Vopak Development Canada

Vopak Pacific Canada Project Description

July 5, 2018

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Table of Contents

Table of Contents (Cont'd)

Table of Contents

In-Text Figures

In-Text Tables

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Acronyms and Abbreviations

Term	*Definition*
AAQO	Ambient Air Quality Objectives
AltaGas	AltaGas Ltd.
BC	British Columbia
BCEAA	*BC Environmental Assessment Act*
BCWQ	BC Water Quality guidelines
BPD	Barrels Per Day
BGS	Below Ground Surface
CBM	Cubic Meters
CCME	Canadian Council of the Ministers of the Environment
CCR	Central Control Room
CCTV	Closed Circuit Television
CDC	Conservation Data Centre
CEAA 2012	*Canadian Environmental Assessment Act 2012*
CEA Agency	Canadian Environmental Assessment Agency
CEMP	Construction Environmental Management Plan
CEPA	*Canadian Environmental Protection Act*
CGS	Coast Guard Stations
CMA	Census Metropolitan Area
CMT	Culturally Modified Tree
CN	Canadian National Railway
CPP	Clean Petroleum Products (i.e., diesel and/or gasoline)
CRA	Commercial, Recreational, Aboriginal
CS	Carbon Steel
CSA	*Canada Shipping Act*
CWH	Coastal Western Hemlock
DAS	Disposal At Sea
db	Decibels
DFO	Fisheries and Oceans Canada
DWT	Dead weight tonnes
EA	Environmental Assessment
EAO	Environmental Assessment Office
ECA	Emission Control Area
ECCC	Environment and Climate Change Canada
EED	Environmental Evaluation Document
EEE	Environmental Effects Evaluation
FA	Fisheries Act
GHG	Greenhouse Gas
LOA	Length Overall
LPG	Liquefied Petroleum Gas
MW	Megawatt

Term	***Definition***
MTPA	Million Tons Per Annum
PNCIMAICA	Pacific North Coast Integrated Management Area
PD	Project Description
PPE	Personal Protective Equipment
The project	Vopak Pacific Canada project
PRPA	Prince Rupert Port Authority
RA	Responsible Authorities
RIPET	Ridley Island Propane Export Terminal
RTI	Ridley Terminals Incorporated
SARA	*Species at Risk Act*
SQCRD	North Coast Regional District
TC	Transport Canada
TDG	Transportation of Dangerous Good
The Project	Vopak Pacific Canada project
VC	Valued Components
VLGC	Very Large Gas vessel
VOC	Volatile Organic Compound

1. General Information and Contact

1.1. Nature and Location of Project

Vopak Development Canada Inc. (Vopak), a wholly-owned subsidiary of Royal Vopak, is proposing to construct and operate a new bulk liquids tank storage facility in Prince Rupert, British Columbia (BC). Vopak Pacific Canada (the Project) is proposed to be located on Ridley Island within the lands and waters under the jurisdiction of the Prince Rupert Port Authority (PRPA) (Figure 1). The Project will store Liquefied Petroleum Gas (LPG) (i.e., propane), Clean Petroleum Products (CPP) (i.e., diesel and/or gasoline), and methanol on behalf of Vopak's customers. Vopak will build the Project and manage the day-to-day operations of the bulk liquids tank storage facility. All products will be transported from various locations across Western Canada to the Project via the existing Canadian National Railway (CN) line. Customers of Vopak will be scheduling the transportation of the products to site and will ship the products from the jetty to international markets.

The physical works and activities of the Project are located entirely on federal lands and waters administered by PRPA. The Project is being built within an area designated for port-related activities within PRPA jurisdiction. Ridley Island falls under the Port of Prince Rupert 2020 Land Use Management Plan, which refers to the development of a liquid bulk terminal as being a long-term prospect in the port.

1.2. Proponent Information

1.2.1. *About Vopak*

Vopak is the world's leading independent tank storage provider. We operate a global network of terminals located at strategic locations along major trade routes. With a 400-year history and a strong focus on safety and sustainability, we ensure efficient, safe and clean storage and handling of bulk liquid products and gases for our customers. By doing so, we enable the delivery of products that are vital to our economy and daily lives. Vopak is listed on the Euronext Amsterdam stock exchange and is headquartered in Rotterdam, the Netherlands. Including our joint ventures and associates, we employ an international workforce of over 5,500 people. Vopak operates 66 terminals in 25 countries with a combined storage capacity of 35.9 million cubic metres (m^3). Vopak has a 30 percent interest in the Ridley Island Propane Export Terminal (RIPET), which is currently being constructed in Prince Rupert, BC. RIPET is the first propane export facility off the coast of Canada.

1.2.2. *Contact Information*

The contact information for the Project is as follows:

Project Name	Vopak Pacific Canada
Proponent	Vopak Development Canada Inc.
Address	444 5th Ave SW, Suite 1460 Calgary, AB T2P 2T8 www.vopak.com Project website: https://www.vopak.com/vopak-pacific-canada Project email: vopakpacificcanada@vopak.com

Project Lead	Peter Keeshan Business Development Director Email: peter.keeshan@vopak.com Phone: (403) 870 8469
Principal Contact	Marina Spahlinger Manager, Regulatory and Stakeholder Relations Email: marina.spahlinger@vopak.com Phone/Fax: (587) 355 7874

1.2.3. *Corporate Policies (Safety, Health, Environment, and Sustainability)*

As a service provider, Vopak's role and responsibility is to provide safe, efficient and clean liquid bulk storage and handling services. We abide by existing rules and regulations as a minimum and adopt best practices whenever possible. And we explore ways to facilitate the introduction of more sustainable technologies, processes and products.

Our ambition is to be a strong link in our customers' global value chains and a leader in our industry. We aim to achieve this by maximizing operational safety and minimizing our environmental footprint, by training our people, developing talent and sharing best practices, and by encouraging and maintaining an open dialogue with our stakeholders as a responsible member of the communities in which we operate. Our behaviour is guided by the Vopak Values and operational standards outlined below.

Vopak Values

- Care for Safety, Health & Environment;
- Integrity;
- Team Spirit;
- Commitment; and
- Agility.

The Vopak Way: 75 Global Operational Standards

Standardization is important for operational excellence. For this reason Vopak has carefully recorded and analyzed its operational best practices around the world in order to develop 75 standards for global implementation. These standards cover all aspects of a terminal's lifecycle in the fields of Safety, Health, Environment, Quality and Operations, as well as Technical and Project Management. These global standards, known as the Vopak Way, are at the heart of Vopak's strategy and have been developed in close consultation with local technical and safety managers. The Vopak Way aims to bring about continuous improvement in every aspect of our operation.

Safety fundamentals:
https://www.vopak.com/sites/default/files/attachment/basicpage/vopak_fundamentals_on_safety_web_0.pdf

Vopak Code of Conduct:

https://www.vopak.com/sites/default/files/attachment/basicpage/code_of_conduct.pdf

Vopak WeConnect Foundation

The Vopak WeConnect Foundation aims to empower young people in the communities near Vopak locations and connect them to the world by opening up new (professional) horizons and increasing their future job readiness and/or by inspiring them to work together with others across cultures, languages and social backgrounds. The Foundation was formally established in June 2017 and is registered under number 69006784 with the Dutch Chamber of Commerce.

1.2.4. *Expertise Informing the Project Description*

The technical aspects of the Project Description are based on Vopak's expertise in developing tank storage facilities on tidewater around the world. Content that pertains to the potential environmental effects of the project was determined by SNC-Lavalin Inc. (SNC-Lavalin) based on information known about the project site to-date and SNC's expertise working on Ridley Island. SNC-Lavalin has worked in Prince Rupert and in the area of the Project location for more than a decade.

The table below captures those SNC-Lavalin personnel who have contributed to the development of the Project Description.

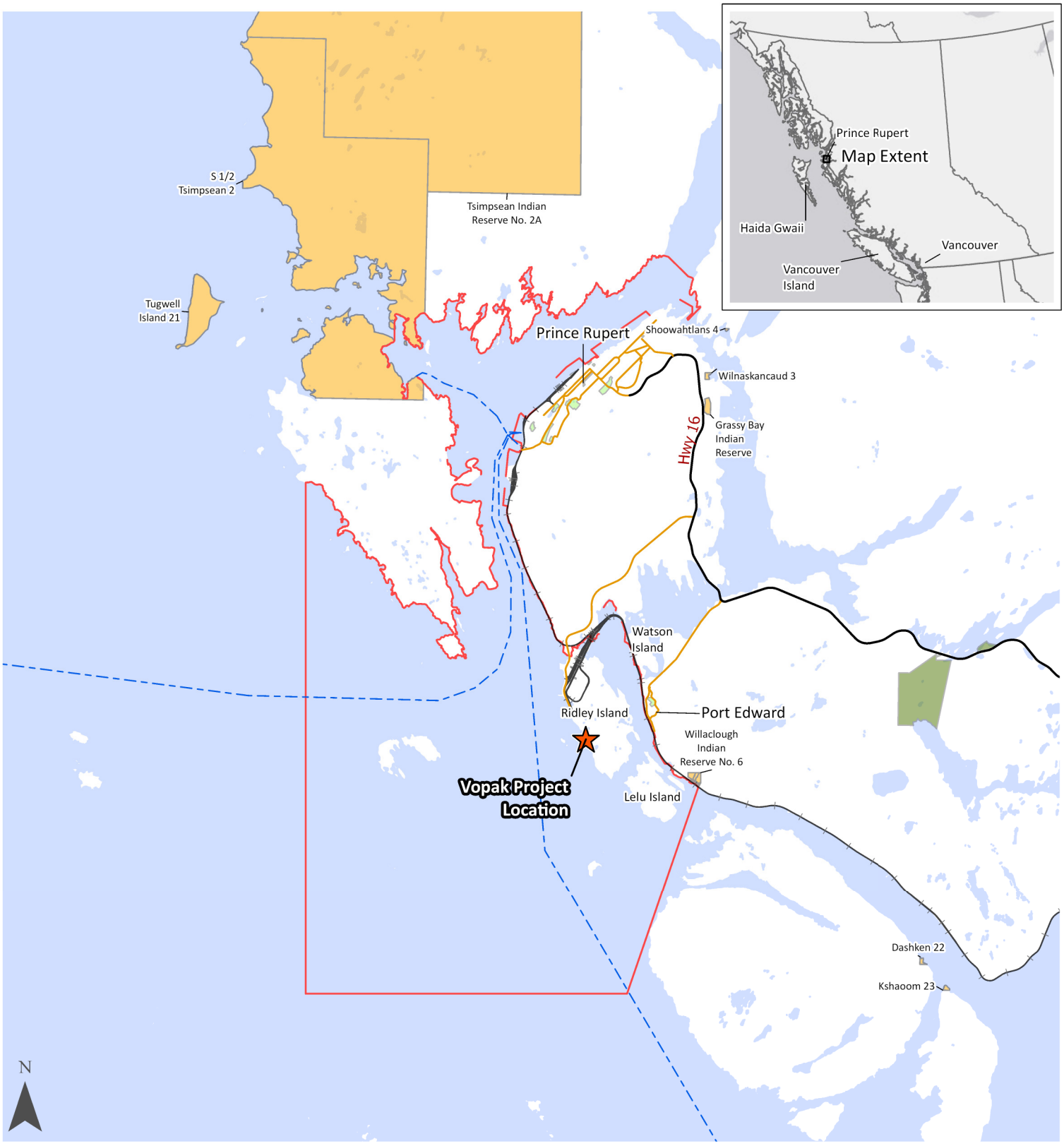
Staff	Role/Years' Experience
Eileen Miranda, R.P. Bio., P.M.P.	Project Manager/14 years
Martha Baldwin, B.Sc.	Assistant Project Manager/8 years
Jason Casselman, M.Sc., R.P.Bio.	Fish and Marine Biologist/12 years
Bryan McEwen, M.Sc.	Air and Noise Technical Lead/20 years
Chris Albrecht, M.Sc., R.P.Bio.	Terrestrial Biologist/12 years

1.3. Overview of Consultation to Date

Consultation is a key aspect of the Project. Vopak has initiated engagement activities early and aims to engage with First Nations, the public and stakeholders throughout the environmental effects evaluation (EEE), the Project development, as well as operations. Vopak has initiated early discussions with the following parties:

- First Nations (Lax Kw'alaams, Metlakatla, Kitselas, Kitsumkalum, Gitxaala and Gitga'at).
- Local governments (City of Prince Rupert, District of Port Edward, and the North Coast Regional District).
- Community stakeholders (Prince Rupert Chamber of Commerce and Community Futures Pacific Northwest).
- Provincial government (BC Environmental Assessment Office).
- Federal government (PRPA, the Canadian Environmental Assessment Agency, Transport Canada, Environment Canada, the Department of Fisheries and Oceans and Health Canada).
- General public.

A summary of engagement activities completed to date is provided in Section 7.



Project Location
Highways
Major Streets
Ferry/Water Routes
Railway
PRPA Jurisdiction
Local Park
Provincial Park
First Nation Reservations
Ocean

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

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Figure 1: Project Location

Created by: ECH	Checked by: MB/EM	Date: 2018/06/26
Coord. Sys.:	Scale: 1:163,840	Reference No: 655902-PD-1

0 1 2 4 6 8 Kilometers

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2. Project Overview

2.1. Project Purpose and Rationale

The purpose of the Project is to provide berthing and loading facilities for bulk liquid cargo that will be received via the existing rail loop on Ridley Island. Canadian products such as methanol, diesel and propane are largely landlocked and in need of enhanced market access. Due to the shortage of market access many products cannot reach international markets, where there is a strong demand. The Project provides much needed tidewater access to global markets around the world. Methanol, for example, is in high demand in China for use as fuel additive and manufacturing. Diesel would reach markets in need of fuels for transportation (cars, boats and trucks). Propane would be exported for use in Asia Pacific for heating or other industrial applications.

The state-of-the-art facility will allow for efficient and safe export of products, in a port that has demonstrated a track record for safe movements for multiple types of cargo. The rail on Ridley Island was constructed to help spur export development and has capacity that the Project can utilize. In addition to helping multiple products get market access, the Project will help create long-term economic prosperity in Prince Rupert and throughout Western Canada.

2.2. Components and Capacities

The scope of the Project includes the receiving and unloading of customer products from CN rail cars on six rail tracks into the Project's rail unloading area and into Project storage facilities. From the storage facilities the product is loaded via pipeline along the Project's jetty to a berthed ship ready to take the products to their final destination. The Project includes all physical works and activities associated with the construction, operation and decommissioning of the bulk liquids storage facility, the jetty and supporting infrastructure. The physical works and activities are located entirely on federal lands and waters, administered by PRPA.

At full build-out the facility will have a capacity of 90,000 m^3 of LPG, 260,000 m^3 of CPP and 220,000 m^3 of methanol. Components of the Project include:

Bulk liquids tank storage facility

- The operation of 6 rail tracks within the existing PRPA Road Railway Utility Corridor (RRUC);
- Up to 50 rail car unloading racks;
- Gas generators capable of producing up to 2.7 megawatts (MW) of electrical power combined for LPG cooling;
- LPG cooling equipment and de-ethanizer;
- Emergency ground flare;
- Six pressurized LPG bullets of 1,000 m^3 each;
- One full containment LPG storage tank of 90,000 m^3;
- Carbon steel (CS) storage tanks (CPP: 2 tanks at 40,000 m^3 and 6 tanks at 30,000 m^3, Methanol: 4 tanks at 40,000 m^3 and 2 tanks at 30,000 m^3); and
- Process control and safety systems.

Jetty

- A 200 meter (m) long causeway;
- A 800 m long trestle;
- A pipe rack for the insulated pipelines for products and utilities;
- Two berths for vessels up to 85,000 m^3 capacity (80,000 dead weight tonnes [DWT]);
- Two loading platforms including all required equipment and systems; and
- One auxiliary platform for the firewater pump house, spill boom shed and electrical building.

Supporting infrastructure

- Roads and car parking;
- Drainage and wastewater treatment system;
- Nitrogen for safety and maintenance purposes;
- Office including central control room (CCR), maintenance and utilities buildings;
- Electrical substation and connection to the BC Hydro grid; and
- Natural gas connection to Pacific Northern Gas for compressors, gas generators and heating of buildings.

A preliminary site plan is provided in Figure 2. The figure provides an approximate scale of the proposed components of the Project. It includes the general location of the railway corridor, facilities and jetty. The site plan will be refined during the EEE process.

Section 3 details Project components and related activities further.

2.3. Power Supply

Total power consumption during operations will be on average less than 2 MW. At peak, it is expected to be 4.5 MW. Power is expected to be supplied by both BC Hydro and on-site gas generators. Vopak will utilize the existing PRPA-owned power line on site and has received confirmation from PRPA that it has sufficient capacity for the project. Additionally, Vopak has initiated discussions with BC Hydro to identify any constraints early on. Discussions are ongoing.

The LPG cooling infrastructure will be powered by gas generators, which can generate a total of 2.7 MW and will potentially utilize ethane that is removed from the LPG in order to meet export specifications of our customers. This is an efficient use of what could otherwise be a waste stream. The specifications allow for a range of ethane to be removed, which allows for the removal of the exact amount of ethane needed to generate power for the cooling process. As such, there will be no excess ethane extracted as part of this process and no additional waste is anticipated in order to meet the required specifications. In case that there is insufficient ethane in the LPG, natural gas from Pacific Northern Gas will be used.

2.4. Project Location

The Project is proposed to be located on Ridley Island in BC (Figure 1). Ridley Island and its surrounding waters are located within the boundaries of the Port of Prince Rupert, which is under the jurisdiction of PRPA, a Canadian Port Authority under the *Canada Marine Act* and its regulations. By road via the Ridley Island access road and Highway 16, the Project is approximately 16 kilometers from the centre of Port Edward and 19 kilometers from the centre of Prince Rupert. The coordinates of the center of the facility are: NAD83 Zone 9N 414180 E 6008978 N (130.3162656°W 54.2214887°N).

2.5. Land and Water Use

Ridley Island is within the municipal boundaries of the City of Prince Rupert and is part of the North Coast Regional District. It is located within the jurisdiction of PRPA. Ridley Island falls under the Port of Prince Rupert 2020 Land Use Management Plan which refers to the development of a liquid bulk terminal as being a long-term prospect in the port. More broadly, the development focus for the central, western and southern areas of Ridley Island includes major industrial uses with a clear requirement for Port access, dry and liquid bulk commodity terminals, transload facilities, rail support services and container service areas.

Figure 3 displays various land and water uses in the vicinity of the proposed Project.

2.5.1. *Federal Land*

The Project will be located on Ridley Island with some components being on the designated water lot, which are federally administered Crown land within the jurisdiction and administration of PRPA. Vopak intends to enter into a long-term lease with PRPA.

2.5.2. *First Nation Territory*

The Project and associated activities fall within, or near, the traditional territories of the following six First Nations:

- Lax Kw'alaams;
- Metlakatla;
- Kitselas;
- Kitsumkalum;
- Gitxaala; and
- Gitga'at.

Vopak has initiated early engagement activities with these First Nations and intends to continue the engagement throughout the development, operations and decommissioning phases of the Project.

2.6. Project Employment

The Project will diversify the local economy in the long-run and will require a workforce of approximately 300 people, with an estimated peak number of 200 people, during the two-year construction phase and up to 40-50 people during the operational lifespan of the Project. Vopak expects to be able to recruit a large number of local employees (up to 60% during construction and approximately 70% during operations).

2.7. Work Camp

During construction, workers will utilize the existing work camp near Port Edward that is accessible via road and will be transported to and from the site via bus (see Figure 2). The camp is subject to an existing permit from Port Edward that is valid until 2021 and that can be extended for another three years. As such, a new permit for the camp will not be required. While the camp could accommodate up to 250 workers, Vopak expects the work camp will not be used at full capacity due to efforts to recruit construction workers locally. Out of town construction workers will be required to stay in the camp. The work camp will be used during construction and then decommissioned by the work camp contractor in accordance with the permit from Port Edward.

The work camp is fenced with security check points to enter and exit, and no drugs or alcohol are permitted on site. The site is run by staff responsible for janitorial service, site operations, and food services.

2.8. Project Costs

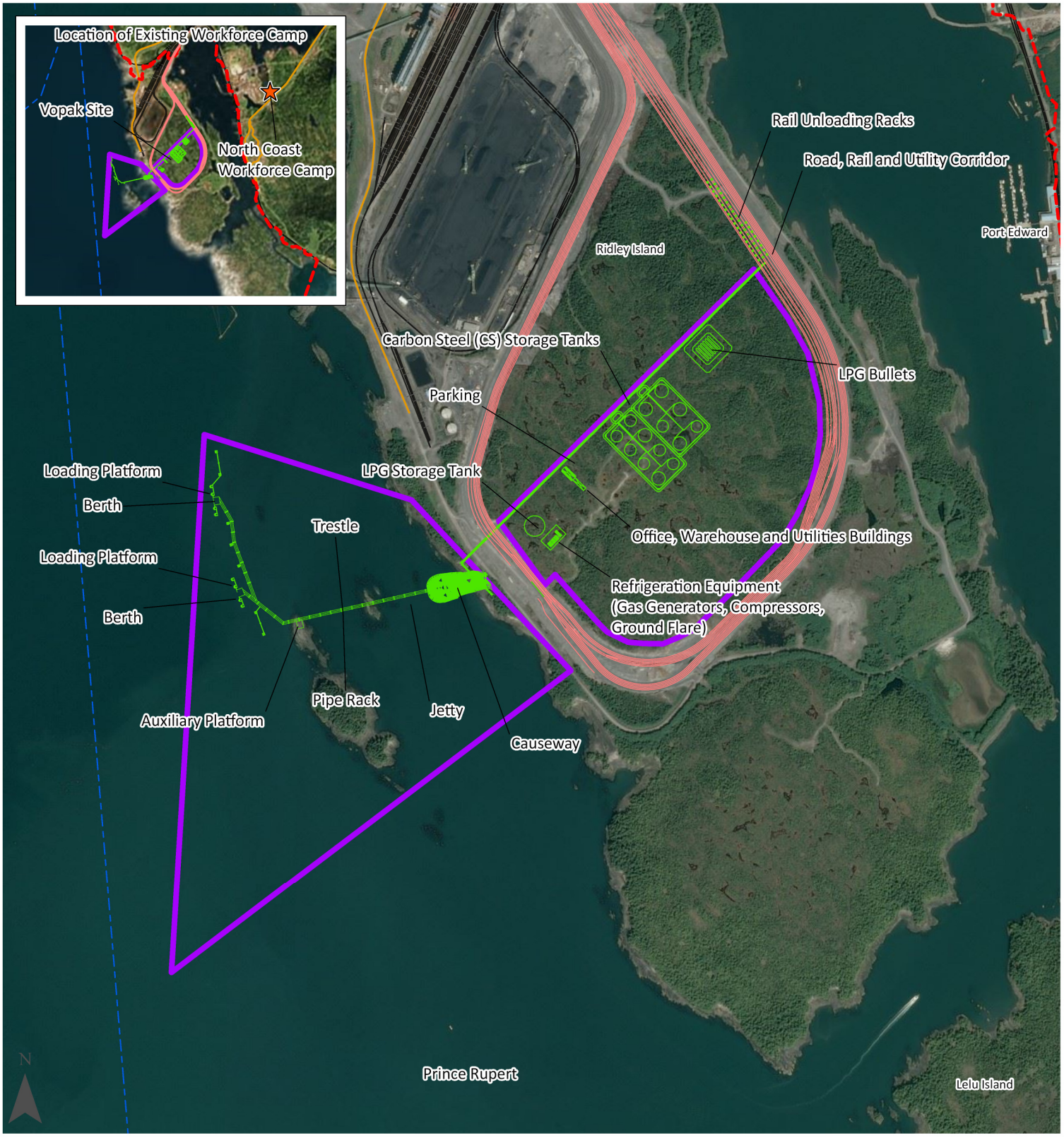
The estimated costs of the Project are shown below:

- Development and construction costs: $750-950 million;
- Decommissioning costs: $5-10 million; and
- Annual operating costs: $40-50 million.

The federal government has not provided any financial support for the Project. Vopak does not plan to apply for federal funding for the Project.

2.9. Current Stage of Project Design

The project is currently in the conceptual stage. While the design will be further defined over the course of the environmental effects evaluation, no major changes or gaps related to the design are anticipated.



- PRPA Jurisdiction (Entire Map Extent)
- Major Streets
- Ferry/Water Routes
- Railway
- Road, Rail and Utility Corridor
- Project Components
- Land and Water Lot Areas

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

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Figure 2: Project Area and Components

Created by: ECH	Checked by: MB/EM	Date: 2018/06/26
Coord. Sys.:	Scale: 1:17,920	Reference No: 655902-PD-3

0 140 280 560 840 1,120
Meters

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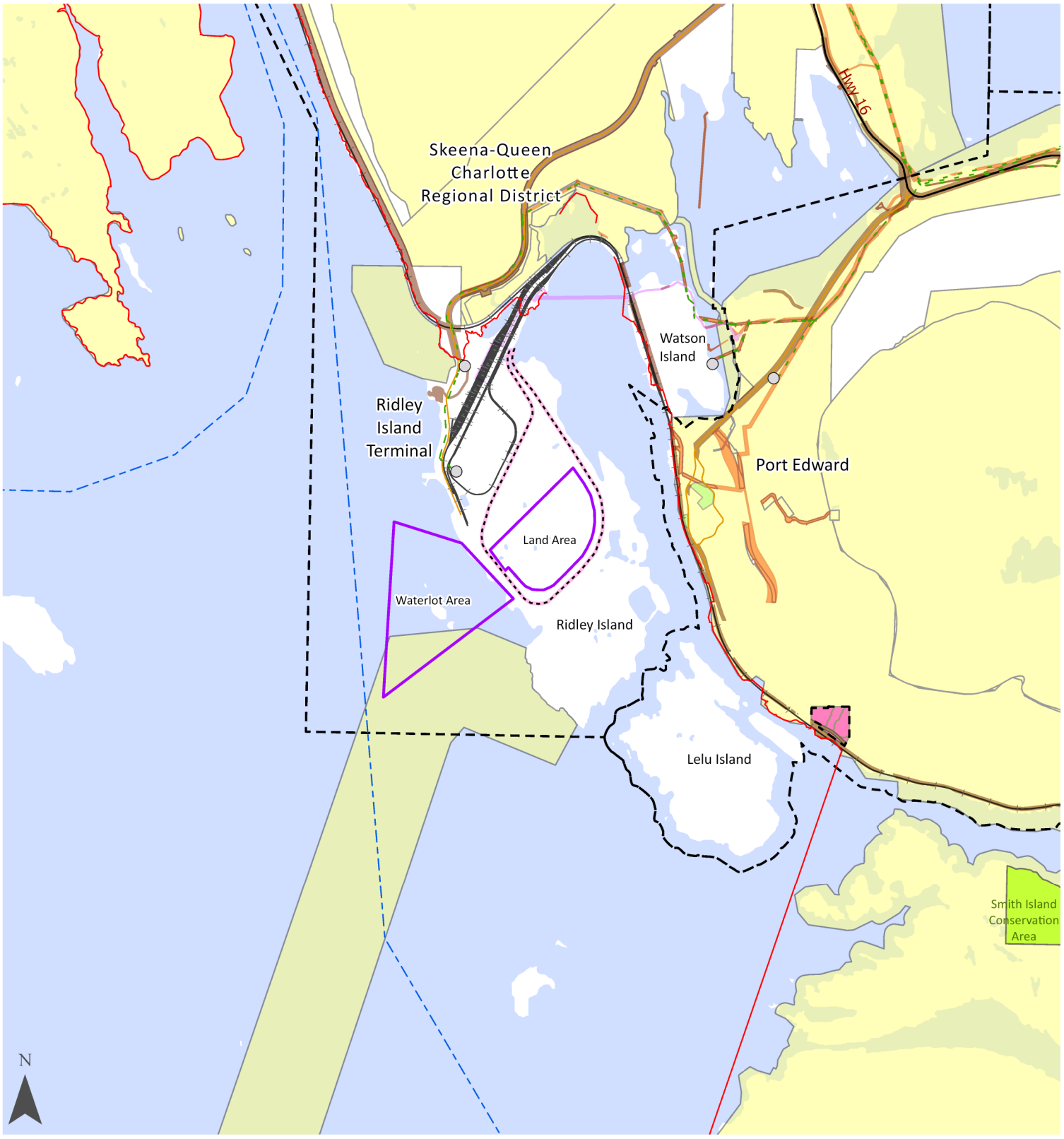

BC Hydro Substations
BC Hydro Transmission Lines
Local Government Boundaries
PRPA Road, Rail, Utility Corridor (RRUC)
PRPA Jurisdiction
Local Park
Area of Interest
Oil and Gas Pipeline Right-of-Way
Crown Land Right-of-Ways
Highways
NGO Conservation Area
Crown Land Transportation Tenures
Major Streets
First Nation Reservations
Crown Land Tenures
Ferry/Water Routes
Ocean
Railway

Project Location:
Ridley Island, Prince Rupert, BC

Client:
Vopak Development Canada

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Figure 3: Land Use in the Vicinity of the Project

Created by: ECH	Checked by: MB/EM	Date: 2018/06/26
Coord. Sys.:NAD 1983 CSRS UTM Zone	Scale: 1:55,000	Reference No: 655902-PD-2

0 430 860 1,720 2,580 3,440 Meters

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3. Project Components and Related Activities

The following section details the proposed Project's physical components and related construction, operation and decommissioning activities. Figure 2 above displays the Project footprint and location of Project components.

3.1. Physical Project Components

The physical components of the Project (summarized in Table 1) can be broadly grouped into three major categories:

- The bulk liquids tank storage facility, which includes the infrastructure to receive the products from the railway line, propane cooling and bulk liquids tank storage.
- The jetty, which includes the causeway, trestle, pipe rack with (insulated) piping for products and utilities, two berths, breasting and mooring dolphins, fender systems, mooring hooks and two loading platforms to support the loading arms, other mechanical equipment, communications and safety systems, gangway towers and fire monitors for the safe transfer of products to the vessels.
- Supporting infrastructure required to operate and maintain the Project (e.g., roads, car parking, office, maintenance and utility buildings, utilities, drainage and wastewater treatment systems).

Table 1: Physical Components of Vopak Pacific Canada

Component Category	Project Components
Bulk liquids tank storage facility	• Up to 50 rail car unloading racks along the RRUC; • Gas generators capable of producing up to 2.7 MW of electrical power combined for LPG cooling; • LPG cooling equipment and de-ethanizer; • Emergency ground flare; • Six pressurized LPG bullets of 1,000 m^3 each; • One full containment LPG storage tank of 90,000 m^3; • CS storage tanks (CPP: 2 tanks at 40,000m^3 and 6 tanks at 30,000m^3, Methanol: 4 tanks at 40,000m^3 and 2 tanks at 30,000m^3); and • Process control and safety systems.
Jetty	• A 200 m long causeway; • A 800 m long trestle; • A pipe rack for the insulated pipelines for products and utilities; • Two berths for vessels up to 85,000 m^3 capacity (80,000 DWT); • Two loading platforms including all required equipment and systems; and • One auxiliary platform for the firewater pump house, spill boom shed and electrical building.
Supporting Infrastructure	• Roads and car parking; • Drainage and wastewater treatment system; • Nitrogen for safety and maintenance purposes; • Office including CCR, maintenance and utilities buildings; • Electrical substation and connection to the BC Hydro grid; and • Natural gas connection to Pacific Northern Gas for compressors, gas generators and heating of buildings.

3.2. Construction Activities

The construction phase of the Project is expected to be two years in duration. The anticipated construction activities include:

- Site clearing;
- Construction of Project facilities on land (civil, mechanical and electrical and instrumental work);
- Construction of marine jetty and berths, including dredging;
- Post-construction clean-up and on-site ground reclamation; and
- Commissioning.

3.2.1. *Site Clearing*

The Project footprint is expected to cover approximately 30 hectares of land. This bedrock area is currently covered by peat, trees and other vegetation that would need to be cleared. Prior to site preparation, the Project area will be surveyed and flagged. Avoidance areas (e.g., riparian areas, known archaeological or heritage sites, wildlife features, etc.) identified during environmental baseline studies will be fenced or flagged until approved mitigation measures can be employed, if applicable. There is no merchantable timber on Ridley Island and therefore debris will be chipped. Large stumps and rocks will be removed from the cleared site. Organics will be disposed of in the existing on-land disposal area on Ridley Island, which PRPA confirmed has sufficient capacity. The surface material consists of peat (muskeg) with an average thickness of approximately 2 m. The peat and organic soils are underlain, in general, by a variable sequence of overburden (sand, gravels, and silts) overlying bedrock. This overburden is not suitable as load bearing material and will need to be stripped down to bedrock prior to placing engineered fill. Graders, bulldozers, backhoes and other earth moving equipment will be used to strip the overburden. Non-structural overburden (primarily peat) from the Project site will be disposed of in the existing organic material disposal area on Ridley Island. According to existing geotechnical and geophysical studies, the intact mica schist bedrock underlying the overall site is generally suitable to support the foundations for the proposed terminal facilities. Additional geotechnical studies will be completed to confirm the foundation is adequate. Exposed bedrock will be ripped mechanically or blasted. Following clearing and grading, a stable, flat and safe work surface will be created using fill material from the blasting and from quarries, if required, with appropriate site drainage and sediment control measures in place.

3.2.2. *Construction of Project Facilities (Civil, Mechanical and Electrical & Instrumental work)*

Construction of the tank storage facilities will start with civil work like roads, car parking, foundations for tanks, buildings and other infrastructure, tank pits including bund walls (or dykes), drainage systems and the office, warehouse and utilities buildings. The civil works are followed by the mechanical works which include amongst others all the tanks, pipelines, manifolds, pumps, valves and mechanical LPG cooling equipment, including the de-ethanizer. Finally, the electrical and instrumentational (E&I) work is executed, which includes all the cables, terminal lighting, instrumentation and control and safety systems to operate and control the terminal. The facilities will be partly constructed in place and partly modular pre-fabricated. Vopak intends to use existing transportation corridors for the transportation of materials used for the construction of the facility.

3.2.3. *Construction of the Jetty*

A jetty feasibility study has been conducted to establish the jetty siting options available within the water lot allocated by PRPA for this project. In this study multiple criteria were taken into account to establish these options. The criteria were among others: structural feasibility based on the geotechnical data, dredging requirements, environment impact and footprint, and feasibility to design for seismic forces.

The marine floor conditions are hard rock with large variations in level, covered by varying depths of silty sediment up to 70 m. This sediment is not suitable for piling. Hence the location for the jetty and berths was selected to avoid very deep gullies that would require extremely long piles, which are not feasible to design for seismic forces. Furthermore, a jetty location was selected to avoid any blasting and drilling of underwater rock which would have a higher impact on the marine environment.

Due to the difficult geotechnical circumstances and to accommodate the vessels, dredging will be required for the Project. A jetty location within this water lot which does not require dredging, is not available. The estimated dredge volume is 682,000 m^3 of soft material, which is expected to be disposed at sea (DAS) at a location defined during the DAS permitting process in consultation with First Nations and in conjunction with various stakeholders. Dredging will likely be conducted by cutter suction dredging equipment. Alternatives to DAS will be explored through the DAS permitting planning and process.

The jetty construction activities can be split in three major components:

- The causeway;
- The substructure of the trestle (including auxiliary platform) and berths; and
- The top structure of the trestle and berths.

The causeway of approximately 200 m will have a foundation that consists of large angular rock (rip-rap). The top will consist of smaller rock and an asphalted road, which will be constructed using bulldozers, backhoes and other rock moving equipment. The trestle and berth substructures will consist of pile bents (for the trestle) and pre-fabricated jackets (for the berths and auxiliary platform) including the mooring and berthing dolphins. These piles and jackets have outer piles through which anchor piles with interior pin piles (rock sockets) will be installed with a construction barge and temporary drilling rig. This method will minimize the underwater noise during construction, since the rock sockets will be “screwed” into the bedrock through the outer piles.

The trestle top structure deck will consist of Hillman Composite Beams (HCB) with a top layer of concrete (a lighter alternative to steel or thick cast in place concrete) and which minimizes the substructure requirements, footprint and impact to the marine environment. Furthermore the top structure of the trestle will consist of piperacks, product and utilities piping, electric cables, handrails and other equipment. The top structure will be modular fabricated and installed as much as possible to reduce the onsite construction time. The top structure will be delivered on barges and installed with cranes on construction barges. The berths top structure consisting of the loading platforms infrastructure, mooring and berthing dolphins and walkways between these structures and the auxiliary platform top structure (spill boom shed, electrical building, firewater pump house) will also be delivered on barges and installed with cranes on construction barges, with the exception of the concrete decks which are casted onsite.

3.2.4. *Post-Construction Clean Up and Ground Reclamation*

Vopak will undertake reclamation and site clean-up activities prior to commencement of Project commissioning and operations.

Ground reclamation, as required, will be completed in accordance with applicable guidelines and current best management practices.

3.2.5. *Commissioning*

Commissioning activities take place to ensure safe and compliant delivery of the Project prior to start up.

The commissioning activities consist of the integrated application of a set of techniques and procedures to check, inspect and test every part of the Project assets, from individual functions to complete subsystems and systems.

Main activities during commissioning consist of:

- Energizing of (sub-)systems which may already take place during construction or pre-commissioning. Systems may be energized by water pressure (hydro-testing), nitrogen pressure (leak testing) or electrical power.
- Pre-commissioning is the preparation and functional testing for commissioning by the contractor(s) who constructed the assets. This step includes hydro test, loop test, FAT (factory acceptance test) and the SAT (site acceptance test).
- Cold commissioning consists of activities required to test and assure the completeness of scope, integrity and safe operability of the installed assets by handling a 'safe medium' such as water.
- Hot commissioning consists of activities required to test and assure the completeness of scope, integrity and safe operability of the installed assets by handling the product for which the assets are designed.
- Performance tests are to demonstrate that the design criteria and operating parameters are met (e.g., the pump speed).

3.2.6. *Water requirements during construction/commissioning*

Approximately 100,000 cubic meters (cbm) of water will be required during construction/commissioning for hydrostatic testing and cold commissioning of the tanks and infrastructure. An evaluation will take place to determine if freshwater or seawater will be used.

3.3. Operations Activities

Vopak aims to be a leader in its industry and a strong link in our customers' global value chains. We believe we can only achieve this by acting according to the Vopak Values and our operational standards. Standardization is important for operational excellence. Please refer to Section 1.2.3 Corporate Policies for more information on the Vopak Way: 75 global operational standards and the Vopak Values.

The facility will operate 24 hours per day, 365 days per year. The operational lifespan of the Project is anticipated to be a minimum duration of 50 years.

Activities during operations include:

- Railway operations associated with inbound train unloading and outbound train staging;
- LPG cooling process;
- Product storage;
- Vessel berthing;
- Cargo loading;
- General terminal operations; and
- Other associated activities.

Routine inspections and maintenance of all systems will be completed on an ongoing basis, including:

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

3.3.1. *Railway Operations*

Products will be delivered via unit trains of approximately 100 rail cars at the north-east section of the PRPA RRUC. The RRUC is a shared facility and consists of multiple railway tracks and service roads that extend clockwise around the perimeter of Ridley Island. The Project will utilize nine rail tracks within the existing RRUC to handle the unit trains expected for the Project. Six of these tracks will be used for unloading of products, making up and breaking down unit trains, and the remaining three will be used for various shunting operations. From the rail unloading area, all product will be pumped uphill toward the manifold and tank farm area (approximate elevation change 25m, approximate length 1250 m).

The rail unloading area will consist of up to 50 unloading bays in order to allow multiple railcars to be unloaded simultaneously. The expected number of rail cars at full capacity is approximately 240 per day (60 for LPG, 90 for CPP and 90 for methanol). Once a set of multiple rail cars has been unloaded and disconnected, the empty railcars will be moved from the unloading area and the next set of full rail cars will be moved into the unloading position.

3.3.2. *LPG Cooling Process*

The LPG will arrive by rail in a pressurized state. Rail cars will be unloaded into temporary pressurized storage bullets (six bullets of 1,000 m^3 each). Depending on the ambient temperature, the pressure of the bullets will be between 3.6 and 8.8 bar. The product will then be transferred through a refrigeration unit into a refrigerated storage to be stored at approximately -42 degrees Celsius. The pressurized storage acts as a buffer, allowing pressurized LPG, which is unloaded at regular intervals, to be refrigerated continuously. By refrigerating the LPG continuously, the size of the refrigeration plant can be minimized, reducing the overall footprint and power consumption and increasing the efficiency of the unit. The refrigeration unit will be powered by gas generators which can produce a maximum of 2.7 MW combined.

3.3.3. *Product Storage*

The products will be stored at atmospheric pressure in tanks that are specifically designed for the product type. The tanks will meet or exceed the applicable Canadian standards and regulations and will incorporate best available technology.

After the LPG has been received and cooled (see cooling process in Section 3.3.2), it will be stored in a full containment refrigerated storage tank of 90,000 m^3, which will be composed of an inner steel tank and an outer concrete tank for optimal isolation. Tank dimensions are typically 70 m in diameter (D) with a height (H) of 25 m.

The other bulk liquids will be stored in CS tanks. Furthermore, depending on their specific characteristics such as vapour pressure (how fast a product evaporates) and flash point (lowest temperature at which vapours of the material will ignite, when given an ignition source) products will be stored in such a way that these vapours are minimized. For instance methanol with a high vapour pressure and low flash point will be stored in tanks with internal floating roofs (IFR) which float on top of the product and which reduce the accumulation of product vapours and possible formation of a combustible mixture as well as vapour emissions to the environment.

To keep rainwater outside the tank, an additional fixed steel roof will be placed on top of the tanks. Products with low vapour pressure and/or low flash point are stored with a steel fixed roof only. An overview of products and related storage tank specifications is provided below in Table 2.

Finally the CPP and methanol tanks will be placed in a secondary containment tankpit with bundwalls or dykes with an impermeable barrier in the floor of the tankpit and in the dykewalls, so product cannot flow into the ground in case of an incident.

Table 2: Overview of Products and Related Storage Tank Specifications

Product	Tank type	Tank capacity (m^3)	Tank dimensions (HxD)
LPG	Full containment concrete CS Bullets	90,000 (1) 1,000 (6)	25m x 70m 5.5m x 45m (HxL)
CPP	CS with fixed roof (and IFR for high vapour pressure product)	40,000 (2) 30,000 (6)	25m x 45m 24m x 40m
Methanol	CS with IFR and fixed roof	40,000 (4) 30,000 (2)	25m x 45m 24m x 40m

3.3.4. *Vessel berthing*

The berths for the vessels will include breasting and mooring dolphins, fender systems, mooring hooks and two loading platforms to support the loading arms, other mechanical equipment, communications and safety systems, gangway towers and fire monitors for the safe transfer of products to the vessels.

The jetty will be able to accommodate vessels of up to 85,000 m^3 (80,000 DWT) at both berths with a maximum draft of 14.5 m.

3.3.5. *Cargo Loading*

Vessels will be berthed at the terminal. Very Large Gas Carriers (VLGC) will receive LPG, whereas product tankers such as handymax or panamax vessels will receive the other products for export. Piping and loading arms will deliver products to the vessels. Electric motor driven pumps will transfer the products through the pipes and loading arms from the storage tanks to the vessels. It is anticipated that

vessel loading operations will occur approximately once every three days, which at full capacity results in approximately 150 vessels per year depending on customer demand. Vessels will be loaded at up to 3,000 m^3 per hour and will typically be at berth for approximately 40 hours. The terminal will require two berths as vessels for different products may require access to the terminal at the same time.

3.3.6. *General Terminal Operations*

Power

The Project will be powered through a connection to the existing 69 kV substation on Ridley Island, which is connecting with the BC Hydro grid. The LPG cooling infrastructure will be powered by gas generators. See Section 2.3 for more information.

Lighting

The Project will utilize smart, low consumption light-emitting diode (LED) lighting, which will be pointed down to avoid sky glow and impacts on birds. The LED lighting will only be used to illuminate those parts of the terminal that need lighting, when they need lighting. Several types of sensors will be connected to the LED lights to facilitate lighting requirements, allowing for light shut off at appropriate times. For both indoor and outdoor applications at the Project Vopak will schedule the illumination through motion and occupancy sensors thereby reducing the amount of light trespass.

Security

Access to the terminal is regulated by adequate site-security measures and strict visitor control procedures. The terminal will be physically secured with a fence and a closed-circuit television (CCTV) system will be used for access control.

Ancillary buildings operations

There will be three main buildings on the terminal: the office, the maintenance building and the utilities building. The office includes the CCR from which the operations of the terminal are executed and monitored. Other services in this building are: Customer Service, Human Resources, Safety, Health and Environment (SHE) and Finance.

Maintenance work will be conducted in the maintenance building, which will also house spare parts.

The utilities building houses the required infrastructure and equipment to produce nitrogen, among other functions. Nitrogen is used to clean and purge pipes and storage tanks.

Staffing

It is estimated that approximately 40-50 persons will be employed full time when the terminal is operational. Since the terminal will be operated 24-7, the operations department will work in shifts. All other employees are expected to work during regular business hours (from 9 to 5) only.

Water Requirements during operations

Water requirements during operation are limited to potable water for offices, sanitary water and service water (e.g., for cleaning and rinsing of piping and tanks). The source of water is from the existing water supply available on Ridley Island. Additionally, water will be required for fire suppression. An evaluation will be completed to confirm the feasibility of on-site fresh water storage or pumping of sea water.

3.3.7. *Associated Activities*

Activities associated with the Project will include the receiving of liquid products into PRPA boundaries by rail and shipping of liquid products outside of the PRPA boundaries.

Marine Shipping

Vessels to be loaded at the terminal will call at the pilotage station at Triple Island from which they will be subject to compulsory pilotage before entering PRPA waters. Pilotage and escort requirements will be in accordance with PRPA's "Harbour Practices and Procedures" and in consultation with the Pacific Pilotage Authority, Transport Canada, and the Canadian Coast Guard. The vessel traffic along the shipping lane through PRPA waters and between Triple Island and the terminal is expected to increase by up to 150 vessels per year. After vessels have been loaded, the same pilotage and escort process will take place for vessels leaving the facility.

Vessels that call at the terminal will be owned and operated by third party companies that are specialists in the safe transport of the products. Vessel vetting by Vopak will furthermore ensure that all vessels comply with the local and international safety and environmental standards.

Before any vessel arrives at the jetty, the following checks are performed to ensure all standards are met and the vessel is allowed to berth at the jetty and can receive the product.

- Standard tanker chartering questionnaire Q88 to assess vessel suitability and risks (detailing the vessel description, classification, dimensions, certification, crew management, cargo and ballast handling, mooring and miscellaneous like the last SIRE[1] and CDI[2] inspections performed);
- SIRE / CDI ship inspection reports;
- Surveyor documents (quality certificate of ship tanks); and
- ISGOTT[3] checklist (when moored).

Rail Shipping

The expected number of rail cars is approximately 240 per day (60 for LPG, 90 for CPP and 90 for methanol). Vopak customers will utilize unit trains owned and operated by CN railway to deliver product to the storage facility. CN will deliver the unit trains to the facility, after which Vopak will take over the responsibility for the rail cars. The cars will be split and shunted into place for the unloading of the products. After they have been unloaded, the empty cars will be parked at the west end of the RRUC corridor for pick up by CN.

Propane, CPP and methanol are regulated for transport under the *Transportation of Dangerous Goods (TDG) Act and Regulations*. Rail tank cars that carry these products are specifically designed and built for that purpose and are required to meet well-established engineering codes and the requirements of Transport Canada. For the propane, the tank cars are intended to ship propane at ambient temperatures

[1] The Ship Inspection Report Programme (SIRE) is a carrier risk assessment tool – a large database of up-to-date information about carriers and barges. It is an industry-wide system established 21 years ago and is used by the Oil Companies International Marine Forum (OCIMF) member companies and registered recipients.
[2] Chemical Distribution Institute (CDI) is a Chemical Industry Organization that was created to improve the safety and quality performance of bulk liquid shipping. Within their CDI-M scheme they provide annual inspections of chemical and liquid petroleum gas tankers.
[3] International Safety Guide for Oil Tankers and Terminals (ISGOTT) is the definitive guide to the safe carriage and handling of petroleum products on tankers and at terminals.

and as such they are pressurized to keep the propane in liquid form. Methanol and CPP are also transported at ambient temperature, but are not required to be pressurized.

3.4. Decommissioning and Reclamation Activities

All decommissioning and reclamation activities will be conducted in accordance with the applicable regulations at that time. Prior to decommissioning, a decommissioning and reclamation plan will be developed. At a minimum, the plan will include a schedule for equipment decommissioning and disassembly. The schedule will indicate the approximate time required to remove and dispose all abandoned installations, structures, and buildings for which on-site reuse is not possible, and measures to reinstate the site to a suitable state.

Decommissioning and reclamation planning will be developed in accordance with the rules and legislations in place at the time of decommissioning and is expected to involve First Nation consultation.

3.5. Project Emissions, Discharges and Waste

3.5.1. *Project Emissions*

Project-related emissions sources include:

- On-shore (trains, vehicles, emergency ground flare and gas generators); and
- Marine (vessels and tugs).

Project sources used during the construction and operations phase will emit particulate matter (PM_{10}, $PM_{2.5}$), nitrogen oxides (NO_X), sulphur oxides (SO_X), carbon monoxide (CO), and volatile organic compounds (VOCs). The EEE will review the potential effects of these emissions.

The facility will have an enclosed ground level flare, which will only be used in case of emergency or for periodical (annual) maintenance activities. The flare will not emit a visible flame, nor will it emit radiant energy that will impact adjacent properties.

Emissions Containment

The low pressure refrigerated propane storage tank will be connected to a vapour recovery system to recover boil-off vapours, which are re-condensed to liquid propane and returned to the refrigerated storage tank. A closed venting system will be installed to receive any gas released as a result of a maintenance related shutdown, and the system will feed to the emergency flare. Maintenance related shutdowns are expected to take place once per year.

3.5.2. *Waste Management*

Construction and Operations

Waste materials from construction areas will be removed, transported and recycled or disposed at an approved disposal site in compliance with any regulatory requirements. Undeveloped areas will be contoured and erosion control measures will be implemented.

Overburden resulting from construction of the Project will be disposed of at the approved disposal sites located at the southern tip of Ridley Island.

Solid and liquid wastes will be generated throughout the construction and operations phases of the Project. Solid waste types anticipated during the construction phase include scrap metal, used tires, scrap lumber, wood, concrete, grout waste, rock, steel and formwork waste. General wastes will be disposed of at the Prince Rupert landfill which accepts material from residential, commercial, industrial, institutional, demolition, land clearing, and construction sources. Recyclable materials such as steel and corrugated cardboard will be sold or recycled.

Wastewater during construction will mostly be the water used during hydrostatic testing of the facilities during commissioning. An evaluation will be completed to determine if freshwater or seawater will be used. After hydrostatic testing has been completed, the water will be discharged into Vopak's stormwater pond through a filter system where it will be tested prior to being released into PRPA's freshwater basin or through the outfall into the ocean (depending on the source of the water).

Four types of liquid discharges or waste can be defined during operations as shown below:

- Rainwater (never been in possible contact with products);
- Process waste (has been or could have been in contact with products);
- Tank or pipe cleaning waste; and
- Sanitary waste.

Rainwater will generally go into the rainwater drainage system which is directed to the stormwater pond (location to be determined). Any run-off rainwater from tank pits and operational areas collected in catch basins will be routed to an oil/water separator to eliminate any potential for contamination and will then be directed to the stormwater pond. The quality of the water in the stormwater pond will be monitored, tested and, if necessary, treated before it is discharged through the outfall. Process waste will be collected in a separate containment and will be treated prior to being released to the stormwater pond. Tank or pipe cleaning waste will be stored in slop tanks and/or sludge containers and will be disposed of at an approved waste treatment plant. For the sanitary waste (sewage) a sceptic tank will be installed, which will be emptied regularly by an external party in accordance with applicable regulations.

Dredging Waste

The estimated dredge volume for construction of the marine jetty is approximately 682,000 m^3 of soft material which is expected to be disposed at sea at a location defined during the DAS permitting process in consultation with First Nations and in conjunction with various stakeholders. Dredging will likely be conducted by cutter suction dredging equipment. Alternatives to DAS will be explored through the DAS permitting planning and process.

3.5.3. *Other Safety Systems*

Fire Protection

The facilities will be designed and operated in accordance with the requirements of the National Fire Protection Association, the National Fire Code of Canada and the BC Fire Code. Dry chemical fire extinguishers will be provided in all areas where a hydrocarbon release could occur. A looped firewater system will be installed to service the unloading rack, the LPG cooling area, the storage tank areas and the jetty. Hydrants and remotely operated fire monitors will be placed strategically.

The need for additional fire water storage needs to be defined based on maximum water demand for fighting a major fire, the defined duration of the event, and the current availability of fire water on site. An evaluation to confirm the feasibility of on-site fresh water storage or pumping of sea water will be completed.

Safety Monitoring, Alarm and Emergency Shutdown Systems

The facility will have a control system that will monitor, alarm, and shut down all or part of the facilities in the event of an emergency. A description of the elements of the control and emergency shutdown systems for the terminal components is provided below:

- Combustible gas detectors will be installed in all areas where hydrocarbon releases are possible. Horns and beacons will be provided to warn personnel of any potential hazard. Automated valves will be provided to isolate sections of the facility upon detecting gas. Consideration shall be given to safely venting any isolated equipment or systems if combustible levels are detected.
- Emergency shutdown buttons are installed on locations where personnel are performing operational activities (e.g., rail offloading, pumps and manifolds, LPG cooling facilities, jetty loading platforms).
- Fire detection will be installed at the unloading racks, the pressurised bullets, the LPG cooling area and on the storage tanks. Audible alarms and strobe lights will be installed to warn personnel of any potential hazard.
- The design of the detection systems will allow for early warning of dangerous conditions and allow time for terminal personnel to take action.
- The pipelines will be equipped with a leak detection system and emergency shutdown valves that allow for the rapid isolation in the unlikely event of a pipe failure.

4. Project Schedule

The planned schedule, as well as the activities associated with the construction, operation and future decommissioning of the Project are described below.

4.1. Schedule

The preliminary key Project phases are:

- Environmental assessment and engineering design – 2018 to 2019
- Permitting and environmental management plans – end of 2019
- Construction activities – 2020 to 2022
- Commissioning – 2022 (one to two months)
- Operational in-service date – 2022
- Operations and maintenance – 2022 out to a minimum of 50 years (2072)
- Decommissioning, abandonment and reclamation – sometime after 2072 when the Project has reached the end of its operational life.

5. Regulatory Context

5.1. Federal Environmental Effects Evaluation

The *Canadian Environmental Assessment Act, 2012* (CEAA 2012) defines responsibilities and procedures for environmental assessments (EA) of projects that involve the federal government. The Project is not anticipated to require an environmental assessment under Section 13 of CEAA 2012 as it not a designated project as defined in the CEAA 2012 *Regulations Designating Physical Activities (SOR/2012-147)*.

Vopak considered the following subsections in the *Regulations Designating Physical Activities*:

- 2(a) The construction, operation, decommissioning and abandonment of a new fossil-fuel electrical generating facility with a production capacity of 200 MW or more.
- 14(e) The construction, operation, decommissioning and abandonment of a new petroleum storage facility with a storage capacity of 500,000 m^3 or more.
- 14(f) The construction, operation, decommissioning and abandonment of a new liquefied petroleum gas storage facility with a storage capacity of 100,000 m^3 or more.
- 24(c) The construction, operation, decommissioning and abandonment of a new 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.
- 25(a) The construction, operation, decommissioning and abandonment of a new railway line that requires a total of 32 km or more of new right of way.
- 25(b) The construction, operation, decommissioning and abandonment of a new railway yard with seven or more yard tracks or a total track length of 20 km or more.

The Project is not expected to exceed any of the above thresholds. While the project will involve the construction, operation, decommissioning and abandonment of a new jetty designed to handle ships larger than 25,000 DWT, it will be located on land that has been designated as a marine terminal in the Port of Prince Rupert 2020 Land Use Management Plan that has been subject to public consultation.

However, as the Project will be built on federal lands it will be subject to an environmental effects determination under Section 67 of CEAA 2012:

- 67 An authority must not carry out a project on federal lands, or exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands, unless:

  (a) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or

  (b) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides that those effects are justified in the circumstances under subsection 69(3).

While PRPA will coordinate the Section 67 environmental effects evaluation process, all federal authorities involved in regulating the Project will be required to make a determination. These federal authorities are expected to be PRPA, Transport Canada (TC), Environment and Climate Change Canada (ECCC) and Fisheries and Oceans Canada (DFO). The federal authorities will make a determination prior to issuing any permits outlined in Section 5.3 below. The environmental effects evaluation will be prepared by Vopak following the guidance of PRPA and using federal guidance as provided in *Projects On Federal Lands: Making a determination under section 67 of the Canadian Environmental Assessment Act, 2012,* (CEA Agency, 2014).

5.2. Provincial Environmental Assessment

The provincial EA process in BC is administered by the BC Environmental Assessment Office (EAO). Projects that are considered reviewable pursuant to the BC Environmental Assessment Act (BCEAA) are specified in the *Reviewable Projects Regulations*.

Relevant criteria of a Reviewable Project in BC includes:

- Energy Storage Facilities – subject to subsection (2), a new energy storage facility with the capability to store an energy resource in a quantity that can yield by combustion > 3 Petajoules (PJ) of energy.
- Railways – subject to subsection (2), a new railway facility that consists of:
    - 20 continuous km of developed track; or
    - rail line designed to accommodate high-speed trains with a design speed of > 200 km/hour.
- Marine Port Facilities (other than Ferry Terminals) – subject to subsection (2), a new marine port facility, other than a ferry terminal, if construction of the facility entails dredging, filling or other direct physical disturbance of:
    - > 1 000 m of linear shoreline; or
    - > 2 hectares of foreshore or submerged land, or a combination of foreshore and submerged land, below the natural boundary of a marine coastline or marine estuary.

The Project currently exceeds the energy storage threshold of 3 PJ of stored energy and will require dredging of an area larger than 2 hectares of foreshore or submerged land.

Vopak is currently in discussions with federal and provincial regulators to determine a joint environmental assessment process and ensure the concerns and interests of all involved are satisfied.

5.3. Other Permitting Requirements

Other federal legislative or regulatory requirements that may apply to the Project are identified in Table 3.

Table 3: Preliminary List of Potential Other Regulatory Requirements

Permit or Approval	Regulator	Description
PRPA Lease Agreement under the *Canada Marine Act*	PRPA	Lease to occupy and use PRPA-administered lands.
Navigation Protection Act (NPA) Approval	TC	Approval for the construction of Project components that would impact navigation (marine facility, dredging, etc.).
Fisheries Act Authorization	DFO	Marine-based activities and infrastructure causing disturbance or loss of fish habitat in the marine environment require an Authorization from DFO.
Canadian Environmental Protection Act permit	ECCC	Permit authorizing disposal of excavated or dredged material at sea.

6. Environmental Evaluation Overview

An evaluation of potential environmental effects will be undertaken in order to determine the likelihood and severity of potential impacts from the Project on components of the environment that are of value to First Nations, the public, and/or agencies. A preliminary list of these 'Valued Components' (VCs) is included below, based on experience from similar projects in the area, and will be updated to reflect comments received from First Nations, the public and agencies.

The purpose of the environmental evaluation will be to undertake a systematic assessment of potential project-related effects on VCs. The early identification of potential Project-related effects reduces the likelihood of long-term adverse effects, as it allows for the identification and implementation of mitigation measures to avoid or minimize significant adverse effects through engineering design and changes to construction methodologies and management.

An Environmental Evaluation Document (EED) will be submitted to regulatory authorities for their review and as a basis for their environmental effects determination. The EED will:

- Describe the project;
- Describe the identified VCs, their baseline conditions and their proposed boundaries;
- Predict environmental effects of interactions between the Project and VCs;
- Identify mitigation measures recommended to avoid or minimize adverse environmental effects;
- Evaluate the potential for significant adverse environmental effects; and
- Document the analysis and identify and describe applicable follow-up monitoring and management plans.

6.1. Preliminary List of Valued Components and Potential Project Interactions

Vopak has identified a preliminary list of candidate VCs for review. The selected VCs are currently a *candidate* list that will be subject to change based on future input gathered through review by First Nation and public engagement. The candidate VCs are presented as a means for initial discussions and are not meant to be conclusive. The selected VCs will form the basis of the environmental assessment. Potential Project interactions with identified VCs will be evaluated for potential Project-related adverse effects. Where an interaction is anticipated, the effect will be evaluated and mitigation identified to avoid or minimize the effect.

Table 4 on the following page summarizes the selected candidate VCs with rationale.

Table 4: Preliminary List of Valued Components and Rationale for Selection

Valued Component	Sub Component	Rationale
Air Quality and Greenhouse Gas (GHG) Emissions	--	• Air Quality and GHG Emissions are a potential concern to the public, First Nations and regulators; and • Potential interaction of the Project including emissions of Criteria Air Contaminants and GHGs.
Noise and Vibration	--	• Noise is of potential concern to the public, First Nations and wildlife; and • Potential disturbance to nearby sensitive receptors.
Visual/Lighting	--	• Visual viewscape from marine side may be altered; • Lighting related to the Project may increase sky glow; and • Lighting related to the Project may disturb or interrupt wildlife and marine life along the jetty.
Marine Resources	Marine Habitat	• The Marine Resources VC was selected as an umbrella for several marine-related subcomponents commonly regarded in other environmental assessments as important values for the public, First Nations, federal and provincial regulators. • Several federal acts have provisions for the protection of resources related to the marine environment, including fauna and habitat. • Assess the potential for sediment contamination.
	Marine Water Quality Marine Sediment Quality	
	Marine Fish and benthic invertebrates	
	Marine Mammals, including species at risk	
Terrestrial Resources	Wildlife and Wildlife Habitat, including Birds and species at risk	• Terrestrial Resources are considered to be of value for several stakeholders and communities because of mandated protection legislation, values placed on preservation of natural environments (e.g., wetland function), recreation and hunting values. Certain species are considered to be of traditional or cultural importance for First Nations. • Includes assessment of species at risk, including (e.g., little brown myotis bat)
	Vegetation, including rare plants	
	Wetland Function	
Soils and Terrain	--	• The Soils and Terrain VC is proposed to understand the potential effects of the Project on soils and terrain.
Freshwater Fish and Fish Habitat	Ground and Surface Water Quality	• The freshwater fish and fish habitat was selected to represent several related components of freshwater aquatic habitat. Surface water and groundwater quality, along with sediment quality are inter-linked, and may collectively affect habitat for receptors such as fish and other fauna.
	Sediment Quality	
	Freshwater Fish	
Archaeology	--	• Archaeological sites have been identified within the Vopak project site; therefore, Archaeology has been identified as a VC for this Project.
Current Use for Traditional Purposes	--	• Impacts on current use for traditional purposes is a potential concern for First Nations. Activities may include fishing in waters along Ridley Island.

Table 4 (Cont'd): Preliminary List of Valued Components and Rationale for Selection

Valued Component	Sub Component	Rationale
Socio-economic Condition	--	• Social, community and economic conditions have been considered as important values to be assessed in EA. Project-related effects on socio-economic values have traditionally focused on effects on: o Economic impact to the Commercial, Recreational and Aboriginal Fisheries; o Recreational and tourism values; and o Visual quality and aesthetic. • Potential economic effects of project (e.g., job creation during construction and operation).
Human Health	Air Quality	• Air quality, noise and lighting have been considered in other EAs as important to the health of nearby residents and workers; • This VC includes Aboriginal health and wellbeing; and • Results of the marine sediment assessment will provide the basis for assessing potential Project-related effects to human health from contaminated marine foods.
	Noise and Vibration	
	Ambient Light	
	Marine Foods	

6.2. Environmental and Socio-Economic Setting

A number of large-scale projects have been proposed in the Prince Rupert area since the early 2000s, which has resulted in an extensive body of available data for the site and adjacent areas. Vopak intends to draw on information made available through the following environmental assessments and studies to inform the EED for the Project. Additional information will be collected through field surveys and environmental baseline studies to support baseline information in the instance existing information is insufficient. The information gathered will form the baseline in the assessment of potential Project-related effects.

A background literature review was completed on projects and affiliated documents listed in Table 5 below.

Table 5: List of Reviewed Documents

Proponent	Project	Author, Year	Document Name
AltaGas Ltd.	Ridley Island Propane Export Terminal	SNC-Lavalin 2016	Environmental Effects Determination
Pacific NorthWest LNG Limited Partnership	Pacific Northwest LNG	Stantec 2016 Agency 2016	Environmental Impact Statement Technical Data Reports Environmental Assessment Report
Nexen Energy	Aurora LNG	Stantec 2016	Environmental Assessment Certificate Application Technical Data Reports
WCC LNG Project Limited	WCC LNG	WCC LNG 2015	Project Description Valued Component Selection

Table 5 (Cont'd): List of Reviewed Documents

Proponent	Project	Author, Year	Document Name
BG Group	Prince Rupert LNG	AECOM 2014	Project Description Application Information Requirements Environmental Impact Statement Guidelines
PRPA	2020 Land Use Management Plan (2020 LUMP)	AECOM 2012	Port of Prince Rupert 2020 Land Use Management Plan
Canadian National Railway Company	Fairview Terminal Expansion	Stantec 2012	Comprehensive Study Report Technical Data Reports
Ridley Terminals Inc.	Ridley Terminals Expansion	Worley Parsons 2012	Parcel A and Energy Bulk Export Terminal Pre-Feasibility Study Parcel A: An Archaeological Impact Assessment
PRPA	Ridley Island – Future Industrial Development	Millennia Research 2008	Archaeological Overview Assessment: Ridley Island, BC
Canpotex Terminals Ltd.	Canpotex Potash Export Terminal	Stantec 2011	Environmental Impact Statement Technical Data Reports
WestPac LNG Corporation	WestPac LNG	Jacques Whitford 2006	Project Description
PRPA Environmental Stewardship Committee (PESC)	Environmental Programs	2017 - 2018	PESC meeting minutes
NaiKun Wind Energy Group Inc.	NaiKun Offshore Wind Energy	NaiKun 2009	EA Certificate Application and Supporting Studies
PRPA	Environmental Programs	SNC-Lavalin 2014 to 2017	Marine Water Quality Annual Reports Air Quality Reports

The following sections describe the environmental setting of the Project.

6.2.1. *Air Quality, Noise & Vibration, and Ambient Light*

Air Quality

The local airshed is not currently considered 'challenged' due to relatively few industrial emission sources and due to the fact that PRPA's Air Quality monitoring program has not recorded any air quality exceedances for any criteria air contaminant. As well, the Prince Rupert airshed benefits from consistent wind flow (being situated on the coast), generally without persistent stagnant conditions that can affect inland airsheds in BC.

PRPA, with some assistance from the province, conducts ambient monitoring in the community. This monitoring is to confirm that the air quality is currently 'good' and to track ambient levels of the criteria air contaminants as part of their ongoing environmental sustainability initiative. Recent monitoring has indicated very localized PM (i.e., dust) measurements. PRPA completed an airshed study of all port-related activities in 2016, which confirmed that the port activities do not exceed the ambient objectives held by the provincial and federal governments. (BC Ministry of Environment 2016).

PRPA conducts an emissions inventory of the entire port operations within its jurisdiction and compiles annual GHG summaries each year. The purpose for the emissions inventory is to serve as part of PRPA's environmental stewardship program, as well as their membership in Green Marine and related environmental certification. This data will be shared with Vopak and will be used to inform the baseline characterization of GHGs completed for the EEE.

Given the Emission Control Area (ECA) established for the west coast of North America, shipping emissions of key contaminants (SO_2, PM, NO_2) were predicted to decrease significantly and these improvements are expected to help alleviate air quality concerns that could otherwise develop with increases of shipping rates in the region.

Noise and Vibration

The nearest noise receptors to the Project site are located across Porpoise Harbour in Port Edward. Noise and vibration experienced at these receptors are currently affected by existing operations of marine vessels, non-road engines, heavy- and light-duty vehicles, and movement of inbound and outgoing cargo (including metallurgical and thermal coal, petroleum coke), coal operation infrastructure and existing CN rail infrastructure.

Ambient Light

Local sources of light emissions include the high and low mast lighting at Ridley Terminals Inc. (RTI), which is necessary to safely operate at night. This light source currently has limited or no visibility from the town of Port Edward (SNC-Lavalin 2016a and 2016b).

6.2.1. *Marine Areas of Interest*

6.2.1.1. Marine Habitat

Two important biogenic habitats were identified along the west coast of Ridley Island: kelp beds and eelgrass beds. The canopy-forming bull kelp (*Nereocystis luetkeana*) was observed in the shallow subtidal zone fringing the shoreline where rock substrate was present. Other large understory kelps including *Laminaria* spp., *Alaria* spp., *Costaria* spp., *Desmarestia* spp., and *Cymathere* spp. were also identified in the low intertidal and shallow subtidal zones. These kelps are considered to provide important habitat for many invertebrate and fish species.

An eelgrass bed (*Zostera marina*) was identified along a stretch of sandy beach east of Coast Island (directly west of Ridley Island) in a band along the shoreline of Ridley Island. This bed fringes the shoreline in the lower intertidal and shallow subtidal zones, and is discontinuous over a distance of approximately 350 m. Eelgrass beds are considered important nursery habitat for juvenile fish and invertebrates.

Stantec (2011) recorded a high diversity and abundance of algae and invertebrates in the intertidal habitat on the west side of Ridley Island, which is typical along the North Coast of British Columbia. Algal abundance declined moving away from shore reportedly due to the rapid decrease in light in the offshore environment. Foliose red algae were the dominant algal species in the survey area, while sugar wrack kelp (*Laminaria* spp.) was the most abundant brown algae.

6.2.1.2. Marine Water Quality

PRPA has conducted marine water quality monitoring in PRPA waters since 2013. Coastal waters are monitored for oceanographic properties, heavy metals, polycyclic aromatic hydrocarbons and bacteriological properties. Six water sampling sites are scattered along Ridley Island in Chatham Sound, while four sites are located in Porpoise Harbour.

There have been limited Canadian Council of Ministers of the Environment (CCME) and British Columbia Water Quality (BCWQ) guideline exceedances in the five years since the water quality program was initiated. *Enterococcus* was recorded above the threshold level in 2013 (two of seven sites during the second quarter sampling event), in 2015 (six of ten sites had at least one exceedance) and in 2016 (seven of ten sites had at least one exceedance). Nine of 10 sites experienced at least one exceedance in 2017. The exceedances typically occur after freshet or heavy rainfall events associated with the early summer and fall months. An exceedance in *Enterococcus* levels has not been observed during the first quarter of any year.

Other parameters that have exceeded respective guidelines have been documented and are considered a rare occurrence. Parameters include copper (five occurrences in 5 years), fecal coliform (two occurrences in five years), chromium, selenium, cadmium) and naphthalene (one occurrence in five years). Polycyclic aromatic hydrocarbons (PAHs) were 'non-detect' for all sites in proximity to Ridley Island since 2013.

6.2.1.3. Marine Fish

Several species of fish have been previously observed in moderate abundance around Ridley Island. The most common fish observed included Northern ronquils (*Ronquilus jordani*), eelpouts and English sole, whereas longnose skate and black-eyed goby were less abundant. The vast majority of fish recorded occurred at depths greater than 10 m. Other species known to occur include surf smelt (*Hypomesus pretiosus*), halibut (*Hippoglossus stenolepsis*), northern sculpin (*Icelinus borealis*), starry flounder (*Platichthys stellatus*) and rock sole (*Lepidopsetta bilineata)* (AECOM 2014).

6.2.1.4. Marine Benthic Invertebrates

A number of commercially important invertebrate species were observed around Ridley Island from a subtidal survey that was completed in May 2009 as part of the Canpotex project (Stantec 2011). The survey noted that Spiny pink shrimp (*Pandalus borealis eous*) were very abundant. Spot prawns (Pandalus *platyceros*) were present in low abundance. Both of these *Pandalus* species shared similar distribution along the deeper, western portion of the survey area. Commercial crab harvesting operations were observed in the immediate vicinity, indicating a relatively productive area for Dungeness crab. Geoduck clams (*Panopea abrupta*) were present in moderate abundance throughout the survey area and were associated with unmounded holes. California sea cucumbers (*Parastichopus californicus*), and scallops (*Chlamys spp*.) were present at low to very low abundance in the survey area.

6.2.1.5. Marine Mammals

The Pacific North Coast Integrated Management Area (PNCIMA) is one of five large federal ocean management areas in Canada and covers an area of approximately 102,000 square kilometers (DFO 2011). The Project site falls within PNCIMA, and the Department of Fisheries and Oceans (DFO) mapping data indicate that the Prince Rupert area of the PNCIMA includes important foraging, resting, and migrating areas for cetaceans and pinnipeds (DFO 2016).

Local environmental assessment studies have also indicated that many species of marine mammals occur regularly in the Prince Rupert area, including Dall's porpoises (*Phocoenoides dalli*), Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) and harbour seals (*Phoca vitulina richardsi*). It has been observed that many of these marine mammal species increase in numbers during spring and summer months in the Prince Rupert area in relation to seasonal increases in prey (Stantec 2014).

6.2.1.6. Marine Species at Risk

Six SARA-listed (Schedule 1) marine species (non-fish species) were identified as having ranges that include Ridley Island and surrounding waters (WorleyParsons 2012). Cetaceans included grey whale (Eschrichtius robustus), harbour porpoise (*Phocoena phocoena*), humpback whale (*Megaptera novaeangliae*), killer whale (resident and transient populations) (*Orcinus orca*). Also listed as Schedule 1 SARA species are Steller sea lion (*Eumetopias jubatus*) and northern abalone (*Haliotis kamtschatkana*), a culturally significant species.

Green sturgeon (*Acipenser medirostris*) is a species of Special Concern protected under SARA Schedule 1. This fish species occurs in coastal marine waters, estuaries and the lower reaches of large rivers and is known to occur in the area of Port Edward and Prince Rupert (CDC 2018). No other fish with known geographic distribution within the North Coast Regional District are designated under SARA; however, several species have been assessed as 'at-risk' by the Committee on the Status of Endangered Wildlife In Canada (COSEWIC)[4], including coho salmon (*Oncorhynchus kisutch*) (Interior Fraser River population - Endangered) and eulachon (*Thaleichthys pacificus*) (Special Concern).

6.2.2. *Terrestrial Areas of Interest*

6.2.2.1. Soil and Terrain

Soil Quality

The Project site is largely undeveloped and the soil type consists predominantly of terric mesisols and typic mesisols which coincides with organic soils developed in wetlands, poorly to very poorly drained and with a pH of less than 5.5 (Soil Classification Working Group 1998). Another soil type previously observed is orthic dystric brunisols, which is developed on marine and glaciomarine surficial material. This type of soil is moderately well to imperfectly drained and typically has pH levels under 5.5 (Soil Classification Working Group 1998).

[4] COSEWIC status indicates these species are candidates for protection under SARA.

Terrain

The site is characterized by low-lying, rolling terrain, with a maximum elevation of approximately 50 m. The surficial materials overlay bedrock to a maximum depth of 21 m below ground surface (bgs) (Dillon 2004). The terrain on the western shoreline of Ridley Island is generally characterized as a steep, rocky intertidal zone composed primarily of bedrock, boulder and cobble (WorleyParsons 2012). The eastern shoreline of Ridley Island in Porpoise Harbour is dominated by boulders, cobble, and gravel in the high to mid-tidal zones, whereas the low intertidal zone is predominantly marine clays and mudflat.

6.2.2.2. Ground and Surface Water

Groundwater

There are no known aquifers on Ridley Island, however the water table can be typically found at depths between 0.5 and 2.0 m and within the underlying bedrock encountered at depths between 1.0 m and 16.6 m. Previous Environmental Site Assessment studies established groundwater monitoring wells, however, several have been disturbed during subsequent construction. None of the groundwater wells are on the Project site.

Surface Water

The central portion of Ridley Island predominantly consists of short non-connected watercourses, standing pools of water and wetland ecosystems.

6.2.2.3. Vegetation

Ridley Island is located within the Coastal Western Hemlock Southern Very Wet Hypermaritime (CWHvh1) biogeoclimatic subzone variant. The proposed Project site is situated on a mosaic of mature coastal forest, wetland ecosystems (muskeg, bogs, and marshes with open water, treed swamps) and transitional zones between forest and wetland (WorleyParsons 2012).

Within the site, bog ecosystems are dominated by stunted shore pine (*Pinus contorta*) and yellow-cedar (*Xanthocyparis nootkatensis*), with several shrubs common to bogs and a diverse bryophyte layer (Stantec 2011).

Marsh habitats contain thick stands of sedge such as Sitka sedge (*Carex sitchensis*). Rushes and other characteristic wetland species are commonly found on pond perimeters.

Plant Species at Risk

No occurrences of plant species at risk listed under the federal *Species at Risk Act* (SARA) have been recorded in the nearby vicinity of the Project site (CDC 2018). Two provincially Blue-listed plants were previously reported outside the Project site on Ridley Island - Alaska holly fern (*Polystichum setigerum*) and Gmelin's sedge (*Carex gmelinii*) (Stantec 2011).

6.2.2.4. Wildlife

Mammals

Several mammalian species are known to occur on Ridley Island including black-tailed deer (*Odocoileus hemionus*), gray wolf (*Canis lupus*), red squirrel (*Tamiasciurus hudsonicus*), beaver (*Castor canadensis*), short-tailed weasel (*Mustela erminea*), Pacific marten (*Martes caurina*), porcupine (*Erethizon dorsatum*), snowshoe hare (*Lepus americanus*) and bear (*Ursus sp*.) (SNC-Lavalin 2016).

Birds

There is suitable habitat at the Project site for multiple species of migratory and resident birds. Two Bald Eagle (*Haliaeetus leucocephalus*) nests were previously reported on the island (Stantec 2011). Eagle nests are protected year-round in British Columbia. Northern Goshawk (*Accipiter gentilis laingii*), a federal species at risk, has been reported historically, but there are currently only small patches of suitable nesting habitat for this species (mature and old forest) near the Project site (Stantec 2011). No owls have been recorded on Ridley Island, though Western Screech-Owl (*Megascops kennicottii*), a provincial species at risk, were observed on neighbouring Lelu Island (Stantec 2016).

Several species of coastal seabirds and waterfowl have been observed foraging off the coast and within the wetlands ecosystems on Ridley Island (Stantec 2011). Loons, gulls and alcids have been commonly documented in the waters around Ridley Island, as have other species such as cormorants and herons.

Amphibians and Reptiles

Higher elevation ponds and marshes on Ridley Island provide suitable breeding habitat for amphibians, including western toad (*Anaxyrus boreas*), a federal species at risk. Four other pond-breeding amphibian species may occur near the Project site including roughskin newt (*Taricha granulosa*), red-legged frog (*Rana aurora*), long-toed salamander (*Ambystoma macrodactylum*), and northwestern salamander (*A. gracile*) (CDC 2018). Ridley Island is within the geographic distribution of coastal tailed frog (*Ascaphus truei*); however, there is a lack of suitable breeding habitat for this species so the likelihood of tailed frog presence is low.

Common garter snake (*Thamnophis sirtalis*) and the western garter snake (*T. elegans*) are two reptile species that may occur near the site (WorleyParsons 2012).

Terrestrial Species at Risk

Confirmed occurrences of SARA-listed wildlife on the Project site include western toad and Great Blue Heron ssp. *fannini*. Herons are tolerant of human presence and often will roost or hunt in drainage ditches or shorelines. No heron nests have been documented on Ridley Island and observations have been limited to foraging along shorelines.

The bat species, little brown myotis (*Myotis lucifugus*), is listed as Endangered under SARA and its residences are protected by SARA prohibitions from disturbance or destruction on federal lands. The species hibernates tree root wads, among other locations during the winter and is generally active from late March to September. Little brown myotis roosts in buildings, trees and rock crevices, and forages in upland habitat such as wetland complexes.

6.2.2.5. Freshwater Fish and Fish Habitat

Fish bearing watercourses and waterbodies are generally limited on Ridley Island. The rain or snow-fed bogs on the site have low pH (acidic) water and low productivity, and is considered unsuitable as fish habitat (WorleyParsons 2012). The closest fish bearing watercourse to the site is located less than 200 m to the southwest of the property and across from the road, rail utility corridor. Information provided within the Prince Rupert LNG field study indicates the presence of threespine stickleback (*Gasterosteus aculeatus*) and sculpin (*Myoxocephalus octodecemspinosus*) in the watercourse.

6.2.3. *Socio-Economic Setting*

The following section provides a general description of the social and economic setting of the area surrounding the Project site.

Local Community

The Project is situated within the North Coast Regional District (NCRD) on the north coast of British Columbia. The main urban centre within the NCRD is the City of Prince Rupert, which is located 15 km north of the Project site.

Over the last 10 years, the NCRD has experienced a decrease in population in the order of 21%, and at the same time its economy has been facing substantial restructuring with decreasing reliance on more traditional sectors, such as fishing and forestry. While on a community-level basis there tends to be relatively high levels of labour market participation, the NCRD currently suffers from unemployment at a rate in the order of double that of the province. Among all North Coast regional districts, Port Edward had the largest decrease in population between 2014 and 2015 (Buck, T., Suzuki Environmental Foundation 2017).

The District of Port Edward is the closest community to the Project site, located approximately 2.5 km east and across Porpoise Bay. The District itself consists of approximately 18,387 hectares, with an estimated population of 544 residents (DPE 2013; 2013a). The town has an elementary school, a playing field and a ball diamond, a community centre offering recreational services, and several public parks, including Fisher Point, Kloya Bay, Rainbow Lake, Diana Lake and Prudhomme Lake Provincial Park. Public, emergency and medical services are based out of Prince Rupert, located 15 km north of Port Edward.

Emergency and Health Services

There are existing emergency and health services, based primarily in Prince Rupert. These services include those of the Pacific Pilotage Authority, BC Coast Pilots, SMIT Marine and PRPA, provincial ambulance, fire and policing, as well as resources available from tenants of PRPA.

Four Coast Guard Stations (CGS) (with up to 90 staff) are located in the North Coast. One of these stations is located in Prince Rupert at the Seal Cove Seaplane Base. The Prince Rupert CCG Station offers services to assist maritime safety (DFO 2007).

Marine Resource Use and Local Economy

Marine resource use and local economic activity in the vicinity of the Project site includes (SNC-Lavalin 2016a and 2016b):

- Industrial and commercial marine activities associated with PRPA and Port Edward Harbour Authority;

- Recreational activities; and
- Commercial, recreational and aboriginal fisheries.

PRPA and the tenants on port lands constitute an important part of the economy of the Prince Rupert and Port Edward area. The following facilities are all currently part of PRPA: Fairview Container Terminal, Ridley Terminals (coal and petroleum coke, construction of Ridley Island Propane Export Terminal), Pinnacle Pellets (wood pellets), Prince Rupert Grain, Northland Cruise Terminal, construction of Ridley Island Propane Export Terminal, and Atlin Terminal (small cruise ships). These facilities create marine traffic into and out of the Port of Prince Rupert.

In addition to PRPA, Port Edward Harbour Authority serves small craft harbours in each of the small vessel marinas in Prince Rupert and Port Edward (Fairview Harbour, Porpoise Harbour, Rushbrook Harbour, and Cow Bay Harbour). There are several other types of marine facilities within Prince Rupert and Port Edward including marinas, yacht clubs, public wharves, and coastal ecotourism and fishing lodges.

Recreational, commercial and Aboriginal fisheries are well-established on Chatham Sound and the North Coast. Several species of salmon (sockeye, chinook, coho, pink and chum) are harvested and found throughout Chatham Sound, and have long been the most important contributor to local fisheries. Eulachon, Dungeness crab (*Cancer magister*) and shrimp (*Pandalus spp*.), and several fish species such as halibut (*Hippoglossus stenolepsis*), and lingcod (*Ophiodon elongates*) make up a significant portion of other fisheries.

In addition to eulachon, other species are commonly harvested in Chatham Sound by Aboriginal fisheries and groups including but not limited to cockles (*Clinocardium spp*.), butter clams (*Saxidomus spp*.), mussels (*Mytilus spp*.) and littleneck clam (*Protothaca staminea*).

Tourism and recreation is playing an increasing role in the regional economy, capitalizing on the area's high level of natural beauty and the abundance of eco-adventure opportunities. Recreational activities in the area include recreational boating (powered and self-propelled) and tourism activities associated with Kitson Island.

6.2.4. *Current Use of Land and Water for Traditional Purposes*

Prince Rupert Harbour sits within one of the oldest continuously occupied areas in BC. Current use of the land or resources on the Project site by Aboriginal persons for traditional purposes is likely to be limited due to site access restrictions to the Port of Prince Rupert. Aboriginal persons may currently use resources for traditional purposes in the marine areas. Vopak will engage with Aboriginal groups to better understand their current use of land and water for traditional purposes.

6.2.5. *Archaeological Resources*

An archaeological overview assessment of Ridley Island was completed for PRPA in 2008. Two archaeological impact assessments were conducted on behalf of Ridley Terminals Inc. in 2010 and 2012 and an additional impact assessment was completed for the Canpotex Export Terminal Project. The majority of archaeological sites were identified on the north side of Ridley Island, whereas several were identified along the perimeter of the central and southern portions of Ridley Island. Three archaeological features were identified within the Project area, while another was located on the marine lot property boundary. All archaeological features identified were Culturally Modified Trees (CMTs).

6.3. Summary of Potential Project-Related Effects and Mitigations

Table 6 below is a preliminary outline of potential Project-effects on proposed VCs within PRPA jurisdiction. Potential effects are presented as a means for initial discussions and are not meant to be conclusive. Project-specific effects will be determined in consultation with First Nations, government agencies and other stakeholders. The preliminary outline is based on a review of similar Project environmental assessments that have been previously conducted in the vicinity of Ridley Island, and professional opinion. The EED will identify potential interactions of the Project activities and components with identified VCs. The nature of the interaction and potential effects on VCs will be evaluated and documented in detail in the EED.

Mitigation measures for identified potential Project-related effects will be identified in the EED based on the proponent's experience of operating tank farms across the globe, industry best management practices, and industry standards and regulations. A preliminary overview of some of the anticipated mitigation measures are also provided in Table 6.

Table 6: Potential Project Effects and Mitigation(s)

Proposed Valued Component	Description of Potential Effects and Environmental Sensitivity	Potential Mitigation(s)
Air Quality and GHG Emissions	• Potential effects to air quality related to Project emissions of criteria air contaminants (CAC), potential contribution to increase in GHG emissions • Associated effects as they relate to the effects on Human Health and climate change.	• To be developed. • Best management practices (BMPs) for construction and operation such as regular maintenance of machinery and equipment, use low sulphur fuel and dust suppressants among others. • Ensure use of the vessel management procedures and standards and practices from the PRPA Port Information Guide (PRPA 2015).
Noise and Vibration (excluding underwater noise)	• Disturbance to the local residents or other sensitive receptors (e.g., marine and land-based wildlife) from construction and operations.	• To be developed. • Demonstrated commitment to standard best practices such as BC OGC's Noise Control Best Practices Guideline. • Standard BMPs will be applied.
Visual/Lighting	• Light pollution from the Project may interact with human and marine receptors. • New facilities may increase 'light spill' or 'light trespass' thereby causing disturbance to local residents and other sensitive receptors.	• To be developed. • Utilize optimized design standards.
Marine Habitat	• Potential disturbance of high productivity marine habitat of eelgrass, shellfish beds and rockweed bed within the marine area of interest.	• To be developed. • Refer to marine related mitigations under Marine Water quality, marine fish etc.

Table 6 (Cont'd): Potential Project Effects and Mitigation(s)

Proposed Valued Component	Description of Potential Effects and Environmental Sensitivity	Potential Mitigation(s)
Marine Water Quality Marine Sediment Quality	• Adverse effects on water and sediment quality can originate from both construction and operation and have interactive adverse effects on marine habitat, fish and mammals. • Examples of adverse effects include increased turbidity from surface water runoff.	• To be developed. • Development of a comprehensive set of Environmental Management Plans for construction and operation. • Demonstrated commitment to best practices for construction and operation.
Marine Fish and benthic invertebrates	• Sensory disturbance from underwater noise on fish and marine mammals	• To be developed. • Avoidance, where possible, of marine works during sensitive windows, such as during peak juvenile salmon outmigration, eulachon migration.
Marine Mammals, including species at risk	• Sensory disturbance from underwater noise which may alter behaviour of marine mammals. • Mortality and injury from marine vessel collision.	• To be developed. • Demonstrated commitment to best practices during construction and operation in the marine environment such as the use of noise-reducing equipment. • Refer to guidance in Mariner's Guide to Whales Dolphins and Porpoises of Western Canada.
Terrestrial Resources	• Degradation or permanent loss of available habitat. High biodiversity habitat will be of particular concern due to potential presence of important species and ecological functions (i.e., wetlands). Also may result in disruption to wildlife movement or mortality for migratory birds or species at risk which may inhabit the island. • Loss of rare plants, sensitive ecological communities and wetland function due to site clearing. • Introduction/distribution of invasive species.	• To be developed. • Development of a wildlife and vegetation management plan for construction and operation. • Prepare and implement a noxious weed plan.
Soil and Terrain	• Potential for soil contamination from adjacent operations	• To be developed. • Demonstrated commitment to best practices for construction and operation.

Table 6 (Cont'd): Potential Project Effects and Mitigation(s)

Proposed Valued Component	Description of Potential Effects and Environmental Sensitivity	Potential Mitigation(s)
Surface Water Quality Groundwater Quality Sediment Quality	• Adverse effects on water and sediment quality can originate from both construction and operation and have interactive adverse effects on freshwater habitat, fish and mammals. • Examples of adverse effects include disturbance of soils or sediment causing increased turbidity in local water features.	• To be developed. • As above, for Soil and Terrain.
Freshwater fish and fish habitat	• Change/loss of fish habitat.	• To be developed.
Socio-Economic Conditions	• Marine Use: Project-related marine shipping and the new jetty may interfere with Aboriginal, recreational and commercial marine activities along Ridley Island. • Economic: Potential economic effects of project (e.g., job creation during construction and operation) • Visual Quality: project-related effects on visual aesthetic may impact recreational and tourism value.	• To be developed. • Establish a marine communication plan to ensure marine stakeholders are apprised of scheduled marine construction activities. • All shipping within PRPA will be conducted following the rules of shipping established by the Port under the Canada Marine Act and in compliance with the Canadian Coast Guard and the Port Authority Operations Regulations. • Carrier transit speed is determined with the Pilot and Harbour Master to account for safe navigation, reduced collision with other vessels, and reduced interaction with marine mammals.
Archaeology	• Potential disturbance of known or unknown archaeological sites on land and in the foreshore. Previous assessments have identified CMTs.	• Avoidance of CMTs, where possible. If removal of CMT is necessary, proper approval and oversight is required (i.e., a professional archaeologist and local First Nations representatives). • Potential chance finds of archaeological importance are typically protected through BMPs including an immediate stop work to allow for the appropriate data recovery, excavation and analysis.

Table 6 (Cont'd): Potential Project Effects and Mitigation(s)

Proposed Valued Component	Description of Potential Effects and Environmental Sensitivity	Potential Mitigation(s)
Current Use for Traditional Purposes	• Impacts on current use for traditional purposes will be assessed in conjunction with First Nations.	• To be developed. • Mitigation measures will be determine in conjunction with First Nations.
Human Health	• Potential effects on human health are indicated under the Air, Noise and Light issues.	• To be developed. • Refer to mitigations as noted under Air, Noise and Light topics.

6.4. Monitoring Programs

Monitoring programs, as required, will be proposed in the EEE. Monitoring is required in the event:

- the likelihood of a potential effect occurring or the consequence of the identified potential effect is unknown, or predicted with low confidence, or
- the effectiveness of a proposed mitigation is not proven.

Monitoring programs are best put in place to manage the uncertainty and confirm proposed mitigations are proving effective.

6.5. Cumulative Effects

The requirements for the completion of a cumulative effects assessment of the Project are unknown at this stage and will be reviewed as the environmental assessment process is further defined.

6.6. Trans-BC-Boundary Effects

There are no trans-BC-boundary effects anticipated.

7. Engagement and Consultation

Vopak is committed to engaging with potentially affected Aboriginal groups, government agencies, and local community stakeholders throughout the Project lifecycle. Vopak aims to develop long-term relationships with the communities in which it operates.

7.1. First Nations Engagement

Vopak will engage with First Nation groups as directed by federal and provincial authorities in order to inform them of the Project and understand their concerns and to seek ways to avoid or minimize any adverse effects on Aboriginal interests.

Vopak will engage with the following six First Nations as the Project and associated activities fall within, or near, their traditional territories:

- Lax Kw'alaams;
- Metlakatla;
- Kitselas;
- Kitsumkalum;
- Gitxaala; and
- Gitga'at.

7.1.1. *Engagement Activities to Date*

Vopak has initiated consultations with all the above-mentioned First Nations respecting the proposed Project. A brief summary of consultation activities completed to date is provided in the table below. Issues raised as part of the early consultation activities will be addressed as part of the formal environmental assessment process.

Table 7: First Nations consultation activities to date

First Nation	High Level Summary of Engagement	Issues Raised
Lax Kw'alaams First Nation	• Introductory meeting with the Mayor; • Provided content from environmental desktop study that summarizes existing environmental conditions requesting comments; • Provided preliminary Project Description Summary as well as project area map; • Meeting with Director of Lands and Natural Resources in conjunction with PRPA to discuss the Section 67 engagement process and receive feedback; • Provided draft Project Description for comments	• Cumulative effects of different projects on Ridley Island • Employment opportunities • Concerns with Section 67 process

Table 7 (Cont'd): First Nations consultation activities to date

First Nation	High Level Summary of Engagement	Issues Raised
Metlakatla First Nation	• Introductory meeting with the Chief and Council; • Provided content from environmental desktop study that summarizes existing environmental conditions requesting comments; • Provided preliminary Project Description Summary as well as project area map; • Meeting with Environmental Assessment Manager in conjunction with PRPA to discuss the Section 67 engagement process and receive feedback; • Provided draft Project Description for comments.	• Cumulative effects of the project • Concerns related to Disposal at Sea • Potential for marine sediment contamination • Accidents and malfunctions from rail • Impacts of lighting on wildlife • Impacts of the project on bats • Socio-economic effects, including those related to the work camp and human well-being • Impacts to visual and air quality • Impacts on marine mammals, including sea otters • Impacts to archaeology • Employment opportunities • Concerns with the Section 67 process
Kitselas First Nation	• Introductory meeting with Director of Land & Resources and other senior staff; • Provided content from environmental desktop study that summarizes existing environmental conditions requesting comments; • Provided preliminary Project Description Summary as well as project area map; • Meeting in conjunction with PRPA to discuss the Section 67 engagement process and receive feedback; • Provided draft Project Description for comments.	• Cumulative effects of increased rail traffic and shipping • Employment and training opportunities • Cumulative effects of different projects on Ridley Island • Impacts of light and noise on wildlife • Concerns with Section 67 EEE process • Concerns with BC EAO involvement being undefined
Gitxaala Nation	• Introductory meeting with the Chief; • Provided content from environmental desktop study that summarizes existing environmental conditions requesting comments; • Provided preliminary Project Description Summary as well as project area map; • In conjunction with PRPA, requested feedback on Section 67 engagement process; • Provided draft Project Description for comments.	• General concerns with the project in the area. • Effects of the project on air quality • Shipping and rail traffic increases • Transportation of dangerous goods via rail • Socio-economic effects, including effects of temporary workforce on community health • Employment opportunities • Cumulative effects of the project • Concerns with the Section 67 process

Table 7 (Cont'd): First Nations consultation activities to date

First Nation	High Level Summary of Engagement	Issues Raised
Kitsumkalum First Nation	• Introductory meeting with the Chief; • Provided content from environmental desktop study that summarizes existing environmental conditions requesting comments; • Provided preliminary Project Description Summary as well as project area map; • In conjunction with PRPA, requested feedback on Section 67 engagement process; • Provided draft Project Description for comments.	• Cumulative effects on air, noise and visual effects • Cumulative effects of increased rail traffic and shipping • Accidents and malfunctions from rail • Cumulative effects of different projects on Ridley Island • Concerns regarding train derailments • Air quality impacts • Potential for marine sediment contamination (dioxins and furans) • Employment opportunities • Socio-economic impacts of work camps • Concerns with the Section 67 EEE process
Gitga'at First Nation	• Introductory meeting with Environmental Assessment Coordinator, CEO of Gitga'at Economic Development and Director of Lands and Oceans Department; • Provided content from environmental desktop study that summarizes existing environmental conditions requesting comments; • Provided preliminary Project Description Summary as well as project area map; • In conjunction with PRPA, requested feedback on Section 67 engagement process; • Provided draft Project Description for comments.	• Cumulative effects • Rail traffic and marine shipping increases • Concerns regarding product types • Employment opportunities • Concerns with the development of projects within PRPA • Concerns with the Section 67 EEE process

7.1.2. *Proposed Consultation*

As part of the Section 67 EEE process, First Nations will have opportunities to comment on the project at different stages of the process, including but not limited to the Project Description and the EED. Project consultation activities will be updated subject to discussions with the BC EAO.

Written comments provided by First Nations will be tabled, tracked and shared as part of the EED, unless specifically requested to be treated in confidence and used to inform the development of the Project's environmental effects evaluation.

7.2. Public Engagement

Vopak will engage with local residents and stakeholders and provide opportunities for them to participate in the review of the proposed Project as explained below.

7.2.1. *Engagement Activities to Date*

Vopak has initiated engagement activities with the following local stakeholders:

Table 8: Local stakeholder activities to date

Stakeholder Group	High Level Summary of Engagement	Issues Raised
City of Prince Rupert	Introductory meeting with the Mayor.	N/A
District of Port Edward	Introductory meeting with the Mayor, District Councillors and Chief Administrative Officer.	• Quality of living in the community • Noise • Lighting • Pollution • Increased railway traffic
North Coast Regional District	Introductory meeting with Chief Administrative Officer.	• Increased vessel traffic • Impacts to marine environment
Prince Rupert Chamber of Commerce	Introductory meeting with Manager of Communications.	N/A
Community Futures Pacific Northwest	Introductory meeting with General Manager.	• Economic opportunities for the local communities

Vopak has initiated engagement activities with the following government agencies:

Government Agency	High Level Summary of Engagement
Prince Rupert Port Authority	• Introductory meeting with PRPA; • Joint meeting with federal authorities to introduce the project, discuss the Section 67 process and other permitting; • Provided draft Project Description; • Ongoing discussions regarding a joint environmental assessment with the BC EAO.
Canadian Environmental Assessment Agency	• Introductory discussions with the Agency; • Provided draft Project Description.
Transport Canada	• Joint meeting with federal authorities to introduce the project, discuss the Section 67 process and other permitting.
Environment Canada	• Joint meeting with federal authorities to introduce the project, discuss the Section 67 process and other permitting.
Health Canada	• Joint meeting with federal authorities to introduce the project, discuss the Section 67 process and other permitting.
Department of Fisheries and Oceans	• Provided introductory information to the DFO. • Discussed the DFO permitting process.
BC Environmental Assessment Office	• Introductory discussions ; • Ongoing discussions regarding a joint environmental assessment with the BC EAO.

7.2.2. *Proposed Future Engagement*

Vopak encourages members of the public who have concerns or questions regarding the Project to attend open houses and/or submit comments directly to Vopak via the project email address: vopakpacificcanada@vopak.com. Vopak will also include information regarding the construction and operation (such as key contact details) of the Project on the Project website.

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