



Section 3.1: Introduction

TERMPOL Surveys and Studies

ENBRIDGE NORTHERN GATEWAY PROJECT

FINAL - REV. 0

**Prepared for:
Northern Gateway Pipelines Inc.**

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1 Introduction

Northern Gateway Pipelines Partnership (Northern Gateway) proposes to construct and operate:

- an oil export pipeline and associated facilities
- a condensate import pipeline and associated facilities
- a tank terminal and marine terminal (referred to as the Kitimat Terminal) near Kitimat, British Columbia

These project components and activities are collectively referred to as the Enbridge Northern Gateway Project (the Project). The Project will transport oil from Alberta near Bruderheim to a terminal on the coast of British Columbia near Kitimat for shipping to world markets. The terminal would also be the site for the import of condensate. The marine terminal comprises two oil berths and a utility berth and will accommodate the transfer of oil into, and condensate out of, tankers.

This section provides an overall introduction to the Project and contains general project information.

1.1 Project Overview

In 1998, Enbridge Inc. began an analysis of the need for, and feasibility of, a pipeline to meet the long-term needs of Western Canadian Sedimentary Basin (WCSB) production and new oil sands production and provide Canadian producers with access to alternative markets. The analysis considered a pipeline originating in Alberta and terminating at a marine terminal on the west coast of Canada, to open up access to markets in the western United States and the Asia-Pacific Rim countries. The analysis also included a high-level comparison of potential pipeline route and marine terminal alternatives. In 2002, the need for a new oil export pipeline was confirmed, and within two years, the Project was formally launched.

Since then, Enbridge has furthered project development through additional contacts with potential Canadian and international shippers. Among other things, the commercial need for a pipeline to transport condensate to markets in Alberta was identified. The Project was also developed to address those commercial needs.

The oil pipeline is designed for an average annual throughput capacity of 83,400 m³ (525,000 barrels) per day, and will have an outside diameter of 914 mm (NPS 36). It will be designed to transport conventional light and heavy oil, synthetic oil, bitumen blended with condensate and bitumen blended with synthetic oil. The condensate pipeline is designed with an average annual throughput capacity of 30,700 m³ (193,000 barrels) per day and will have an outside diameter of 508 mm (NPS 20).

Oil sourced from the Alberta oil sands region and other production sources in the WCSB will be delivered to the Kitimat terminal for marine transportation to international overseas markets and western United States markets. Condensate will be imported from a variety of supply areas in the Asia Pacific and Middle East and will be transported to Albertan sources of bitumen and heavy oil production for blending purposes.

1.2 Purpose of the Project

The primary purpose of the Project is to provide access for Canadian crude oil to new markets, comprised of existing and future refiners in the U.S. West Coast and Asia. Providing new pipeline transportation service to tidewater will allow Canada to diversify its market for crude oil, and conversely will allow Pacific Rim refiners to consistently access Canadian crude oil supply and thereby diversify their own sources of supply. Increasing the number of transportation options and markets for Canadian oil supply will lead to higher netbacks for all Canadian producers and encourage innovation within Canada's energy sector. A secondary purpose of the Project is to provide for the construction of a condensate import pipeline to service future diluent requirements.

1.3 Project Benefits

The Project will generate substantial economic benefits at local, regional, provincial and national levels. Local and regional economic benefits will include property taxes, employment opportunities and project-related purchases of goods and services.

The Project will generate revenue by way of property taxes and corporate income taxes will provide employment opportunities as long as it operates and will generate revenue for businesses by way of sale of goods and services.

Estimates of employment (direct, indirect and induced) generated during construction of the Project total about 74,000 jobs. About 54% of the employment will be in British Columbia, 29% will be in Alberta and the remaining 17% will be in the rest of Canada.

Northern Gateway has sought to establish positive relationships with communities and Aboriginal groups along the route. Northern Gateway has developed a number of initiatives designed to build long-term positive relationships with communities and Aboriginal groups. Northern Gateway plan to provide an equity investment option so that Aboriginal communities can benefit directly from the Project; and to develop agreements for short-term opportunities that allow Aboriginal communities to:

- develop programs to provide both medium and long-term opportunities such as employment, training, business procurement and environmental protection for Aboriginal communities
- continue Enbridge's partnerships with and support of organizations that contribute to the economic and social development of communities where people live and work

1.4 Northern Gateway Pipelines Limited Partnership

Northern Gateway Pipelines Limited Partnership (the Partnership) was formed under Alberta law to design, develop, construct, own and operate the Project. The Partnership includes Enbridge Inc., as limited partner, and Northern Gateway Pipelines Inc., as general partner. The Partnership is offering an equity position to Aboriginal groups and so may eventually include such organizations.

Enbridge Inc. (Enbridge) operates, in Canada and the United States, the world's longest crude oil and liquids pipeline system. Enbridge is also Canada's largest gas distribution company.

Enbridge has unique and extensive experience in developing, managing and optimizing both liquids and natural gas pipelines and has developed industry leading technology in pipeline development and operations, including:

- project design, construction and operation
- hydrocarbon transportation
- commodity batching
- tankage
- pipeline maintenance
- supervisory control and data acquisition system (SCADA)
- leak detection and pipeline integrity management

Enbridge takes pride in its long-standing reputation as a socially responsible corporation and is committed to designing, constructing and operating the Project to meet strict environmental and safety regulatory requirements and applicable best practices.

1.5 Marine Terminal Alternatives

Northern Gateway initially considered alternative locations for the marine terminal in Alaska (i.e., Bradfield Canal), Washington (i.e., Ferndale and Anacortes) and areas in British Columbia, including Stewart, Alice Arm, the Mylor Peninsula, Port Simpson, Prince Rupert, Kitimat, Bella Coola, Squamish, and Vancouver (Burrard Inlet, Roberts Bank and Fraser Port).

1.5.1 Considerations in Marine Terminal Siting

Important considerations in the siting of the Kitimat terminal included, but were not limited to:

- the need for year round ice free access
- sufficient access channel width and water depth and a suitable turning basin to permit safe transit by large tankers
- a ship berth area sheltered from the effects of open water wave conditions
- feasibility of pipeline access to the terminal
- an area accessible from the existing road system without major road construction
- ease of access to and development of marine infrastructure
- the need to minimize environmental effects
- availability of suitable land to locate both the tank and marine components of a terminal
- availability of nearby existing onshore and marine infrastructure

1.5.2 Comparison of Marine Terminal Alternatives

During the 1970s, a working group was established by the Department of Fisheries and Oceans and Environment Canada to compare the relative vulnerability of 11 potential west coast ports due to accidental oil releases. Ports were compared based on navigational, biological, economic and social risk. The ports that were compared were Port Simpson, Ridley Island (Prince Rupert), Kitimat, Bella Coola, Britannia Beach (Squamish), Port Moody, Roberts Bank, Esquimalt, Cherry Point (Ferndale), Burrows Bay and Port Angeles. The working group concluded that the ports with the lowest relative risks were Port Simpson, Ridley Island (Prince Rupert), Kitimat and Port Angeles.

Of the four ports that were ranked as having the lowest relative risks, Northern Gateway eliminated Port Simpson and Port Angeles from further consideration based on its criteria noted in Section 1.5.1. Prince Rupert and Kitimat were further evaluated, and a decision was made which resulted in the selection of the Port of Kitimat as the preferred location for the marine terminal.

2 Project Description

The Project includes the construction, operation and decommissioning of two pipelines, associated facilities and the Kitimat Terminal. An overview of these project components is provided below.

2.1 Pipelines

The pipeline corridor is one-km wide and approximately 1,172 km long as shown in Figure 2-1. The major components of the pipeline portion of the Project include:

- an oil export pipeline, 914 mm OD (NPS 36), designed for an average annual throughput capacity of 83,400 m³ (525,000 barrels) per day
- a condensate import pipeline, 508 mm OD (NPS 20), designed for an average annual throughput capacity of 30,700 m³ (193,000 barrels) per day

The delineation of the pipeline right-of-way (RoW) will be based on detailed design, further site-specific constraint mapping, further site-specific field investigations, and information received from the public, Aboriginal groups, landowners, other interested parties, and government agencies. The pipelines will be in a common permanent 25 m wide RoW, extending from Bruderheim near Edmonton to the Kitimat Terminal. Kitimat Terminal.



Figure 2-1 Pipeline Route

2.2 Tank Terminal

The tank terminal will occupy approximately 220 ha as shown in Figure 2-2 and will include 14 hydrocarbon tanks (11 oil and 3 condensate), each with a capacity of 78,800 m³ (496,000 barrels). A security fence will be built around the land portion of the tank terminal. The 220 ha includes a 60 m wide firebreak area, which will be cleared around the outside perimeter of the terminal. A site adjacent to the tanks and within the tank terminal security fence will also be developed for two future additional tanks for product segregation purposes. The main components of the tank terminal include:

- the oil transfer system, including oil receiving station, tanks, oil loading system, custody transfer metering, recovered oil drain tank
- the condensate transfer system, including condensate initiating pump station, tanks, condensate unloading system, custody transfer metering, booster pumps
- ancillary systems, including electrical supply and distribution, fire protection, product secondary containment, waste water treatment including containment reservoir and coalescing separator, corrosion control, potable water and utility air
- buildings
- control centre
- civil infrastructure including roads and fences

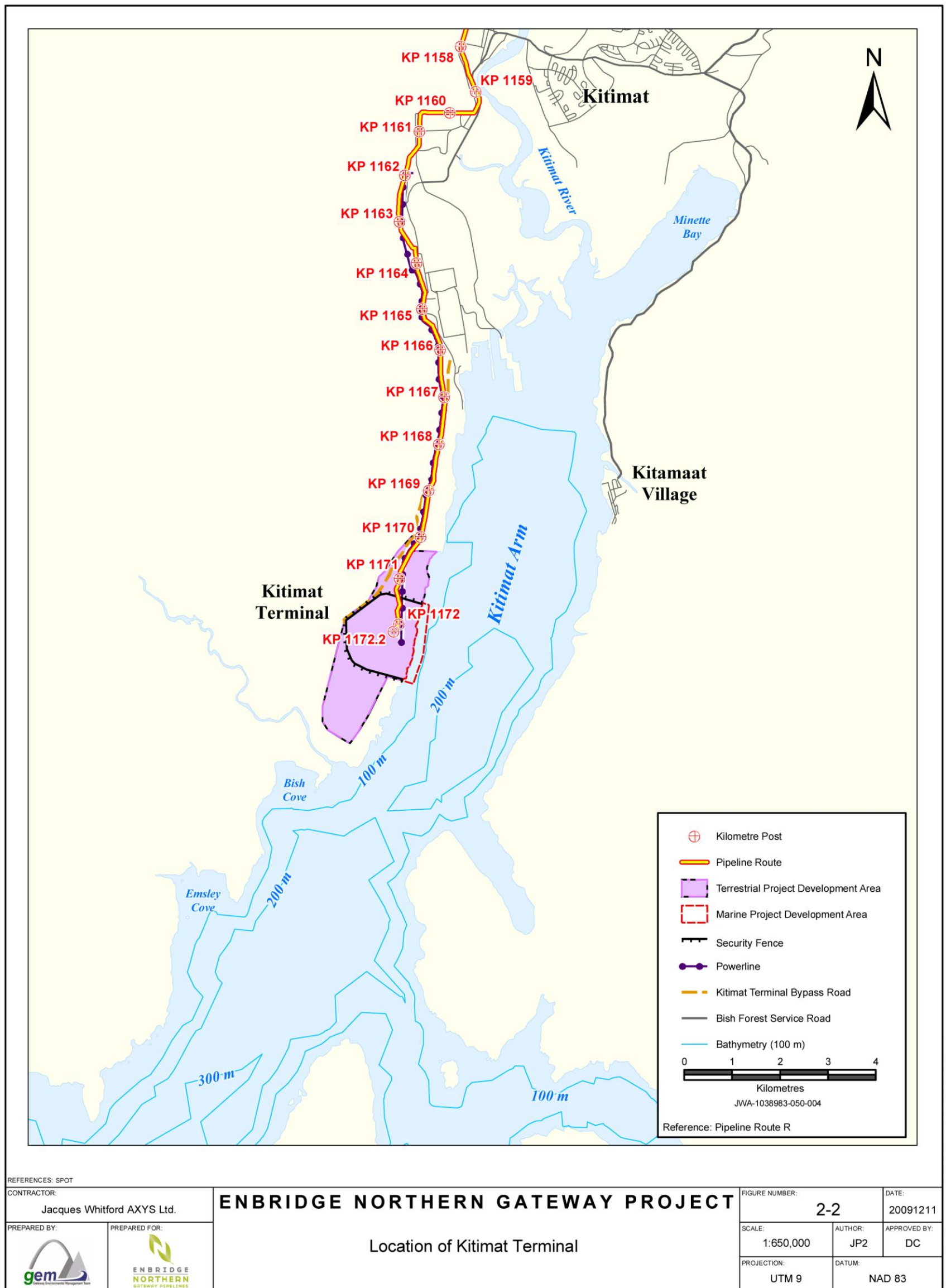


Figure 2-2 Location of Kitimat Tank Terminal

2.3 Marine Terminal

The marine terminal comprises the marine-based infrastructure within the Kitimat Terminal and extends from the upper edge of the marine riparian area seaward. It includes a 150 m marine safety zone seaward from the berthing structures (a 100-m water lot is included within the safety zone). The marine terminal will consist of two tanker berths and one utility berth. Both tanker berths will be equipped for loading oil tankers and unloading condensate tankers. A very large crude carrier (VLCC) and a Suezmax condensate tanker berthed at the marine terminal are shown in Figure 2-3.

The main components of each tanker berth include:

- loading platform with connecting trestles and the piping, loading arms and associated facilities portion of the oil and condensate transfer systems
- berthing structures
- mooring structures

Terminal construction will also include:

- a utility berth for berthing tugs and mooring/boom boats

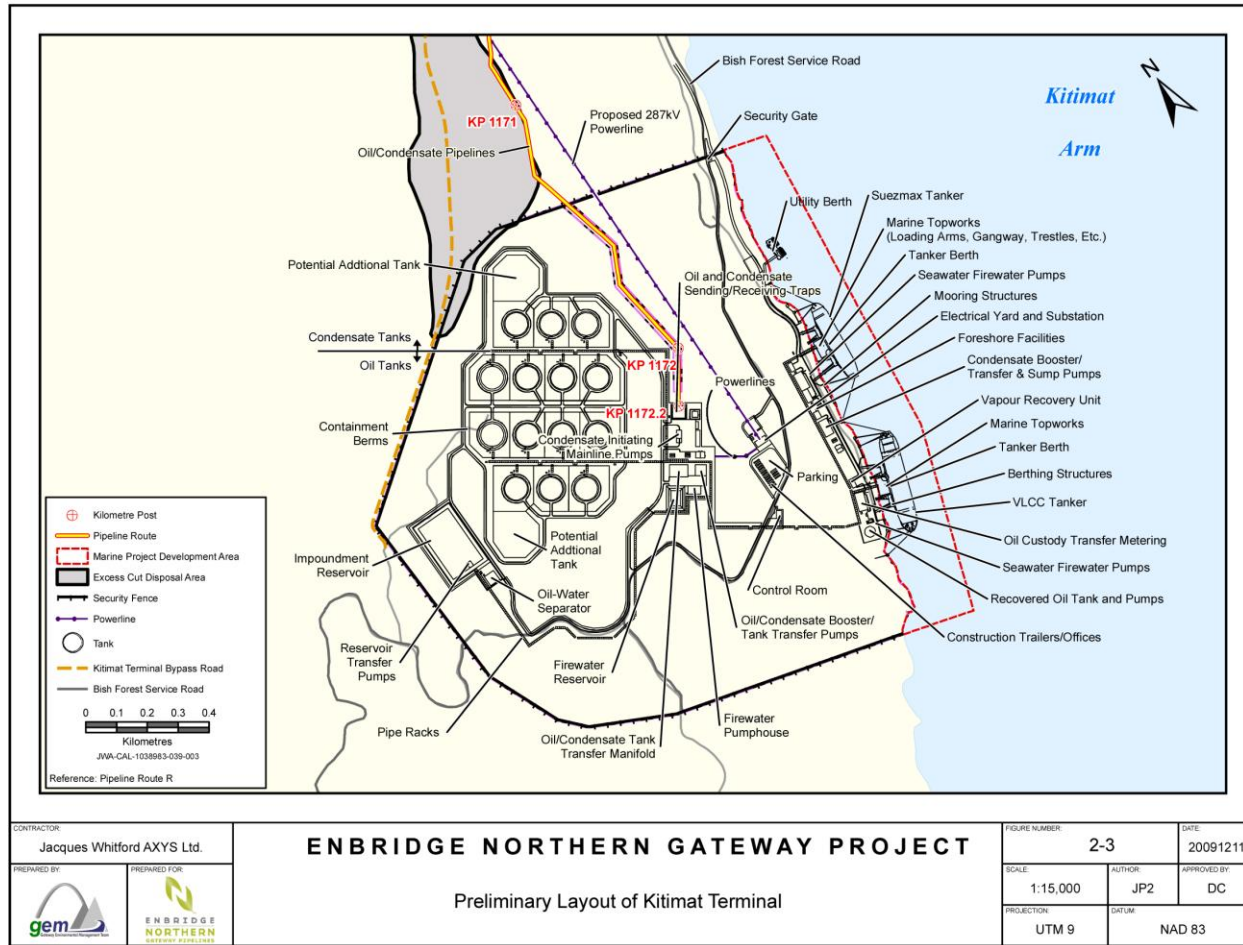


Figure 2-3 Preliminary Layout of Kitimat Terminal

2.4 Marine Transportation

Marine transportation includes the routine operations of oil and condensate tankers that will be chartered by other interests. Compliance with Northern Gateway's vessel vetting and operational protocols including the use of escort tugs will be mandatory for any ships nominated to call at the Kitimat Terminal.

2.4.1 Oil and Condensate Tankers

During operations, a total of between 190 and 250 oil and condensate tankers will call on the Kitimat terminal each year. This will likely consist of 40 to 60 very large crude carriers (VLCCs), 110 to 130 Suezmax tankers and 40 to 60 Aframax tankers. The average cargo capacity of these vessels ranges from 110,000 m³ for an Aframax tanker to 330,000 m³ for a VLCC. All vessels will be double hulled.

Vessels arriving from or departing to Asian ports will navigate the northern approach route through Dixon Entrance, through the northern portion of Hecate Strait, then by way of Browning Entrance, Principe Channel, Nepean Sound, Otter Channel, Squally Channel, Lewis passage, Wright Sound and Douglas Channel to the Kitimat Terminal.

Vessels arriving from or departing to west coast ports south of Kitimat will either 1) transit Queen Charlotte Sound and north through Hecate Strait, before continuing through Browning Entrance and following the route to the Kitimat Terminal outlined above (southern approach via Principe Channel) or 2) transit Queen Charlotte Sound, and the southern portion of Hecate Strait, then by way of Caamaño Sound, Campania Sound, Squally Channel, Lewis Passage, Wright Sound and Douglas Channel (southern approach direct). Local pilots will board and assist all incoming and outgoing vessels.

2.4.2 Support Vessels for the Marine Terminal Operations

Full Mission Bridge Simulations have shown that tankers of the largest design size are capable of navigating the entire route un-assisted. In order to mitigate risk, all laden tankers will have a tethered escort tug throughout the Confined Channel sections (from Browning Entrance or Caamaño Sound to the Kitimat Terminal). The tug will be tethered to the stern of the laden tanker at all times ready to assist with steering or "braking". In addition a close escort tug will attend all laden tankers between the Triple Island pilot station and Browning Entrance.

Inbound and outbound tankers in ballast will have a close escort tug between the Pilot boarding stations at Triple Island, Browning Entrance and Caamaño Sound and the berths at Kitimat Terminal. The close escort tug will normally be positioned approximately 500 meters astern of the ship, or as directed by the master or pilot during the transit.

Harbour tugs and line-handling boats will support berthing and unberthing operations at the marine terminal and will be berthed at the utility berth when on standby. The line-handling boats will be used for deployment of ship moorings and oil spill booms. When not in active use, the tugs will return to a base for maintenance and refuelling in Kitimat. The line-handling boats will be permanently stationed at the utility berth.

2.5 Project Schedule

Construction of the pipelines and associated facilities will be scheduled to provide a safe and efficient work progression, while minimizing adverse environmental and socio-economic effects. Construction schedules have been developed to facilitate coordination of all activities for each construction spread; however, to minimize environmental effects, some work at watercourse crossings and other areas may be out of sequence with the construction schedule.

Key project milestones estimated at the time of filing are set out in Table 2-1.

Table 2-1 Project Milestones

Item	Project Milestone	Start Date	Completion Date
1	NEB Application Submission	–	Q1, 2010
2	Detailed Engineering	Q1, 2011	Q1, 2015
3	Joint Review Panel Hearing	Q1, 2011	Q2, 2011
4	GIC Approval		Q2, 2012
5	Commercial Sanction	Q2, 2012	Q3, 2012
6	Procurement of Major Material and Equipment	Q2, 2013	Q3, 2016
7	Kitimat Terminal Construction	Q2, 2013	Q3, 2017 ^a
8	Tunnel Construction	Q2, 2013	Q4, 2016
9	Oil and Condensate Pipeline Construction	Q4, 2013	Q4, 2016
10	Pump Station Construction	Q4, 2014	Q4, 2016
11	Leave-to-Open and Commissioning	Q3, 2016	Q4, 2016
12	Project In-service		Q4, 2016 ^b
Notes:	^a Post in-service tank construction will be complete in Q3, 2017. ^b Q4, 2016 is the earliest in-service date. In-service date will depend on various factors, including timing of detailed engineering, the regulatory decision, timing of commercial sanction for the Project and construction progress.		

3 TERMPOL Submission

In accordance with Transport Canada's TERMPOL Review Process 2001 (TP743E), Northern Gateway has prepared and is submitting the following surveys and studies for consideration by the TERMPOL Review Committee (TRC):

- 3.1 INTRODUCTION
- 3.2 ORIGIN, DESTINATION AND MARINE TRAFFIC VOLUME SURVEY
- 3.3 FISHERY RESOURCES SURVEY
- 3.4 OFFSHORE EXERCISE AND OFFSHORE EXPLORATION AND EXPLOITATION ACTIVITIES SURVEY
- 3.5 ROUTE ANALYSIS, APPROACH CHARACTERISTICS AND NAVIGABILITY SURVEY
- 3.6 SPECIAL UNDERKEEL CLEARANCE SURVEY
- 3.7 TRANSIT TIME AND DELAY SURVEY
- 3.8 CASUALTY DATA SURVEY (To be submitted during the first quarter of 2010)
- 3.9 SHIP SPECIFICATIONS
- 3.10 SITE PLANS AND TECHNICAL DATA
- 3.11 CARGO TRANSFER AND TRANSSHIPMENT SYSTEMS
- 3.12 CHANNEL, MANEUVERING AND ANCHORAGE ELEMENTS (Combined with Section 3.5)
- 3.13 BERTH PROCEDURES AND PROVISIONS
- 3.14 SINGLE POINT MOORING PROVISIONS AND PROCEDURES
- 3.15 GENERAL RISK ANALYSIS AND INTENDED METHODS OF REDUCING RISKS (To be submitted during the first quarter of 2010)
- 3.18 CONTINGENCY PLANNING
- 3.19 OIL HANDLING FACILITIES REQUIREMENTS

Reports which are excluded from this submission are:

- 3.16 PORT INFORMATION BOOK
- 3.17 TERMINAL OPERATIONS MANUAL
- 3.20 HAZARDOUS AND NOXIOUS LIQUID SUBSTANCES

Reports 3.16 and 3.17 will be completed upon receipt of project approval and in accordance with TERMPOL recommendations, will be submitted to the TRC prior to completion of terminal construction. Report 3.20 relates primarily to the transportation of liquid chemical products and is not applicable to this project.

3.1 Volume 2

Volume 2 of the submission contains the following supporting documents:

1. 3Si Risk Strategies Incorporated. Enbridge – Northern Gateway Kitimat Terminal, Marine Facility Security Overview. Nov 2009.
2. FORCE Technology. Manoeuvring Study of Escorted Tankers to and from Kitimat Terminal. Jan 2010.
3. Moffatt & Nichol. Enbridge Gateway Marine Terminal - Vessel Wake Study. Jan 2010.
4. WorleyParsons Westmar. Enbridge Northern Gateway Project – Assessment of Level of Service Requirement for the BC North Cost VTS System. January 2010. **(To be submitted in the first quarter of 2010)**
5. ASL Environmental Sciences. 2009. Marine Physical Environment Technical Data Report. Prepared for Enbridge Northern Gateway Pipelines Limited Partnership. Calgary, AB.
6. ASL Environmental Sciences. 2010. Weather and Oceanographic Conductions in the Open Water Area. Technical Data Report. Prepared for Enbridge Northern Gateway Pipelines Limited Partnership. Calgary, AB.
7. Hayco (Hay and Company Consultants). 2009. Wind observations in Douglas Channel, Squally Channel and Camano Sound. Technical Data Report. Prepared for Enbridge Northern Gateway Pipelines Limited Partnership. Calgary, AB.
8. Polaris Applied Sciences Inc. 2009. Coastal Operations and Sensitivity Mapping for the Confined Channel Assessment Area. Technical Data Report. Prepared for Northern Gateway Pipelines Inc. Calgary, AB. **(To be submitted in the first quarter of 2010)**
9. Polaris Applied Sciences Inc. 2009. Coastal Operations and Sensitivity Mapping for the Open Water Area. Technical Data Report. Prepared for Northern Gateway Pipelines Inc. Calgary, AB. **(To be submitted in the first quarter of 2010)**
10. SL Ross. 2009. Properties and Fate of Hydrocarbons from Hypothetical Spills in the Confined Channel Assessment Area and at the Marine. Terminal Technical Data Report. Prepared for Enbridge Northern Gateway Pipelines Limited Partnership. Calgary, AB.
11. SL Ross. 2010. Properties and Fate of Hydrocarbons from Hypothetical Spills in the Open Water Area. Technical Data Report. Prepared for Enbridge Northern Gateway Pipelines Limited Partnership. Calgary, AB.

Enbridge Northern Gateway recognizes that the Queen Charlotte Islands have been renamed Haida Gwaii. This change has been reflected in the text of the TERMPOL submission. However, as the change is very recent, the publicly available maps and navigation charts that have been used in the TERMPOL submission have not yet been revised.