pipit	Yellow	-	-
Aquila chrysaetos	Golden Eagle	Yellow	NAR (1996)	-
Ardea herodias fannini *	Great Blue Heron, *fannini* subspecies	Blue	SC (2008)	1-SC (2010)
Bombycilla cedrorum	Cedar Waxwing	Yellow	-	-
Bonasa umbellus	Ruffed Grouse	Yellow	-	-
Brachyramphus marmoratus	Marbled Murrelet	Blue	T (2012)	1-T (2003)
Branta bernicla	Brant	Blue	-	-
Branta canadensis	Canada Goose	Yellow	-	-
Bubo virginianus	Great Horned Owl	Yellow	-	-
Bucephala albeola	Bufflehead	Yellow	-	-
Bucephala clangula	Common Goldeneye	Yellow	-	-
Bucephala islandica	Barrow's Goldeneye	Yellow	-	-
Buteo jamaicensis	Red-tailed Hawk	Yellow	NAR (1995)	-
Calidris minutilla	Least Sandpiper	Yellow	-	-
Calypte anna	Anna's Hummingbird ‡	Yellow	-	-
Cardellina pusilla	Wilson's Warbler	Yellow	-	-
Catharus fuscescens	Veery	Yellow	-	-
Catharus guttatus	Hermit Thrush	Yellow	-	-
Catharus ustulatus	Swainson's Thrush	Yellow	-	-
Cepphus columba	Pigeon Guillemot	Yellow	-	-
Cerorhinca monocerata	Rhinoceros Auklet	Yellow	-	-
Certhia americana	Brown Creeper	Yellow	-	-
Chaetura vauxi	Vaux's Swift	Yellow	-	-
Charadrius vociferus	Killdeer	Yellow	-	-
Chordeiles minor	Common Nighthawk	Yellow	T (2007)	1-T (2010)
Cinclus mexicanus	American Dipper	Yellow	-	-
Circus cyaneus	Northern Harrier	Yellow	NAR (1993)	-

Scientific Name	Common Name	BC List	Listed COSEWIC	Listed SARA
Colaptes auratus	Northern Flicker	Yellow	-	-
Columba livia	Rock Pigeon	Exotic	-	-
Contopus cooperi	Olive-sided Flycatcher	Blue	T (2007)	1-T (2010)
Contopus sordidulus	Western Wood-Pewee	Yellow	-	-
Corvus caurinus	Northwestern Crow	Yellow	-	-
Corvus corax	Common Raven	Yellow	-	-
Cyanocitta stelleri	Steller's Jay	Yellow	-	-
Cypseloides niger	Black Swift	Yellow	-	-
Dendragapus fuliginosus	Sooty Grouse	Blue	-	-
Dryocopus pileatus	Pileated Woodpecker	Yellow	-	-
Empidonax alnorum	Alder Flycatcher	Yellow	-	-
Empidonax difficilis	Pacific-slope Flycatcher	Yellow	-	-
Empidonax flaviventris	Yellow-bellied Flycatcher	Yellow	-	-
Empidonax hammondii	Hammond's Flycatcher	Yellow	-	-
Empidonax oberholseri	Dusky Flycatcher	Yellow	-	-
Euphagus carolinus	Rusty Blackbird	Blue	SC (2006)	1-SC (2009)
Euphagus cyanocephalus	Brewer's Blackbird	Yello	-	-
Falcipennis canadensis	Spruce Grouse	Yellow	-	-
Falco columbarius	Merlin	Yellow	NAR (1985)	-
Falco peregrinus pealei *	Peregrine Falcon, *pealei* subspecies	Blue	SC (2007)	1-SC (2003)
Falco sparverius	American Kestrel	Yellow	-	-
Fratercula cirrhata	Tufted Puffin	Blue	-	-
Gallinago delicata	Wilson's Snipe	Yellow	-	-
Gavia immer	Common Loon	Yellow	-	-
Gavia pacifica	Pacific Loon	Yellow	-	-
Gavia stellata	Red-throated Loon	Yellow	-	-
Geothlypis tolmiei	MacGillivray's Warbler	Yellow	-	-
Geothlypis trichas	Common Yellowthroat	Yellow	-	-
Glaucidium gnoma	Northern Pygmy-Owl	Yellow	-	-
Grus canadensis	Sandhill Crane	Yellow	NAR (1979)	-
Haematopus bachmani	Black Oystercatcher	Yellow	-	-
Haemorhous purpureus	Purple Finch	Yellow	-	-
Haliaeetus leucocephalus	Bald Eagle	Yellow	NAR (1984)	-
Hirundo rustica	Barn Swallow	Blue	T (2011)	-
Histrionicus histrionicus	Harlequin Duck	Yellow	-	-
Ixoreus naevius	Varied Thrush	Yellow	-	-
Junco hyemalis	Dark-eyed Junco	Yellow	-	-

Scientific Name	Common Name	BC List	Listed COSEWIC	Listed SARA
Lagopus lagopus	Willow Ptarmigan	Yellow	-	-
Lagopus leucura	White-tailed Ptarmigan	Yellow	-	-
Lagopus muta	Rock Ptarmigan	Yellow	-	-
Larus argentatus	Herring Gull	Yellow	-	-
Larus canus	Mew Gull	Yellow	-	-
Larus glaucescens	Glaucous-winged Gull	Yellow	-	-
Leucosticte tephrocotis	Gray-crowned Rosy-Finch	Yellow	-	-
Lophodytes cucullatus	Hooded Merganser	Yellow	-	-
Loxia curvirostra	Red Crossbill	Yellow	-	-
Megaceryle alcyon	Belted Kingfisher	Yellow	-	-
Megascops kennicottii kennicottii *	Western Screech-Owl, *kennicotti* subspecies	Blue	T (2012)	1-SC (2005)
Melanitta fusca	White-winged Scoter	Yellow	-	-
Melanitta perspicillata	Surf Scoter	Blue	-	-
Melospiza lincolnii	Lincoln's Sparrow	Yellow	-	-
Melospiza melodia	Song Sparrow	Yellow	-	-
Mergus merganser	Common Merganser	Yellow	-	-
Mergus serrator	Red-breasted Merganser	Yellow	-	-
Molothrus ater	Brown-headed Cowbird	Yellow	-	-
Oceanodroma furcata	Fork-tailed Storm-Petrel	Yellow	-	-
Oceanodroma leucorhoa	Leach's Storm-Petrel	Yellow	-	-
Oreothlypis celata	Orange-crowned Warbler	Yellow	-	-
Pandion haliaetus	Osprey	Yellow	-	-
Parkesia noveboracensis	Northern Waterthrush	Yellow	-	-
Passer domesticus	House Sparrow	Yellow	-	-
Passerculus sandwichensis	Savannah Sparrow	Yellow	-	-
Passerella iliaca	Fox Sparrow	Yellow	-	-
Patagioenas fasciata	Band-tailed Pigeon	Blue	SC (2008)	1-SC (2011)
Perisoreus canadensis	Gray Jay	Yellow	-	-
Phalacrocorax pelagicus	Pelagic Cormorant	Yellow	-	-
Phalacrocorax penicillatus	Brandt's Cormorant	Red	-	-
Pheucticus melanocephalus	Black-headed Grosbeak	Yellow	-	-
Picoides dorsalis	American Three-toed Woodpecker	Yellow	-	-
Picoides pubescens	Downy Woodpecker	Yellow	-	-
Picoides villosus	Hairy Woodpecker	Yellow	-	-
Pinicola enucleator	Pine Grosbeak	Yellow	-	-
Piranga ludoviciana	Western Tanager	Yellow	-	-
Poecile atricapillus	Black-capped Chickadee	Yellow	-	-
Poecile rufescens	Chestnut-backed Chickadee	Yellow	-	-

Scientific Name	Common Name	BC List	Listed COSEWIC	Listed SARA
Ptychoramphus aleuticus	Cassin's Auklet	Blue	-	-
Regulus calendula	Ruby-crowned Kinglet	Yellow	-	-
Regulus satrapa	Golden-crowned Kinglet	Yellow	-	-
Rissa tridactyla	Black-legged Kittiwake	No status	-	-
Selasphorus rufus	Rufous Hummingbird	Yellow	-	-
Setophaga coronata	Yellow-rumped Warbler	Yellow	-	-
*Setophaga coronata auduboni***	Audubon's Warbler	-	-	-
Setophaga petechia	Yellow Warbler	Yellow	-	-
Setophaga ruticilla	American Redstart	Yellow	-	-
Setophaga townsendi	Townsend's Warbler	Yellow	-	-
Sitta canadensis	Red-breasted Nuthatch	Yellow	-	-
Sphyrapicus ruber	Red-breasted Sapsucker	Yellow	-	-
Spinus pinus	Pine Siskin	Yellow	-	-
Spizella passerina	Chipping Sparrow	Yellow	-	-
Stelgidopteryx serripennis	Northern Rough-winged Swallow	Yellow	-	-
Sterna paradisaea	Arctic Tern	Yellow	-	-
Streptopelia decaocto	Eurasian Collared-Dove	Exotic	-	-
Strix nebulosa	Great Gray Owl	Yellow	NAR (1996)	-
Strix varia	Barred Owl	Yellow	-	-
Sturnus vulgaris	European Starling	Exotic	-	-
Synthliboramphus antiquus	Ancient Murrelet	Blue	SC (2004)	1-SC (2006)
Tachycineta bicolor	Tree Swallow	Yellow	-	-
Tachycineta thalassina	Violet-green Swallow	Yellow	-	-
Tringa flavipes	Lesser Yellowlegs	Yellow	-	-
Tringa melanoleuca	Greater Yellowlegs	Yellow	-	-
Troglodytes pacificus	Pacific Wren	Yellow	-	-
Turdus migratorius	American Robin	Yellow	-	-
Uria aalge	Common Murre	Red	-	-
Vireo cassinii	Cassin's Vireo	Yellow	-	-
Vireo gilvus	Warbling Vireo	Yellow	-	-
Zonotrichia leucophrys	White-crowned Sparrow	Yellow	-	-

Species list compiled from BC Breeding Bird Atlas (2014)

*Regionally appropriate subspecies added to the Breeding Bird Atlas list

** Audubon's warbler (no provincial or federal designation) is lumped with the yellow-rumped warbler (provincially yellow listed with no federal designation).